

# AGRIBALKAN 2021

## III. BALKAN AGRICULTURAL CONGRESS



**29 AUGUST – 01 SEPTEMBER 2021,  
EDIRNE, TURKEY**

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**29 AUGUST – 01 SEPTEMBER 2021,  
EDIRNE, TURKEY**



**In Trakya University Balkan Congress Center, Edirne, Turkey**

**Organized by Trakya University**

**with**

**Trakya Universities' Union, Balkan Universities' Union, Namık Kemal University, Onsekizmart University - Turkey, Uludag University, Turkey, Agriculture University of Plovdiv, Trakia University-Stara Zagora - Bulgaria, Democritus University of Thrace – Greece and with contribution of other Balkan Institutions...**



Dear Colleagues,

You are welcome to our congress will be organized by Trakya University supporting with Trakya Universities Union, Balkan Universities Association and together with other Balkan Universities and Institutions.

The aim of our international congress is to present the newest research results and research goals, analyze current conditions and perspectives in agriculture.

Conference activities;

Plenary sessions with oral and poster presentations are on 29 August – 01 September 2021.

You are welcome to our congress and Edirne,  
TURKEY,

Yours sincerely,

Prof. Dr. Erhan TABAKOĞLU

Rector of Trakya University  
Honorary Chair of Congress

Prof Dr Yalcin KAYA

Head of Organizing Committee

# FOREWORD

Agriculture is so important sector feeding all humankind, but it needs new developments and technologies to supply enough food for increasing world population year by year. Turkey is one leading agricultural economy in the world. Balkan region is one the important agricultural areas of the world having rich soils producing different crops vastly and keeping enormous biodiversity for our future.

As there have been many different scientific meetings around the world, we intended to bring three communities together, namely science, research and private investment, in a friendly environment of Edirne / Turkey to share what they have and get benefit from each other. Trakya University intended to aim that agricultural community in Balkan areas should come together in that important event. Our congress goal is the agricultural subjects should be kept broad in order to provide opportunity to the science community to present their work that can be off value for agriculture.

First Balkan Congress was organized by Trakya University in 2014 as the biggest agricultural congress in Turkey and Balkan region. In the first congress, over 700 participants were presented total 830 papers (650 poster and 180 oral presentations) and invited speakers presented country reports from all Balkan countries. 2<sup>nd</sup> Balkan Agriculture Congress was organized by Tekirdağ Namık Kemal University in 2017.

As third one, Trakya University hosted again in Edirne, Turkey in 2021. We would like to thank all participants for great interest to our AGRIBALKAN 2021 congress even in Covid 19 pandemy. There is a worldwide participation from 41 countries with 406 papers contributed by 988 authors. Our AGRIBALKAN Congress will be organized with 288 oral, 118 e-poster presentations.

We hope that this congress will help to solve our problems with establishing good network collaborations, joint projects and better relationships among countries with sharing our knowledge and experiences together. We wish success for this meeting and hope a great scientific achievement with your contributions.

Edirne is very nice, lovely and historical city at just the edge of Europe, but just right at the heart of Balkan region and history endowed with monuments reminding imperial past. We are much pleased to host you all in Edirne and in Turkey.

We would like to thank you to join this congress and we would like to give also special thanks our sponsors and collaborators for giving us big supports to organize this event.

We wish you nice stay in Edirne for truly rewarding days.

Prof. Dr. Erhan TABAKOGLU  
Rector of Trakya University  
Honorary Chair of Congress

Prof Dr Yalcin KAYA  
Director of TU Plant Breed. Res. Center  
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## CONTENTS

<b>NEGATIVE EFFECTS OF GLOBAL WARMING AND CLIMATE CHANGE ON PLANT HEALTH.....</b>	<b>29</b>
<b>THE IMPACT OF INTERNATIONAL TRADE ON FOOD SECURITY DURING THE PANDEMIC TIME COVID 19 IN KOSOVO .....</b>	<b>31</b>
<b>DEVELOPING LEGUME FORAGE CROPS-BASED AGROECOSYSTEM .....</b>	<b>32</b>
<b>DEFINING THE IDEAL GENOTYPE COMPONENT OF A MODERN CROP VARIETY ...</b>	<b>33</b>
<b>NEW APPROACH IN SUNFLOWER BREEDING, COMING FROM THE SEED MARKET REQUEST.....</b>	<b>34</b>
<b>THE DEVELOPMENT OF AQUACULTURE PRODUCTION AND SOME ARGUMENTS IN FISH GENETICS AND BIOTECHNOLOGY STUDIES IN ALBANIA .....</b>	<b>35</b>
<b>EVALUATING COMMERCIAL BERRY JAMS FOR THE PRESENCE OF .....</b>	<b>36</b>
<b>POLYPHENOLS IN SAMSUN AREA .....</b>	<b>36</b>
<b>BIOACTIVITY OF ESSENTIAL OILS FROM <i>LAURUS NOBILIS</i> BY THE EVALUATION OF THE ACARICIDAL EFFECT ON VARROASIS.....</b>	<b>37</b>
<b>THE AMELIORATIVE EFFECTS OF ROSMARINUS OFFICINALIS AGAINST ALUMINIUM NEUROTOXICITY IN YOUNG RATS BRAIN: HISTOLOGICAL AND BIOCHIMICAL STUDIES .....</b>	<b>38</b>
<b>SURVEY ON FEMALE CAMEL REPRODUCTIVE TRAITS AMONG PASTORAL HERDS AT THE SOUTH EASTERN OF ALGERIA .....</b>	<b>39</b>
<b>CONTRIBUTION TO THE STUDY OF ANTIMICROBIAL RESISTANCE PROFILES OF <i>E. COLI</i> IN POULTRY IN ALGERIA .....</b>	<b>40</b>
<b>RETROSPECTIVE STUDY OF THE EPIDEMIOLOGICAL SITUATION OF ANIMAL BRUCELLOSIS IN THE WILAYA OF BÉJAIA.....</b>	<b>41</b>
<b>OVERVIEW OF THE IMPACT OF COCCIDIOSIS ON SOME PARAMETERS IN A DOMESTIC QUAIL FARM <i>COTURNIX JAPONICA</i> (AVES, PHASIANIDAE) IN ALGERIA .....</b>	<b>42</b>
<b>EFFECT OF THE AGE OF BREEDING FEMALES ON THE EGG BIOMETRY OF THE PARTRIDGE <i>GAMBRA ALECTORIS BARBARA</i> (PHASIANIDAE, AVES) IN ALGERIA .</b>	<b>43</b>
<b>THE EFFECTS OF THYM OIL (THYMOL) ON HONEY BEE COLONIES AND EVALUATION OF THE EFFICACY ON THE PARASITE OF THE VARROA DESTRUCTOR BEE .....</b>	<b>44</b>
<b>MASTITIS DIAGNOSIS IN ALGERIAN DAIRY CATTLE FARMS .....</b>	<b>45</b>
<b>TREND ANALYSIS FOR THE GLOBAL FISHERY AND AQUACULTURE PRODUCTION OF THE GROOVED CARPET SHELL <i>RUDITAPES DECUSSATUS</i> (LINNAEUS, 1758) (MOLLUSCA: BIVALVIA).....</b>	<b>46</b>
<b>STUDY OF THE INTESTINAL PARASITES OF THE CUFF SHEEP <i>AMMOTRAGUS LERVIA</i> AT THE LEVEL OF THE DJELFA HUNTING RESERVE.....</b>	<b>47</b>
<b>DETERMINATION OF NOSEMA SPORES IN THE BEE CAKES.....</b>	<b>48</b>

<b>THE INFLUENCE OF THE COMPOUND FEED SUPPLEMENTATION WITH FISHMEAL ON RAISING PERFORMANCE DURING THE 1-42 DAYS OF BROWN JUMBO QUAILS .</b>	<b>49</b>
<b>FISH LICE AFFECTING AQUARIUM FISHES .....</b>	<b>50</b>
<b>THE PREVALENCE OF NOSEMOSIS IN HONEY BEE COLONIES IN SOME REGIONS OF CENTRAL ALGERIA .....</b>	<b>51</b>
<b>A RESEARCH ON PRODUCTION AND PROBLEMS IN FEED FACTORIES: THE CASE OF DIYARBAKIR .....</b>	<b>52</b>
<b>MULTIPARASITISM INVOLVING EUSTRONGYLIDES SPP. IN THE WILD FISH POPULATIONS INHABITING THE DANUBE DELTA BIOSPHERE RESERVE .....</b>	<b>53</b>
<b>THE BOLA-DRB3 GENE HSP70.1 GENE: AN OVERVIEW OF ITS MECHANISMS OF ACTION AND ITS RELEVANCE TO LIVESTOCK ANIMALS IN TERMS OF DISEASE RESISTANCE AND THERMOTOLERANS.....</b>	<b>54</b>
<b>DISTRIBUTION OF NOSEMA SP (CAUSES AGENT OF NOSEMOSIS IN HONEY BEES) IN SOME APIARIES IN ALGERIA .....</b>	<b>55</b>
<b>CURRENT POSSIBILITIES OF MICRO MINERAL USE IN LAYING HEN DIETS: A REVIEW .....</b>	<b>56</b>
<b>USE OF VITAMINS IN LAYING HEN DIETS WITH CURRENT APPROACHES: A REVIEW .....</b>	<b>57</b>
<b>THE EFFICACY OF BENTONITE FEED ADDITIVES IN IMPROVING LAYING HENS PERFORMANCE AND EGG QUALITY: A REVIEW.....</b>	<b>58</b>
<b>CURRENT POSSIBILITIES OF MACROMINERAL USE IN LAYING HEN DIETS: A REVIEW .....</b>	<b>59</b>
<b>COMPARISON OF PYROXASULFONE'S BIOREMEDIATION WITH SOME SOIL BACTERIA BASED ON CHEMICAL OXYGEN DEMAND AND ITS EFFECT ON MORTALITY ON DAPHNIA MAGNA.....</b>	<b>60</b>
<b>HORMONAL AND BIOCHEMICAL PARAMETERS ANALYSIS OF THE YELD COWS BLOOD .....</b>	<b>61</b>
<b>THE EFFECTS OF ADDITION OF ORGANIC ACIDS AND SUCROSE TO THE DRINKING WATER OF BROILERS IN THE PRE-SLAUGHTER FEED WITHDRAWAL PERIOD ON PERFORMANCE AND NUMBER OF MICROORGANISMS.....</b>	<b>62</b>
<b>USE OF ORGANICACIDS AS FEED ADDITIVES IN POULTRY FEED.....</b>	<b>63</b>
<b>MORPHOMETRIC CHARACTERISTICS AND BIOCHEMICAL COMPOSITION OF FLAT OYSTER (OSTREA EDULIS, LINNAEUS 1758) IN ÇARDAK LAGOON (ÇANAKKALE STRAIT).....</b>	<b>64</b>
<b>DETERMINATION OF THE CHANGE IN THE PROTEIN AND CELLULOSE CONTENT OF COTTON SEED MEAL FERMENTED WITH RUMEN LIQUID IN DIFFERENT ENVIRONMENTAL CONDITIONS.....</b>	<b>65</b>
<b>RELATIONSHIP BETWEEN REPRODUCTION PERFORMANCES AND COAT CHARACTERISTICS OF MONTBELIARDE COWS DURING HOT SEASON IN ALGERIA .....</b>	<b>66</b>

<b>HISTORICAL DEVELOPMENT OF HORSE BREEDS.....</b>	<b>67</b>
<b>THE IRRIGATION OF TENDER WHEAT (TRITICUM AESTIVUM) BY WASTEWATER FROM SEYBOUSE’S VALLEY IN THE REGION OF GUELMA (NORTH-EAST ALGERIA). .....</b>	<b>68</b>
<b>APPLICATION OF CLIMATE SMART AGRICULTURAL SYSTEMS IN TURKEY .....</b>	<b>69</b>
<b>VERTICAL FARMING APPLICATION IN TURKEY .....</b>	<b>70</b>
<b>COMBINE HARVESTER BEARINGS EVALUATION FOR PREVENTIVE MAINTENANCE PURPOSES .....</b>	<b>71</b>
<b>SECTOREL USE OF WATER AND ECONOMICAL POLITICS OF WATER .....</b>	<b>72</b>
<b>WEB BASED DATA LOGGING SYSTEM DESIGN FOR CONTROLLED ENVIRONMENTS .....</b>	<b>73</b>
<b>INVESTIGATION OF THE SUSTAINABILITY OF SOIL PROPERTIES OF OLIVE ORCHARDS IN DIFFERENT LAND CONDITIONS OF THE SEMIARID MEDITERRANEAN AGROECOSYSTEM.....</b>	<b>74</b>
<b>MONITORING THE NUMBER OF PRINTS OF INJECTION MACHINES WITH WIRELESS CONNECTION.....</b>	<b>75</b>
<b>GENETIC VARIABILITY, ASSOCIATION AND DIVERSITY STUDY AMONG THE SUNFLOWER GENOTYPES AT SEEDLING STAGE BASED ON DIFFERENT MORPHO-PHYSIOLOGICAL PARAMETERS UNDER POLYETHYLENE GLYCOL INDUCED STRESS .....</b>	<b>76</b>
<b>THE PHYSIOLOGICAL TRAITS OF N<sub>2</sub>- FIXING COMMON BEAN IN RESPONSE TO IRON DEFICIENCY .....</b>	<b>77</b>
<b>SALT STRESS EFFECT ON GERMINATION IN FOUR VARIETIES OF WHEAT HARD (TTITICUM DURUM DESF) .....</b>	<b>78</b>
<b>GENETIC DIVERSITY ANALYSIS IN CHICKPEA (CICER ARIETINUM L) GENOTYPES GROWN IN NORTHWESTERN ALGERIA USING MICROSATELLITE MARKERS (SSR).....</b>	<b>79</b>
<b>EFFECTS OF THREE PLANT EXTRACTS ON THE MYCELIA GROWTH INHIBITION OF CLADOSPORIUM HERBERUM, THE FRUIT ROT PATHOGEN OF CARICA PAPAYA (PAW-PAW) .....</b>	<b>80</b>
<b>THE INFLUENCE OF APPLICATION OF ZINC OXIDE (ZNO) NANOPARTICLES ON GROWTH AND YIELD COMPONENTS OF BREAD WHEAT (TRITICUM AESTIVUM L.) .....</b>	<b>81</b>
<b>SEASONAL CARBON EMISSIONS AND SEQUESTRATION IN ORGANIC AGROECOSYSTEMS IN CENTRAL LITHUANIA.....</b>	<b>82</b>
<b>GRAIN MASS YIELD AND PLASTID PIGMENTS CONTENT IN WINTER FORAGE PEA LINES.....</b>	<b>83</b>
<b>RESULTS OF APPLICATION OF DIFFERENT SHADING NETS ON TOMATO QUALITY .....</b>	<b>84</b>
<b>EVALUATION OF SOME ANNUAL RYEGRASS CULTIVARS IN GERMINATION AND EARLY SEEDLING STAGE UNDER DIFFERENT SALINITY LEVELS.....</b>	<b>85</b>

<b>EFFECTS OF DIFFERENT SOWING TIMES ON GRAIN YIELD AND YIELD FEATURES IN MAIZE GROWN UNDER HATAY ECOLOGICAL CONDITIONS .....</b>	<b>86</b>
<b>EFFECT OF SEED PRIMING ON GERMINATION AND SEEDLING GROWTH OF THE CHICKPEA (CICER ARIETINUM) UNDER DROUGHT STRESS.....</b>	<b>87</b>
<b>THE EFFECT OF DIFFERENT SOWING TIME AND PLANT DENSITY APPLICATIONS ON GRAIN YIELD AND COMPONENTS OF GRAIN CORN VARIETIES WITH DIFFERENT MATURATION PERIODS .....</b>	<b>88</b>
<b>EFFECTS OF GENOTYPE BY ENVIRONMENT INTERACTION ON THE YIELD AND QUALITY TRAITS OF POTATO BREEDING LINES IN THE CENTRAL ANATOLIA REGION OF TURKEY .....</b>	<b>89</b>
<b>BREEDING OF SAFFLOWER SUITABLE FOR TEA PRODUCTION.....</b>	<b>90</b>
<b>STUDY OF THE BIODIVERSITY AND THE OF NATURAL PASTURES IN STRANDZHA MOUNTAIN AND OPPORTUNITIES FOR THEIR USE.....</b>	<b>91</b>
<b>COMPARISONS OF HIGH YIELDING GENETICALLY DIVERSE WHEAT LINES IN CROATIA .....</b>	<b>92</b>
<b>EFFECT OF INTERCROPPING WHEAT AND FABA BEAN ON BIOCHEMICAL PARAMETERS AND MINERAL CONTENT OF LEAVES IN MOROCCO .....</b>	<b>93</b>
<b>POTENTIAL EFFECT OF WHEAT AND FABA BEAN INTERCROP ON THE GRAIN YIELD AND COMPETITIVE INTERACTIONS .....</b>	<b>94</b>
<b>EFFECT OF DIFFERENT HARVEST PERIODS AND NITROGEN DOSES ON THE YIELD AND QUALITY PROPERTIES IN SWEET CORN.....</b>	<b>95</b>
<b>EFFECT OF ORGALIFE FERTILIZER ON SOME QUALITY PROPERTIES OF THE SEED AND GROWTH POTENTIAL OF TWO RICE VARIETIES (ORYZA SATIVA L.) CULTIVATED IN NORTH MACEDONIA.....</b>	<b>96</b>
<b>INVESTIGATION OF THE EFFECT OF DIFFERENT HARVEST TIMES ON SOME YIELD CHARACTERISTICS OF TURKISH OREGANO (ORIGANUM ONITES L.) .....</b>	<b>97</b>
<b>MINERAL, CRUDE ASH, AND CRUDE FAT CONTENTS OF SECOND CROP FORAGE PEA AND CEREALS MIXED CROPPING .....</b>	<b>98</b>
<b>ROOTING OF BLACK ELDERBERRY (<i>SAMBUCUS NIGRA L.</i>) BY TREATED OF INDOLE 3-ASETIC ACID.....</b>	<b>99</b>
<b>SOIL CARBON MANAGEMENT AS a PART OF FIELD FERTILITY RESTORATION....</b>	<b>100</b>
<b>REDUCTION IN THE APPLICATION RATES OF MINERAL FERTILIZERS DUE TO INCREASED EFFICIENCY OF THEIR USE .....</b>	<b>101</b>
<b>EFFECTS OF DIFFERENT PRIMING APPLICATIONS ON SEED GERMINATION AND SOME PHYSIOLOGICAL CHANGES OF WHEAT (TRITICUM AESTIVUM L.) SEEDLINGS UNDER OSMOTIC STRESS.....</b>	<b>102</b>
<b>ASSESSMENT OF DROUGHT TOLERANCE OF THREE WINTER COMMON WHEAT CULTIVARS .....</b>	<b>103</b>
<b>REVEALING OF FLOODING TOLERANCE LEVELS OF SOYBEAN GENOTYPES AT THE EARLY SEEDLING STAGE USING MORPHO-PHYSIOLOGICAL CHARACTERS</b>	<b>104</b>

<b>YIELD AND YIELD RELATED TRAITS OF ADVANCED LINES OF WINTER BARLEY</b>	<b>105</b>
<b>A STUDY ON DETERMINATION OF YIELD AND PLANT CHARACTERISTICS OF SOME DRY BEAN (PHASEOLUS VULGARIS L.) GENOTYPES UNDER ÇANKIRI CONDITIONS</b>	<b>106</b>
<b>SEASONAL VARIATION RECORDED IN MYCORRHIZAL FUNGI COLLECTED FROM MAIZE GENOTYPES</b>	<b>107</b>
<b>INFLUENCE OF GROWING CONDITIONS ON GROWTH ACTIVITY IN WINTER BARLEY GENOTYPES</b>	<b>108</b>
<b>MICROPROPAGATION OF HELICHRYSUM ITALICUM</b>	<b>109</b>
<b>CHANGES IN THE RATE OF GROWTH AND ACCUMULATION OF DRY MATTER AND DIFFERENCES IN THE MICROCLIMATE OF WHEAT CROPS WITH A BALANCED MINERAL NUTRITION OF PLANTS</b>	<b>110</b>
<b>VARIATION OF AGRONOMIC TRAITS OF TWO-ROWED GENOTYPES OF WINTER BARLEY</b>	<b>111</b>
<b>BREEDING AND AGRONOMIC STRATEGIES TO IMPROVE ADAPTABILITY AND NUTRITIONAL COMPONENTS OF SWEET POTATO IN SUB-SAHARAN AFRICA</b>	<b>112</b>
<b>DETERMINATION OF YIELD AND SOME PLANT CHARACTERISTICS IN SAFFRON (Crocus sativus L.) IN TEKİRDAĞ CONDITIONS</b>	<b>113</b>
<b>EFFECT OF WATER LIMITATION ON EXPRESSION OF SUNFLOWER FATTY ACIDS IN DIFFERENT REGIONS OF IRAN</b>	<b>114</b>
<b>GROWTH AND YIELD OF WATERMELON (CITRILLUS LANATUSL) AS INFLUENCED BY PLANTING SPACING AND MULCHING IN LAFIA, NASARAWA STATE, NIGERIA</b>	<b>115</b>
<b>EFFECTS OF SODIUM BI-CARBONATE AND MODIFIED ATMOSPHERE PACKAGING ON THE POSTHARVEST STORAGE QUALITY OF SNAP BEAN PODS</b>	<b>116</b>
<b>DETECTION OF SUNBURN IN WATERMELON AND INVESTIGATION OF ITS INSURABILITY</b>	<b>117</b>
<b>EFFECTS OF AVG AND 1-MCP TREATMENTS ON FRUIT QUALITY AND COLD STORAGE OF APPLE CV. FUJI</b>	<b>118</b>
<b>EFFECT OF HUMIC ACID APPLICATIONS ON TUBER QUALITY IN POTATO (Solanum tuberosum L.)</b>	<b>119</b>
<b>DETERMINATION OF SOME AMPELOGRAPHIC CHARACTERS OF AMERICAN GRAPE CULTIVARS HAVE <i>Vitis labrusca</i> TRAITS INTRODUCED FROM NORTH AMERICA TO TURKEY</b>	<b>120</b>
<b>DETERMINATION OF PHENOLOGICAL STAGES AND THE CHANGE OF YIELD POTENTIAL ACCORDING TO HARVEST IN BLUEBERRIES GROWN OUTDOORS IN POTS AND RAISED BEDS</b>	<b>121</b>
<b>USE OF THIDIAZURON IN TISSUE CULTURE STUDIES IN VEGETABLES</b>	<b>122</b>
<b>EFFECT OF VERMICOMPOST FERTILIZATIONS ON THE YIELD AND YIELD-RELATED COMPONENTS AT THE ADVANCE SELECTION STRAWBERRY LINES</b>	<b>123</b>

<b>INFLUENCE OF TIMING OF HEADING CUTS ON FLOWERING, VEGETATIVE GROWTH, AND FRUIT QUALITY IN SOME SWEET CHERRY CULTIVARS .....</b>	<b>124</b>
<b>CHANGES IN BIOCHEMICAL PROPERTIES AND POSTHARVEST QUALITY OF POMEGRANATES (SILIFKE AŞISI) UNDER MODIFIED ATMOSPHERE PACKAGING</b>	<b>125</b>
<b>EFFECTS OF POSTHARVEST UV-C TREATMENTS ON POSTHARVEST QUALITY OF APRICOT CV. ROXANA DURING COLD STORAGE .....</b>	<b>126</b>
<b>RESEARCH ON SOURCES OF SEEDLESS AND METHODS OF BREEDING SEEDLESS GRAPE CULTIVARS .....</b>	<b>127</b>
<b>ACCESSION DEPENDENT MORPHOLOGICAL AND BIOCHEMICAL DIVERSITY IN APRICOT CV. TEBERZE .....</b>	<b>128</b>
<b>FATTY ACID COMPOSITION AND DIVERSITY OF GRAPE SEEDS .....</b>	<b>129</b>
<b>VILLAGE-LEVEL CHANGE DETECTION AND FUTURE PREDICTION OF OLIVE GROVES IN EZINE, CANAKKALE USING LANDSAT IMAGERIES .....</b>	<b>130</b>
<b>FRUIT SETTING IN ALMOND (PRUNUS DULCIS) .....</b>	<b>131</b>
<b>PRODUCTIVITY OF CHICKPEA (<i>CICER ARIETINUM</i> L.) BY INFLUENCE OF SOME HERBICIDES, HERBICIDE COMBINATIONS AND AN HERBICIDE TANK MIXTURE .</b>	<b>132</b>
<b>STABILITY AND SELECTIVITY OF SOME HERBICIDES AND HERBICIDE TANK MIXTURES ON DURUM WHEAT (TRITICUM DURUM DESF.) .....</b>	<b>133</b>
<b>GERMINATION CHARACTERISTICS OF ARGAN SEEDS .....</b>	<b>134</b>
<b>ALLELOPATHIC POTENTIAL OF ESSENTIAL OILS FROM ALGERIAN CITRUS .....</b>	<b>135</b>
<b>HEPATOPROTECTIVE EFFECT OF AQUEOUS EXTRACT OF PISTACIA ATLANTICA DESF ON RAT’S MERCURY-INDUCED ACUTE HEPATOTOXICITY IN ALGERIA .....</b>	<b>136</b>
<b>TOXIC ACTIVITY OF THE ENTOMOPATHOGENIC FUNGUS M. ANISOPLIAE ON THE HEARTBEAT OF THE DESERT LOCUST SCHISTOCERCA GREGARIA (FORSKÅL, 1775).....</b>	<b>137</b>
<b>INFLUENCE OF SACCHAROTHRIX ALGERIENSIS NRRL B-24137 ON THE EXPRESSION OF VASCULAR WILT OF CHICKPEA .....</b>	<b>138</b>
<b>ETHNOBOTANICAL SURVEY ON THE USE OF INSECTICIDE PLANTS IN ALGERIA</b>	<b>139</b>
<b>ASSESSMENT OF IRRIGATION WATER QUALITY OF THE DAM LAKES LOCATED IN THE NORTH – WEST PART OF MARMARA REGION (TURKEY) .....</b>	<b>140</b>
<b>ASSESSMENT OF ERGENE RIVER BASIN IN TERMS OF IRRIGATION WATER SUPPLY: APPLICATION OF TRACE ELEMENTS BASED INDICES.....</b>	<b>141</b>
<b>ALLEVIATION OF ADVERSE EFFECTS OF SALT STRESS ON STEVIA REBAUDIANA BERTONI BY EXOGENOUS APPLICATION OF SALICYLIC ACID: MORPHOLOGICAL AND PHYSIOLOGICAL TRAITS .....</b>	<b>142</b>
<b>PGP-ACTIVITIES OF NEWLY ISOLATED RHIZOSPHERE STRAINS FOR ANTIFUNGAL BIOCONTROL .....</b>	<b>143</b>
<b>FIRST REPORT OF RHIZOCTONIA ORYZAE-SATIVAE CAUSING AGGREGATE SHEATH SPOT ON RICE IN TURKEY .....</b>	<b>144</b>

<b>DETERMINATION OF PESTS (DIPTERA: TEPHRITIDAE) IN FRUIT GROWING ON TURKISH REPUBLIC OF NORTHERN CYPRUS .....</b>	<b>145</b>
<b>PESTICIDE SELECTIVITY: COMPARATIVE TARGET-SITE ANALYSIS WITHIN ACARI .....</b>	<b>146</b>
<b>SYMPTOMATOLOGY AND PATHOGENICTY OF CACAO POD ROT (CAUSED BY PAHYTOPHTHORA SP) INFECTION IN CACAO (THEOBRAMA CACAO) IN CAGAYAN PROVINCE, PHILIPPINES .....</b>	<b>147</b>
<b>ADULT FLIGHT PERIOD AND HOSTS OF TROPINOTA HIRTA (PODA, 1761) (CETONIIDAE; COLEOPTERA) IN ÇANAKKALE PROVINCE.....</b>	<b>148</b>
<b>AN INNOVATIVE APPROACH IN BIOCONTROLLING WOOD-BORING INSECTS USING, EPN-GEL.....</b>	<b>149</b>
<b>EVALUATION OF PHG-RESISTANCE GENES IN COMMON BEAN CULTIVARS IN TURKEY TO PSEUDOCERCOSPORA GRISEOLA, THE CAUSAL AGENT OF ALS DISEASE.....</b>	<b>150</b>
<b>OCHRATOXIN A IN OIL SEEDS.....</b>	<b>151</b>
<b>NEW POTENT PHYTOPATHOGENIC BACTERIA ON BANANA PLANT: RHIZOBIUM RADIOBACTER.....</b>	<b>152</b>
<b>REACTIONS OF SOME ADVANCE YIELD TRIALS BREAD WHEAT GENOTYPES TO RUSTS AND BUNT .....</b>	<b>153</b>
<b>REACTIONS OF SOME ADVANCE YIELD TRIALS WINTER DURUM WHEAT GENOTYPES TO STEM, LEAF AND YELLOW RUSTS .....</b>	<b>154</b>
<b>EFFECTS OF SOME ESSENTIAL OILS (<i>CITRUS LIMON</i> AND <i>CITRUS SINENSIS</i>) AGAINST <i>APHIS FABAE</i> SCOPOLI (<i>HEMIPTERA: APHIDIDAE</i>) .....</b>	<b>155</b>
<b>THE ENHANCEMENT OF WATER STRESS RESISTANCE IN PALM DATE BY MYCORRHIZAL FUNGI AND PGPR BACTERIA .....</b>	<b>156</b>
<b>MOLECULAR AND MORPHOLOGICAL IDENTIFICATION IN SEVERAL THRIPS (<i>THYSANOPTERA: THIRIPIDAE</i>) SPECIES IN ARTVIN .....</b>	<b>157</b>
<b>EFFECTS OF SOME COMMONLY USED INSECTICIDES ON THRIPS HAWAIIENSIS MORGAN (<i>THYSANOPTERA: THIRIPIDAE</i>) AND RECENT STATUS OF THIS PEST ON LEMONS IN ÇUKUROVA REGION.....</b>	<b>158</b>
<b>FIRST REPORT OF PLUM POX VIRUS ON PRUNUS SERRULATA KANZAN IN TURKEY .....</b>	<b>159</b>
<b>DETERMINATION OF CONTACT AND REPELLENT EFFECT OF SIĞLA (<i>LIQUIDAMBAR ORIENTALIS</i> MILL.) OIL ON PHYTOSEIULUS PERSIMILIS ATHIAS- HENRIOT (<i>ACARI: PHYTOSEIIDAE</i>) .....</b>	<b>160</b>
<b>DETERMINATION OF CONTACT AND REPELLENT EFFECT OF SIĞLA TREE (<i>LIQUIDAMBAR ORIENTALIS</i> MILL.) STORAX ON TETRANYCHUS URTICAE KOCH (<i>ACARI: TETRANYCHIDAE</i>) .....</b>	<b>161</b>
<b>FIRST REPORT OF BARLEY YELLOW DWARF VIRUS-PAS (BYDV-PAS) IN GERANIUM DISSECTUM IN TURKEY.....</b>	<b>162</b>

<b>BANANA BUNCH TOP DISEASE (BBTD) SITUATION IN CAGAYAN, PHILIPPINES .....</b>	<b>163</b>
<b>PROMISING RESULTS OF FIELD TESTS OF 4 NEW ALTERNATIVES FOR COPPER PPP'S REDUCTION/REPLACEMENT IN ORGANIC PRODUCTION OF OIL BEARING ROSES (ROSA DAMASCENA) .....</b>	<b>164</b>
<b>STUDY ON COMMON WINTER WHEAT LINES FOR RESISTANCE TO PUCCINIA TRITICINA .....</b>	<b>165</b>
<b>FIRST BIOLOGICAL AND SEROLOGICAL CHARACTERIZATION OF ZYMV AND ITS INFUCTION OF SQUASH PERCENT IN MID OF IRAQ FOR TWENTY ONE YEARS .....</b>	<b>166</b>
<b>SYNERGISTIC APTNESS OF ENTOMOPATHOGENIC BEAVERIA BASSIANA AND ENHANCED DIATOMACEOUS EARTH (DEBBM) TO MANAGE RICE WEEVIL, SITOPHILUS ORYZAE L. (CURCULIONIDAE: COLEOPTERA) .....</b>	<b>167</b>
<b>PROSPECTS FOR ENGINEERING CEREALS TO FIX ATMOSPHERIC NITROGEN.....</b>	<b>168</b>
<b>COMPARATIVE EFFECT OF NATURALLY SYNTHESIZED BIOSTIMULANTS OF PGPR ON GROWTH OF MAIZE CROP (ZEA MAYS) .....</b>	<b>169</b>
<b>CHARACTERIZATION OF RHIZOBIA FROM ROOT NODULE AND RHIZOSPHERE OF VICIA FABA IN ALGERIA .....</b>	<b>170</b>
<b>HALOPHYTIC PLANTS, AN ALTERNATIVE FOR THE REHABILITATION OF SALINE SOILS TO THE DEVELOPMENT OF AGRICULTURE IN ALGERIA. ....</b>	<b>171</b>
<b>PASSIBLE USE OF HYPERACCUMULATOR OF PLANTS FOR THE REMEDIATION OF CADMIUM-POLLUTED SOILS .....</b>	<b>172</b>
<b>ORGANIC MATTER AS AN EXTERNAL FACTOR IN RESISTANCE TO WATER STRESS IN REINA MORA VARIETY OF BEAN (VICIA FABA L.) .....</b>	<b>173</b>
<b>ASSESSMENT OF MYCORRHIZAL INFECTIOUS POTENTIAL OF RETAMA MONOSPERMA RHIZOSPHERIC SOILS IN MARRAKECH-SAFI REGION OF MOROCCO .....</b>	<b>174</b>
<b>COMPARATIVE EFFECT OF NITROGENOUS FERTILIZERS ON MOBILIZATION AND ABSORPTION OF PHOSPHORUS BY WHEAT IN SALINE-SODIC SOIL .....</b>	<b>175</b>
<b>EVALUATION OF SOILWAT MODEL FOR SOIL PHYSICAL PROPERTIES IN THE DIFFERENT LAND USE.....</b>	<b>176</b>
<b>ISOLATION AND CHARACTERIZATION OF ARBUSCULAR MYCORRHIZAL (AM) FUNGI SPORES FROM DATE PALM RHIZOSPHERE IN AN ARID REGION.....</b>	<b>177</b>
<b>SIGNIFICANCE OF ZINC FERTILIZATION ON NUTRIENT CONTENT AND UPTAKE BY RICE CROP GROWN IN LATERITIC SOIL OF WEST BENGAL, INDIA .....</b>	<b>178</b>
<b>THE EFFECTS OF CORN AND SUNFLOWER STRAW ADDED TO A SOIL WITH HIGH CLAY CONTENT ON WATER HOLDING AND MODULUS OF RUPTURE VALUE OF SOILS .....</b>	<b>179</b>
<b>SAFFRON CULTIVATION IN TURKEY .....</b>	<b>180</b>
<b>THE EFFECT OF POTASSIUM ON SOME PHYSIOLOGICAL PARAMETERS UNDER SALT STRESS.....</b>	<b>181</b>
<b>THYME CULTIVATION IN TURKEY .....</b>	<b>182</b>

<b>EFFECTS OF IRRIGATION WITH WATER FROM DIFFERENT SOURCES ON VARIOUS CHEMICAL PROPERTIES OF THE SOIL.....</b>	<b>183</b>
<b>TOTAL PHENOLICS, FLAVONOIDS CONTENTS AND ANTIOXIDANT PROPERTIES OF DIFFERENT EXTRACTS OF CYMBOPOGON CITRATUS LEAVES FROM ALGERIA ..</b>	<b>184</b>
<b>PHYTOCHEMICAL SCREENING, PHENOLIC CONTENT AND ANTIOXIDANT EFFECTS OF CLEOME ARABICA LEAF CRUDE EXTRACT AND ITS DIFFERENT FRACTIONS</b>	<b>185</b>
<b>PHYTOCHEMICAL ANALYSIS, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF ALGERIAN THYMELAEA HIRSUTA L. CRUDE EXTRACT .....</b>	<b>186</b>
<b>PHYTOCHEMICAL PROFILING, ANTIOXIDANT AND ANTI-INFLAMMATORY BIOACTIVITIES DEMONSTRATION OF ALGERIAN OSYRIS QUADRIPARTITA SALZM. EX DECNE LEAVES EXTRACTS.....</b>	<b>187</b>
<b>GREEN EXTRACTION AND CHROMATOGRAPHY OF CAROTENOID FROM TOMATO .....</b>	<b>188</b>
<b>EFFECT OF THE AROMATISATION WITH SUMMER SAVORY (<i>SATUREJA HORTENSIS</i> L.) ESSENTIAL OIL ON THE OXIDATIVE AND MICROBIAL STABILITIES OF LIQUID WHOLE EGGS DURING STORAGE.....</b>	<b>189</b>
<b>BIOACTIVE PROPERTIES OF THE ENDEMIC ALGERIAN MYRTUS NIVELII BATT &amp; TRAB. SCIENTIFIC APPROACHES TO THE TRADITIONAL USES .....</b>	<b>190</b>
<b>SWELLING AND EROSION OF NATURAL MATRIX TABLETS .....</b>	<b>191</b>
<b>CHARACTERIZATION OF BACTERIAL PATHOGENS FROM COMMERCIALY AVAILABLE READY TO EAT (RTE) SALAD SOLD AT HYDERABAD, SINDH PAKISTAN .....</b>	<b>192</b>
<b>ASSESSMENT OF HEPATOPROTECTIVE ACTIVITY OF SQUALENE EXTRACTED FROM OLIVE OIL LEES (AMURCA) ON THE RAT'S LIVER.....</b>	<b>193</b>
<b>IMPROVING POSTHARVEST STORABILITY OF “CYPRUS LEMONS” BY THE APPLICATION OF OZONE, ROSEMARY OIL, STRAW COVERAGE AND/OR/WITH MODIFIED ATMOSPHERE PACKAGING .....</b>	<b>194</b>
<b>CEREAL B-GLUCANS IN NUTRITION .....</b>	<b>195</b>
<b>MILLET GRAIN: NUTRITIONAL COMPOSITION AND POTENTIAL HEALTH BENEFITS .....</b>	<b>196</b>
<b>THE QUALITY CHARACTERISTICS OF DRIED RED CAPIA PEPPER .....</b>	<b>197</b>
<b>BIOCHEMICAL EVALUATION OF FOUR LENTIL (<i>LENS CULINARIS</i>) ALGERIAN ACCESSIONS FOR NUTRITIONAL VALUE .....</b>	<b>198</b>
<b>NUTRITIONAL VALUES OF PLANT RESIDUES OF BEAN VARIETIES GROWN AS SECOND CROPS.....</b>	<b>199</b>
<b>EFFECT OF DIFERENT FATTENING SISTEMS ON FATTENING PERFORMANCE, AND CLINICAL INDICATIONS IN SHARRI LAMBS.....</b>	<b>200</b>
<b>EFFECT OF THE BREED AND DIET ON CARCASS AND MEAT QUALITY TRAITS OBTAINED FROM KOSOVO LAMBS.....</b>	<b>201</b>

<b>PACKAGING AND STORAGE - FACTORS THAT AFFECT THE QUALITY OF KULEN AS A FERMENTED MEAT PRODUCT .....</b>	<b>202</b>
<b>CHEMICAL COMPOSITION AND TECHNOLOGICAL QUALITY OF EINKORN WHEAT (<i>TRITICUM MONOCOCCUM</i> L.) .....</b>	<b>203</b>
<b>EFFECT OF COOKING METHODS ON SULFITES CONTENT OF DRIED FRUITS.....</b>	<b>204</b>
<b>THE POSSIBLE USE OF UV-VIS SPECTROPHOTOMETRIC DATA FOR CLASSIFICATION OF VIRGIN OLIVE OILS.....</b>	<b>205</b>
<b>TRANS FATTY ACID FORMATION IN VEGETABLE OIL PRODUCTION TECHNOLOGY: AFFECTING FACTORS AND MINIMIZING PROCESSES .....</b>	<b>206</b>
<b>FACTORS INFLUENCING THE QUALITY OF CRUDE OIL PRODUCTION .....</b>	<b>207</b>
<b>THE EFFECT OF ADDING CHILI ON THE SENSORY CHARACTERISTICS OF CHEESE MADE BY DIFFERENT COAGULANTS .....</b>	<b>208</b>
<b>PHOSPHOMOLYBDATE TEST METHOD FOR ANTIOXIDANT ACTIVITY IN EXTRACTS OF ANIMAL FEED .....</b>	<b>209</b>
<b>PHYSICO-CHEMICAL AND RHEOLOGICAL STUDY OF MOROCCAN RAW CAMEL MILK'S, CASE OF BENI MELLAL-KHENIFRA REGION .....</b>	<b>210</b>
<b>ALLEVIATING EFFECTS OF ASCORBIC ACID ON RED RADISH (<i>RAPHANUS SATIVUS</i> L.) LEAVES TREATED WITH EXCESS COPPER.....</b>	<b>211</b>
<b>DIET-EPIGENOME INTERACTIONS: EPI-DRUGS MODULATING THE EPIGENETIC MACHINERY DURING CANCER PREVENTION.....</b>	<b>212</b>
<b>SCREENING OF LACTIC BACTERIA BASED ON ITS PROTEASE ACTIVITY FOR COLLAGEN EXTRACTION FROM SHRIMP (<i>PARAPENAEUS LONGIROSTRIS</i>) BYPRODUCTS .....</b>	<b>213</b>
<b>ASSESSMENT OF THE EFFECTS OF WATER STRESS AND SUBSTRATE ON FLOWERING, PODDING AND MYCORRHIZAE PRESENCE IN FABA BEAN LEGUME (<i>VICIA FABA</i> L.).....</b>	<b>214</b>
<b>EFFECT OF <math>\Gamma</math>-IRRADIATION ON PIPERINE CONTENT AND MICROBIAL QUALITY OF BLACK PEPPER .....</b>	<b>215</b>
<b>ADDITION OF NATURAL TANNINS DURING FERMENTATION TO STABILIZE THE COLOR OF RED WINEFROM VAR. "SHESH I ZI" .....</b>	<b>216</b>
<b>EVALUATION OF THE PHYSICAL-CHEMICAL CHARACTERISTICS OF THE APPLE VARIETIES FOR THE PRODUCTION OF APPLE – CIDERS .....</b>	<b>217</b>
<b>ASSESSMENT OF SAMET (GRAPE SYRUP) PHYSICO-CHEMISTRY AND MICROBIOLOGICAL CHARACTERISTICS.....</b>	<b>218</b>
<b>MARKER GENES RELATED TO FATTY ACIDS COMPOSITION OF BEEF .....</b>	<b>219</b>
<b>A NOVEL TECHNOLOGY FOR FOOD PROCESSING: COLD PLASMA .....</b>	<b>220</b>
<b>PROTEIN OXIDATION IN ULTRAVIOLET LIGHT-TREATED DAIRY PRODUCTS.....</b>	<b>221</b>
<b>THE EFFECT OF STORAGE ON THE TEXTURE QUALITY OF HAZELNUT CHIPS PRODUCED IN DIFFERENT FORMULATIONS.....</b>	<b>222</b>

<b>FORTIFIED CAKE WITH POMEGRANATE AND ORANGE PEELS POWDER AS A FUNCTIONAL PRODUCT .....</b>	<b>223</b>
<b>CHEMICAL PROPERTIES AND BIOACTIVE COMPONENTS OF PEANUT OIL.....</b>	<b>224</b>
<b>ALGERIAN HERBAL MEDICINE IN THE TREATMENT OF GASTROINTESTINAL DISEASES.....</b>	<b>225</b>
<b>IDENTIFICATION OF YEASTS ISOLATED FROM NATURALLY FERMENTED GREEN OLIVES WITH MOLECULAR BASED METHODS.....</b>	<b>226</b>
<b>SOME PROPERTIES OF ACUR PICKLES PRODUCED USING SALT AND VINEGAR AT DIFFERENT CONCENTRATIONS.....</b>	<b>227</b>
<b>HYDROLOGICAL DROUGHT ANALYSIS AND DROUGHT HYDROLOGY.....</b>	<b>228</b>
<b>ANATOMICAL, PALYNOLOGICAL AND MICROMORPHOLOGICAL STUDIES ON COUSINIA AUCHERI, AN ENDEMIC SPECIES FOR TURKEY .....</b>	<b>229</b>
<b>COMPARATIVE ANALYSIS OF RICE PERFORMANCE AND PROFITABILITY WITH THE SYSTEM OF RICE INTENSIFICATION (SRI) AND TRADITIONAL PRACTICES (TP) IN ZIGUINCHOR DISTRICT, SENEGAL.....</b>	<b>230</b>
<b>VALORIZATION OF FIG TREE (<i>FICUS CARICA</i>) .....</b>	<b>231</b>
<b>EFFECTIVE ORGANO-MINERAL FERTILIZERS OF PROLONGED ACTION FROM THE PROCESSED ORGANO-CONTAINING WASTES OF VARIOUS ORIGIN.....</b>	<b>232</b>
<b>STUDY OF THE CHEMICAL COMPOSITION, ANTICANDIDA AND ANTIOXIDANT ACTIVITIES OF WILD AND CULTIVATED ORIGANUM COMPACTUM ESSENTIAL OIL FROM THE MUNICIPALITY OF CHAOUN IN MOROCCO .....</b>	<b>233</b>
<b>DIGITAL MARKETING IN SMEs OPERATING IN THE AGRICULTURAL FOOD INDUSTRY OF TURKEY: CHALLENGES, OPPORTUNITIES AND STRATEGIES TO FOLLOW.....</b>	<b>234</b>
<b>DETERMINATION OF TRACTOR USAGE PREFERENCES IN AGRICULTURAL ENTERPRISES.....</b>	<b>235</b>
<b>COMPARISON OF FERTILIZER USE EFFICIENCY IN BALKAN COUNTRIES .....</b>	<b>236</b>
<b>CHEMICAL, BIOCHEMICAL AND VOLATILE PROFILES OF SAFFRON (<i>CROCUS SATIVUS</i> L.) FROM DIFFERENT GROWING AREAS OF MOROCCO.....</b>	<b>237</b>
<b>CHARACTERISTICS OF LIVESTOCK FARMERS AND TRADERS PARTICIPATING IN LIVESTOCK MARKETS: A CASE STUDY FROM THE REPUBLIC OF BENIN .....</b>	<b>238</b>
<b>CONSTRAINTS OF LIVESTOCK MARKETS IN THE REPUBLIC OF BENIN AND SUGGESTIONS .....</b>	<b>239</b>
<b>THE SUSTAINABILITY AND THE CREDIT USE IN APPLE PRODUCTION IN ISPARTA PROVINCE IN TURKEY .....</b>	<b>240</b>
<b>RISK AND SUSTAINABILITY IN OVINE LIVESTOCK ACTIVITY: ANTALYA PROVINCE CASE.....</b>	<b>241</b>
<b>THYMUS CAPITATUS HOFF, AND THYMUS FONTANESII BOISS &amp; REUT EXTRACTS FROM ALGERIA, PHENOLIC FLAVONOIDS CONTENTS AND BIOLOGICAL ACTIVITIES.....</b>	<b>242</b>

<b>PHYTOCHEMICAL SCREENING, TOTAL PHENOLICS, FLAVONOIDS CONTENTS, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF THE ETHANOL EXTRACTS OF FORTUNELLA MARGARITA OF LEAVES AND PEELS .....</b>	<b>243</b>
<b>REMOVAL OF CONGO RED (CR) FROM AQUEOUS SOLUTIONS BY ADSORPTION ONTO APRICOT STONE ACTIVATED CARBON (ASAC)- THERMODYNAMIC AND KINETIC MODELING .....</b>	<b>244</b>
<b>TOTAL PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF ANAGALLIS MONELLI L. FROM ALGERIA .....</b>	<b>245</b>
<b>A CONVENIENT SOLVENT FREE MICROWAVE EXTRACTION OF NATURAL PRODUCTS .....</b>	<b>246</b>
<b>PHENOLIC CONTENT AND ACTIVITY ANTIOXIDANT OF METHANOLIC AND AQUEOUS EXTRACTS OF ALOEA VERA LEAVES.....</b>	<b>247</b>
<b>EFFECT OF EXTRACTION MODE ON PHENOLIC FLAVONOIDS CONTENTS AND BIOLOGICAL ACTIVITIES OF THYMUS CAPITATUS HOFF, AND THYMUS FONTANESII BOISS &amp; REUT EXTRACTS FROM ALGERIA. ....</b>	<b>248</b>
<b>ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENT OF EDIBLE AND NO-EDIBLE PARTS OF CUCUMIS METULIFERUS FRUIT EXTRACTS FROM ALGERIA ..</b>	<b>249</b>
<b>IMPACT OF VARICOCELE ON MALE FERTILITY IN THE WESTERN REGION OF ALGERIA .....</b>	<b>250</b>
<b>IMPACT OF CLIMATE CHANGE ON APICULTURE IN BOSNIA AND HERZEGOVINA AND THE SUB-MEDITERRANEAN CLIMATE ZONE WITH A FOCUS ON TILIA TOMENTOSA (MOENCH.).....</b>	<b>251</b>
<b>FRUIT AND LEAF VIABILITY OF TILIA CORDATA (MILL.) IN MIXED LINDEN FORESTS IN CONTEXT OF CLIMATE CHANGE WITH FOCUS ON CLIMATE ZONES IN BOSNIA AND HERZEGOVINA.....</b>	<b>252</b>
<b>BIOCHEMICAL STUDIES OF AT.TC RAPESEED (<i>BRASSICA NAPUS</i> L.) PLANTS UNDER DROUGHT STRESS .....</b>	<b>253</b>
<b>EVALUATING THE GENETIC STRUCTURE OF SOME SAINFOIN ACCESSIONS BY SIMPLE SEQUENCE REPEAT (SSR) MARKERS .....</b>	<b>254</b>
<b>THE IMPORTANCE OF CHOOSING THE APPROPRIATE ISOLATION PROTOCOL FOR THE PURPOSE OF THE BREEDING STUDIES.....</b>	<b>255</b>
<b>IN VITRO PROPAGATION OF A HIGH VALUE MEDICINAL PLANT: <i>ORIGANUM SIPYLEUM</i> L. ....</b>	<b>256</b>
<b>EFFECT OF AROMATIC AMINO ACID COMPOSITION ON PHENOLIC COMPOUND CONTENT AND THE EXPRESSION LEVEL OF GENES INVOLVED IN THE BIOSYNTHESIS PATHWAY .....</b>	<b>257</b>
<b>ENHANCED PRODUCTION OF SECONDARY METABOLITES BY RHIZOBIUM RHIZOGENE MEDIATED HAIRY ROOT INDUCTION IN MORINGA OLEIFERA.....</b>	<b>259</b>
<b>DETERMINATION OF PHYTOCHEMICALS AND ANTIOXIDANT CAPACITY OF EDIBLE DANDELION PLANT (<i>TARAXACUM OFFICINALE</i>) COLLECTED FROM KIRŞEHİR REGION.....</b>	<b>260</b>

<b>RAPID DEVELOPMENT OF BREAD WHEAT LINES RESISTANT TO WARRIOR YELLOW RUST RACE (<i>PUCCINIA STRIIFORMIS F.SP. TRITICI</i>)</b> .....	261
<b>THE IMPACT OF URBANIZATION ON URBAN AIR QUALITY: A CASE OF PM10 MASS CONCENTRATION IN URBAN AREA OF “LIQENI I THATË”, TIRANA</b> .....	262
<b>ECOPHYSIOLOGICAL APPROACHES FOR PROTECTING ENVIRONMENT</b> .....	263
<b>A STUDY ON THE DISTRIBUTION OF CHRYSOPERLA CARNEA (STEPHENS) (NEUROPTERA: CHRYSOPIDAE) IN NATURAL AREAS OF THE EASTERN MEDITERRANEAN REGION</b> .....	264
<b>A MAJOR LINKS BETWEEN APHIDS SPECIES (HOMOPTERA: APHIDIDAE) AND SOME GREEN LACEWINGS EGG-LAYING LOCATIONS (NEUROPTERA: CHRYSOPIDAE) IN THE EASTERN MEDITERRANEAN REGION</b> .....	265
<b>EXPANDING THE USE OF WASTE WATER IN AGRICULTURE</b> .....	266
<b>PERFORMANCE EVALUTION OF AUTOMATICALLY EXTRACTED CITRUS TREES FROM LIDAR POINT CLOUD DATA: REVISITING A TRADITIONAL STRATEGY BASED ON LOCAL MAXIMA AND WATERSHED SEGMENTATION</b> .....	267
<b>ASSESSMENT OF SOIL POLLUTION AND PROCESS OF DISTRIBUTION OF HEAVY METAL FROM SALIX ALBA PLANT</b> .....	268
<b>FOOD WASTE MANAGEMENT IN THE TOURIST AREA OF DAJTI, TIRANA</b> .....	269
<b>CONSIDERATION OF BEEF CATTLE BARN PROJECTS WITH MANURE MANAGAMENT PLANNING: ÇANAKKALE/AYVACIK CASE STUDY</b> .....	270
<b>TEMPORAL DISTRIBUTION OF AIRBORNE ALLERGENIC POACEAE POLLEN IN DIFFERENT REGIONS OF TURKEY</b> .....	271
<b>EFFECTS OF METEOROLOGICAL VARIABLES ON STEM DIAMETER VARIATION AND PHENOLOGICAL DEVELOPMENT IN OLIVE TREES (<i>OLEA EUROPEAE L.</i>)</b> .....	272
<b>A SMALL-SCALE TRANSPORTABLE BIODIGESTER USING ORGANIC HOUSEHOLD WASTES, WASTEWATER AND HUMAN EXCRETA TO BIOGAS RECOVERY</b> .....	273
<b>ESTIMATES ON CLIMATE CHANGES IN ALBANIA, BASED ON FACTUAL DATA ON THE FIELD OF AGRICULTURE IN THE SOUTHEASTERN AREA</b> .....	274
<b>CLIMATE CHANGE IN ALBANIA AND SOME CONSIDERATIONS FOR THEIR IMPACT ON THE VARIOUS SECTORS</b> .....	275
<b>INDUSTRIAL RESEARCH AND EXPERIMENTAL DEVELOPMENT VEHICLES WITH BRUSHESLESS ELECTRIC MOTORS POWERED BY LITHIUM-ION BATTERIES FOR PERSONAL TRANSPORTATION-GENTLE ELECTRIC</b> .....	276
<b>EVALUATION OF UNIVERSITY FEMALE STUDENTS IN BREAST CANCER SCREENING WITH CHAMPION'S HEALTH BELIEF MODEL SCALES</b> .....	277
<b>INSIGHTS INTO SUNFLOWER LEAF MORPHOGENESIS: A CELL CYCLE PERSPECTIVE</b> .....	278
<b>EVALUATION OF ANTIOXIDANT CAPACITY AND FLAVONOID CONTENT IN ANNUAL AND PERENNIAL WILD <i>HELIANTHUS</i> SPECIES</b> .....	279

<b>EVALUATION OF MACRO AND MICRO NUTRITIONAL ELEMENT CONTENT AND SOIL PROPERTIES OF <i>HYPERICUM SCABRUM</i> AND <i>HELICHRYSUM PLICATUM</i> PLANTS .....</b>	<b>280</b>
<b>DROUGHT-INDUCED RESPONSES IN ROOTS AND LEAVES OF WHEAT CULTIVARS WITH DIFFERENTIAL TOLERANCE TO DEHYDRATION .....</b>	<b>281</b>
<b>HONEY PLANTS ECOLOGICAL ASSESSMENT IN TREBESHINA-DHEMBEL-NEMERCKE MOUNTAIN RANGE .....</b>	<b>282</b>
<b>ISOLATION AND IDENTIFICATION OF THE PATHOGENS CAUSING ROOT ROT DISEASE IN ALFALFA AND THE EVALUATION OF ALFALFA RESISTANT VARIETIES TO <i>FUSARIUM EQUISETI</i> AND <i>F. TRICINCTUM</i>.....</b>	<b>283</b>
<b>THE IDENTIFICATION OF NEW SUNFLOWER VARIETIES RESISTANT TO OROBANCHE CUMANA IN FIELD .....</b>	<b>284</b>
<b>DETERMINATION OF COLD STORAGE PERFORMANCE OF 'KLEMANTINE' AND 'ORLANDO TANJELO' HYBRID CO210 MANDARIN GENOTYPE.....</b>	<b>285</b>
<b>THE USE OF MEDICAL AND AROMATIC PLANTS IN LANDSCAPE ARCHITECTURE AND AGRICULTURAL LANDSCAPE, THE CASE OF DÜZCE.....</b>	<b>286</b>
<b>HONEYCOMB EXPERIMENTAL DESIGN FACILITATES THE DIFFERENTIATION OF INDIGENOUS AMF SPORES IN ZEA MAYS PLANT RHIZOSPHERE.....</b>	<b>289</b>
<b>MULTIFUNCTIONAL APPLICATIONS OF WILD HALOPHYTES SPECIES.....</b>	<b>290</b>
<b>ANTIBACTERIAL ACTIVITY OF THE ESSENTIAL OILS OF <i>R. ANGUSTIFOLIA</i> AGAINST MULTIRESISTANT BACTERIAL STRAINS.....</b>	<b>291</b>
<b>IN VITRO ANTIOXIDANT ACTIVITY OF THE ESSENTIAL OILS OF <i>R. ANGUSTIFOLIA</i> .....</b>	<b>292</b>
<b>THE IMPACT OF COMPOST SPREADING ON THE QUALITY OF THE LENTIL PLANT (<i>LENS CULINARY</i>) ON A CONVENTIONAL SYSTEM .....</b>	<b>293</b>
<b>INOCULATION EFFECTS OF PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) ON THE GROWTH OF THE PEANUT KT-22 VARIETY IN MOROCCO .....</b>	<b>294</b>
<b>ASSESSMENT OF ACTIVITIES PROMOTING PLANT GROWTH AND TOLERANCE TO ABIOTIC STRESS OF RHIZOBACTERIA ISOLATED FROM THE RHIZOSPHERE OF THREE VARIETIES OF PEANUT (<i>ARACHIS HYPOGAEA</i> L.) IN MOROCCO .....</b>	<b>295</b>
<b>STUDY OF NEW DRUG CANDIDATES DERIVED FROM PLECONARILE INHIBITING COXSACKIEVIRUS B3 (CVB3) BY MOLECULAR DOCKING, ADMET, AND RETROSYNTHESIS .....</b>	<b>296</b>
<b>DISCRIMINATING ABILITY OF ISSR MARKERS IN THE REVEALING OF THE GENETIC POLYMORPHISM IN TURKISH BROOMRAPE POPULATIONS.....</b>	<b>297</b>
<b>ENHANCEMENT OF SOYBEAN (<i>GLYCINE MAX</i> L.) ADAPTABILITY AND PRODUCTIVITY THROUGH MOLECULAR METHODS .....</b>	<b>299</b>
<b>SESAME AN UNDERUTILIZED OIL SEED CROPS: BREEDING ACHIEVEMENTS AND FUTURE CHALLENGES.....</b>	<b>300</b>
<b>ABUNDANCE AND DYNAMICS OF APHIDS COLLECTED FROM POTATO CROP .....</b>	<b>301</b>

<b>DETERMINATION OF FORAGE QUALITY OF DIFFERENT COOL SEASON TURF GRASS SPECIES AND VARIETIES .....</b>	<b>302</b>
<b>USE OF GARDEN RADISH IN JOHNSONGRASS CONTROL IN COTTON.....</b>	<b>303</b>
<b>EFFECTS OF GREEN AND COMMERCIAL SYNTHESIS ZNO NANOPARTICLES ON GROWTH PARAMETERS AND WATER STATUS IN PEPPER UNDER DROUGHT STRESS.....</b>	<b>304</b>
<b>POSSIBLE EFFECTS OF GLOBAL WARMING ON INSECT POPULATION .....</b>	<b>305</b>
<b>DETERMINATION OF THE GROWTH PHYSIOLOGY OF CORIANDER (<i>Coriandrum sativum</i> L.) IN DIFFERENT GROWING ENVIRONMENTS .....</b>	<b>306</b>
<b>GENETIC CHARACTERIZATION OF SOME LOCAL AND FOREIGN BREAD WHEAT GENOTYPES WITH MOLECULAR MARKERS .....</b>	<b>307</b>
<b>BIOACCUMULATION OF HEAVY METALS BY SELECTED SOME PLANTS CULTIVATED IN CENTRAL AND EASTERN BLACK SEA REGION.....</b>	<b>308</b>
<b>OPTIMIZATION OF ULTRASOUND ASSISTED EXTRACTION REGARDING TOTAL PHENOLIC CONTENT AND ANTIOXIDANT CAPACITY OF OLIVE LEAVES .....</b>	<b>309</b>
<b>THE EFFECTS OF MONOCHROMATIC LIGHTING ON HATCH WINDOW AND HATCHING PERFORMANCE IN BROILER BREEDER EGGS.....</b>	<b>310</b>
<b>THE EFFECTS OF IN OVO INJECTION OF PROPOLIS EXTRACT TO BREEDER EGGS ON HATCHABILITY AND EARLY PERFORMANCE IN BROILERS .....</b>	<b>311</b>
<b>CHANGES IN SOME BIOCHEMICAL PARAMETERS OF SWEET RED PEPPERS AT DIFFERENT STORAGE TEMPERATURE .....</b>	<b>312</b>
<b>REDUCING THE TOXIC EFFECT OF KATHON CG USING LIQUID VERMICOMPOST IN PISUM SATIVUM VAR. ARVENCE.....</b>	<b>313</b>
<b>NUTRITIONAL ENRICHMENT OF SESAME SEED BY <i>Aspergillus niger</i> SOLID-STATE FERMENTATION.....</b>	<b>314</b>
<b>SOLID-STATE FERMENTATION USING <i>Aspergillus niger</i> IMPROVES THE NUTRITIONAL QUALITY OF OLIVE PULP.....</b>	<b>315</b>
<b>EFFECTS OF DIFFERENT SOWING TIMES ON YIELD AND QUALITY TRAITS OF SAFFLOWER UNDER THE TEKİRDAĞ CONDITIONS.....</b>	<b>316</b>
<b>RHIZOBIA INOCULATION AND DMPP NITRIFICATION INHIBITOR HAD EFFECT PHENOLOGICAL AND MORPHOLOGICAL CHARACTERS OF BEAN (<i>PHASEOLUS VULGARIS</i> L.).....</b>	<b>317</b>
<b>THE EFFECTS OF BEE FLIGHT AND POLLINATING DISTANCE ON SEED PRODUCTION AND QUALITY IN SEED SUNFLOWER PRODUCTION.....</b>	<b>318</b>
<b>THE EFFECTS OF SUMMER PRUNING APPLICATIONS OF VINE GROWTH AND CLUSTER FEATURES.....</b>	<b>319</b>
<b>SEEDS OF ECHINOCHLOA SPP. IN SEEDBANK IN RICE FIELDS IN THE BIGA DISTRICT OF THE ÇANAKKALE PROVINCE, TURKEY .....</b>	<b>320</b>
<b>INVESTIGATION OF SOME QUALITY PARAMETERS OF HOMEMADE YOGURT WITH NETTLE POWDER.....</b>	<b>321</b>

<b>THE USE OF MAPLE SYRUP AND CHLORELLA VULGARIS IN YOGHURT PRODUCTION.....</b>	<b>322</b>
<b>DETERMINATION OF ADULT LONGEVITY OF COTESIA GLOMERATA L. (HYMENOPTERA: BRACONIDAE) ON DIFFERENT DIETS.....</b>	<b>323</b>
<b>NUTRITIVE VALUE OF SILAGE AND HAY MADE FROM RADISHES (RAPHANUS SATIVUS) BY-PRODUCTS FOR ANIMAL .....</b>	<b>324</b>
<b>AN OVERVIEW OF SUPPORT POLICIES IN WHEAT PRODUCTION .....</b>	<b>325</b>
<b>THE STRUCTURAL EVALUATION REGARDING TO AGRICULTURAL TOURISM OF VITICULTURE FARMS IN TEKİRDAĞ PROVINCE .....</b>	<b>326</b>
<b>SALINITY AND DROUGHT STRESS IN WALNUT .....</b>	<b>327</b>
<b>SALT STRESS AND ITS MECHANISM IN ALMOND .....</b>	<b>328</b>
<b>CHANGES IN SHRUB QUALITY AND GOAT PREFERENCES IN THE CAFETERIA FEEDING SYSTEM .....</b>	<b>329</b>
<b>INVESTIGATION OF GOATS' DAILY BEHAVIOR UNDER CAFETERIA FEEDING SYSTEM .....</b>	<b>330</b>
<b>GENOME ANNOTATION IN PLANTS USING ENSEMBL .....</b>	<b>331</b>
<b>ALTERNATIVE BOOM DESIGN FOR FIELD SPRAYERS .....</b>	<b>332</b>
<b>USE OF SSR MARKERS IN STRAWBERRY CULTIVARS .....</b>	<b>333</b>
<b>GENIC SIMPLE SEQUENCE REPEATS IN WILD PISTACIA SPECIES .....</b>	<b>334</b>
<b>EFFECT OF DIFFERENT GERMINATION ENVIRONMENT ON SOYBEAN GERMINATION.....</b>	<b>335</b>
<b>VARIATION OF PM10 AND SO2 CONCENTRATIONS IN HEATING DEGREE DAYS AND COOLING DEGREE DAYS IN KIRKLARELI, TURKEY.....</b>	<b>336</b>
<b>ASSESSMENT OF ENVIRONMENT EFFECT ON AGRONOMIC AND QUALITY PARAMETERS OF BARLEY (<i>Hordeum vulgare</i> L) GENOTYPES UNDER RAINFED CONDITION .....</b>	<b>337</b>
<b>ASSOCIATION OF YIELD AND YIELD COMPONENT IN DURUM WHEAT (<i>Triticum durum</i> Desf.) GENOTYPES UNDER RAINFED CONDITIONS.....</b>	<b>338</b>
<b>GENOTYPES × ENVIRONMENT INTERACTION AND STABILITY OF BREAD WHEAT (<i>Triticum aestivum</i> L.) CULTIVAR UNDER RAINFED CONDITIONS.....</b>	<b>339</b>
<b>IDENTIFICATION OF RESIDENTIAL DEVELOPMENT IMPACTS ON AGRICULTURAL LANDS USING LANDSAT IMAGERIES: CASE STUDY OF BURSA, NİLUFER (1990-2020) .....</b>	<b>340</b>
<b>INVESTIGATION OF SAME AGRICULTURAL CHARACTERS OF SECOND CROP HYBRID CORN VARIETIES .....</b>	<b>341</b>
<b>APRICOTS SAPLING PRODUCTION IN TURKEY.....</b>	<b>342</b>
<b>SURVEY OF TOMATO BACTERIAL DISEASES GROWN UNDER GREENHOUSES IN MERSİN AND NEW EMERGING BACTERIAL DISEASE AGENTS .....</b>	<b>343</b>

<b>CHERRY LAUREL (<i>P. LAUROCERASUS</i> L.) FLOWER CHARACTERISTICS, FERTILIZATION AND FRUIT SET .....</b>	<b>344</b>
<b>EFFECTS OF NITROGEN FERTILIZATION ON LIGNOTUBER DEVELOPMENT AND SPROUTING OF <i>ARBUTUS UNEDO</i> L. ....</b>	<b>345</b>
<b>SIMULATING FUTURE STATUS OF AGRICULTURAL LANDS IN SOUTH PART OF MARMARA BASIN DEPENDING ON HISTORICAL TRENDS* .....</b>	<b>346</b>
<b>EFFECT OF ESSENTIAL OIL ON ABIOTIC STRESS TOLERANCE IN WHEAT .....</b>	<b>347</b>
<b>THE EFFECT OF COWPEA (<i>VIGNA UNGUICULATA</i> L.) ON HUMAN HEALTH .....</b>	<b>348</b>
<b>POLYPHENOL CONTENT AND ANTIOXIDANT CAPACITY OF MEDICINAL AND AROMATIC PLANTS.....</b>	<b>349</b>
<b>PHYSIOLOGICAL AND BIOCHEMICAL EFFECTS OF THERMO PRIMING ON WHEAT (<i>TRITICUM AESTIVUM</i> L.) UNDER DROUGHT AND HEAT STRESSES .....</b>	<b>350</b>
<b>LABORATORY EVALUATION OF ENTOMOPATHOGENIC NEMATODE HETERORHABDITIS BACTERIOPHORA (<i>RHABDITIDA: HETERORHABDITIDAE</i>) ON THE INDIAN MEAL MOTH, (<i>PLODIA INTERPUNCTELLA</i> (HUBNER) (<i>LEPIDOPTERA: PYRALIDAE</i>)).....</b>	<b>351</b>
<b>EFFECT OF OPERATIONAL PARAMETERS ON PHOTOCATALYTIC DEGRADATION OF REACTIVE BLUE 19 DYE USING <i>CU<sub>2</sub>O</i>.....</b>	<b>352</b>
<b>THE EFFECTS OF GLYCINE BETAINE APPLICATIONS ON THE PRODUCTION AND QUALITY OF NARİNCE GRAPE VARIETY .....</b>	<b>353</b>
<b>EXPANSION OF THE GENETIC BASE BY INTERSPECIFIC HYBRIDIZATION IN <i>CAPSICUM ANNUUM</i> AND <i>CAPSICUM CHINENSE</i> .....</b>	<b>354</b>
<b>DETERMINATION OF THE FACTORS AFFECTING THE PRODUCTION AND QUALITY OF WHEAT GROWING IN SOUTH MARMARA .....</b>	<b>355</b>
<b>THE DETERMINATION OF BOTANICAL PROPERTIES OF FORAGE KOCHIA POPULATION GROWN IN KONYA CONDITIONS .....</b>	<b>356</b>
<b>EFFECTS OF NITROGEN FERTILIZERS, GENOTYPE AND CUTTING STAGES ON PROTEIN CONTENTS AND FIBER COMPONENTS OF OAT FORAGE .....</b>	<b>357</b>
<b>ASSIGNATION OF RESISTANCE AGAINST SAFFLOWER RUST DISEASE (<i>PUCCINIA CARTHAMI</i>) IN SOME OLEIC AND LINOLEIC TYPE SAFFLOWER GENOTYPES UNDER FIELD CONDITIONS.....</b>	<b>358</b>
<b>NEW TRENDS IN VEGETABLE OIL CONSUMPTION .....</b>	<b>359</b>
<b>OPTIMIZATION OF NANOCELLULOSE ESTERIFICATION WITH DIFFERENT FATTY ACIDS AND ACETIC ANHYDRIDE.....</b>	<b>360</b>
<b>DETERMINATION OF RESISTANCE TO IRON DEFICIENCY OF SOME SUNFLOWER LINES.....</b>	<b>361</b>
<b>THE EFFECT OF ACTIVATED BENTONITE ON TOXIC IRON (<i>Fe<sup>+2</sup></i>) UPTAKE IN RICE PLANT GROWN IN SAND CULTURE.....</b>	<b>362</b>
<b>TEMPORAL VARIATIONS IN THE LEVELS AND QUALITY OF GROUNDWATER IN THE AGRICULTURAL AREAS IN MENEMEN LEFT BANK IRRIGATION SYSTEM .....</b>	<b>363</b>

<b>PRODUCTIVITY STATUS OF AGRICULTURAL LANDS IN LEFT BANK IRRIGATION OF MENEMEN PLAIN.....</b>	<b>364</b>
<b>A HIGHLY PATHOGENIC BACILLUS THURINGIENSIS ISOLATE FROM TUTA ABSOLUTA AND ITS INSECTICIDAL EFFECT ON T. ABSOLUTA (MEYRICK) (LEPIDOPTERA: GELECHIIDAE).....</b>	<b>365</b>
<b>THE TOXICITY EVALUATION OF PREPARED LANTANA CAMARA EXTRACT FORMULATION AGAINST TUTA ABSOLUTA (LEPIDOPTERA: GELECHIIDAE).....</b>	<b>366</b>
<b>PLANT SECONDARY METABOLITES AS ANTIBIOTIC RESISTANCE MODIFYING AGENTS IN FOOD CHAIN .....</b>	<b>367</b>
<b>TRANSFER OF CYTOPLASMIC MALE STERILITY TO MAIZE BY THE PATERNAL HAPLOID METHOD .....</b>	<b>368</b>
<b>CHANGE IN WATER ACTIVITY OF SOME TURKISH HAZELNUT CULTIVARS AT DIFFERENT MOISTURES AND TEMPERATURES .....</b>	<b>369</b>
<b>CHANGES IN CHLOROPHYLL CONTENT AND FRUIT QUALITY IN ALPHONSE LAVALLÉE GRAPE VARIETIES FROM VERAISON TO RIPE.....</b>	<b>370</b>
<b>SPECIES RICHNESS IN VINEYARDS DEPENDING ON AGRICULTURAL SYSTEMS ...</b>	<b>371</b>
<b>PROFILE OF OLIVE GROWERS IN THE FOCUS ON WEEDS IN THE KÖPRÜBAŞI DISTRICT (MANISA, TURKEY).....</b>	<b>372</b>
<b>HYDROPRIMING AFFECTS SEED GERMINATION AND SEEDLING PERFORMANCE IN SWEET CORN CULTIVARS.....</b>	<b>373</b>
<b>DETERMINATION OF REACTIONS OF SOME BEAN GENOTYPES TO BEAN CHARCOAL ROT (MACROPHOMINA PHASEOLINA) DISEASE.....</b>	<b>374</b>
<b>SELECTION OF ZINC DEFICIENCY RESISTANT RICE (ORYZA SATIVA L.) VARIETIES IN SAND CULTURE ENVIRONMENT .....</b>	<b>375</b>
<b>ANTS (HYMENOPTERA: FORMICIDAE) ASSOCIATED WITH APHIDS (HEMIPTERA: APHIDIDAE) FROM ÇARDAK LAGOON IN THE ÇANAKKALE PROVINCE OF TURKEY .....</b>	<b>376</b>
<b>SCREENING AND DETECTION OF GENETICALLY MODIFIED ORGANISMS IN FOOD PRODUCTS.....</b>	<b>377</b>
<b>A SAMPLE OBSERVATION FOR GASTRONOMIC APPLICATIONS: INTERACTION OF LEMON OR APPLE VINEGAR ADDED OLIVE OIL WITH SEA BASS FILLET AND BEEFSTEAK .....</b>	<b>378</b>
<b>AUTHENTICATION OF EXTRA VIRGIN OLIVE OIL .....</b>	<b>379</b>
<b>COMMONLY USED SYNTHETIC ANTIOXIDANTS IN OILS AND FATS .....</b>	<b>380</b>
<b>EFFECTS OF ENCAPSULATION ON BIOAVAILABILITY OF FEED ADDITIVES.....</b>	<b>381</b>
<b>EFFECT OF BORON ON THE BERRIES SETTING AND QUALITY CHARACTER OF GRAPE.....</b>	<b>382</b>
<b>OBSERVATIONS ON THE FORAGING BEHAVIOURS OF BEES IN TWO DIFFERENT ZUCCHINI FARMING SYSTEMS .....</b>	<b>383</b>

<b>EFFECTS OF LIVING AND NON-LIVING MULCH APPLICATIONS ON FRUIT YIELD AND QUALITY IN ORGANIC KIWIFRUIT PRODUCTION .....</b>	<b>384</b>
<b>MODELLING AND OPTIMIZATION OF COAGULATION -FLOCCULATION PROCESS OF WASTE WATER BY RESPONSE SURFACE METHODOLOGY .....</b>	<b>385</b>
<b>OPTIMISATION OF THE COAGULATION-FLOCCULATION PROCESS BY BENTONITE AND ALUMINUM SULPHATE.....</b>	<b>386</b>
<b>INTRAPERITONEAL ACUTE TOXICITY OF THE ETHANOLIC EXTRACT OF LEAVES PLANT OF OLEA EUROPEA VAR. OLEASTRE.....</b>	<b>387</b>
<b>SELECTION OF MULBERRY (MORUS ALBA) IN SAMSUN.....</b>	<b>388</b>
<b>INCREASING NUMBER OF PARTIAL RESISTANCE TRAITS TO ZUCCHINI YELLOW MOSAIC VIRUS IN ONE PRODUCTIVE HYBRID OF SQUASH INCREASE RESISTANCE AND STIMULATE THEIR EFFECTIVENESS.....</b>	<b>389</b>
<b>BIOMATERIALS POTENTIAL AS COAGULANTS IN WASTEWATER TREATMENT ...</b>	<b>390</b>
<b>THE ALGERIAN GREEN ALGA ULVA LACTUCA AND ITS HYDROETHANOLIC EXTRACT PROTECT AGAINST SERUM AND ERYTHROCYTE OXIDATIVE STRESS INDUCED BY TYPE 2 DIABETES IN RATS.....</b>	<b>391</b>
<b>DEXAMETHASONE AS AN EFFICIENT DRUG FOR COVID-19: META-ANALYSIS.....</b>	<b>392</b>
<b>ANTIMICROBIAL ACTIVITY OF ESSENTIAL OIL OF THYMUS NUMIDICUS POIRET .....</b>	<b>393</b>
<b>IMPACT OF ALCOHOLIC EXTRACTS OF THYMUS NUMIDICUS OF THE LARVAL DEVELOPMENT OF TUTA ABSOLUTA .....</b>	<b>394</b>
<b>EFFECT OF PLANTING GEOMETRY AND VARIETIES ON THE YIELD OF LENTIL IN NORTHERN TRANSITION ZONE OF KARNATAKA, INDIA .....</b>	<b>395</b>
<b>MITIGATION OF DROUGHT STRESS EFFECTS BY CHITOSAN-COATED IRON OXIDE NANOPARTICLES AND NATURAL GROWTH STIMULANTS IN PEPPERMINT .....</b>	<b>396</b>
<b>IMPACT OF STORAGE CONDITIONS ON ACHENE LONGEVITY AND ITS YIELD IN SUNFLOWER (HELIANTHUS ANNUUS L.).....</b>	<b>397</b>
<b>GENOME EDITING AS AN ATTRACTIVE TOOL TO ENGINEER RESISTANCE AGAINST PLANT VIRUSES .....</b>	<b>398</b>
<b>MILK YIELD COMPOSITION AND MODELING OF LACTATION CURVES OF ARABIAN DONKEYS .....</b>	<b>399</b>
<b>DELAYING SOWING DATE TO REDUCE THE MECHANISM OF SUNFLOWER VERTICILLIUM WILT .....</b>	<b>400</b>
<b>THE A-1,6-MANNOSYLTRANSFERASE VDOCH1 PLAYS A MAJOR ROLE IN MICROSCLEROTIUM FORMATION AND VIRULENCE IN THE SOIL-BORNE PATHOGEN VERTICILLIUM DAHLIAE.....</b>	<b>401</b>
<b>EVALUATION OF THE CONTENT OF PHENOLIC COMPOUNDS AND ANTIOXIDANT POTENTIAL OF WHITE MULBERRY FRUITS AND PEKMEZ .....</b>	<b>402</b>
<b>DEPENDENCY ANALYSIS OF QUANTITATIVE TRAITS AND GRAIN PRODUCTIVITY IN GARDEN PEA (PISUM SATIVUM L.) .....</b>	<b>403</b>

<b>EFFECT OF HUMIC ACID APPLICATIONS ON TUBER QUALITY IN POTATO (<i>Solanum tuberosum</i> L.).....</b>	<b>404</b>
<b>PARTICIPANT LIST .....</b>	<b>405</b>
<b>AGRIBALKAN 2021 CONFERENCE STUDENT ORGANIZING TEAM .....</b>	<b>414</b>
<b>OUR SPONSORS .....</b>	<b>415</b>

# NEGATIVE EFFECTS OF GLOBAL WARMING AND CLIMATE CHANGE ON PLANT HEALTH

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## ABSTRACT

There are so many signs about negative effects of global warming and climate change over the world. Each living organism has different experiment under this new conditions. Many events such as drought, drying up of lakes, extreme temperature, floods, mucilage tell us to new living conditions although we are not used to, but from now on we have to get used to. The death of so many flamingos in Tuz Gölü (Salt Lake) in Konya province, the excessive flood and landslide in Black Sea, the drought in so any regions of Turkey especially South and Central Anatolia even East Anatolia Region due to the scarcity of water the loss of quality and yield in agriculture are clear examples of negative effect of global warming or climate change. Moreover, there are similar events in some Europe countries which tell us that floods, droughts and famines that in Africa and Asia would also be in other continents from now on. Therefore, all over the world is under the threat and under the risk of global warming. There has been yield and quality loss in so many cultivated plants such as cereal, fresh fruits, vegetables in 2021, due to unexpected drought (the lack of irrigation, rain and water). Only the yield loss in wheat production estimated at least two million tons, it means over 5 billion Turkish Lira. In addition, the yield loss in citrus, fruits, vegetables and other crops, could give us an idea to estimate how much we are under the risk of global warming. It could be tolerated for one year, however if this challenge continues for so many years, it would be main cause of so many economic and social trouble of many countries. It also will change the map of agriculture. While some countries will find new opportunities to produce and cultivate new productions even it was impossible before, some countries will not able to produce their main productions, although they could easily produce beforehand. Similar to human being, plants and animals' reactions to new challenging, unexpected conditions, which are much more different than before will change. While global warming is a big challenge and hard experiment for some organisms, it is a big opportunity to live, multiply and widespread for the others. Only increase of a degree temperature or a little bit of humidity change is enough to multiply in a short period for microorganisms such as viruses, bacteria and fungi including insects and weeds. It means that the list of main pest organisms will be changed and increased soon. In this case some new pest organisms will be challenge even they aren't a problem until now, or maybe some of them will be main pest even we have no any idea about them. In addition to drought and other problems, phytosanitary problems such as; combating against new diseases and pests, will increase the negative effects of global warming and climate change even more dramatic. By using excessive and overuse pesticide will cause residue and resistance problems. New strategies, new studies should be carried out in order to establish a sustainable plant health system against global warming and climate change. Monitoring, surveys, control programs, technical instructions all should be updated according to new conditions. Technical staff should be educated, researchers and lecturer should investigate and share new developments in case of new pest organism. An effective and quick information system should be established among all stakeholders, and awareness of producers about new diseases and pests should be increased. By developing new early warning systems via artificial intelligence, it should be ensured that diseases and pests are

controlled at the right time before they widespread. With a comprehensive and sustainable action plan, the negative effects of climate change and global warming can be minimized. Thus, by correctly planning the pest management in wide areas, both successful control could be made and resistance and residue problem could be managed with the right method.

**Keywords:** Global warming, pest management, early warning system, plant health,

# THE IMPACT OF INTERNATIONAL TRADE ON FOOD SECURITY DURING THE PANDEMIC TIME COVID 19 IN KOSOVO

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## **ABSTRACT**

International food trade, in addition to being an economic activity, is also an activity deeply linked to food security, the well-being of the population and politics. The purpose of this study is to assess the impact of international trade on food security during the COVID 19 pandemic in Kosovo. Although trade in agricultural products during this period has been shown to be more flexible than trade in other commodities due to the essential nature of food products, additional disruptions in the supply chain can start and undermine this sustainability. Interruptions in food supply chains pose a risk to global and local food security, especially in Kosovo given that according to (Ask, 2020), trade in goods in 2019 represents a trade deficit of 3.113.34 billion euros. Despite the concluded trade agreements (CEFTA, SAA, FTA with Turkey), Kosovo continues to face a large negative trade balance, with an annual trade deficit that reached the value of over 3.1 billion euros in 2019, reflecting a low level of competition in domestic, and foreign markets and with a lack of product variety. Trade plays a crucial role in global food security. This point has been made by several international economic organizations and groups since the outbreak of COVID-19.

**Keywords:** International trade, food security, Covid 19, food, import-export, Kosovo

# DEVELOPING LEGUME FORAGE CROPS-BASED AGROECOSYSTEM

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## ABSTRACT

Legume crops (including legume forage crops) by the virtue of their intrinsic ability to fix atmospheric nitrogen are considered to add an additional sustainability to agro-ecosystem. Legumes are of great significance due to their high protein value benefitting both, human and animal health. The proposed review examines important approaches in the cultivation of legumes - alone and along with other non-leguminous crops based on experimental data accrued from the Institute of Forage Crops - Pleven, Bulgaria (43° 23'N, 24° 34'E, 230 m above sea level). Renewed preparedness is needed to sustain the agriculture through better use of natural resources and ensuring their use efficiency. During spring sowing, slow development and low competitiveness in perennial grasses and some legume forage crops are common in the first year, thereby, leading to low productivity swards. In order to use the land area more efficiently, better garnish the crops, to restore soil fertility, besides under-cover sowing of some perennial forage crops. We studied the effect of spring forage pea and vetch as cover crops of alfalfa pure sown and mixtures of alfalfa with cocksfoot (50: 50%) with reference to botanical composition and dry mass yield. With their nitrogen-fixing ability, cover crops imposed strong positive effect on alfalfa in the first year, enriching the soil with nitrogen input following the death and decomposition of nodules and root biomass in the following years. Such an arrangement resulted in higher weed competitiveness and dry matter productivity, and in mixtures, in an increase in the proportion of cocksfoot and dry matter productivity. Thus, sowing alfalfa under the cover of spring forage pea and vetch is a possible agro-technical possibility. Mixed cropping is more effective than pure grown, commonly used mixture contains cropping of alfalfa and cocksfoot. Under favorable conditions, dry mass obtained from it in sufficient quantity and with a balanced basic chemical composition. We studied smooth brome as a component of alfalfa and a possible alternative to cocksfoot. The dry mass yield from mixture of alfalfa with smooth brome (50:50%) was significantly higher than pure grown alfalfa, suggesting smooth brome as good alternative to cocksfoot. Subclover is an annual, but due to its self-seeding capacity, with a perennial behavior, its inclusion in the composition of grass mixtures improved all the land productivity traits, in addition to increasing the longevity of the stands. We studied the possibility of including subclover with a percentage of its sowing rate for self-seeding (25 and 50%) in the composition of alfalfa with cocksfoot mixture. Weeding and the possibility of obtaining more production with the inclusion of pasture species, but with haymaking direction, were monitored. Good tolerability between the two legumes has been reported. A higher dry mass yield and the most balanced basic chemical composition from alfalfa and from mixture of alfalfa with subclover was obtained, when 50% seeds were sown for self-seeding. Possible agro-technical measures and response of the concept of agriculture to ecologically oriented are the sowing of alfalfa under the cover of spring forage pea and vetch; the use of smooth brome as an alternative to cocksfoot as a grass component of alfalfa in mixtures; the inclusion of subclover with 50% of its sowing rate in the composition of mixtures of alfalfa with cocksfoot. Our studies, hence demonstrated the essential role of leguminous forage crops and mixtures in developing a sustainable production system.

**Key Words:** legumes, cover crops, pea, alfalfa, smooth brome, subclover

# DEFINING THE IDEAL GENOTYPE COMPONENT OF A MODERN CROP VARIETY

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## ABSTRACT

To define the ideal genotype component of a modern variety we should make a clear distinction between natural ecosystem and agroecosystem. In the first, plants struggle to survive within a community composed of different species and different genotypes within each species, thus competitive ability is of prime importance and natural selection acts on this requirement, i.e., for aggressiveness. In the agro-ecosystem, the ultimate goal is crop yield of genetically identical or similar plants in a regime where self-competition prevails and plants are further supported by applied inputs, thus breeding must focus on resource use efficiency and productivity. Because of the inverse relationship between yielding and competitive ability, there are two extreme types of ideotypes. At the one extreme is the strong competitor able to benefit when grow in competition but falling short in yielding capacity *per se*, that is the *aggressive ideotype* that reaches high crop yield only at high densities. At the other extreme is the weak competitor ideotype standing out for yielding capacity *per se*, that is the *productive ideotype*, that thanks to high plant yield efficiency allows crop spacing. At dense stand (under competition), the aggressive genotype dominates over the productive one, to fictitiously become selectable. The productive genotype becomes selectable only when it is widely separated to escape the obstructive influence of competition, ideally at the nil-competition regime. In the study, it is analyzed why we should seek for crop spacing via the productive ideotype: to cope with intra-crop variation, compensate for missing plants, induce the multigenotypic variety and counteract unpredictable stresses, expand the adoption of low-input agriculture and conserve natural resources and environment, and address the erratic optimum density and ensure efficient use of resources inter-seasonally. It is also analyzed why breeding should be conducted at the nil-competition regime: to cope with the confounding effects of competition in the recognition of the productive ideotype, maximize phenotypic differentiation and facilitate selection from the very early segregating generations, optimize heritability due to environmental variance and experimental designs that sample spatial heterogeneity, apply high selection pressure focusing exclusively on the productive ideotype, and avoid the risk of bias selection or loss of desired genotypes due to proximity to empty hills.

**Keywords:** Resource use efficiency, intra-crop competition, nil-competition

## **NEW APPROACH IN SUNFLOWER BREEDING, COMING FROM THE SEED MARKET REQUEST**

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### **ABSTRACT**

The beginning of scientifically grounded sunflower breeding date to 1912, when a program of varietal development was established. Under the leadership of V.S. Pustovoit, a method was developed for obtaining high-yielding varietal populations based on individual selection and seed reserve that is used through the selection cycle. Using this method, the oil content in seed was increased from 35% to 55%. Extensive genetic studies on sunflower inbreeding and heterosis were conducted in the second half of the 20th century by a large number of researchers. The first objectives in sunflower breeding programs place emphasis on high seed yield and high oil content. The selection must be targeted on genotypes with high oil content in kernels – to obtain a high oil yield per unit. For a successful realization of high yields, it is necessary to improve a range of properties and characteristics, such harvest index, resistance to biotic and abiotic stresses, earliness, adaptability. The increase in market segmentation has had a great impact on breeding goals in the last few years. In recent period, introgression of genes for herbicides resistance (imidazolinone and sulfonylurea) from wild *Helianthus* species has become a topical breeding objective for both oil and confectionery sunflower. Detection of genes for modified oil quality of sunflower and their introduction into productive genotypes are important objectives. The new mutant has a high oleic acid content or palmitic or stearic acid. Developing hybrids with modified tocopherols (alpha, beta, gamma and delta) is an important breeding objective because this feature may increase storage life of oil. Defining an ideal plant type, for specific agroecological conditions is also important in sunflower breeding.

**Keywords:** Sunflower, breeding, characteristics, selection, seed market

# THE DEVELOPMENT OF AQUACULTURE PRODUCTION AND SOME ARGUMENTS IN FISH GENETICS AND BIOTECHNOLOGY STUDIES IN ALBANIA

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## ABSTRACT

The expansion of the species structure, the application of intensive forms along with the semi-intensive ones and the inclusion of biotechnological practices in the Albanian aquaculture of the last three decades has created a new vision for this economic activity. In Albania the aquaculture economy, initially realized in semi-intensive systems, has started with rearing of common carp (beginning of the '60s of the last century) and has enriched species structure at the beginning of the '70s the involvement in the production of Chinese cyprinids, such as grass carp (*C. idella*), silver carp (*H. molitrix*), big-head carp (*A. nobilis*) and Wuchan bream (*M. amblycephala*). Prior to the 1990s, more than 25 cypriniculture farms were put into operation in Albania, mainly in the central and coastal regions of Albania, with a total area of over 800 ha. Intensive aquaculture started in Albania in the mid-1970s with the introduction of rainbow trout (*O. mykiss*). At the end of 2002 and during 2003, significant investments were made for the construction of a hatchery for production of fingerlings of Ohrid trout (*S. letnica*) in Lin (Pogradec). Beginning from the mid-1990s, in a large part of the country, numerous private plants were put into operation, mainly with family administration for the cultivation of rainbow trout. Semi-intensive mariculture in Albania has its beginnings in the mid-90s with the Kavaja farm for the cultivation of the sea shrimp of the species *Marsupenaeus japonicus*. Not too long ago, starting from Bay of Valona to the southern edge of the Albanian coast several intensive swimming plants (about ten private enterprises with a total area of 8000 m<sup>2</sup>) have been put into operation for the cultivation of marine ichthyc species, sea bream (*Sparus aurata*) and sea bass (*Dicentrarchus labrax*). The topic of studies in the fields of fish genetics and biotechnology has been generally related to specific problems of aquaculture in Albania. The species included in the studies were carp, rainbow trout and alloctonic cyprinids, the reproduction of which is realized by applying hypophysation. It is worth mentioning topics such as: a. Evaluations on triploid hybrids, obtained by crossing the "rainbow" trout with the "wild" trout (*S. trutta fario*); b. Biotechnological interventions aimed at increasing the efficiency of hypophysation during hormonal stimulation of reproduction in alloctonic cyprinides; c. Analysis of the impact of geographical variability of environmental factors on the variability of meristematic and morphometric features of carp (*C. carpio*); d. Genetic determination of reductive evolution for carp scaly cover; e. The role of the moment of realization of hormonal stimulation on the duration of the latency time to reproducers of grass carp (*C. idella*). This theme is realized by the research staffs of the Department of Biotechnology at the University of Tirana and by the Department of Aquaculture and Fisheries at the Agricultural University of Tirana.

**Keywords:** Albanian aquaculture, Chinese cyprinids, rainbow trout, sea shrimp, marine ichthyc species, fish genetics, biotechnology studies

# EVALUATING COMMERCIAL BERRY JAMS FOR THE PRESENCE OF POLYPHENOLS IN SAMSUN AREA

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## **ABSTRACT**

Biologically active components such as polyphenols are becoming an area of interest in the research of many scientists. Furthermore, polyphenols have a very important role as functional foods in our nutrition having many effects on prevention and protection from several specific diseases i.e. certain polyphenols can stop several diseases' development via certain mechanisms. Berries are rich in the content of polyphenols. Due to the stated facts, berries are recommended for regular consumption. At the same time, fresh berries are subject to rapid deterioration and, consequently, they are generally processed into different kinds of products to extend their shelf-life and made easily accessible all year round. Customers are more likely to buy commercial fruit products than to make them at home, so the purpose of this paper was to estimate the amount of polyphenolic content in four different kinds of jams of fruit from locations 'Samsun', Black sea region Turkey. Individual polyphenols were detected and quantified by Ultra-Fast Liquid Chromatography (UFLC) technique. Most of the analyzed polyphenol compounds were detected in the blueberry jam sample.

**Keywords:** Berry Jam, Polyphenols, Disease control, Samsun

# BIOACTIVITY OF ESSENTIAL OILS FROM *LAURUS NOBILIS* BY THE EVALUATION OF THE ACARICIDAL EFFECT ON VARROASIS

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## ABSTRACT

Beekeeping appears to be increasingly threatened worldwide with a multifactorial origin (diseases, parasites, pesticides, climatic factors). Among the biological agents involved, the *Varroa destructor* parasite seems to be responsible for a large part of the collapses and mortalities of the bee colonies it infests. This parasite is probably the one with the strongest economic impact both in weakening the beekeeping sector and also indirectly in reducing the yields of pollen-dependent crop production, the main being the honey bee *Apis mellifera*. To do this in the field of hygiene and prophylaxis of this insect requires or even requires draconian methods of control among which the use of natural acaricidal molecules. Our experimental work revolves around two aspects, mainly honey bees and bee products. Our results show that the mite closely follows the development of its host. To control this parasite, we studied the acaricidal effect of essential oils from *Laurus nobilis*. To determine the efficacy of this treatment, we performed Apiguard. The results obtained showed that this plant not gave 100% efficacy because of the presence of the brood, but in the light of our results, It is clear that this essential oils have shown appreciable results and appear to have greatly reduced the final infestation rate to 0,6% for laurel Which is not negligible. The untreated control batch had a fairly large natural mortality of varroa, the infestation rate rose from 33, 24% to 22.1% during the treatment period.

**Keywords:** Beekeeping, *Apis mellifera*, *Varroa destructor*, treatment, essential oils, Apiguard, *Laurus nobilis*, efficiency.

# THE AMELIORATIVE EFFECTS OF ROSMARINUS OFFICINALIS AGAINST ALUMINIUM NEUROTOXICITY IN YOUNG RATS BRAIN: HISTOLOGICAL AND BIOCHEMICAL STUDIES

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## ABSTRACT

**Objective / Purpose:** Medicinal and aromatic plants are plants that are used as medicines to maintain health, to cure or prevent diseases; and their therapeutic use goes back a long time in human history. *Rosmarinus officinalis* L. is one of the most important plants used in traditional Mediterranean diet and medicine, because of its high antioxidant activity and phenolic content. The Aim of this study is designed to investigate the neuroprotective effect of the Aqueous Extract of Rosemary (AER) deleterious effects caused by the toxicity of aluminum (AlCl<sub>3</sub>) in young rat brain.

**Material and Methods:** AlCl<sub>3</sub> was administered intraperitoneally (at 60 mg/kg body weight, one times a week) and AER was given orally by gavage at a daily dose (150 mg/kg body weight/day) to rats for 6weeks of experimentation.

**Results:** AlCl<sub>3</sub> caused a deficit of memory performances, a significant decrease of Acetylcholinesterase(AchE) activity and increase lipid peroxidation levels Thiobarbituric-acidreactive substances (TBARS).in addition, the histological study revealed that Al induce Necrosis with neurotic plaques, fibrosis and vacuolated cellules compared to control in the cerebral cortex and Many granular cells appeared smaller with dark cytoplasm and small condensed nuclei (apoptotic), shrinkage of the granular layer (decrease in the number of granular cells), formation of dilated blood vessels in the dentate gyrus region of hippocampus. However, treatment with AER allowed recovering their working memory, with increase of AchE activity and a decreased significantly TBARS and increased the number of cell units with a reduction in neuronal death, the absence of fibrosis and the presence of persistent vacuolated neuronal cells in the cerebral cortex; moreover, in the dentate gyrus region of the hippocampus, we observed An increase in the thickness of the granular layer with fewer apoptotic cells, formation of dilated blood vessels.

**Conclusion / Discussion:** Our findings suggested that aqueous extract of rosemary could improvement the memory which can be partially explained by its decrease of AChE activity in rat brain; and also could to restore the neuronal degeneration induced by toxicity of Aluminium due to its antioxidant activities.

**Keywords:** Aluminium, *rosmarinus officinalis*, memory, acetylcholinesterase, tbars, cerebral cortex, dentate gyrus

## SURVEY ON FEMALE CAMEL REPRODUCTIVE TRAITS AMONG PASTORAL HERDS AT THE SOUTH EASTERN OF ALGERIA

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### ABSTRACT

The classic hyper-extensive mode of camel breeding is undergoing a shift towards intensification, resulting in new practices around several aspects. However, camel calves production remains the primary purpose in pastoral farming. In this regard, some reproductive traits had been studied based on commemoratives of 50 female camels that were collected thought progeny history testing in 10 pastoral camel livestock. This survey indicated that camels conceived and calved during the same season with high incidence between December-January and the postpartum estrus interval was  $7.80\pm 4.95$  months. Age (months) at first estrus and first mating female camels were, respectively,  $27.36\pm 11.52$  and  $30.72\pm 10.92$ . Age (months) at the first calving and calving interval were  $45.72\pm 14.40$  and  $22.92\pm 8.16$ , respectively. The average annual fertility of the studied herds was 52% and the average culling age was 23.3 years. The number of calves per age was  $7.38\pm 2.50$ . These results show decreased levels of camel herd's fecundity and fertility, which make breeding less profitable and reduces opportunities for genetic improvement. The classic hyper-extensive mode of camel breeding is undergoing a shift towards intensification, resulting in new practices around several aspects. However, camel calves production remains the primary purpose in pastoral farming. In this regard, some reproductive traits had been studied based on commemoratives of 50 female camels that were collected thought progeny history testing in 10 pastoral camel livestock. This survey indicated that camels conceived and calved during the same season with high incidence between December-January and the postpartum estrus interval was  $7.80\pm 4.95$  months. Age (months) at first estrus and first mating female camels were, respectively,  $27.36\pm 11.52$  and  $30.72\pm 10.92$ . Age (months) at the first calving and calving interval were  $45.72\pm 14.40$  and  $22.92\pm 8.16$ , respectively. The average annual fertility of the studied herds was 52% and the average culling age was 23.3 years. The number of calves per age was  $7.38\pm 2.50$ . These results show decreased levels of camel herd's fecundity and fertility, which make breeding less profitable and reduces opportunities for genetic improvement.

**Keywords:** Algeria, camel, fecundity, fertility, livestock system, reproduction.

## CONTRIBUTION TO THE STUDY OF ANTIMICROBIAL RESISTANCE PROFILES OF *E. COLI* IN POULTRY IN ALGERIA

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### ABSTRACT

*Colibacillosis* are surely the most frequent and important bacterial infections in avian pathologies. Avian *E. coli* is currently one of the most important causes of seizure in poultry slaughterhouses. Our study was conducted on 31 strains of *E. coli* isolated in the province of Tissemsilt (western region of Algeria), aims to estimate the magnitude of antimicrobial resistance and to contribute to the study of *E. coli* antimicrobial resistance profiles. Evaluation of the resistance of *E. coli* to antibiotics was carried out by the Mueller-Hinton (MH) agar diffusion method according to NCCLS (National Committee for Clinical Laboratory standards). Our results showed a very high resistance rate of 100 %; all strains were multiresistant (resistance to at least 4 antibiotics). There was a 100 % resistance to Ampicillin, Amoxicillin/Clavulanic acid and Nalidixic acid. Resistance was also found at 96.77 %, 77.4 %, 71 % and 67.74 %, towards Amoxicillin, Doxycycline, Trimethoprim-Sulfamethoxazole and Tetracycline, respectively. Eleven different antibiotypes were reported. Fronting to the perennial increase in antimicrobial resistance in avian pathologies, a surveillance plan must be established and respected.

**Keywords:** *Colibacillosis*, *e. coli*, antimicrobial resistance, poltry

## RETROSPECTIVE STUDY OF THE EPIDEMIOLOGICAL SITUATION OF ANIMAL BRUCELLOSIS IN THE WILAYA OF BÉJAIA

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### ABSTRACT

Brucellosis is an infectious, contagious disease of bacterial origin. It can have serious consequences for human health and the economy of a country. In Algeria, no region is untouched by this disease, which continues to spread and to be enzootically rampant in different animal populations. It is in this context that a collection of statistical data on animal brucellosis in the Bejaïa region was carried out, calculating the prevalence and incidence of this disease during the period 2009 to 2019. Our retrospective study has shown that the frequency of this disease is very high, around 69% and IC (95%): [64% - 74%]. The highest number of cases of animal brucellosis was recorded in 2015 with 163 cases (22.39%) and the number of positive contaminated site is 72 Householder (17.56%). Brucellosis occurs throughout the year, with a very high rate in the months of March and April when it reaches a peak of 77 cases (11.31%) in 44 Householder. For the seasonal distribution of animal brucellosis, the disease reaches its peak in spring with 209 cases (30.69%) in 122 Householder. Among 52 municipalises, 79% are affected. The municipalities of El kseur and Amizour are the most affected with 100 cases (13.74%) in 41 Householder and 69 cases (9.48%) in 55 Householder respectively. Animal brucellosis affected (90%) of the 19 daïra of the wilaya of Bejaia. The results show that the most affected daïra is El Kseur with 136 cases (18.68%) of animal brucellosis in 62 Householder.

**Keywords:** Bejaia, animal brucellosis, householder, prevalence

# OVERVIEW OF THE IMPACT OF COCCIDIOSIS ON SOME PARAMETERS IN A DOMESTIC QUAIL FARM COTURNIX JAPONICA (AVES, PHASIANIDAE) IN ALGERIA

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## ABSTRACT

Coccidiosis is a very common intestinal parasitic disease caused by a worldwide distributed protozoan of the genus *Eimeria*. This disease is very common in young birds beyond the second week of life, especially in land-based breeding. The study was carried out in a hunting center of Zeralda located in the north-east of Algiers. The objective of our work is to study the evolution of coccidiosis in quails from 1 to 35 days old by collecting their droppings daily. These are analyzed in the laboratory using the flotation method and the Mac Master one to count coccidia. Weight changes are taken into account as well as mortality in parallel with certain zootechnical parameters such as density. The species of coccidia recovered is *Eimeria coturnicis*. The results showed that there is an average evolution of mortality of individuals with a rate of 13.33% due to the presence of coccidia with a significant regression ( $P=0.031$ ). The weight of the quails increases with the age of the animal with a rapid growth rate from the 3rd week onwards. Indeed, the statistical analysis reveals that the evolution of the number of *E. coturnicis* did not affect the evolution of the weight ( $P=0.70$ ) and the GMQ ( $R=0.52$ ) of quails.

**Keywords:** coturnix japonica, coccidiosis, mortality, density, average gain quotient

# EFFECT OF THE AGE OF BREEDING FEMALES ON THE EGG BIOMETRY OF THE PARTRIDGE GAMBRA ALECTORIS BARBARA (PHASIANIDAE, AVES) IN ALGERIA

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## ABSTRACT

The present study was conducted at the Zéralda hunting centre on two different batches of Partridge gabra. The work carried out investigates the effect of the age of breeding partridges on the biometric characteristics of the eggs. In lot 1 (N= 180), the age of the Partridges is two years. Lot 2 (N= 625), is the progeny of the partridges from lot 1. Weighing and measuring of the eggs of both lots shows that the average weight of the eggs of lot 1 ( $21.34 \pm 1.68$  g) is higher than the weight of the eggs of lot 2 ( $20.39 \pm 1.61$  g). The same applies to the egg measurements. The analysis of variance shows a highly significant difference between the weights and measurements of the eggs of the two batches  $p < 0.05$ . For the other indices, the ANOVA test shows that there is no significant difference between the shell index, shape index, density and water loss of the eggs of the two batches  $p > 0.05$ . On the other hand, it shows a significant difference between the egg volumes of the two batches with  $19.65 \pm 3.49$  cm<sup>3</sup> for batch 1 and  $18.92 \pm 2.53$  cm<sup>3</sup> for batch 2 ( $P < 0.0001$ ). The results obtained concluded that the Partridge gabra of lot 1, although older, had good production and physical characteristics of the eggs laid and were competitive with the Partridges of lot 2.

**Keywords:** partridge gabra, egg biometrics, the comparison test (ANOVA)

# THE EFFECTS OF THYM OIL (THYMOL) ON HONEY BEE COLONIES AND EVALUATION OF THE EFFICACY ON THE PARASITE OF THE VARROA DESTRUCTOR BEE

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## ABSTRACT

Varroasis is one of the most dangerous pathologies of honey bees, it is one of the major concerns of the beekeeper in Algeria. In front of the phenomenon of resistance of varroa to chemical molecules, it seems interesting other alternative biological treatments. Thymol or Thyme oil is one of the molecules known for their effectiveness in the fight against varroasis. The objective of this study is to assess the effectiveness of this treatment under local Algerian conditions and to estimate the side effects of this molecule on bees. The experiment was carried out in several apiaries of beekeepers located in the central region of Algeria (Blida, Bouira and Tizi Ouzou). An extraction of thyme oil was carried out in the laboratory a few days before the field test. The treatment method consists in putting a sheet of cardboard in a thymol / ethanol mixture (50/50) for 10 minutes and then directly putting these cartons in numbers on the frames by reversing the feeders. The treatment was carried out on two applications at an interval of one week. The results obtained show a wide variation in efficiency (between 56 -91%). Indeed, the problem with thymol is its variable evaporation rate depending on the temperature, which influences the effectiveness of the treatment. Several side effects appeared in the colonies such as two cases of desertion, a cessation of brood production for three colonies; other tests are necessary in the future to integrate the thymol in a support which controls its evaporation, it is also essential to optimize the duration and the dose of the product according to the temperature and the regions.

Varroasis is one of the most dangerous pathologies of honey bees, it is one of the major concerns of the beekeeper in Algeria. In front of the phenomenon of resistance of varroa to chemical molecules, it seems interesting other alternative biological treatments. Thymol or Thyme oil is one of the molecules known for their effectiveness in the fight against varroasis. The objective of this study is to assess the effectiveness of this treatment under local Algerian conditions and to estimate the side effects of this molecule on bees. The experiment was carried out in several apiaries of beekeepers located in the central region of Algeria (Blida, Bouira and Tizi Ouzou). An extraction of thyme oil was carried out in the laboratory a few days before the field test. The treatment method consists in putting a sheet of cardboard in a thymol / ethanol mixture (50/50) for 10 minutes and then directly putting these cartons in numbers on the frames by reversing the feeders. The treatment was carried out on two applications at an interval of one week. The results obtained show a wide variation in efficiency (between 56 -91%). Indeed, the problem with thymol is its variable evaporation rate depending on the temperature, which influences the effectiveness of the treatment. Several side effects appeared in the colonies such as two cases of desertion, a cessation of brood production for three colonies; other tests are necessary in the future to integrate the thymol in a support which controls its evaporation, it is also essential to optimize the duration and the dose of the product according to the temperature and the regions.

**Keywords:** Honey bee, thymol, varroa destructor, side effects

# MASTITIS DIAGNOSIS IN ALGERIAN DAIRY CATTLE FARMS

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## **ABSTRACT**

Mastitis is the most common infectious disease in dairy cattle farming. They are responsible for the quantitative and qualitative deterioration of the milk produced. Although several methods have been developed for the diagnosis of sub-clinical mastitis, the California Mastitis Test (CMT) is a rapid and reliable test for determining of somatic cell concentration in milk and therefore, the identification of unhealthy milk. The objective of this study is to evaluate the mammary health status of cows, based on the individual cell count (ICC) of milk explained by the Californian Mastitis Test (CMT) score. A total of 280 udders from 12 farms in the central region of Algeria were examined, over a period of one year starting in October 2016. The mammary health diagnosis has divided the milk samples collected according to the results of the individual cell count in two groups: the first has 55% of the udders considered as healthy. The second group includes 45% infected udders, 40% diagnosed with sub-clinical mastitis. However, about 5% of infected cows with clinical mastitis showed cell levels > 5 million / ml indicating a very alarming epidemiological situation. The results obtained vary from one farm to another and within the same farm, depending on the diversity of hygiene practices ( $P < 0.05$ ). The work carried out shows that the presence of cells in milk can affect the hygienic quality of milk and that good farming practices are necessary in order to maintain the safety of the product.

**Keywords:** Cell count; individual milk; CMT; mastitis; Algeria

**TREND ANALYSIS FOR THE GLOBAL FISHERY AND AQUACULTURE  
PRODUCTION OF THE GROOVED CARPET SHELL *RUDITAPES DECUSSATUS*  
(LINNAEUS, 1758) (MOLLUSCA: BIVALVIA)**

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**ABSTRACT**

The grooved carpet shell *Ruditapes decussatus* (Linnaeus, 1758) is one of the most popular molluscs of coastal and lagoon areas in the Mediterranean. It is cultured in the Mediterranean basin and the Atlantic coast of Portugal, Spain and France while it is mostly harvesting in France and Spain. It is collected for a long time as a food source since it has a high commercial value in Spain, Portugal, Italy, and Morocco. Therefore, it is an important species for fishery and aquaculture in addition to being used for the assessment of environmental quality in the regions where it is grown. Due to its high economic value and importance in fisheries and aquaculture, the trends in global fishery and aquaculture production should be monitored. This study aimed to analyse the trends in the global capture and aquaculture production of the grooved carpet shell, *R. decussatus*. The data set covers 70 years between 1950 and 2019 for the global capture production and 39 years between 1981 and 2019 for the global aquaculture production of *R. decussatus*. The results of the trend analysis for both global fishery and aquaculture production pointed out that both productions of the grooved carpet shell have a decreasing trend. Moreover, trend analysis outputs forecasted decreasing trends for the future period. Therefore, the fishery production of the grooved carpet shell should be planned and managed for sustainable fishery and aquaculture production.

**Keywords:** Trend analysis, forecasting, fisheries, production, bivalve

# STUDY OF THE INTESTINAL PARASITES OF THE CUFF SHEEP AMMOTRAGUS LERVIA AT THE LEVEL OF THE DJELFA HUNTING RESERVE

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## ABSTRACT

The present study is carried out in the Djelfa hunting reserve. The goal is to make an inventory of endoparasites that can affect the Barbary sheep. The Djelfa hunting reserve is located in the town of Ain Maâbed in the Séhary Guebli forest, 280km south of Algiers. It covers an area of 31866.25 ha. It belongs to the semi-arid cold winter bioclimatic stage. Fresh mouflon droppings are collected over two periods. The first runs from September 15, 2016 until April 15, 2017 and the second runs from January 20 until September 14, 2018, with 4 outings per month. Each jar is filled with a preservative solution, potassium dichromate K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, in order to preserve droppings and possible parasites. The coproscopic method used is that of the flotation. 12 species of parasites were identified during the first period and 7 species during the second period, belonging to protozoa, nematodes, cestodes, trematodes and arthropods. Among the parasites, *Nematodirus* sp. is well represented.

**Keywords:** Barbary sheep, endoparasites, flotation, nematodirus sp., djelfa hunting reserve

## DETERMINATION OF NOSEMA SPORES IN THE BEE CAKES

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### ABSTRACT

Today, honey bees are faced with many pathogens that threaten their health both at the individual and colony level. *Nosema* disease is the first place among these pathogens. The nosema spores could be transmitted to honey bee by contact with the feces of other infected bees, infected water and pollen as well. The spores can be infected honey bee products such as honey, beeswax, royal jelly, pollen and perga with supplementary feeding materials and through trophylaxis. The aimed to the study was to determine the *Nosema* spores from bee cakes. In the study, 69 bee cakes were tested from twenty-three different enterprises. *Nosema* spores were detected from 56.5% of bee cakes. These results showed that the cakes used as supplementary feeding pose an infection risk for honey bees. It is strongly recommended that the bee cake producers must test the honey and pollen for diseases, they use in cake making.

**Keywords:** Honey bee, supplementary feeding, bee cake, *Nosema* spores

# THE INFLUENCE OF THE COMPOUND FEED SUPPLEMENTATION WITH FISHMEAL ON RAISING PERFORMANCE DURING THE 1-42 DAYS OF BROWN JUMBO QUAILS

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## ABSTRACT

In order to establish the effect of supplementation the compound feed with fishmeal on the raising performance of youth breeding brown Jumbo quails (especially in the consumption of the compound feed) in the period 1 - 42 days of age, an experiment was established in a total number of 300 quail chicks divided into two groups (150 quail chicks/group). At the age of 42 days the average weight of the chickens in the experimental group was 245.55 g/head, while in the chickens of the control group it was 225.25 g/head. The average daily gain during the 0 - 6 weeks was 236.00 g/head in the experimental group and 215.90 g/head in the control group. The specific consumption of the compound feed was lower nu 32.17 %, 3.959 g c.f./g gain in the experimental group, while in the control group was of 5.837 g c.f./g gain. Research has shown that the growth performance of the group that received compound feed with fishmeal supplement was superior that of the control group.

**Keywords:** Quails, meat, growth, compound feed, fishmeal

## FISH LICE AFFECTING AQUARIUM FISHES

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### ABSTRACT

Fish lice are among branchiuran crustaceans, fish lice are the animals reported to parasitize both marine and freshwater fishes. *Argulus* spp may be a chief hazard to fish wellbeing, as substantial invasions can be a reason of significant injury and mortality. In addition, fish lice are commonly known to be the reason for other fish infections. During different rounds, *Argulus* spp was poised from the caudal and anal fins of aquarium fishes including goldfish (*Carassius auratus*). These goldfish may be asymptomatic, and no surplus cases may be celebrated after manual removal of the lice. As soon as any *Argulus* animals are recognized, control, management and cure may be recommended because contagions can intensify promptly. Currently, there are no FDA-approved medications for the control and handling of this parasite, but numerous compounds and medicines as well as organophosphates and diflubenzuron have been used with achievement. The transmission and isolation of inward bound fish is the best way to avoid an admission of *Argulus* swarm.

**Keywords:** Aquarium, argulus, gold fish, disease, parasites

# THE PREVALENCE OF NOSEMOSIS IN HONEY BEE COLONIES IN SOME REGIONS OF CENTRAL ALGERIA

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## **ABSTRACT**

The bee is an essential part of the environmental balance in the world as a pollinator of many species. It also has other interests including the production of honey, propolis, royal jelly and wax. Unfortunately, this species is threatened by several factors, the most important of which is the presence of pathogens that cause pathologies in the colonies. One of the most dangerous conditions is nosemosis. The interest of this present work is to assess the health situation of bee colonies in some regions of central Algeria (Boumerdes, Bouira and Blida). The comparison of the prevalence shows that the apiaries located in the Boumerdès area have the highest rate of infestation (21%). This high prevalence of nosemosis in this area is linked to particular climatic conditions such as the presence of high humidity and a long cold period. Symptoms have been detected in a few apiaries, but no correlation exists between the presence of the signs and the rate of contamination.

**Keywords:** Bee-nosemosis-center of algeria-prevalence-climate.

# A RESEARCH ON PRODUCTION AND PROBLEMS IN FEED FACTORIES: THE CASE OF DIYARBAKIR

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## ABSTRACT

The present study aimed to reveal the status of feed factories in Diyarbakır in 2021. The study is of importance as it will create an important record in terms of determining the status of feed factories in Diyarbakır in the second year of the Covid-19 pandemic, which started in 2020 and continues. In the present study, a survey-based method of obtaining data was adopted to determine the status and problems of feed factories. The material of the study comprised the answers given to 58 questions in the forms that were the subject of a face-to-face survey with the representatives of mixed feed factories operating in Diyarbakır. With the survey, financial status, structural features, personnel, production, raw material, and marketing status of the factories were determined. It has been reported in the official records of Diyarbakır that there are 11 active factories in the province. However, 8 active factories were determined operating in the province as of April 2021 during the visits and interviews based on the address, and six of them participated in the survey. Frequency tables were analyzed using the SPSS package program. Among the findings obtained in this study, three of the feed factories in Diyarbakır suspended their activities due to the Covid-19 pandemic. The problems faced by the factories were determined as follows: The number of personnel employed in factories is high. The capacity utilization rates of the factories are low. A significant part of the raw materials used in feed production is supplied from outside the region and/or abroad. There are significant problems in marketing and collection. Some of these problems are related to the pandemic. The use of professional approaches in the preparation of ration formulations is limited. The product variety produced by the factories is low. Since Turkey is a net importer of feed raw materials and animal feed, feed factory owners, managers, and personnel need to learn and implement rational production practices and raw material production should be increased.

**Keywords:** Production, problems, feed, factories

# MULTIPARASITISM INVOLVING EUSTRONGYLIDES SPP. IN THE WILD FISH POPULATIONS INHABITING THE DANUBE DELTA BIOSPHERE RESERVE

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## ABSTRACT

Infestations with *Eustrongylides* spp. have been reported in marine, brackish and freshwater fish. Eustrongylides is present in many aquatic species and can transmit to humans, being of seafood safety and public health concern [20, 25, and 27]. In a cross-sectional study investigating the epizootology of fish eustrongylidosis, four parasite species were found co-existing with the nematode, in perch (*Perca fluviatilis*), (prevalence = 10.14 %) and rudd (*Scardinius erythrophthalmus*), (prevalence = 0.70 %). The concurrent parasites were: *Myxobolus* spp., *Posthodiplostomum cuticola*, *Triaenophorus* spp. and *Piscicola* spp. The other six fish species investigated, *Silurus glanis*, *Esox lucius*, *Stizostedion lucioperca*, *Leuciscus leuciscus*, *Lepomis gibbosus* and *Anguilla anguilla*, did not present signs of concurrent infestations. We used cluster and multi-stage sampling. Multiparasitism was observed in all sampling sites, indicating that the differences between these aquasystems may not have influenced the occurrence and/or frequency of the concurrent infestations. Differences between aqua systems and some fish characteristics are briefly discussed in this study. The article presents the cases found, with some allegations on the outcome and possible exposures.

**Keywords:** Multiparasitism, freshwater fish, eustrongylides spp., myxobolus spp., triaenophorus spp., piscicola spp., posthodiplostomum cuticola

# THE BOLA-DRB3 GENE HSP70.1 GENE: AN OVERVIEW OF ITS MECHANISMS OF ACTION AND ITS RELEVANCE TO LIVESTOCK ANIMALS IN TERMS OF DISEASE RESISTANCE AND THERMOTOLERANS

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## ABSTRACT

Excessive increase in temperature due to global warming causes yield losses and the spread of diseases in animals. High temperatures cause an increase in oxidative damage which too negatively affects the immune system. It has been reported that the heat shock proteins (HSPs) most sensitive to heat stress are the HSP70 (Hsp70.1 ve Hsp70.2) protein family located on chromosome 23. HSP is known to protect cells from various stress factors. Researchers working to elucidate the molecular mechanism of disease resistance in cattle show great interest in the bovine Major Histocompatible Complex (MHC). Polymorphisms in the BoLA-DRB3 gene which attracts great attention in the field of animal breeding are used to increase disease resistance in farm animals. BoLA (bovine leukocyte antigen) gene located on chromosome 23 includes 3 classes (I, II, III), and researches are especially concentrated in exon 2 of class II DRB3 locus (BoLA-DRB3.2). In studies on cattle, BoLA-DRB3.2 and HSP70.1 polymorphisms and frequencies were found to be quite different between breeds. It is very important to develop genotypes that are more resistant to environmental stress factors, have strong adaptability, and have high thermotolerance through genetic selection in farm animals.

**Keywords:** Bovine, thermotolerance, polymorphism, bola-drb3.2 gene, hsp70.1 gene

# **DISTRIBUTION OF NOSEMA SP (CAUSES AGENT OF NOSEMOSIS IN HONEY BEES) IN SOME APIARIES IN ALGERIA**

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## **ABSTRACT**

The bee is an essential part of the environmental balance in the world as a pollinator of many species. It also has other interests including the production of honey, propolis, royal jelly and wax. Unfortunately, this species is threatened by several factors, the most important of which is the presence of pathogens that cause pathologies in the colonies. One of the most dangerous conditions is nosemosis. The interest of this present work is to assess the health situation of bee colonies in some regions of central Algeria (Boumerdes, Bouira and Blida). The comparison of the prevalence shows that the apiaries located in the Boumerdès area have the highest rate of infestation (21%). This high prevalence of nosemosis in this area is linked to particular climatic conditions such as the presence of high humidity and a long cold period. Symptoms have been detected in a few apiaries, but no correlation exists between the presence of the signs and the rate of contamination.

**Keywords:** Bee-nosemosis, center of Algeria, prevalence, climate

# CURRENT POSSIBILITIES OF MICRO MINERAL USE IN LAYING HEN DIETS: A REVIEW

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## ABSTRACT

Today's laying hens have been bred for rapid growth, low feed conversion ratio and high egg production. In order to make progress in this framework, it was necessary to learn the nutritional needs of laying hens in more detail. Micro-minerals are also used to make the laying hens healthier and better performance r. In this context, micro-minerals such as Selenium (Se), Zinc (Zn), Copper (Cu), Iron (Fe) and Manganese (Mn), which have a small amount but a great effect on metabolism, are used in the nutrition of laying hens. These minerals play unique and comprehensive roles in important biological processes such as, oxidative stress protection, antimicrobial, antimutagenic, immune system regulation, and growth, respectively. The use of minerals with high bioavailability, especially during the egg-laying period, not only reduces oxidative stress but also increases the performance of layers. Micro mineral application with in ovo method also contributes positively to the embryonic period and post-incubation development of the chick. The aim of this review is to bring together general information about micro minerals and current literature on the use of micro minerals in laying hen diets in recent years.

**Keywords:** Bioavailability, egg yield, laying hen, metabolism, micro mineral, performance

# USE OF VITAMINS IN LAYING HEN DIETS WITH CURRENT APPROACHES: A REVIEW

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## ABSTRACT

Vitamins perform several functions in a reduction in the risk of disease, maintenance of good health and are essential for growth and metabolism. The vitamins are of two types, one is fat-soluble (vitamin A, D, E, and K) and the other is water-soluble (vitamin B complex group and vitamin C). Vitamins have a positive effect on the growth, development of reproductive organs, egg production and egg quality for laying hens. In addition to these basic roles, vitamins A, D, E play critical roles in immune system development, antioxidant effects and have important role development and eggshell formation. Choline folic acid and biotin are participates in improving protein biosynthesis which is essential for egg production. Meanwhile, inositol induce glucose as the energy supply for laying production PABA is neither essential nor biosynthesized in mammals and human. . Pyridoxine participates in phosphorylation reactions in liver with niacin and riboflavin. This review is divided into sections on the different vitamins with a description of its role in laying hens. Then, there is a discussion of various studies applying different vitamin levels effects on production parameters, egg quality, and the immune system of the laying hens.

**Keywords:** Egg production, egg quality, immunity, laying hens, vitamin

# THE EFFICACY OF BENTONITE FEED ADDITIVES IN IMPROVING LAYING HENS PERFORMANCE AND EGG QUALITY: A REVIEW

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## **ABSTRACT**

This review aimed to discuss the effect of dietary bentonite as feed additives on laying hens performance and egg qualities. The prohibition of antibiotics use could potentially have several negative effects on the animals, such as slower growth, lower egg production, higher illness rate, and death rate. Bentonite has been evaluated as alternatives to antibiotic growth promoters for maintaining poultry health and improving productivity. The main benefits of bentonite are its low cost, safety, and convenience of use in animal feed. Bentonite is natural clays with a high water absorption capacity that is formed by the devitrification of volcanic ash. The efficacy of bentonite was revealed by numerous studies through several mechanisms including 1) increasing nutrient digestibility, and digestive enzymes in the gastrointestinal tract; 2) enhancing intestinal health by improving villus height and surface area of the jejunum which indicate a greater nutrients absorption. 3) providing necessary minerals such as calcium, magnesium, iron, iodine, selenium, and zinc, all of to promote the activity of enzymes and hormones for supporting the performance; 4) absorbing the aflatoxins that lead to liver damage, eliminate several enzymes activity and decrease the immune system. However, to ensure the safety for all animal species in terms of medicinal component binding and effectiveness, the EFSA recommends a maximum bentonite use of 20 g/kg in the diet.

**Keywords:** Bentonite, eggshell, egg production, laying hens.

# CURRENT POSSIBILITIES OF MACROMINERAL USE IN LAYING HEN DIETS: A REVIEW

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## **ABSTRACT**

His review aimed to discuss the strategies of macrominerals use in current laying hen studies, including the effects on performance and metabolic status, as well as requirement, metabolism, bioavailability, absorption, and excretion. In laying hens, calcium (Ca), phosphorus (P), and magnesium (Mg) are essential minerals for growth, egg production, and formation of bone and eggshell. Meanwhile, sodium (Na), potassium (K), and chloride (Cl) have critical functions including controlling body osmotic pressure and water distribution, maintaining proper pH, regulating heart and other muscle function, and participating in oxidation-reduction processes. Also Sulfur (S) plays a variety of roles, including incorporation in amino acids, as well as enzymes and biomolecule metabolism. Deficiencies and excesses of certain elements in the diets of laying hens cause problems, mostly impacting performance, and egg quality. Thus, it is necessary to apply the strategies for supplying the minerals in modern laying hens to maintain their genetic improvement and prevent deficiency diseases in birds. The strategies can be implemented by providing sufficient and balanced minerals, using nanotechnology and organic forms such as metal ions with amino acid ligands, chelated amino acids, and proteinases, and also the use of enzymes like phytase to increase mineral bioavailability.

**Keywords:** Bioavailability, egg quality, laying hens, macromineral, performance

# COMPARISON OF PYROXASULFONE'S BIOREMEDIATION WITH SOME SOIL BACTERIA BASED ON CHEMICAL OXYGEN DEMAND AND ITS EFFECT ON MORTALITY ON DAPHNIA MAGNA

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## ABSTRACT

In this study, the environmental and toxic effects that may occur due to the use of herbicide with Pyroxasulfone active ingredient were minimized by bioremediation techniques, the removal rates of pollution were determined and the mortality (death rate) effect on *Daphnia magna* (water flea) was determined. In the study, removal experiments were carried out in solutions of herbicide containing Pyroxasulfone active ingredient prepared with some bacterial species in a liquid medium. The bacteria used were enriched and taken in required volumes and added to the solutions prepared based on the recommended concentrations of the herbicide with Pyroxasulfone active ingredient for use in agricultural areas. Chemical oxygen demand (COD) measurements were made in the solutions and the removal rates were compared on the basis of bacteria and mixtures of the pollutant. With the determination of the highest removal rates obtained, the death rates on *Daphnia magna* were determined with the samples taken. In the experimental studies, the COD removal percentages were determined over 80% and the reduction rates in the pollutant ratios in the medium differed according to the bacterial species in the prepared liquid medium. The bioremediation mechanism of the herbicide, which was monitored with important environmental parameters such as COD, decreased daily with some newly isolated bacteria and their mixtures, and mortality tests were performed with the environment where the highest reduction rate was observed for these parameters. In the environment where the most effective bioremediation rate was realized, a mortality effect of around 50% was detected on *daphnia magna*.

**Keywords:** Pyroxasulfone, bioremediation, daphnia magna, chemical oxygen demand

# HORMONAL AND BIOCHEMICAL PARAMETERS ANALYSIS OF THE YELD COWS BLOOD

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## ABSTRACT

The authors of this article selected animals with various pathologies of the reproductive system in order to study the hormonal and biochemical status of the yeld (infertile) cows. Further, groups were formed in accordance with the disease type. The experimental groups included clinically healthy fertilized animals and animals with a physiological ovary cycle. The authors of this article measured the levels of sex steroids, adrenal and thyroid hormones, and also determined the indices of the main metabolic processes, the levels of macro- and micronutrients, and vitamin A in the blood serum. Excluding the group of cows with luteal cysts, the infertile animals demonstrated a noticeable decrease in progesterone by 2.4-14.5 times. The yeld (infertile) cows without clinical changes in the genitals, cows with uterine subinvolution and ovarian hypofunction showed a markedly reduced (by 1.6-4.1 times) testosterone level in the blood. A decrease in the estradiol concentration was noted in all the studied groups, some animals demonstrated the deviations in the cortisol and triiodothyronine levels from the indices in the healthy cow groups. The hormonal status of the infertile animals indicated probable violations in the regulation systems of the endocrine glands, the initial links of which are the hypothalamus and pituitary gland. The biochemical blood characteristics, in turn, indicate that yeld (infertile) cows suffer from changes in metabolic processes, a macro- and micronutrients deficiency, especially the selenium deficiency. To restore the reproductive function, the use of hormone therapy in combination with additional sources of macro- and micronutrients is highly recommended.

**Keywords:** Hormones, reproductive system, cows

**THE EFFECTS OF ADDITION OF ORGANIC ACIDS AND SUCROSE TO THE DRINKING WATER OF BROILERS IN THE PRE-SLAUGHTER FEED WITHDRAWAL PERIOD ON PERFORMANCE AND NUMBER OF MICROORGANISMS**

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**ABSTRACT**

Pre-slaughter starvation ensures that the digestive tract is cleaned, minimizing contamination during processing and reducing the amount of undigested feed. As the crop empties during feed withdrawal, the development of lactic acid bacteria decreases and the pH of the crop rises, and this increase increases pathogens such as Salmonella. Most pathogenic bacteria are gram-negative and sensitive to acidic environments with a bacteriostatic effect. At pHs below 5, many pathogens remain stable, and when pH rises above 5, pathogenic bacteria begin to multiply. Birds can tolerate pH levels of 4-8 in drinking water and it is important to acidify the drinking water at the right amount in order to reach the ideal pH level of 4-4.5. In this study, the effects of adding organic acids and sucrose to broilers will be emphasized. It is recommended 620ad sucrose in order to prevent the loss of live weight during fasting and the reduction of darkness due to loss of hemoglobin in liver color. In this study the effects of adding organic acids and sucrose to broilers in combination will be discussed.

**Keywords:** Organic acids, sucrose, broiler, performance, microorganism number, pre-slaughter feed withdrawal

## USE OF ORGANICACIDS AS FEED ADDITIVES IN POULTRY FEED

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### **ABSTRACT**

Organic acids, which are formed by the oxidation of an aldehyde group, are either free or in the form of salts or esters in the structure of plants. They are also called carboxylic acids because of the presence of a carboxyl group in their structure. Microorganisms that make up the natural microflora of the digestive system produce organic acids such as lactic acid, acetic acid, and propionic acid. Organic acids used as feed additives create an acid environment by lowering the pH in the digestive tract. Thus, the balance of microflora in the digestive tract is turned in favor of beneficial microorganisms and the reproduction of pathogenic microorganisms is prevented. In addition, organic acid additions to the feed have a positive effect on possible feed deterioration. As such, organic acid supplements are used intensively in the field of animal nutrition, and this study will focus on the additions made in poultry nutrition.

**Keywords:** Organic acids, poultry feed, feed additives

# MORPHOMETRIC CHARACTERISTICS AND BIOCHEMICAL COMPOSITION OF FLAT OYSTER (*OSTREA EDULIS*, LINNAEUS 1758) IN ÇARDAK LAGOON (ÇANAKKALE STRAIT)

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## ABSTRACT

Flat oyster (*Ostrea edulis*, Linnaeus 1758) are distribution on all sea coasts of Turkey. The flat oyster is an oyster species of economic importance and high nutritional value. Only fisheries of flat oyster is done in Turkey. This study was conducted in the Çanakkale Strait (Çardak Lagoon) between November 2017 and August 2018. Meat yield, condition index and biochemical composition (protein, lipid, carbohydrate, moisture and ash) of flat oyster samples collected monthly were investigated. The lengths of the samples ranged from 78.13 mm to 86.58 mm, and their weights ranged from 74.85 g to 108.06 g. According to AFNOR index, flat oysters distributed in the Çanakkale Strait are of “fine” quality in July and “speciale” quality in other months. When the biochemical composition of flat oysters was examined, it was determined that the amount of protein and lipid was high and the amount of carbohydrates was low in the spring. While a positive correlation was observed between the length, weight and amount of carbohydrate of the flat oyster, a negative correlation was observed between the amount of protein ( $p>0.05$ ). Differences were found between months in the protein, lipid and carbohydrate values of flat oyster ( $p<0.05$ ). The difference between months in the biochemical composition of the flat oyster may be due to factors such as reproduction, temperature and food. Consequently, in terms of AFNOR index and biochemical composition, it is thought that flat oysters in this region are suitable for consumption throughout the year and this region can be evaluated for aquaculture.

**Keywords:** Flat oyster, meat quality, protein, carbohydrate, çanakkale strait

# DETERMINATION OF THE CHANGE IN THE PROTEIN AND CELLULOSE CONTENT OF COTTON SEED MEAL FERMENTED WITH RUMEN LIQUID IN DIFFERENT ENVIRONMENTAL CONDITIONS.

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## ABSTRACT

In this study, the changes in nutrient composition were investigated by fermenting cottonseed meal with rumen liquid. The research was carried out on a total of 72 samples, with 3 different initial pH (4, 5 and 6), 3 different humidity (70, 80 and 90 %) and 4 different fermentation times (1, 3, 5 and 7 day), in a 3x3x4 factorial experiment design and in two replications in each group. A one-year-old ram was used for the rumen fluid sample. Cottonseed meal obtained from a local feed mill was ground to a fineness of 2 mm and placed in a pre-prepared medium with different pH and moisture content. An equal amount of urea was added to the fermentation medium in each group. Fermentation medium was decontaminated by the autoclave method before adding rumen fluid, and then 1000 µl of rumen fluid was added to each medium. Fermentation was carried out in incubators set at 37 °C. The samples, which completed the fermentation period, were dried and analyzed for crude protein, crude cellulose, ash, acid detergent fiber, neutral detergent fiber. At the end of the research, it was determined that the initial pH value could not affect the fermentation and could not have an affect on the nutrient composition. Different fermentation time and different moisture content parameters affected the fermentation and it was determined that they had affects on the nutrient composition. It was determined that the crude protein content of cottonseed meal fermented on the 5th and 7th days at 80% and 90% moisture content increased from 23.9% to 35% and 45%. It was determined that the cellulose content decreased from 32.62% to 25% and 30%. As a result, it was determined that the nutrient composition was improved by fermenting cottonseed meal using rumen liquid.

**Keywords:** fermentation, rumen liquid, nutrient composition, cottonseed meal.

# RELATIONSHIP BETWEEN REPRODUCTION PERFORMANCES AND COAT CHARACTERISTICS OF MONTBELIARDE COWS DURING HOT SEASON IN ALGERIA

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## ABSTRACT

Our study aimed to study the relationship between reproduction performances and coat characteristics of Montbéliarde cows born in Algeria or imported from Europe, during the hot season in Algeria. Hair coat traits (hair coat color, Hair Weight, hair length, number of hair per unit area, hair total diameters and hair medulla diameters) were estimated in 18 imported cattle and 49 locally born cows. These traits were measured in an area of 20cm below the dorsal line in the center of the thorax. Results showed that significant effect of hair total diameter was observed on interval from calving to conception (IC) for imported MB cows, suggesting less incidence of heat stress on reproduction efficiency of cows with thin diameter hair coat. MB cows with short hair coat registered significantly more number of mating per conception ( $2, 28 \pm 1, 93$  Vs  $1, 67 \pm 0, 92$ ) and IC ( $98, 04 \pm 78, 81$  Vs  $74.53 \pm 35.60$  days) when compared to cows with long hairs. Hair works as a temperature regulator in association with muscles in the skin and may affect reproduction performances during hit stress season. It can be assumed that length and total diameter of hairs for MB breed appear to be related to their reproductive efficiency.

**Keywords:** Hair coat, reproduction, montbeliarde cow, hot season

## HISTORICAL DEVELOPMENT OF HORSE BREEDS

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### ABSTRACT

This study was conducted to examine the historical development process of modern horse breeds. Horses are among the few species that have managed to become domesticated on earth. The domestication of horses took place after dogs, goats, sheep, pigs, reindeer and poultry. It is accepted that the first ancestor of the horse species existed in the Eocene geological period (55 million years ago). In the fossil record, 13 genera have been identified in the equine family. Of these, *Equus* is the only surviving genus today. Different ecological regions, climates and cultural conditions have led to the development of well-adapted horse breeds. In addition, the changing needs of human beings have had important effects on the formation and development of these breeds. The changing needs of people have been effective in the differentiation of horses in areas such as hunting and food source, battlefields, agricultural activities, cargo transportation, transportation, show, entertainment, hobby, sports, horse racing and finally therapy and support. As mechanization increases as a result of technological developments in the world, there is a decrease in horse population and genetic diversity. In order to prevent these, measures should be taken such as doing more studies on horse breeds, drawing attention to the relationship between human and horse in the historical process, and protecting genetically endangered breeds.

**Keywords:** Horse breed, historical development, horse coat color

**THE IRRIGATION OF TENDER WHEAT (TRITICUM AESTIVUM) BY  
WASTEWATER FROM SEYBOUSE'S VALLEY IN THE REGION OF GUELMA  
(NORTH-EAST ALGERIA).**

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**ABSTRACT**

The quality of the world's water has deteriorated significantly in the last few years due to the uncontrolled discharges, the intensive use of chemical fertilizers in agriculture, and the disorderly exploitation of water resources. The aim of this study is to analyze physicochemical data of water (tap water, water from Seybouse's valley), physiological and biochemical analyses on a test of soft wheat "*Triticum aestivum*" variety Arz and Hiddab, they focused on the effect of these waters exercised at the four-leaf stage of Plants. The tests involved the following:

- In terms of physicochemical water, the parameters performed are (pH, electrical conductivity, nitrates, nitrites, iron, potassium, sodium, phosphates, sulphates, suspended matter and ammonium).

-on the physiologically level, the analyses established are: biomass calculation and chlorophyll levels determination.

-On the biochemical level: the performed dosages focused on the quantification of the content of soluble sugars, total proteins and prolines.

-According to the obtained results, this study allowed us to appreciate the relatively harmful effects on these two wheat varieties treated with water Seybouse's valley in the region of Guelma which are marked by excessive nitrate pollution, nitrites, phosphates, sulphates and ammonium.

**Keywords:** Seybouse's valley, wheat, agriculture, wastewater, guelma

# APPLICATION OF CLIMATE SMART AGRICULTURAL SYSTEMS IN TURKEY

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## ABSTRACT

Climate change affects agriculture in many ways. Nowadays, climate-related factors such as high temperature, elevated atmospheric CO<sub>2</sub>, drought ext. are intensively exposed and if climate change caused factors are continuing to contribute it as now, climate change effects in agriculture are expected to increase in the close future. Climate smart agricultural systems are generated to mitigate and/or adapt agricultural systems to these changes in the climate *via* tools supported by technological developments of devices and/or systems with or without software supporting systems. The aim of this study is to assess the application of climate smart agricultural systems in Turkey and list its challenges. In order to determine it, the study was conducted with a literature review. The software designed to serve to the climate change adaptation and/or mitigation approach, in order to minimize the effect caused by climate change such as drought or disruption in ecological balance due to overheating and limited water resources. Recently, climate-smart agricultural systems in the agricultural lands of Turkey are applied as soil scanning, Internet of Things, and access to GPS and smart data management, as well as other smart technologies like drones, thermal-electromagnetic imaging cameras, and mobile applications which helps farmers to remotely control their lands or greenhouses. These technologies bring minimization to the damage that nature has to face with, because of uncontrolled usage of pesticides or other chemicals. Thus, farmers are able to apply the fertilizers or pesticides more controlled and consciously, so their financial expenses are also reduced. With the help of remotely controlled sensors, farmers do not have to be present in the land, remote access is available. Turkey is very newly adapted these technologies so there are less information and experts to intervene in case of any technical problems. Farmers are also have lack of enough and/or adequate information that is caused many problems during implementation. Due to be imported systems and technologies, any kind of interventions for the case of any problems takes very long time period and it is more expensive. Therefore, urgent national systems production is highly required, even there are few initiatives are existed. Due to relatively high farmer's age in Turkey, the awareness of climate smart agricultural systems' application is another need. There are still lack of national generated climate-smart agricultural systems adapted to Turkish lands. The best appropriate climate smart agricultural systems are needed to adapt the several different side-specific conditions cause of Turkey's different agro-ecological zones.

**Keywords:** Agriculture, climate change, climate-smart agricultural systems, iot, mobile applications

## VERTICAL FARMING APPLICATION IN TURKEY

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### ABSTRACT

The world population, which is thought to exceed 9, 7 billion by 2050, faces major food and nutritional security problem. Increasing world population has led to fast urbanization, accelerating climate change, less availability of water resources, and agricultural land. The purpose of this study is to explain alternative solutions by vertical agriculture as growing plants in vertically. This agricultural system is target to increase productivity while saving 95 % of comparing to traditional agriculture with the huge efficiency in small areas. The system is managing by Controlled Environmental Farming technology and closed farming techniques under three different soilless systems: (i) hydroponic, (ii) aeroponic or (iii) aquaponics. There of them has advantages and disadvantages and different application requirements. Generally, vertical farming systems known to provide many potential advantages such as biosecurity, pests, droughts and reduced transportation and clean use of fossils fuels. Also, they are not got influenced by adverse weather conditions as totally controlled. There are few applications of vertical farming systems in Turkey cause of its first investment expenses. However, cause of industrialization in big cities with less agricultural activities are having huge potential to conduct vertical farming cause of the logistically availability to distribute the products in short time period to final consumers in all over the world from Turkey.

**Keywords:** aeroponic; aquaponic; hydroponic; soilless agriculture; vertical farming

# COMBINE HARVESTER BEARINGS EVALUATION FOR PREVENTIVE MAINTENANCE PURPOSES

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## ABSTRACT

It is not an easy to ensure an even mass feed during grain harvesting. In case of unstable supply of grain mass flow, the threshing machine and its parts are loaded unevenly. At such moments, the drum bearings experience huge overloads. Rolling bearings are among the most load-retaining components of the threshing machine. Such overloads have a significant effect on the durability of the threshing drum bearings. According to the pre-established methodology and the planned measurement procedure, the tests will be carried out with CLAAS LEXION combine threshing drum bearings. For the bearings technical condition evaluation, the vibration analysis method was chosen. The results showed that the defective frequencies occurred in the test bearing with an output of 3590 MH (motor hours). Based on the calculated defect frequencies, the bearing may have a defect in the outer and/or inner ring or balls. To prevent the combine from the threshing drum failure, it is recommended to replace the bearing with a new one or to have it additionally checked by another diagnostic method. The application of such a bearing condition assessment methodology would serve for a safer and smoother operation of the threshing apartus and the selection of the most appropriate technological parameters during harvesting.

**Keywords:** threshing drum, bearings, vibroanalysis method

## SECTOREL USE OF WATER AND ECONOMICAL POLITICS OF WATER

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### ABSTRACT

The journey of water in the atmosphere and the earth, called the water cycle, started with the industrial revolution and continues with both economic cycles and social transformation, and this process does not improve when we assume that only 2.5% of the world's water is fresh water and 95% of it is in glaciers. With the crisis of capitalism in 1970, it was aimed to ensure the circulation of capital and thus the consumption economy came to the fore with the globalization of capital. In the capitalist system, countries are located on production, consumption and circulation. Gaining the most profit with the least cost paved the way for rapid capitalism in the world and this situation caused the disruption of the natural cycle with rapid urbanization, rapid population growth and rapid consumption. When we look at the distribution of water consumption by sectors in developed countries and underdeveloped countries, water use in the industrial sector is the highest in developed countries, while it shows the highest water use in the agricultural sector in undeveloped countries. In this context, in order to increase efficiency in water use and to ensure sustainability, measures should be taken to ensure efficiency in agricultural water use, which is the area where the most water is consumed, gray water should be used where possible in domestic water use, rainwater harvesting should be done. At the same time, rapid urbanization should be prevented and on-site investment should be provided so that water use between basins should be balanced.

**Keywords:** sustainability, water efficiency, saving on water, neoliberalism, interdependence

# WEB BASED DATA LOGGING SYSTEM DESIGN FOR CONTROLLED ENVIRONMENTS

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## ABSTRACT

Although the agricultural production areas do not have the opportunity to expand, the continuous increase in the human population makes it necessary to improve the means of production. In this context, it is inevitable for agricultural studies to turn to intensive production. Although most of the studies in question are conducted in field conditions, the ones conducted in controlled environments are also undeniable. In fact, some of these studies have to be carried out only in the laboratory environment. In laboratories where agricultural research is carried out, high-cost equipment is used to control indoor conditions. Continuous operation of these equipment is essential for researchers to obtain reliable results. The first thing that comes to mind is that even if the air conditioning units fail, long-term work will be enough to produce completely erroneous results. This will result in both economic and labor loss. From this point of view, the necessity of a system that allows remote monitoring of indoor conditions during ongoing research in controlled environments has been seen. It was requested that the system also records these data so that the changes that may cause errors while analyzing the research data can be determined. Commercial products that perform the required operations are available in the market. However, the continuity of these products is limited by the life of the infrastructure of the manufacturers and they are not preferred due to their high costs. Accordingly, it was wanted to produce a cost-effective alternative. In parallel with the developing technology, the production of electronic devices and components is increasing and diversifying. One of these devices is microprocessor development boards that can communicate with unlimited sensors and mechanical devices. The most widely used of these boards is Arduino (Arduino LLC., Italy) development platforms due to its open source structure. Within the scope of the study, it has been seen that the DHT11 temperature humidity sensor data can be transmitted to the web-based database via the Arduino Ethernet shield. In this context, a PHP based MySQL database was created and single-row data sent from the Ethernet shield were transferred to the relevant columns. After the necessary connections of the sensor, shield and microprocessor units were provided, the original software was created. After confirming that data transfer can be done without any problems, the system was fixed in the Crop Stress Monitoring and Thermography Laboratory in Çanakkale Onsekiz Mart University Faculty of Agriculture. The system currently records indoor temperature-humidity data to the database every 10 minutes. The fact that the system cost around \$50 with all its components show that the study achieved its goal. In future studies, it is possible to integrate additional sensors into the system, within the capacity of the microprocessor unit.

**Keywords:** arduino, ethernet shield, temperature-humidity sensor, web database, mysql

# INVESTIGATION OF THE SUSTAINABILITY OF SOIL PROPERTIES OF OLIVE ORCHARDS IN DIFFERENT LAND CONDITIONS OF THE SEMIARID MEDITERRANEAN AGROECOSYSTEM

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## ABSTRACT

Olive is an important product for Turkey located in the Mediterranean basin for centuries. It is particularly cultivated in rainfed conditions with a certain slope created by the topographic structures where often mechanization is difficult to implement. Recent years in the country, the subsidies, the importance of olive oil in health and use of mechanization in flat lands led to the expansion of olive towards to the valleys by shifting to narrow tree-spaced as new plantations to improve efficiency per unit area. Meanwhile, it is thought that there is a deterioration in soil with the mechanization. For this reason, soil properties were examined for two consecutive years under unirrigated olive trees in both sloping and flat land orchards, named no-tillage sustainable-sloping-SSO and tillage conventional-flat-CFO in Çanakkale (NW Turkey), where olives are grown intensively. Results showed that the soil physical properties deteriorate by tillage practices in CFO and reach over threshold level in many soil depths, especially in tillage depth, that may affect the nutrient mobility. High bulk density of 1.70 gr cm<sup>-3</sup> and penetration resistance of 2 MPa were found in CFO, on the contrary, hydraulic conductivity was optimal level. Essential macro and micro nutrients have been found to be generally insufficient for both orchards, despite annual fertilization in CFO. The ratio of C: N found that there is no difference between SSO and CFO due to the fact that they have been under similar cultural practices for long-term since establishing, except for the last few years including the experimental years. This indicates that the necessary importance should be given in order to continue under both slope and flat lands with the current sustainable olive cultivation by improving the cultural practices such as native vegetation due to importance income source in countryside of the region and contribution to the environmental ecosystem.

**Keywords:** olive orchards, sustainable cultivation practices, mechanization, çanakkale region

# MONITORING THE NUMBER OF PRINTS OF INJECTION MACHINES WITH WIRELESS CONNECTION

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## ABSTRACT

The aim of this study is to examine the studies for online tracking of the number of prints of injection machines and to identify the problems with online tracking and to develop solutions for these problems. In this way, we wanted to both increase the efficiency for the production lines and develop a method based on this and also test its efficiency. If we compare the losses due to errors, it is seen that the production slows down and the quality decreases due to 10% employee-related, 10% material, 20% mold and 60% machine-based. For this reason, it has been decided to monitor the machines, since designing the control tool in a way that will reduce the error rate of the machine will greatly reduce the error.

**Keywords:** injection, communication of objects, thermoplastics, polyamides

# GENETIC VARIABILITY, ASSOCIATION AND DIVERSITY STUDY AMONG THE SUNFLOWER GENOTYPES AT SEEDLING STAGE BASED ON DIFFERENT MORPHO-PHYSIOLOGICAL PARAMETERS UNDER POLYETHYLENE GLYCOL INDUCED STRESS

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## ABSTRACT

Drought stress directly affects growth along with productivity of plants by altering plant water status. Sunflower (*Helianthus annuus* L.) an oilseed crop, is adversely affected by abiotic stresses. The present study was carried out to study the genetic variability and diversity among the sunflower genotypes at seedling stage based on different morpho-physiological parameters under Polyethylene Glycol (PEG) induced stress. A total of twenty seven genotypes including two hybrids, eight advanced lines and seventeen accessions of sunflower (*Helianthus annuus* L.) were tested at germination and seedling stages in Polyethylene Glycol. Correlation and principle component analysis confirmed that germination percentage, root length, proline content, shoot length, chlorophyll content, stomatal frequency and survival percentage are positively correlated with each other hence; these traits were responsible for most of variation among genotypes. The cluster analysis results showed that genotypes Ausun, line-2, line-8, 17559, 17578, Hysun-33, 17555, and 17587 as more diverse among all the genotypes. These most divergent genotypes could be utilized in the development of inbreed which could be subsequently used in the heterosis breeding. Drought stress directly affects growth along with productivity of plants by altering plant water status. Sunflower (*Helianthus annuus* L.) an oilseed crop, is adversely affected by abiotic stresses. The present study was carried out to study the genetic variability and diversity among the sunflower genotypes at seedling stage based on different morpho-physiological parameters under Polyethylene Glycol (PEG) induced stress. A total of twenty seven genotypes including two hybrids, eight advanced lines and seventeen accessions of sunflower (*Helianthus annuus* L.) were tested at germination and seedling stages in Polyethylene Glycol. Correlation and principle component analysis confirmed that germination percentage, root length, proline content, shoot length, chlorophyll content, stomatal frequency and survival percentage are positively correlated with each other hence; these traits were responsible for most of variation among genotypes. The cluster analysis results showed that genotypes Ausun, line-2, line-8, 17559, 17578, Hysun-33, 17555, and 17587 as more diverse among all the genotypes. These most divergent genotypes could be utilized in the development of inbreed which could be subsequently used in the heterosis breeding.

**Keywords:** Sunflower, drought, stress, polyethylene glycol

# THE PHYSIOLOGICAL TRAITS OF N<sub>2</sub>- FIXING COMMON BEAN IN RESPONSE TO IRON DEFICIENCY

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## ABSTRACT

Iron is an essential element for plants as well as other organisms, functioning in various physiological and biochemical processes such as, photosynthesis, respiration, DNA synthesis and N<sub>2</sub> fixation. Plants take up iron from soil in which its solubility is extremely low especially under aerobic conditions at high-pH range. However, some genotypic differences in response to this nutritional constraint have been observed among multiple species. In order to express the physiological basis of the tolerance/ sensitivity of some common bean genotypes to iron deficiency when depending on symbiotic nitrogen fixation, a greenhouse experiment was conducted hydroponically on two *phaseolus vulgaris* L. genotypes (ARA14 and cocoanc) inoculated with an efficient strain of *Rhizobium tropici* CIAT899. Whole plant and nodule growth, leghaemoglobin accumulation, symbiotic nitrogen fixation and Fe nutrition were evaluated and the necessary correlations are established. Obtained results demonstrated a clear difference in response of common bean genotypes to iron deficiency. ARA14 proved to be tolerant, as compared to coco blanc, sensitive. Other its ability to maintain nodules integrity through the allocation of Fe to these organs that provides whole plant with the necessary nitrogen, ARA14 expressed a high Fe use efficiency for laghaemoglobin accumulation, symbiotic nitrogen fixation and whole plant and nodule growth.

**Keywords:** common bean, iron deficiency, leghaemoglobin, symbiotic nitrogen fixation, fe-use efficiency

# **SALT STRESS EFFECT ON GERMINATION IN FOUR VARIETIES OF WHEAT HARD (TRITICUM DURUM DESF)**

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## **ABSTRACT**

In Algeria, exactly in arid regions, soil salinity and irrigation water are constraints that adversely affect agricultural production. The objective of this experiment is to determine the NaCl tolerance of four varieties of durum wheat (*Triticum durum*. Desf). The trial was conducted for 12 days in the laboratory at room temperature. The seeds are soaked in 5 different concentrations (0, 3, 6, 9 and 12g/l NaCl). Parameters measured are; the germination rate, plant height, length and number of roots. Overall we can say that the Setifis variety is ranks first followed by Vitron, Waha and Bousselem.

**Keywords:** durum wheat, Salinity, germination

**GENETIC DIVERSITY ANALYSIS IN CHICKPEA (CICER ARIETINUM L)  
GENOTYPES GROWN IN NORTHWESTERN ALGERIA USING  
MICROSATELLITE MARKERS (SSR)**

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**ABSTRACT**

The present study aimed to characterize a subset of 10 selected Chickpea accessions (*Cicer arietinum* L), using SSR. The result indicated a presence of a total of 59 alleles. The genetic diversity at the 15 microsatellites loci was varied from 0, 32 for TA22 to 0.78 for TA72 and TA117 with an average of 0.66. Polymorphic information content (PIC) values ranged from 0.27 to 0.74. This study also detected a high significant ( $P < 0.01$ ) positive correlation between alleles per locus, gene diversity (H) and polymorphism information content (PIC). In the dendrogram and on the PCoA bi-plots, chickpea genotypes were adjoined according to their geographic origin, type of chickpea (Kabuli/ Desi). Nevertheless, the distribution of the different grouping through the factorial correspondence analysis (AFC) is due to the genetic variability

**Keywords:** chickpea, *cicer arietinum*, genetic diversity, North West of Algeria, ssr

# EFFECTS OF THREE PLANT EXTRACTS ON THE MYCELIA GROWTH INHIBITION OF CLADOSPORIUM HERBERUM, THE FRUIT ROT PATHOGEN OF CARICA PAPAYA (PAW-PAW)

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## ABSTRACT

Post harvest disease is a major challenge of *Carica papaya* (Pawpaw) production worldwide. The deterioration in the quality of fruit from bloom to harvesting stage is greatly caused by microbial infection. This study was therefore, carried out to identify and control the pathogen responsible for *C. papaya* fruit rot with extracts from three plants. Samples of rotten *C. papaya* were collected from Federal University of Technology Bosso Campus, Minna, Nigeria. *Cladosporium herberum* was isolated from rotten *C. papaya* fruits and confirmed to be the casual organism by pathogenicity test. Aqueous leaf extracts of *Anacardium occidentale*, *Prunus dulcis* and *Gmelina arborea* at different concentrations of 50mg/ml, 100mg/ml, and 150mg/ml were extracted using crude extraction method and were used as biological agents against fungal isolates. Results of phytochemical screening confirmed the presence of alkaloid, saponins, flavonoids, tannins, phenols, glycosides, terpenoids and steroid. The three plant extracts inhibited the mycelia growth of *C. herbarum*. The effect of the plant extracts on the mycelia growth of *C. herbarum* increased with concentration of the extracts in the order, 50mg/ml < 100mg/ml < 150mg/ml. The highest percentage mycelia inhibition was shown in *A. occidentale* (91.88%) and *P. dulcis* (80.48%) least with *G. arborea* (67.16%) at 150mg/ml concentration. These results indicated that aqueous leaf extracts of *A. occidentale* contained the antifungal agents that gave best effective control of *C. herbarum* the pathogen of post-harvest *C. papaya* fungal rot disease. Therefore, large scale production of these plant extracts and their efficacy on the field is recommended.

**Keywords:** Post-harvest, pawpaw, deterioration, pathogen, extracts, inhibition

# THE INFLUENCE OF APPLICATION OF ZINC OXIDE (ZNO) NANOPARTICLES ON GROWTH AND YIELD COMPONENTS OF BREAD WHEAT (TRITICUM AESTIVUM L.)

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## ABSTRACT

The properties of nanoparticles and their use have been shown as prominent for application in agriculture. Zinc oxide (ZnO) nanoparticles (NPs) in agricultural production can bring certain benefits, improve zinc deficiencies, promote seed germination, improve plant phenology, plant growth, stem height, root volume and increase biomass in wheat. Otherwise, sufficient concentration could raise negative and possible harmful effects. The objective of this study was to evaluate the impact of seed priming with zinc oxide nanoparticles (ZnO NPs) on plant growth and yield components, plant height and spike length of wheat (*Triticum aestivum* L.). In order to estimate the effects of ZnO NPs on yield component, four winter wheat genotypes namely, NS Pobeda, NS Futura, NS 40S and NK Ingenio were selected. Seeds of each wheat genotypes were primed with different concentrations of ZnO NPs (0, 10, 100 and 1000 mg/L) for 48 h in dark box by continuous aeration. Primed seeds were afterwards sown in soil pots with 60-70% moisture contents during the experiment, till maturity. Results revealed that days to anthesis and maturity significantly increased after application ZnO nanoparticles. Considerable improvement was observed in plant height and spike length of wheat which increased with rates of ZnO NPs, as compared to the control. At rates of 10 mg/L ZnO NPs, the greatest increase in plant height and spike length was observed for genotypes NS Pobeda and NS Futura. At rates of 100 mg/L ZnO NPs, the greatest increase was observed for genotypes NS 40S and NK Ingenio. In condition of maximum rates of ZnO nanoparticles reduced both traits of wheat. Our result indicated plant response to ZnO nanoparticles can significantly increase plant height and spike length of wheat. Plant response to ZnO nanoparticles significantly depends on concentration of application, as well as from wheat genotype.

**Keywords:** Wheat, zinc oxide, nano particles

# SEASONAL CARBON EMISSIONS AND SEQUESTRATION IN ORGANIC AGROECOSYSTEMS IN CENTRAL LITHUANIA

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## ABSTRACT

The growth rate of atmospheric carbon dioxide (CO<sub>2</sub>) concentrations since industrialization in Anthropocene is characterized by large variability, mostly resulting from variability in CO<sub>2</sub> uptake by terrestrial ecosystems including agroecosystems. Various crops emit different rates of CO<sub>2</sub> into atmosphere. Investigations of seasonal carbon exchange in agroecosystems were carried out at the Training Farm of Agriculture Academy in 2014–2016. The aim was to investigate and compare carbon exchange rate of different crops of ecological farming. This study involved carbon exchange rate of agroecosystems including measurement of emitted and absorbed CO<sub>2</sub> fluxes by applying closed chamber method. Plant (R<sub>a</sub>) and soil respiration (R<sub>s</sub>) varied between crops and during growth stages. However total respiration compose less than 30% of total carbon exchange in agroecosystems. Main drivers of mean plant and soil respiration were meteorological conditions, crop species, and vegetation period and growth stage. Generally, respiration emissions were completely recovered by atmospheric carbon rates sequestered in crops gross primary production (GPP). Therefore the ecosystems biota was acting as atmospheric CO<sub>2</sub> sink. Photosynthetically assimilated mean CO<sub>2</sub> rates ranged between 10.148 μmol m<sup>-2</sup> s<sup>-1</sup> in vetch+oat mixture and 11.923 μmol m<sup>-2</sup> s<sup>-1</sup> in ley and exceeded mean respirational emissions by 72 %. The differences in photosynthetically assimilated CO<sub>2</sub> rates were significantly interacted and correlated with leaf area index (LAI) ( $r=0.4-0.8$ ,  $p=0.01-0.04$ ), specific leaf area (SLA) ( $r=0.3-0.8$ ,  $p=0.01-0.03$ ) and dry biomass ( $r=0.4-0.6$ ,  $p=0.03-0.05$ ). Between ecological crops, the highest mean net ecosystems production (NEP) was sequestered in biomass of ley and wheat and ranged between 9.931 and 9.199 μmol m<sup>-2</sup> s<sup>-1</sup>, respectively. These crops might be considered the most environmental sustainable between crops.

**Keywords:** CO<sub>2</sub> fluxes, bio-parameters, environment, crops

## GRAIN MASS YIELD AND PLASTID PIGMENTS CONTENT IN WINTER FORAGE PEA LINES

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### ABSTRACT

Forage peas hybrid lines №PL, №11, №12A, №13, Taskent, Tore and Mir variety (standard) were studied for green mass yield and plastid pigments content. The study was performed in two locations both situated in the Central part of the Danube hilly plain region of Bulgaria (2017-2019). Location A (43° 23'N, 24° 34'E, 230 m altitude), podzolized soil subtype; location B (43.41° N, 24.61° E), haplustoll soil subtype. For the first experimental year green mass yield for location A ranged between 1270 and 2484 kg/da. Lines №13 and №11 showed higher green mass yield than the standard by 23.47% and 38.15%, respectively. Green mass yield for location B ranged between 2144 and 2873 kg/da, and Tashkent variety and №13 showed higher green mass yield than the standard by 6.12% and 7.87%, respectively. For the second year green mass yield for location A ranged between 2144 and 2873 kg/da. №PL and №13 lines showed higher green mass yield than the standard by 6.94% and 7.20%. Green mass yield for location B ranged between 1158 and 1420 kg/da and №13 only showed higher green mass yield than the standard by 10.94%. On average for the period green mass yield for location A ranged between 1960 and 2547 kg/da and №11 and №13 lines showed higher green mass yield than the standard by 13.51% and 13.73%, respectively. Green mass yield for location B ranged between 882 and 1049 kg/da and Tore variety and №13 showed higher green mass yield than the standard by 8.13% and 9.87%, respectively. As a whole green mass yield was found higher for location A as compared to location B. The data were in correspondence with plastid pigments content: for location A - 304.48 mg/100 g FW and for location B - 282.18 mg/100 g FW.

**Keywords:** forage pea, green mass, plastid pigments

# RESULTS OF APPLICATION OF DIFFERENT SHADING NETS ON TOMATO QUALITY

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## ABSTRACT

Extremely high temperatures leave a number of consequences for most vegetable crops, primarily disruption of physiological processes, reduction of total yield, reduced quality and quantity of products, higher occurrence of diseases, pests and great damage to plants. In order to reduce the negative impact of extremely high temperatures and the impact on yield in the experimental field PSS Sombor, an experiment was performed with tomatoes and the use of shading nets. We applied different colors of the shading net: green, blue, gray, black. Shading nets significantly reduce the permeability of UV rays and temperature. The experiments were performed with two varieties of "Kruna" and "Rio Grande" tomatoes using mulch foil in a "drop by drop" system. The varieties were planted by random selection, so that they could compare how the nets affect different varieties. The results of the experiment show that the application of shading nets affected the lushness, quality, yield of tomatoes as well as pest reduction. Statistical data showed that the Rio grande tomato variety gave better results, and a higher yield compared to the control. In the Rio grande variety, the blue net showed better than the control, while the black net also showed a significant statistical increase in yield compared to the control. In this way of production, a simple and mobile construction is a great advantage, as well as the possibility of long-term application. The disadvantages of shading nets are investments during the first year, but this application is recommended for the production of tomatoes on smaller areas because it contributes to stable and quality production.

**Keywords:** Nets, colors, tomatoes, shading, yield, temperatures

# EVALUATION OF SOME ANNUAL RYEGRASS CULTIVARS IN GERMINATION AND EARLY SEEDLING STAGE UNDER DIFFERENT SALINITY LEVELS

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## ABSTRACT

In recent years, salinity problems have started to emerge in the fields where agricultural production has been made for centuries. It is not possible to rehabilitate these areas in the short term. Therefore, cultivation of salinity-resistant plant resources in these fields is very significant for economic production. This study was carried out to determine the tolerances of some annual ryegrass (*Lolium multiflorum* Lam.) cultivars (cv. Braulio, cv. Devis, cv. Hellen, cv. Trinova) in germination and early seedling stage under different salinity levels (control, 50, 100, 150 and 200 mM). In this research, germination ratio (GR), germination index (GI) and mean germination time (day) for germination traits and root length, shoot length and fresh weight (mg plant<sup>-1</sup>) for early seedling stage traits were investigated. The experiment was laid out according to the factorial design (cultivar and salinity level) in randomized parcel with 4 replications and conducted in the climatic chamber conditions in the laboratory. According to the variance analysis, effect of cultivars (C), salinity levels (S) and C×S on germination ratio, germination index, mean germination time and root length was statistically significant while effect of cultivars on shoot length and fresh weight was not significant. Germination ratio of cultivars decreased as the salinity level increased. Germination ratios of Braulio and Hellen was higher than other cultivars. In addition, when the germination index and mean germination time was evaluated, cv Hellen gave the best result. Germination ratios were found to be higher at control, 50 and 100 mM salinity levels compared to 150 and 200 mM and they were statistically similar to each other. As the salinity level increased, germination index and mean germination time of cultivars increased. In addition, fresh weight and root and shoot length decreased as the salinity level increased. As a result, when the resistance of the cultivars against salt stress was fully evaluated, cultivars used in this study can tolerate 50 and 100 mM salinity levels. However, cultivars were sensitive to 150 and 200 mM salinity levels. Among the cultivars, Braulio and Hellen cultivars were found to be more tolerant to salt stress than other cultivars. It was determined that Braulio and Hellen cultivars would give good results in annual ryegrass cultivation in regions where irrigation water and/or soil have salinity troubles.

**Keywords:** Germination, early seedling stage, salt stress, annual ryegrass, *lolium multiflorum lam.*

# EFFECTS OF DIFFERENT SOWING TIMES ON GRAIN YIELD AND YIELD FEATURES IN MAIZE GROWN UNDER HATAY ECOLOGICAL CONDITIONS

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## **ABSTRACT**

With the global climate change, the ecological conditions of the regions have changed over the time. With the change in ecology, the sowing times of the plant species and cultivars cultivated in the region have started to be the subject of research again. This study was conducted to determine the sowing time in the cultivation of grain corn as the main crop in Hatay ecological conditions. P31P41, 70 May 82, DKC 6590 and Carella F1 maize cultivars were used as plant material in the study. Three different sowing times (25 February, 14 March and 30 March) were applied to these varieties, which were selected as plant material and widely cultivated in the region. The experiment was laid out according to the split plot in randomized complete block with three replications. Ear length, ear diameter, number of rows per ear, number of grains per row of ear, thousand grain weight and seed yield characteristics were investigated in maize cultivars. According to the results of analysis of variance, the effect of sowing times was significant on all traits expect for ear length and ear diameter. The highest thousand grain weight was obtained from February 25 sowing time while the lowest was determined in March 30 sowing time. In addition, grain yield of cultivars sown at different sowing time varied between 117 kg da-1 and 1390 kg da-1. The highest grain yield was obtained from March 14 sowing time. According to these results, it was determined that the most suitable sowing time for these cultivars used in the study in Hatay ecological conditions was February 25 and March 14.

**Keywords:** Grain maize, grain yield, hatay, sowing time

## **EFFECT OF SEED PRIMING ON GERMINATION AND SEEDLING GROWTH OF THE CHICKPEA (*CICER ARIETINUM*) UNDER DROUGHT STRESS**

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### **ABSTRACT**

*Cicer arietinum* chickpea cultivation is practiced around the world for its agronomic economic ecological and food importance. Chickpeas seeds production is affected by several abiotic stresses especially drought. To evaluate chemical stimuli effect on three chickpea genotypes, Flip 84 92 C, Flip 93 93, Ghab-4 seeds germination and seedling growth under drought stress a factorial experiment in a completely randomized design with four replicates per treatment were performed. First factor of priming includes different levels of salicylic, ascorbic acids, zinc sulfate and distilled water as a control and the second factor was drought stress levels.

**Keywords:** Chickpea; drought; germination; priming; seedling growth

**THE EFFECT OF DIFFERENT SOWING TIME AND PLANT DENSITY APPLICATIONS ON GRAIN YIELD AND COMPONENTS OF GRAIN CORN VARIETIES WITH DIFFERENT MATURATION PERIODS**

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**ABSTRACT**

The study was carried out in Amik Plain conditions, in Tel-Kaliş Research and Application Center of Hatay Mustafa Kemal University, Faculty of Agriculture, Department of Agronomy, according to the experimental design of split-split plot in random blocks design with 3 replications. Planting time was included in the main plots, varieties in the sub-plots, and plant density in the sub-sub plots. With the sowing, 15-15-15 compound fertilizers were applied, with 8 kg/da N, 8 kg/da P<sub>2</sub>O<sub>5</sub> and 8 kg/da K<sub>2</sub>O forms. Afterwards, 20 kg/da nitrogen fertilizer in the form of urea was applied when the plants had 8 leaves. In this study, it was aimed to determine the effect of different planting time (1 June, 20 June and 10 July) and plant density (8000, 9000, 10000 and 11000 plant per decare) on grain yield in 2 grain corn varieties with different maturation times (DKC5747 (FAO 500) and PR31P41 (FAO 650)). As a result of the study, sowing time was effective on all the examined traits. The highest number of grains per ear, single grain weight and kernel yield were obtained at the second sowing time (June 20), while the lowest values were determined at the third sowing time (10 July). In terms of these characteristics, it was determined that the most suitable plant density was 9000-11000 plants/da in DKC5747 variety and 8000 plants/da in PR31P41 variety. It was concluded that the most suitable planting time in Amik Plain second crop corn agriculture is 20 June, the most suitable planting frequency is 9000-11000 plants/da and the most suitable varieties are the varieties in the short maturation group.

**Keywords:** Second corn, genotip, sowing date, plant density, amik plain

# EFFECTS OF GENOTYPE BY ENVIRONMENT INTERACTION ON THE YIELD AND QUALITY TRAITS OF POTATO BREEDING LINES IN THE CENTRAL ANATOLIA REGION OF TURKEY

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## ABSTRACT

The current research was conducted to assess the effect of GEI on physiological, yield and quality traits of potato breeding lines in the Central Anatolia Region of Turkey. The research was laid in randomized complete block design at three locations (environments) with four replications and the data collected was analyzed using AMMI software. Genotypes, location and GEI showed highly significant ( $P \leq 0.01$ ) differences for all the physiological, yield and quality traits except stem establishment, which depict non-significant ( $P > 0.05$ ) results among the environments. The maximum plant yield, tuber yield, and marketable tuber yield was 967.03 t/ha, 41.77 t/ha and 41.60 t/ha, respectively, while the minimum was found to be 400.77 t/ha, 17.04 t/ha and 16.66 t/ha, respectively. Highly significant ( $P \leq 0.01$ ) effects were also observed for variables such as marketable tuber weight, dry matter content and specific gravity, with ranges of 159.83 kg to 81.65 kg, 25.62% to 19.15%, and 1.106 g/cm<sup>3</sup> to 1.076 g/cm<sup>3</sup> respectively. The study classified the breeding lines into high, medium and low based on yield dry matter content and specific gravity. Among the three locations, the highest tuber yield and quality were obtained from Sivas's location. Genotype by environment interaction greatly affects the physiological, yield and quality traits of the potato breeding lines and is considered eminent in plant breeding in this era of climate change. Therefore, it is suggested that such studies should be conducted at multiple locations and years to achieve stable high yielding cultivars adapted to a wide range of environmental conditions. Moreover, some stable breeding lines identified in our study had a broad future prospective in climate change scenarios.

**Keywords:** AMMI, potato breeding lines, genotype by environment interaction, physiological traits, yield traits, quality traits

## BREEDING OF SAFFLOWER SUITABLE FOR TEA PRODUCTION

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### ABSTRACT

*As a result of ecological variety testing of safflower at Aktobe Agricultural Experimental Station, new varieties and variety samples were developed that are highly productive in petals intended for obtaining therapeutic safflower tea. Methods and results of research. Safflower is a new oilseed crop for the Aktobe region. A significant proportion of safflower samples obtained from the international center CIMMYT (Mexico), and in recent years from VIR (St. Petersburg, Russia), the State Scientific Institution "Nizhne-Volzhsy Research Institute of Agriculture" (Volgograd, Russia), the Caspian Research Institute of Arid Agriculture, Kazakh Research Institute of Agriculture and Plant growing". The safflower gene pool at the Agricultural Experimental Station of Aktobe comprises more than 100 samples. According to the results of the EVT, the Akhram variety of safflower was created and transferred to the State variety testing. It exhibits high ecological plasticity and seed and petal yield. Comparative studies on the yield and quantitative content of the petals (rims) of flower in the context of safflower varieties and variety samples were conducted in the breeding experiment, along with the study of productivity. The collection of flower petals by varieties was made in the phase of the beginning of seed ripening, with an aim to study the yield of flower petals of safflower in the nursery of competitive variety testing. Regarding the late-ripening varieties "Akhram" and "Aqbayan" the largest number of petals was contained at one plant - 1.79-1.51 g, and at 100 plants - 33.6-32.5 g. The actual timing of harvesting the flower mass was 5-6 kg / ha. The highest quantitative indicator of the yield of safflower by-products (flower beaters) was noted for late-ripening varieties, in which each plant has the highest number of baskets. The creation of late ripening varieties with high yields of the flower mass has a prospect.*

**Keywords:** safflower, safflower tea, petals, plant, oil-seed crop, variety, breeding

# STUDY OF THE BIODIVERSITY AND THE OF NATURAL PASTURES IN STRANDZHA MOUNTAIN AND OPPORTUNITIES FOR THEIR USE.

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## **ABSTRACT**

The productivity and quality of the production of the natural pasture depends primarily on the use and manifestation of climatic factors. Observations have been made on 4 natural pasturelands in the border region of Southeastern Bulgaria (Strandzha Mountain), during the period 2013-2015. The botanical composition, productivity and chemical composition of the grass cover in the natural pastures were studied. It has been found that the variation in yields from natural pastures depends not only on the weather conditions and soil fertility, but also on the botanical composition and method of use. The non-systematic use of meadows and pastures has strongly influenced the species composition, weeds are increasing at the expense of legumes. To increase the productivity and nutritional value of the fodder obtained from the natural pastures in Strandzha mountain, it is necessary to introduce hay mowing periods with grazing periods.

**Keywords:** strandzha mountain, natural pastures, productivity, climatic factors.

## COMPARISONS OF HIGH YIELDING GENETICALLY DIVERSE WHEAT LINES IN CROATIA

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### ABSTRACT

Wheat is one of the most common and important cereals in Croatia. Therefore, high selection pressure at wheat breeding program is continually placed on disease, drought and lodging resistance, heading date and end-use quality. The usage of genetically resistant wheat lines to abiotic and abiotic stresses can be useful in controlling of wheat diseases and food contamination. The aim of the current study was to evaluate the wheat grain productivity and quality, as well as response of wheat seedlings to drought. In the current study, five lines of winter wheat with referent variety were used for evaluation of desired traits. In general, investigated wheat lines had such good characters as early maturity, high yield, but they were smaller in test weight and protein content, but with higher sedimentation value, dough energy and extensibility, compared to referent variety Kraljica. Overall, lines Osk.4.330/6-18, Osk.3.530/59-18, Osk.4.354/12-18 out yielded the referent check with regard to the grain yield. According to the results collected in this research, wheat lines differences in germination energy, and seedling growth affected by drought were obtained. As planting conditions are not always ideal, all lines could offer farmers tolerance to mild drought during sowing, and will achieve high yields. Nevertheless, stability and drought tolerance of investigated winter wheat lines at different environments needs to be checked at multi-location trials.

**Keywords:** drought, yield performance, quality traits, wheat

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## EFFECT OF INTERCROPPING WHEAT AND FABA BEAN ON BIOCHEMICAL PARAMETERS AND MINERAL CONTENT OF LEAVES IN MOROCCO

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### ABSTRACT

Various studies highlight the advantages of intercropping, including the improvement of plant growth, stabilization of yield and reduction of economic and environmental risks common in monoculture systems. In field experiment, winter wheat (*Triticum aestivum* L.) cultivar 'Wafia' and faba bean (*Vicia faba* L.) cultivar 'Alfia' was cultivated as sole crops or intercropped with different N fertilisation levels during two cropping seasons. The aim of this work was to verify whether the wheat and faba bean intercropping improves biochemical properties and macronutrient uptake of two cultivars in the systems with low levels of nitrogen (N) inputs. The results showed that intercropping system for both experiments without any N fertiliser increased the protein, sugar, chlorophyll content and nitrate reductase activity of both intercropped species compared to the untreated and treated sole crops. Likewise, the uptake of macronutrients P and K was increased in wheat and faba bean intercropped in the 1st and 2nd experiment, respectively, when these elements were less available in the soil. However, Ca content did not show any significant effect. This allows us to conclude that intercropping of soft wheat and faba bean is a relevant way to reduce chemical inputs.

**Keywords:** triticum aestivum, vicia faba, nitrogen fertilisation, intercropping, macronutrients uptake.

## POTENTIAL EFFECT OF WHEAT AND FABA BEAN INTERCROP ON THE GRAIN YIELD AND COMPETITIVE INTERACTIONS

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### ABSTRACT

Several studies were shown that intercropping of cereals and legumes has been largely reported as an eco-functional practice that can improve the land use efficiency and soil fertility, as well as, the reduction of damage from diseases, pests and weeds. The research was carried out over two cropping seasons with different N fertilisation levels to compare winter wheat (*Triticum aestivum* L.) cultivar ‘Wafia’ and faba bean (*Vicia faba* L.) cultivar ‘Alfia’ cultivated as sole crops or intercropped. The overall aim was to evaluate intercrop efficiency using indices such as the land equivalent ratio (LER) and the interspecific (IE) and intraspecific (IA) interaction indices, and to assess the response of this system to biotic factors. The research results showed that intercropping systems without N fertiliser increased shoot and root biomass of wheat. However, The insertion of wheat in intercropping decreased shoot and root biomass of faba bean. Moreover, the grain yield decreased by intercropping compared to sole crops for both experiments. Eventually, without N input the LER > 1 indicates the most efficient use of environmental resources by intercropping. In the 2nd experiment, the IE of soft wheat was equal to 1 indicating that the presence of legume in the intercropping did not affect wheat plant productivity compared to sole crops in half density. However, in the 1st experiment, the presence of the legume was associated with a greater facilitation effect on wheat intercrop (IE > 1) inducing an increase in yield compared to half density. For both experiments, IA of wheat was less than 1 revealing that the wheat yield in half density was higher than that in sole crops in full density.

**Keywords:** interspecific and intraspecific interaction, intercropping, land equivalent ratio, *Triticum aestivum*, *Vicia faba*, nitrogen fertilisation.

# EFFECT OF DIFFERENT HARVEST PERIODS AND NITROGEN DOSES ON THE YIELD AND QUALITY PROPERTIES IN SWEET CORN

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## **ABSTRACT**

In this study, it was aimed to determine the effects of nitrogen dose and harvest period on yield and quality characteristics of sweet corn. The study was carried out in Isparta University of Applied Sciences, Faculty of Agriculture, Field Crops Department, in the trial areas in 2020. The experiment was set up in randomized complete blocks split plot design with 3 replications. Nitrogen doses (15, 20, 25 kg/da) were placed on the main plots and harvest periods [early milk (Z71-73), late milk (Z77-79), dough (Z79-83)] on the sub plots. In the study, ear diameter, ear yield, kernel number in cob, dry matter content, water soluble dry matter content, total soluble sugar content, ash ratio, crude protein ratio and color parameters (L\* and b\*) were investigated. According to results of research, with the increase of nitrogen doses and harvest periods, ear diameter, ear yield, kernel number in cob, dry matter ratio, water soluble dry matter content, L\* and b\* values were increased, total soluble sugar content, ash and crude protein ratio were decreased. As a result, it can be suggested to use 25 kg/da of nitrogen fertilization in Kompozit Şeker variety, and to harvest it in dough period based on yield, and harvesting in the late milk period based on quality.

**Keywords:** sweet corn, nitrogen doses, harvest periods, yield, quality

# EFFECT OF ORGALIFE FERTILIZER ON SOME QUALITY PROPERTIES OF THE SEED AND GROWTH POTENTIAL OF TWO RICE VARIETIES (ORYZA SATIVA L.) CULTIVATED IN NORTH MACEDONIA

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## ABSTRACT

The aim of this study was to examine the effect of Orgalife (liquid organic microbial fertilizer based on manure from californian earthworms) on the seeds of two rice varieties, San Andrea and Opale, obtained from three production years: 2018, 2019 and 2020. They were treated with three different concentrations (3.3%, 6.7% and 9.9%) compared to control (distilled water). Germination energy, total seed germination, germination index, seedlings growth (root length, shoot length, dry seedling weight) and vigor index (I and II) were examined. One-way analysis of variance (ANOVA) was carried out and separation of means was performed using the LSD test at  $P=0.05$  and  $P=0.01$  significance level. The values of all treatments for all parameters were compared with the control. Germination energy and total germination for Opale in 2020 showed statistical significance for the 3.3% concentration at  $P=0.05$ , while for San Andrea the same significance was noticed only for the germination energy. Germination index for Opale gave statistically significant results only for 2020 production year at  $P=0.05$ . For San Andrea the situation is slightly different where the treatments affected the germination index for 2018 and 2020. Orgalife treatments increased the vigor index I and II in 2020 for both varieties and for both levels of significance. The length of the seedlings for Opale in 2020 was positively affected by the 3.3% concentration in both levels of significance, while San Andrea in the same year had statistical significance for the 9.9% concentration only for  $P=0.05$ . The results for the dry matter showed statistical significance for San Andrea for the 6.7% concentration in 2018. As an overall conclusion, we can say that the use of the Orgalife fertilizer showed to be reasonable for the seedling growth and development, better than the effect on the germination parameters.

**Keywords:** Organic fertilizer Orgalife, rice seed, growth promotion, germination energy, total germination and seedling growth

# INVESTIGATION OF THE EFFECT OF DIFFERENT HARVEST TIMES ON SOME YIELD CHARACTERISTICS OF TURKISH OREGANO (*ORIGANUM ONITES* L.)

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## ABSTRACT

This research was conducted to determine the effects of different harvest times (before-flowering, beginning of flowering, full flowering and end of flowering) on some yield characteristics of Turkish oregano (*Origanum onites* L.) in 2018-2019. The field experiment was carried out in randomized complete block design with three replications in Uşak province of Turkey. According to this study results, the plant height, fresh herb yield, dry herb yield and dry leaf yield varied between 36.18-42.17 cm, 10.95-14.44 t ha<sup>-1</sup>, 3.55-5.56 t ha<sup>-1</sup> and 1.68-2.24 t ha<sup>-1</sup>, respectively. Considering the dry leaf yields obtained from this study, it can be suggested that the plants should be harvested during the full flowering period when Turkish oregano is cultivated in Uşak ecological conditions of Turkey for use as a spice.

**Keywords:** Turkish oregano (*Origanum onites* L.), harvest period, ontogenetic variability, yield

# MINERAL, CRUDE ASH, AND CRUDE FAT CONTENTS OF SECOND CROP FORAGE PEA AND CEREALS MIXED CROPPING

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## ABSTRACT

This research was carried out to determine some minerals, crude ash, and crude fat contents of second crop forage pea + cereals mixtures, which were sown after wheat harvest in Central Anatolia ecological conditions. The field experiments were conducted in the 2018-2019 years. Mixed cropping was carried out using forage pea at different densities (80, 100, 120 plants m<sup>-2</sup>), and 25-50 % of the suggested densities of oat, silage maize, and Sudangrass. Results revealed that phosphorus (P) and magnesium (Mg) contents are increasing, but the crude fat content is in a decreasing trend depending on precipitation. Plant densities of forage pea did not cause any significant variation but cereal species caused significant differences in the examined characteristics. Phosphorus content was higher in pea + silage maize mixtures. Especially 25 % oat and pea mixtures had higher Calcium (Ca) content (10163, 0 mg kg<sup>-1</sup>) but increasing densities of cereals decreased Ca content in mixtures. The highest Mg content was 3692, 1 mg kg<sup>-1</sup> and it was recorded at 50 % silage maize + pea mixed cropping. Crude fat contents of forage pea and warm-season cereals (silage maize, Sudangrass) mixtures remained between 1, 6 – 1,8 % but it was higher than 2 % at oat mixtures. The increasing ratio of the warm season cereals caused higher crude ash content in the mixtures and the highest value was determined as 11, 68 % in 50 % silage maize and forage pea mixture. Forage pea and 50 % silage maize mixed cropping should be suggested for the high-quality second crop forage production in the region by considering the examined characteristics.

**Keywords:** Forage pea, mixed cropping, mineral content, crude ash, crude fat

## ROOTING OF BLACK ELDERBERRY (*SAMBUCUS NIGRA L.*) BY TREATED OF INDOLE 3-ASETIC ACID

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### ABSTRACT

Black elderberry (*Sambucus nigra L.*) is a perennial herb in the form of a shrub or semi-shrub in the *Adoxaceae* family. It spreads naturally in the Black Sea, Central Anatolia, Southern and Eastern Anatolia regions of Turkey. Black elderberry fruits are traditionally used as food and medicine in Europe. It is considered by Hippocrates as the greatest medicinal plant of nature. In traditional treatment, its flowers are used as diaphoretic, analgesic, its fruits are used in the treatment of prostate and hemorrhoids, pharmaceutical products are used in the treatment of cold and flu symptoms. Propagation from seed is difficult due to the plant's high seed dormancy. Therefore, the plant is propagated by cuttings. In this study, it was aimed to root elderberry annual and biennial wood branch cuttings by IAA (Indol-3-Acetic Acid) application. Cuttings were taken on 09.11.2020 from annual and biennial wood branches, 10-15 cm long, with two nodes on it. On the same day, IAA was treated with 0-5-15-30 ppm doses for 15 seconds, then planted in 25x30 cm pots filled with a mixture of worm manure + peat + soil + perlite at a ratio of 1: 1: 1: 1.5. The experiment was established in the greenhouse condition according to the Experimental Design of Divided Plots in Random Blocks with 3 replications and 5 plants in each replicate (pot). In this research, it was observed that the first rooting was 17 days after planting. The root lengths were measured by removing them from the pots 120 days after planting, waiting for the strengthening of root development. As a result of the research, root length and development were determined best in control (20.47 cm) and 30 ppm (22.53 cm) applications. Annual cuttings (96%) rooted better than biennial cuttings (76%). While the best rooting rate in stem cuttings was obtained with 30 ppm (100%) IAA application, weak shoot development was observed in the same cuttings. This was followed by control (93%) cuttings in terms of rooting rate, but shoot development was better than other applications. As a result, considering the root length and shoot development, it was concluded that two-node annual wood cuttings taken in November can be used for rooting and reproduction without the need for IAA growth hormone.

**Keywords:** IAA, *Sambucus nigra L.*, annual, biennial, root length

## SOIL CARBON MANAGEMENT AS a PART OF FIELD FERTILITY RESTORATION

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### ABSTRACT

Restoring microbial biocenoses can solve two major issues: the soil fertility decline and the increase the amount of carbon in the atmosphere. The indigenous microflora of fields is highly influenced by intensive crop production. Reduction in the diversity of saprophytic microorganisms is the result of excessive use of mineral fertilizers, pesticides and soil-depleting tillage. Human actions results in continuous selection of aggressive pathogens resistant to conventional chemical fungicides and bactericides. This occurs in the context of carbon cycle disruption when plant residues returned to the soil are insufficient to feed beneficial microorganisms. Years of research by scientific institutions and on-farm studies demonstrate a real opportunity to adjust these processes and stop reduction of humus reserves as the main part of the organic component of the soil. The unique complex of saprotrophic fungi and PGPR bacteria in the microbial preparation Ecosteron has a positive effect on the composition of the soil microbiota. The restored balance of microorganisms allows you to stop the loss of humus compounds and even start their accumulation, if the green manure crops used as an additional source of carbon in the plant residues. A detailed information about application of this environmental tool by farmers will be provided by the presentation.

**Keywords:** ecosteron, microbial, soil, carbon

## REDUCTION IN THE APPLICATION RATES OF MINERAL FERTILIZERS DUE TO INCREASED EFFICIENCY OF THEIR USE

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### ABSTRACT

Nowadays the problem of accumulation of P and K inaccessible to plants in soils is acute for the farmers' community, as well as the problem of ever-increasing application rates of nitrogen fertilizers. A drop in the use of mineral fertilizers that is one of the key points of the European Green Deal requires alternative ways to provide plants with macronutrients. The solution is literally under our feet. PGPR bacteria are always companions of the plant's root system in resilient ecosystems, so they are the first candidates for improving the efficiency of the plant's nutrition system in intensive but environmentally neutral farming. The complex of bacteria developed by BTU-CENTER allows reducing the application of mineral fertilizers by up to 30% without reduction in the yield due to prolongation of the bioavailability of the nutrients used, as well as by increasing the mobility of phosphorus and potassium, which are usually available in soils. Long-term studies show a positive aftereffect on agrocenoses even with a single colonization of the soil with a specially selected complex of PGPR bacteria. In addition, if plants develop under optimal conditions, they get an effective biological stimulation with amino acids and phytohormones of microbial origin.

**Keywords:** fertilizer, macronutrients, phosphorus, potassium

# EFFECTS OF DIFFERENT PRIMING APPLICATIONS ON SEED GERMINATION AND SOME PHYSIOLOGICAL CHANGES OF WHEAT (*TRITICUM AESTIVUM* L.) SEEDLINGS UNDER OSMOTIC STRESS

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## ABSTRACT

Drought, one of the environmental stresses, is the most significant factor restricting plant production on majority of agricultural fields of world. Wheat (*Triticum aestivum* L.) is one of the most widely cultivated crops in dryland, where drought is the main limiting factor on yield. Seed priming is a physiological technique involving seed hydration and drying to improve metabolic processes prior to germination. The aim of this study is the effect of four different priming treatments (hormonal priming (gibberellic acid, GA3), redox-priming (hydrogen peroxide, H<sub>2</sub>O<sub>2</sub>), osmo-priming (polyethylene glycol, PEG) and thermo-priming (38oC)) based on total chlorophyll content (SPAD), relative water content (RWC), specific leaf area (SLA), H<sub>2</sub>O<sub>2</sub> amounts and shoot-root lengths. Water stress significantly decreased seed germination, shoot-root lengths, SLA, SPAD and RWC while increasing H<sub>2</sub>O<sub>2</sub> content. It was determined that thermo-priming treatments improved the negative effects of drought on chlorophyll amounts and germination at the level of control plants, and improved shoot-root lengths at half-level of control plants. In addition, 100% seed germination was achieved with GA3 priming treatment and improved germination, which decreased by 13% with drought stress. In addition, it has been determined that hormonal priming and osmo-priming applications increase the RWC that decreases with drought compared to other priming treatments. Our results showed that thermo-priming and hormonal priming applications are effective in water stress resistance for cv. Ekiz.

**Keywords:** wheat, seed priming, drought tolerance, osmotic stress

## ASSESSMENT OF DROUGHT TOLERANCE OF THREE WINTER COMMON WHEAT CULTIVARS

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### ABSTRACT

Drought tolerance of three winter common wheat cultivars (*Triticum aestivum* L.), Ginra, Yailzla and Nadita was compared by measuring the changes in photochemical activity of PSI and PSII, thermoluminescence emission, activities of two enzymes associated with the nitrates assimilation (nitrate reductase and glutamine synthetase), and the extent of electrolyte leakage. The degree of water stress was determined by alterations in the soil moisture and relative water content (RWC) of leaves. Plants were grown in a climatic chamber (Fytoscope FS-RI-1600, Photon System Instruments, Czech Republic) at 20°C/18°C day/night temperature, the light intensity of 300  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , 16/8 h light/dark photoperiod and 55% air humidity until 3rd leaf emerged. The measurements were performed on the second leaf after 3 and 7 days of dehydration and after 4 days of rehydration. The soil moisture decreased after three days of dehydration of wheat plants but RWC of leaves was not significantly affected. Despite the further decline in soil moisture after 7 days of water stress, the RWC of leaves decreased sharply only in cultivar Yailzla. The chlorophyll fluorescence measurements showed the higher sensitivity of plants from cv. Yailzla to water deficiency compared to Ginra and Nadita. The quantum yield of PSII electron transport (FPSII) was significantly reduced as a result of prolonged drought of this cultivar, which correlated with significant enhancement in excitation pressure and thermal energy dissipation. Interestingly, the reduction of PSII efficiency after 7 days exposure of wheat plants from Yailzla to drought was accompanied by 50% enhancement in PSI activity. In addition, almost 4-fold increase in the electrolyte leakage from leaves of cv. Yailzla was detected after 7 days of dehydration, indicating some membrane damage. Thermoluminescence measurements showed that a mild dehydration induced a clear increase in the intensity of afterglow band, AG in studied cultivars due to the transfer of electrons from stroma reductants to the intersystem chain. At lower water content the emission is weak and B band and AG decreased. Prolongated drought of 7 days led to reduction in the activities of both nitrate reductase and glutamine synthetase in all three wheat cultivars and a corresponding increase in the nitrate content was recorded. After 4 days of rehydration the enzyme activities reached those of the control plants in Ginra and Nadita, while in Yailzla they remained slightly lower. Photosynthetic activity was recovered after rehydration and the values of electrolyte leakage in Yailzla significantly decreased but remained higher than control. Overall, the results obtained showed the higher drought resistance of wheat cultivars Ginra and Nadita. This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme "Healthy Foods for a Strong Bio-Economy and Quality of Life" approved by DCM # 577 / 17.08.2018".

**Keywords:** triticum aestivum l., water deficit, chlorophyll fluorescence, thermoluminescence, nitrates assimilation

## **REVEALING OF FLOODING TOLERANCE LEVELS OF SOYBEAN GENOTYPES AT THE EARLY SEEDLING STAGE USING MORPHO-PHYSIOLOGICAL CHARACTERS**

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### **ABSTRACT**

The world is experiencing considerable increases in the duration and frequency of heavy rainfall events adversely affecting natural vegetation and crop yields due to climatic changes. This study was aimed to reveal the levels of flooding tolerance of 13 soybeans (*Glycine max* L.) genotypes which were registered and grown in Turkey using some morpho-physiological characters. After 5 days of germination, flooding stress was initiated by completely immersing the seedlings in water (submerge) for 3 (moderate-F1) and 5 (severe-F2) days in the controlled growth chamber, with a temperature regime of  $25 \pm 1$  °C, a 16-h photoperiod,  $40 \pm 5\%$  humidity, and  $200 \mu\text{mol m}^{-2} \text{s}^{-1}$  light intensity. Photosynthetic performance (PIABS) of genotypes was significantly decreased with increasing flooding duration. Flooding significantly reduced the length, fresh and dry weights of soybean seedlings compared to their controls. Besides, relative water contents (RWC) of root, hypocotyl and cotyledon in soybean genotypes were significantly decreased by flooding stress. This decrease in RWC was more pronounced in the roots than the other part of seedlings. When all parameters which were examined, it might be suggested that the photosynthetic performance index has revealed the vitality of cotyledon and the differences between soybean genotypes as a function of flooding stress. Soybean genotypes were sorted according to stress factor index (SFI) calculated by all measured parameters. As a result, the flooding tolerance levels of genotypes were in descending order of Umut 2002 > Ataem-7 > Cinsoy > Bravo > Yeşilsoy > Pınar > Yemsoy > Lider > ANP-2018 > Asya > Traksoy > Soy Anam > Mersoy. Finally, Umut 2002, Ataem-7 and Cinsoy may be considered to grow in flood-prone areas.

**Keywords:** soybean (*Glycine max* L.), flooding tolerance, morpho-physiological characters, polyphasic chlorophyll a fluorescence.

# YIELD AND YIELD RELATED TRAITS OF ADVANCED LINES OF WINTER BARLEY

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## ABSTRACT

A field experiment was conducted at the Institute of Agriculture – Karnobat, Southeastern Bulgaria in three growing seasons. Ten advanced lines developed by experimental mutagenesis along with parent line and standard varieties Obsor and Emon were laid out in a complete block design with 4 replications. Variability and heritability for yield-related traits and grain yield were studied. There were significant differences among advanced lines for all studied traits. Heritability in broad sense ranged from 48.51 % for grain weight per spike to 79.36 % for spike length. The grain yield of advanced lines was significantly higher compared to the parent and varied from 5.34 t/ha in M5/14 to 6.28 t/ha in M5/14. Moreover lines M5/1, M5/3, M5/10, and M5/19 had higher grain yield than the high-yielding Standart variety Emon. Hence, using these lines in the breeding program of winter barley could lead to the improvement of grain yield.

**Keywords:** grain yield, yield-related traits, heritability, winter barley, advanced lines

**A STUDY ON DETERMINATION OF YIELD AND PLANT CHARACTERISTICS  
OF SOME DRY BEAN (PHASEOLUS VULGARIS L.) GENOTYPES UNDER  
ÇANKIRI CONDITIONS**

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**ABSTRACT**

The aim of this study is to determine yield performance and some plant properties of some species registered with advanced dry bean lines under Çankırı conditions. The study is performed in the implementation areas at the Uluyazı Campus of ÇAKU in 2015. Field area trials are arranged with a randomized complete block design with four replications. Four advanced lines obtained in a program aimed to develop a genotype that resists high temperature and drought provided from Black Sea Agricultural Research Institute (BSARI), totally seven dry bean genotypes are used as the plant material. According to the genotypes in the studied plant characters properties, the plant height, the number main braches, the number of grains in a pod and harvest index ( $p<0.01$ ) indicate significant changes. While the number of pods, total yield and the weight of 1000 grains show important changes, the alterations in the first pod height, grain yield in the plant and grain yield are determined as slight. The grain yield of genotypes changes from 153, 61 kg/da to 198, 61 kg/da and the maximum value is given by F5.Ç.224 line even though it is insignificant statistically.

**Keywords:** bean, genotype, yield.

## SEASONAL VARIATION RECORDED IN MYCORRHIZAL FUNGI COLLECTED FROM MAIZE GENOTYPES

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### ABSTRACT

Terrestrial plants develop a mutualistic symbiosis with soil born fungi forming arbuscules which facilitate the host plant in various ways. The main benefit is enhanced accessibility to nutrients, especially phosphorus. Mycorrhizal inoculum, compatible with the host, can be used to improve yield. The aim of our experiment was to measure the seasonal variation of mycorrhizal fungal spores and degree of colonization in maize genotypes. Samples were collected from experimental plots under nil-competition conditions from open-pollinated maize lines in Orestiada to study the intensity of mycorrhizal colonization M% and arbuscule abundance A% during the flowering and grain filling stages. At the same time, samples from the rhizosphere of maize hybrids grown in Florina were collected and the number of spores as well as their phenotypic characteristics (size, shape, color) were recorded. Different patterns in mycorrhizal colonization were documented at the different developmental stages. In addition, AMF morphotypes were identified for each genotype.

**Keywords:** maize, mycorrhizal fungal

# INFLUENCE OF GROWING CONDITIONS ON GROWTH ACTIVITY IN WINTER BARLEY GENOTYPES

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## ABSTRACT

In the period 2018-2020 in the Institute of Agriculture - Karnobat, Bulgaria the influence of growing conditions on the growth activity of winter barley genotypes was studied. The experiments were performed in field and laboratory experiments. In a field multifactorial experiment with 4 fertilization variants (N0: N8: N12: N16) and three sowing rates (250, 350 and 450 germinating seeds) the barley varieties Kuber, Sayra, Zemela and Bozhin were grown. The obtained seeds from the different variants were studied in a laboratory experiment by the method of rolls. From each variant 20 seeds are laid in 3 repetitions on filter paper. The rolls are immersed in water and after 10 days the length of the first leaf, the length of the coleoptile, the number of roots and their length are taken into account. It was found that there are proven differences in the indicators in the studied genotypes. On average for the years of study, the length of the first leaf and the length of the roots is the largest for the seeds obtained in the variant at a sowing rate of 450 germinating seeds and N8. With the largest length of coleoptile and the largest number of roots are the seeds of the variant with a sowing rate of 250 germinating seeds and N8. Analysis of the variant shows that the length of the first leaf, the coleoptile and the number of roots depend on the genotype. The strongest influence on the length of the roots have the conditions of the year. The interaction between the two factors strongly influences all the studied indicators. The interaction between the year, genotype, sowing rate and fertilization also has a great influence on the indicators of the length of the first leaf, coleoptile and roots.

**Keywords:** genotype, barley, growing conditions, growth activity

## MICROPROPAGATION OF HELICHRYSUM ITALICUM

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### ABSTRACT

Immortelle plant (*Helichrysum italicum* (Roth) G. Don) spreading in the Southern Marmara and Aegean regions, can be grown in arid and semi-arid regions. It has an important place in modern medicine and cosmetics, including traditional treatment methods, because of its rich essential oil and secondary metabolite content. Tissue culture studies in immortelle plant are limited. The aim of this study is to perform *in vitro* micropropagation optimization for immortelle plant seedling production in Turkey. This study was carried out in Tekirdağ Namık Kemal University, Faculty of Agriculture, Agricultural Biotechnology Research and Production Unit (ZİRAATBİYOTEK). Young shoots from plants kept in the greenhouse were used for micropropagation study. After the explants were kept under a running fountain for one hour, they were sterilized with sodium hypochlorite (NaClO) and tween 20. Three different (15%, 25% and 35%) NaClO concentrations were examined during sterilization. The most successful result was obtained in the solution containing 35% NaClO. Sterilized explants were transferred to MS nutrient media containing plant growth regulators (BAP and NAA combinations) to awaken apical and lateral buds and develop shoots. The highest bud awakening rate (%75) and the best shoot development (10-15 shoots/bud) in explants were obtained in medium containing 0.5 mg BAP + 0.2 NAA. For shoots elongation, 1 mg GA was added to the medium. After three weeks, the shoots reaching a length of 10 cm were taken into MS medium containing 0 MS, 0.5 mg IBA, 1 mg IBA and 1.5 mg IBA as rooting medium. 100% rooting was observed in all prepared medium within three weeks. As a result of micropropagation studies, 36 healthy seedlings rooted in three months were transferred to the pots in the greenhouse and ZİRAATBİYOTEK collection garden.

**Keywords:** micropropagation, *in vitro*, *helichrysum italicum*, immortelle plant

# CHANGES IN THE RATE OF GROWTH AND ACCUMULATION OF DRY MATTER AND DIFFERENCES IN THE MICROCLIMATE OF WHEAT CROPS WITH A BALANCED MINERAL NUTRITION OF PLANTS

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## **ABSTRACT**

In the period 2017-2019 in the Institute of Agriculture - Karnobat, Bulgaria was conducted multifactorial field experiment with wheat. The influence of the mineral nutrition of the plants and the changes that occur in the rate of growth and accumulation of dry matter, as well as the differences in the microclimate of the Mirjana wheat crop were studied. The experiments were performed in four variants of mineral nutrition. In the variants, pre-sowing fertilization with Duofertil TOP 38, nitrogen feeding with Sulfammo 25, foliar feeding with biostimulators from the Fertileader group - Vital and Trio were done. The products are from Timak Agro Bulgaria, and the technological solutions are from the World Agroinnovation Center of the Roulier Group in France. After sowing the experiments in the pre-sowing variants with TOP-PHOS, it was found that wheat plants grow faster than the control. In all variants during the tillering phase in wheat after pre-sowing fertilization with TOP-PHOS the fresh and dry weight of the leaves is greater than in the plants grown by traditional technology. The roots are noticeably larger and they also have higher values of fresh and dry weight. The cultivation technology used with Timak Agro products in different fertilization variants also leads to an improvement of the microclimate in the crop. The air temperature at the crop surface in wheat changes by decreasing by 0.40 to 3.70C, compared to the control variants. It was found that the temperature inside the crop decreased in the range from 0.70 to 7.20C. At the same time, the relative humidity inside the crop increases as the average for the period 2017–2019 for wheat is 4.7%. The changes in the growing conditions that occur in the fertilizer variants prove that the improved nutrition of the crop not only leads to a rapid growth rate, but also changes the microclimate in the crop. The created conditions of combined balanced nutrition of wheat plants give their result in the formation of yield. On average for the period of three consecutive years, an increase in yield by 17.48% was achieved, which is a yield of da by 107 kg more grain obtained.

**Key Words:** wheat, rate of growth, microclimate, mineral nutrition

## VARIATION OF AGRONOMIC TRAITS OF TWO-ROWED GENOTYPES OF WINTER BARLEY

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### ABSTRACT

The aim of the present study was to evaluate the variation in the agronomic traits of barley varieties and advanced lines and to select genotypes for inclusion in the winter barley breeding program of the Institute of Agriculture – Karnobat. In this study, 20 varieties and advanced lines of two-rowed winter barley, along with local standard variety Emon were studied. Genotypes were evaluated in block design with four replications at the Institute of Agriculture – Karnobat, Southeastern Bulgaria in three growing seasons (2018 - 2020). The studied traits included number of spikes per m<sup>2</sup>, plant height (cm), spike length (cm), grain number per spike, grain weight per spike (g), grain weight per plant (g), 1000 grains weight (g), and grain yield t/ha). Significant differences between tested genotypes for all studied traits were found. Mean grain yield ranged from 4.62 t/ha in line WS270Д-1/15 to 6.08 t/ha in line 419Д-5/08. Lines 419Д-2/08, 419Д-5/08, 718Д-4/10, and 530Д-2/09 had the highest but relatively unstable grain yield. Lines 939Д-4/13 and 671Д-3/10 showed grain yield above average but highly unstable during the period of study. While lines Kt 337 and A 9/14 and variety Hasat also showed above mean grain yield but it was relatively stable. Cluster analysis for agronomic traits showed important information about genetic diversity among barley varieties and lines. Genotypes with the combination of desirable agronomic traits can be used in the breeding program for the development of new high-yielding winter barley varieties.

**Key Words:** winter barley, grain yield, agronomic traits

# **BREEDING AND AGRONOMIC STRATEGIES TO IMPROVE ADAPTABILITY AND NUTRITIONAL COMPONENTS OF SWEET POTATO IN SUB-SAHARAN AFRICA**

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## **ABSTRACT**

Food security is a serious problem in Sub-Saharan Africa. Sweet potato (*Ipomoea batatas* (L.) Lam.) is one of the most important tuber-crops globally that have potentials in food security due to its nutritional components to alleviate the micronutrient deficiencies especially in the Sub-Saharan Africa. It is a versatile and diversely nutritional crop that has high starch reserves, dietary fibre, vitamins A, B6 and C for beta-carotene, purifies the liver s it has the highest yield per square meter than any other crop. Sweet potato contains phytochemicals that maintains healthy blood pressure, prevents constipation, has anti-cancer agents, reduce the risk of obesity, diabetes, heart disease, and promotes fertility in women. The production of sweet potato in Sub-Saharan Africa is affected by several factors leading to low yield and nutritional components. Based on the importance of sweet potato to human health and nutrition, various breeding and agronomic strategies that improve the yield and nutritional components of sweet potato in Sub-Saharan Africa need to be identified. This review was hence focus on the factors affecting the sweet potato production in Sub-Saharan Africa and the breeding and agronomic strategies to improve the yield and nutritional components. In order to combat the micronutrient deficiencies, policy makers identified biofortification breeding of sweet potato as a potential to increased that nutritional components. Orange flesh sweet potato biofortification have been recommended as a most promising potential to reduce vitamin A malnutrition and food insecurity. Various interventions and directives to incorporate orange-fleshed sweet potato breeding and adoption in government programs have been proposed by various established research institutes to increase the agricultural production. Viral infections and drought are main biotic and abiotic stresses of sweet potato production. Multilocation field screening, screening for virus resistance, drought and collection of germplasm in breeding programs helped to identify resistant and tolerant varieties. To significantly increase the yield and nutritional components of sweet potato in Sub-Saharan Africa, there is the need for intensification of orange flesh sweet potato production, nutrition-sensitive agriculture, biofortification, resistance breeding, advocacy of use of improved sweet potato cultivars and improve agronomic practices.

**Keywords:** sweet potato, Sub-Saharan Africa, Biofortification, breeding, agronomic

# DETERMINATION OF YIELD AND SOME PLANT CHARACTERISTICS IN SAFFRON (*Crocus sativus* L.) IN TEKİRDAĞ CONDITIONS

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## ABSTRACT

Cultivated in narrow spaces in Safranbolu district of Karabük, Turkey, saffron is the most expensive spice plant in the World. It has many different industrial uses. In this research, carried out on the research and application field of Namık Kemal University Department of field crops, cultivation possibilities of saffron crop under Tekirdağ conditions and the impact of the size of the saffron bulb on the reproduction of the plant have been researched. Saffron bulbs of different sizes were planted by 20\*10 cm spaces, 10 cm deep in the year 2014 and were harvested in the year 2016. The research was conducted in the experimental pattern of divided parcels, with three repetitions. In the experiment, the bulbs brought from the cities of Karaarslan saffron species and Tokat were planted in the main parcels and the three remaining bulb types were planted in the lower parcels according to their lengths (long: 8-10cm; moderate: 5-7cm; short: 2-4cm). Leaf sized in the spring and the falls, wet and dry flower weights, stigma length, wet and dry stigma weights, number of baby bulbs per plant (number/plant) and the efficiency of the saffron crop (g/da) were determined in the research. It has been concluded that the saffron crop can be cultivated under Tekirdağ conditions and that the bulb size of the crop does have an impact on both the blossoming of saffron and the production of baby bulbs.

**Keywords:** saffron (*Crocus sativus* L.) bulb length flower yield, stigma yield, leaf lengths,

## EFFECT OF WATER LIMITATION ON EXPRESSION OF SUNFLOWER FATTY ACIDS IN DIFFERENT REGIONS OF IRAN

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### ABSTRACT

In order to study the Effect of water limitation on expression of sunflower fatty acids in three regions of Iran; Karaj, Kermanshah and Isfahan a set of 12 sunflower hybrids along with check variety Ghasem were evaluated during two years (2019 and 2020). The study was conducted in two separate experiments; optimum irrigation and water limited condition in randomized block design with three replications. Water limitation was imposed by water withholding during growing stages R1-R6. There was similar and differentiate response of fatty acids to the three regions. In all the regions palmitic (16:0), linoleic (18:2) and eicosenic (20:1) acids content were increased but stearic (18:0), oleic (18:1), arachidic (20:0) and behnic (22:0) acids content were decreased. Palmitoleic acid content decreased in Karaj, while increased in Isfahan and Kermanshah. Linolenic acid content reduced in Isfahan while increased in Karaj and Kermanshah. Mono-unsaturated fatty acids reduced but poly unsaturated fatty acids were increased. Saturated fatty acids increased slightly in Karaj but increased in Isfahan and Kermanshah. Considering all the locations water limitation caused a reduction in stearic, oleic, arachidic and behnic acids while increasing of palmitic, palmitoleic linoleic, linolenic and eicosenoic fatty acids. Saturated and mono-unsaturated fatty acids reduced while poly unsaturated fatty acids increased under water limited condition. Linoleic, oleic, palmitic and stearic acids constituted 98.5% of the oil (67.9, 18.7, 6.2 and 5.7% respectively) and linoleic and oleic acids accounted for 86.6% of the oil. Other fatty acids including palmitoleic, linolenic, arachidic, and behenic acids constitute together only 1.5% of the sunflower oil. It is concluded that water stress has a reverse impact on two major fatty acids of sunflower. Oleic acid reduces while linoleic acid increases under water limited condition. It brings to the general conclusion that due to the increase of oleic acid content, oil quality of sunflower from water stressed conditions or dry land areas is higher than sunflowers cultivated in optimum condition to some extent. The changes of fatty acid profile of sunflower could be a protective or adaptability response to drought condition.

**Key Words:** drought stress, oil quality, oleic acid, optimum irrigation

**GROWTH AND YIELD OF WATERMELON (CITRILLUS LANATUSL) AS  
INFLUENCED BY PLANTING SPACING AND MULCHING IN LAFIA,  
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**ABSTRACT**

Field experiment was conducted during the rainy seasons of 2016 and 2017 at the Teaching and Research Farm of the Faculty of Agriculture, Nasarawa State University, Keffi, Lafia Shabu Campus (8° 34' N and 8° 33' E) to determine the effects of varying planting spacing (50x50cm, 50x100cm and 100x100cm) and mulching materials (control, rice husk and dry grass) on the growth, yield and yield characters of watermelon. The nine treatment combinations were laid out in a randomized complete block design (RCBD) with four replications. The results of the study indicated that all the growth and some yield characters measured (vine length, number of branches and number of leaves per plant, number of marketable fruits, fruit length and fruit diameter) were significantly increased by a planting spacing of 100 x 100cm compared to other planting spacing (50x50cm and 50x100cm). The numbers of fruits per hectare and fruit yield (t ha<sup>-1</sup>) were significantly increased by a planting spacing of 50x50cm compared to other spacing. All the growth yield and yield characters of watermelon measured (vine length, number of branches, number of leaves, number of marketable fruits per hectare number of fruit per plant, fruit length, fruits diameter, number of fruits per plant, and fruit yield per hectare) were significantly increased by using rice husk as mulching material compared to using dry grasses and no mulch (control). For effective production of watermelon that will translate to higher marketable yield, a spacing of 100x100cm and rice husk as mulching material should be adopted.

**Key Words:** watermelon, spacing, mulching

# EFFECTS OF SODIUM BI-CARBONATE AND MODIFIED ATMOSPHERE PACKAGING ON THE POSTHARVEST STORAGE QUALITY OF SNAP BEAN PODS

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## ABSTRACT

Present study was conducted to investigate the effects of postharvest applied sodium bi-carbonate (SB) and modified atmosphere packaging (MAP) technique on the storage quality of snap beans (*Phaseolus vulgaris* L. cv. 'Blue Lake'). The main reason behind this aim was the high sensitivity of snap beans to storage conditions and low quality after storage. Snap bean pods of current work were hand-collected from a commercial farm found around Lefke city of Northern Cyprus. Experiments were conducted with a completely randomized block design with four treatments and twenty replications each with 50 bean pods. The treatments are: 1) control, dipping in pure water, 2) SB, dipping in 2% sodium bi-carbonate, 3) Control+MAP, dipping in pure water and storing in MAP and 4) SB+MAP, dipping in 2% SB and storing in MAP. After dipping, all fruits were air dried for 30 min, and transferred to the storage conditions at  $5.5\pm 0.5$  °C and 95% relative humidity. Four replications from each treatment were taken out from storage rooms at 5th, 10th, 15th, 20th and 25th days of storage to measure quality parameters (weight loss, soluble solids concentration (SSC), chilling injury, firmness, browning, shrivelling and chlorophyll content). Results showed that snap bean pods have high weight loss even in cold storage conditions if they are not treated well. Weight loss reached to 24.08% in 25 days of storage at control beans, where the MAP application found to have only 4.34% weight loss. MAP was also found to have a slight influence on the prevention of loss in SSC. Results demonstrated that the storage of bean pods with the application of SB+MAP would be possible up to 25 days in terms of firmness, chilling injury and shrivelling. However, bean pods stored in MAP found to have moderate to extreme browning after 15 days of storage. Further studies come to the forefront of importance to prevent pods browning in MAP conditions for the better and longer storage of beans.

**Key Words:** weight loss, chilling injury, firmness, browning, chlorophyll content

# DETECTION OF SUNBURN IN WATERMELON AND INVESTIGATION OF ITS INSURABILITY

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## **ABSTRACT**

In 2018 and 2019, in order to detect sunburn in watermelon and investigate its insurability, a study was carried out with striped watermelon, ungrafted Crimson Tide grafted on Nun9075, and Paskal hybrid varieties with dark green ground color, ungrafted and grafted on Gürdal. The experiment was carried out in open field conditions belonging to Alata Horticultural Research Institute in 2018. The normal harvest time of the fruits was determined as 09 July in 2018, when the atria and leeches were dry, and 02 July in 2019. After these dates, half of the experiment was irrigated and the other half was dehydrated and continued for another month. One month later, harvests were made in each plot and the blight rates in each plot were determined according to the 1-5 scale we determined. In both years, it was observed that the blight started earlier in the Paskal variety, whose bark ground color was dark, and that there was almost no marketable fruit after one month in the fruits of the plants left in the field with both watery and non-aqueous applications. In the Crimson Tide variety included in the experiment, it was observed that grafting and irrigation increased the rate of marketable fruits after one month in the fruits of the plants left in the field, where irrigated and non-aqueous applications were made. While there was almost no marketable fruit in both years in the Paskal variety, whose bark was dark in color and the scaling was applied after a month, in the Crimson Tide variety it was possible to find marketable fruit in both years, although it varies according to the years.

**Key Words:** watermelon growing, sunburn, insurability

# EFFECTS OF AVG AND 1-MCP TREATMENTS ON FRUIT QUALITY AND COLD STORAGE OF APPLE CV. FUJI

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## **ABSTRACT**

In this study, changes in quality parameters during cold storage after AVG (aminoethoxy-vinylglycine) and 1-MCP (1-methylcyclopropene) applications in apple variety (Fuji) grown in Tekirdağ conditions were investigated. For this purpose, preharvest and postharvest AVG application and postharvest 1-MCP application was performed. All the fruits were stored at  $0\pm 0.5^{\circ}\text{C}$  temperature and 90-95% relative humidity conditions for 5 months. During the storage, weight loss, total soluble solids, titratable acidity, starch index, fruit firmness, total phenolics, total antioxidant, respiration rate and taste values were investigated with 30 days interval. In the study, it was determined that preharvest and postharvest AVG application and 1-MCP application had significant positive effects on preservation the quality of apples during cold storage. Although preharvest AVG and postharvest AVG applications had positive effects on many quality parameters, it was found that better results were generally recorded in combination with 1-MCP.

**Key Words:** apple, AVG, 1-MCP, cold storage, quality

**EFFECT OF HUMIC ACID APPLICATIONS ON TUBER QUALITY IN POTATO  
(*Solanum tuberosum* L.)**

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**ABSTRACT**

This study was carried out to determine the contents of macro and micro nutrients in the leaves of Hacıhaliloğlu, Hasanbey, Kabaası and Roksana apricot cultivars grafted on *Prunus microcarpa* seedling. The study was carried out in the field and laboratories of Kahramanmaraş Eastern Mediterranean Transition Zone Agricultural Research Institute between 2011-2016. It was found that leaf phosphorus (0.32%), potassium (4.51%) and magnesium contents (4.58%) were the highest in apricot cultivars grafted on *Prunus microcarpa*, but they were not statistically significant, and there were significant changes in leaf calcium contents compared to rootstock. In the study, in which significant differences occurred in leaf micronutrient contents, it was determined that the iron content of leaf iron (48.91 mg.kg<sup>-1</sup>) in apricot cultivars grafted on *P.microcarpa* came after the apricot seedling rootstock (56.25 mg.kg<sup>-1</sup>). It was determined that the leaf manganese, zinc and copper contents of apricot cultivars grafted on *P.microcarpa* were the highest values as 51.32 mg.kg<sup>-1</sup>, 20.37 mg.kg<sup>-1</sup>, 17.53 mg.kg<sup>-1</sup>, respectively. At the end of the study, it was concluded that *P.microcarpa* gave promising results as a rootstock and could be used more intensively in rootstock breeding studies.

**Key Words:** apricot, prunus, rootstock

# DETERMINATION OF SOME AMPELOGRAPHIC CHARACTERS OF AMERICAN GRAPE CULTIVARS HAVE *Vitis labrusca* TRAITS INTRODUCED FROM NORTH AMERICA TO TURKEY

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## ABSTRACT

The study was conducted in application area of Agriculture Faculty of Ondokuz Mayıs University between 2011 and 2012. The study carried out for the determination of ampelographical characteristics of grape cultivars of *Vitis labrusca* have foxy grape traits introduced from North America to Turkey in 2006. Totally fourteen cultivars (August Giant, Bluebell, Buffalo, Champbell Early, Delicatessan, Delaware, Munson, Mars, Niagara, Neptune, Steuben, Venus, Valiant ve Concord) were evaluated considering a several ampelographical traits (shoot, mature leaf, one-year-old canes, flower bunch, grape bunch, berry and seed) described by the methods of IBPGR's "Descriptors of the Grapes". It has been determined that all varieties have hermaphrodite flower structure, leaf areas vary between 146.50 (Neptune) and 228.70 cm<sup>2</sup> (Mars), Bluebell has the largest inflorescences and the number of berry per bunch varies between 36.0 (Neptune) and 57.6 (Bluebell). It was also revealed that the maturity period lasted throughout August and three of the studied varieties were seedless (Bluebell, Mars and Venus).

**Key Words:** american grapes, hybride, foxy grape, black sea region, ampelography

**DETERMINATION OF PHENOLOGICAL STAGES AND THE CHANGE OF YIELD  
POTENTIAL ACCORDING TO HARVEST IN BLUEBERRIES GROWN  
OUTDOORS IN POTS AND RAISED BEDS**

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**ABSTRACT**

In the study, three years old 5 different northern highbush blueberry cultivars ('Bluecrop', 'Brigitta', 'Denise Blue', 'Patriot' and 'Blugold') were grown in pots with acidic peatmoss and raised beds under open field conditions. Several phenological stages, total and individual weekly yielding and harvest duration of the cultivars were determined. Flower buds burst during last week of February for all growing conditions while raised bed grown cultivars bloomed earlier than pot ones. Fruit set of raised bed grown blueberries was also earlier than pot plants like veraison. Pot grown 'Patriot' bushes gave the highest yield (955.14 g/plant) and raised bed grown 'Denise Blue' was the lowest yielded (178.87 g/plant) cultivars. Individually the most yielded cultivar is 'Patriot' and pot grown plants are the best. Harvest begins during last week of June in raised bed grown blueberries and pot grown blueberries harvested later. Yield was also varied according to growing conditions, cultivars and harvest period. Patriot grown in pots and 'Bluecrop', 'Denise Blue' and 'Blugold' grown in raised beds starts earlier harvest than other cultivars. Patriot is the latest matured cultivar for both growing conditions.

**Key Words:** *vaccinium corymbosum*, pot, raised bed, yield, maturation

# USE OF THIDIAZURON IN TISSUE CULTURE STUDIES IN VEGETABLES

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## **ABSTRACT**

Thidiazuron (TDZ; N-phenyl-1, 2, 3-thidiazole-5ylurea) is a plant growth regulator with both auxin and cytokinin-like behavior with the chemical formula C<sub>9</sub>H<sub>8</sub>N<sub>4</sub>O<sub>2</sub>. The plant growth regulator N-phenyl-N'-1,2,3-thiadiazol-5-ylurea (thidiazuron, TDZ) originally registered as a cotton defoliant in 1967 by Schering AG (Berlin, Germany) was first described to have cytokinin activity in 1982. In recent years, the use of TDZ in plant tissue culture propagation has been increasing. The optimum concentration of TDZ in nutrient media; varies depending on vegetable species, explant type, and explant exposure time to TDZ. In this study, the studies conducted between 2000 and 2020 on the use of thidiazuron (TDZ) *in vitro* plant tissue culture studies in vegetable species and the results obtained are summarized. As a result of the researches, it has been determined that TDZ is mostly used for *in vitro* shoot regeneration and proliferation in plant tissue culture, as well as for callus production, stimulation of somatic embryogenesis, androgenesis, and gynogenesis.

**Key Words:** callus, shoot regeneration, somatic embryogenesis, thidiazuron, vegetable species

# EFFECT OF VERMICOMPOST FERTILIZATIONS ON THE YIELD AND YIELD-RELATED COMPONENTS AT THE ADVANCE SELECTION STRAWBERRY LINES

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## ABSTRACT

Strawberry one of the most important horticultural crops for Turkey. A big part of the production is consumed as fresh. Nowadays, it is possible to year-round production due to having opportunity to growing strawberry at the different environmental conditions. This field experiment was conducted inside a Spanish-type high tunnel at the Çukurova University's experimental farm in Adana, Turkey. The aim of this study was found out the effects of vermicompost applications on yield and yield-related parameters. Plug-type plants belong to the 5 advance selection strawberry lines, were planted on 19 September. Vermicompost applications were started on 1 January. These floral applications were continued until 4 May one-month interval with 2 lt/100 lt dose adding Tween-20. It was laid out as a completely randomized factorial (application type x sampling date x genotypes) design with 3 replications and each one consisted of 20 plants. Genotype effects on these parameters were obviously observed, whereas vermicompost applications small contributed to the yield that was not statistically significant. While the '59' the coded line had the significantly highest yield and fruit number with 990 g/plant and 94.5 fruit/plant, the lowest value was found in '36' coded line with 626.5 g/plant and 44.2 fruit/plant values, respectively. Besides, the highest fruit weight was obtained in the '112' coded line with a 15.1 g/fruit value, followed by the '36' coded line with 14.2 g/fruit value which is placed in the same statistical group. On the other hand, the '33' and '59' had the lowest fruit weight with 10.1 and 10.5 g/fruit values. Although the vermicompost application has no significant effects on yield, it was small contributed to the yield by improving fruit size. While the average yield and fruit weight was 845.9 g/plant and 12.6 g/fruit under applications, it's were obtained as 838.7 g/plant and 10.2 g/fruit in the control plot, respectively. Regardless of applications, the significantly highest yield was determined in April with 309.4 g/plant value under the Mediterranean climate condition, whereas the lowest yield was observed in February with 12.4 g/plant. As a result of this experiment, genotype has a stronger role on the yield components than vermicompost applications. Even though there were not observed influences on different strawberry lines of vermicompost, this can be tried with different doses and forms to find out the certain effect on strawberry cultivation.

**Key Words:** fragaria ananassa, fruit weight, mediterranean climate, organic fertilization

# INFLUENCE OF TIMING OF HEADING CUTS ON FLOWERING, VEGETATIVE GROWTH, AND FRUIT QUALITY IN SOME SWEET CHERRY CULTIVARS

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## ABSTRACT

Turkey has significant global potential for cherry production and exportation. Many studies have been conducted around the world to increase yields and fruit quality while lowering production costs. Obtaining regular and high-quality yields from fruit trees every year is an absolute necessity for profitable cultivation. Fruit tree productivity is affected by climatic conditions (temperature, humidity, and wind) during the flowering period in spring, as well as good cultural practices such as pruning, irrigation, and fertilization. It is critical to determine the tree's heading cutting times, especially for species with a short fruit development period (60-90 days), such as cherries. The aim of this study was to determine the effect of heading cuts made at four different times (January 20, February 15, March 10, and April 5 in 2020-2021) on flowering, growth, and quality in '0900 Ziraat'/CAB 6P and 'Regina'/CAB 6P combinations throughout 2020-2021. Trees were planted in December 2013 and trained according to the Tall Spindle Axe (TSA) training system. Therefore, it was observed that flowering and fruit set in both cultivars in 2020-2021 were obtained from treatment 1 (January 20) at the earliest and treatment 4 (April 5) at the latest. Likewise, in both years of study, the cumulative yield per tree and decare in both cultivars was highest in treatment 3 (March 10) and lowest in treatment 1 (January 20). In the experiment, the maximum total leaf area was obtained from treatment 1 and the least from treatment 4 in both cultivars. Thus, as a result of the study, heading cuttings taken early in the season increase leaf area while decreasing yield, whereas heading cuttings taken later in the season decrease leaf area while increasing yield.

**Key Words:** 0900 ziraat, regina, cab 6p, pruning, sweet cherry

# CHANGES IN BIOCHEMICAL PROPERTIES AND POSTHARVEST QUALITY OF POMEGRANATES (SILIFKE AŞISI) UNDER MODIFIED ATMOSPHERE PACKAGING

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## ABSTRACT

Importance of the pomegranate (*Punica granatum* L.) as a tropical and subtropical fruit has been increasing due to its premium nutrient quality and beneficial effects on human health with its flavanoids, fenolics and ascorbic acid. However, pomegranate fruit is susceptible to various postharvest quality problems including weight loss, decay and susceptibility to physiological disorders such as chilling injury and husk scald. The objective of this study was to determine effects of different modified atmosphere packaging (MAP) on postharvest quality of ‘Silifke Aşısı’ during cold storage. Pomegranates were harvested at the commercial harvest stage and packed in two different types of MAP [low density polyethylene (LDPE) and polyvinyl chloride shrink film (PVC)]. After packaging, the fruits were stored at 5 °C and 90% RH for 90 days, then removed from storage for postharvest quality analyses. Weight loss, husk and aril color, soluble solids content (SSC), titratable acidity (TEA), total monomeric anthocyanin (TMA), ascorbic acid (AsA), total phenolic (TP) content and total antioxidant (TA) capacity of pomegranates were examined. The results showed that MAP inhibited increase of weight loss, delayed decline of SSC, TEA and AsA and improved TMA of pomegranates at 5 °C compared with the control. It has been determined that the effect of LDPE was better than PVC in maintain the postharvest quality of pomegranates. The best results were obtained from LDPE packaging for controlling weight loss of ‘Silifke Aşısı’ pomegranate fruits with maintaining visual quality and initial aril and husk color and biochemical attribution for 3 months of cold storage.

**Key Words:** pomegranate, storage, MAP, quality

# EFFECTS OF POSTHARVEST UV-C TREATMENTS ON POSTHARVEST QUALITY OF APRICOT CV. ROXANA DURING COLD STORAGE

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## **ABSTRACT**

UV-C irradiation treatment is one of the alternative methods to chemical applications in preventing postharvest pathogen-induced deterioration and increasing the storage life of horticultural products. Especially, UV-C treatments at 254 nm wavelength create a small amount of stress response in the product, increasing its resistance after harvest. In this study, the effects of UV-C irradiation applications at different times on the fruit quality of apricot cv. Roxana during cold storage were investigated. In the study, 8 UV lamps of 15 watts, 230V/50Hz were used. Fruits harvested at the stage when  $\frac{3}{4}$  of the fruit surface turns straw yellow were brought to the laboratory in the Department of Horticulture, Faculty of Agriculture, Selcuk University. After a sample fruit was selected, it was kept in a specially designed cabinet for this purpose at 4 different times (5, 10, 20 and 30 minutes) for UV-C irradiation application. After the applications, the fruits were stored for 35 days in a cold storage containing 1 °C and 90% relative humidity. Weight loss, flesh firmness, skin color (hue angle), soluble solid content (SSC), titratable acidity (TEA), maturity index (SSC/TEA), total phenolic content, total antioxidant content, polygalactronase enzyme activity and visual quality were determined in the samples by sampling them at 7 day intervals. At the end of the 35-day storage period, it was determined that UV-C applications were effective in maintaining quality losses when compared with control. Among the UV-C applications, the 10 minute UV-C application was more effective than the other treatments. Overall, it was determined that 10 minutes of UV-C application gave promising results in extending the storage period by preserving the quality properties of apricots during cold storage.

**Key Words:** apricot, UV-C, postharvest, quality

# RESEARCH ON SOURCES OF SEEDLESS AND METHODS OF BREEDING SEEDLESS GRAPE CULTIVARS

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## ABSTRACT

Seedlessness is one of the most appreciated traits in the table grape and raisins. Therefore, identifying the genetic mechanisms underlying seedlessness, is of great significance for seedless grape breeding. Traditional hybridization uses seeded grapes as the female parent and seedless ones as the pollen parent. This method is not useful because of seedless progeny in the F1 generation is generally low, and the process of breeding new seedless cultivars takes a long time. Embryo rescue facilitates the use of seedless cultivars as female parents, hybridizing these with other seedless cultivars. When this type of cross is used, the fraction of seedless progeny in the F1 generation rises significantly. The *in vitro* embryo rescue is much more effective compared to traditional hybridization method and the percentage of seedless offspring obtained from seedless × seedless crosses by embryo rescue is 85%. Recently, the use of molecular markers has increased, as traditional seedless grape breeding requires a long time and expense. Marker-assisted selection now plays a notable role in the field of plant breeding and cultivar improvement. The first two were sequence-characterized amplified region (SCAR) markers derived from bulked segregant analyses: SCC8 and SCF27. Although these markers could help to predict seedlessness, the presence of null alleles and the weak linkage with the *SDI* locus compromises their use in many genetic backgrounds. Recent studies have found that in table grapes, the *VvAGL11* gene, a member of the D-lineage MADS-box family, controls ovule identity, and thus plays a very large role in the formation of stenospermocarpy. The other method using for breeding seedless grape cultivar is mutation induction. Polyploidy is the heritable condition of possessing more than two complete sets of chromosomes. It is the chemical colchisin that breeders use most in the mutation breeding method. That chemical is used as a polyploidization agent. Developing the desired varieties and adapting to new technologies is extremely important for success. Given that the traditional hybridization program takes excessive labor and long periods, the importance of modern technologies is better understood.

**Key Words:** seedless grape, grape breeding, marker-assisted selection, polyploidy, mutation induction, embryo rescue

## ACCESSION DEPENDENT MORPHOLOGICAL AND BIOCHEMICAL DIVERSITY IN APRICOT CV. TEBERZE

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### ABSTRACT

In this study, some important fruit morphological and biochemical traits have been investigated in nine accessions of Teberze (Tebereze) cultivar grown in only Iğdir province in Turkey. As morphological parameters, fruit mass and flesh/seed ratio were investigated. For biochemical content, specific sugars and organic acid content in fruits of nine Teberze ecotypes sampled from different parts of Iğdir region were determined. Fruit mass and flesh/seed ratio were in range of 34.11 and 40.33 g and 21.15 and 26.30, respectively. HPLC results indicated the presence of four specific sugars such as sucrose, glucose, fructose and sorbitol and four organic acids such as malic, citric, tartaric and ascorbic acid in fruits of accessions. At harvest, the fruit juice content of sucrose, glucose, fructose and sorbitol ranged from 7.51 to 9.84 mg/100 g, 1.85 to 3.07 mg/100 g, 0.64 to 1.09 and 0.55 to 0.82 mg/100 g, respectively. The citric acid content varied from 756 to 933 mg/100 g, malic acid from 245 to 421 mg/100 g and tartaric acid from 30 to 48 mg/100 g, respectively. Ascorbic acid was found between 13.3 to 19.2 mg/100 g. Results indicated morphological and biochemical diversity among nine accessions of cv. Teberze supports the idea that long-term cultivation may have results natural mutation and this effects in particular sugar and organic acid metabolism in cultivars and reveal clonal variation.

**Key Words:** biochemical content, clonal variation, apricot, organic acids, sugars

## FATTY ACID COMPOSITION AND DIVERSITY OF GRAPE SEEDS

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### ABSTRACT

Horticulture plants including grapes has gained more popularity during last two decades due to increasing interest to plant-derived natural products. In this context food industry, consumers, and public health organizations etc. has great attention to health benefits of horticulture plants. In addition, attention is focused on grape by-products identification and bioactivity evaluation. In this study, we attempted to determine fatty acid profile of black grapes including three clones of Karaerik grape variety, one national variety (Okuzgozu) and one international variety (Cabernet Sauvignon). A total of 10 fatty acids were determined in grape varieties and clones. Results indicated that fatty acid profile of varieties and clones differs each other. Linoleic acid (18:2) were found to be predominant for all varieties and clones ranged from 52.33 to 64.21%, and followed by oleic acid (18:1) in range of 17.83-23.14%, palmitic acid (16:0) between 8.64–13.36%, and stearic acid (18:0) between 4.04-6.11%, respectively. Grape varieties and clones had more polyunsaturated fatty acids (PUFA) than saturated fatty acids (SFA) in their seed oils.  $\Sigma$ PUFA/ $\Sigma$ SFA were in range of 2.58 and 4.88 among varieties. Results indicated that there was diversity among Karaerik grape clones for fatty acid profiles. Fatty acid richness of Karaerik clones comparable with Okuzgozu and Cabernet Sauvignon as well.

**Key Words:** grape, by product, fatty acids, metabolic profile

# VILLAGE-LEVEL CHANGE DETECTION AND FUTURE PREDICTION OF OLIVE GROVES IN EZINE, CANAKKALE USING LANDSAT IMAGERIES

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## **ABSTRACT**

Olive (*Olea europaeae* L.) is one of the most economically important agricultural products in Turkey, not only in terms of nutrition but also for other sectors such as, cosmetics. It is grown within in whole Aegean-Mediterranean coast, South-East Anatolian region and some parts of Black Sea region, the highest yield per tree (kg) is known to be obtained around production areas of Canakkale and Balıkesir provinces. The publicly available agricultural production statistics demonstrated that olive grown areas are increased, and this situation declared to be sourced from financial supports. However, it was reported that the increment was insufficient since expected level of increase could not be reached yet. On the other hand, such statistical data is at district level and also becomes available after the harvest season. Thence, present study aimed to quantify the changes in olive areas between 2009 and 2019 at village level, and to predict 2029 year's status in pilot area of Ezine District, located in Central Aegean coast of Canakkale Province. Landsat imageries acquired from TM and OLI sensors in dry season of selected years were used as main data source, local production data was used to verify remotely sensed results and actual status whereas ALOS digital elevation model, markov chain and future land use simulation model were used to predict future olive grove areas and their distributions.

**Key Words:** change detection, ezine, landsat, olive, future prediction.

## FRUIT SETTING IN ALMOND (PRUNUS DULCIS)

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### **ABSTRACT**

Almond cultivation has been increasing rapidly in recent years in terms of both production area and production amount in Turkey. Despite this increase, it is seen that the castings (bud, flower and fruit) experienced during the production season have a significant damage potential in some years. In this article, it has been tried to explain the fruit set in almonds, the castings and their reasons, the precautions that can be taken against these problems and the importance of cultural practices.

**Key Words:** almond, flower, fruit, fruit set, Turkey

# **PRODUCTIVITY OF CHICKPEA (*CICER ARIETINUM* L.) BY INFLUENCE OF SOME HERBICIDES, HERBICIDE COMBINATIONS AND AN HERBICIDE TANK MIXTURE**

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## **ABSTRACT**

Three years field research (2016 – 2018) was conducted on chickpea cultivar Kabule (*Cicer arietinum* L.) to evaluate different herbicides on yield. Factor A included untreated control and 4 soil-applied herbicides – Dual gold 960 EC (S-metolachlor), Stomp aqua (pendimethalin), Merlin flex 480 SC (isoxaflutole) and Pelican 50 SC (diflufenikan). Factor B included untreated control, 3 foliar-applied herbicides – Pulsar 40 (imazamox), Challenge 600 SC (aclonifen) and Shadow 3 EC (clethodim) and 1 herbicide tank mixture – Challenge 600 SC (aclonifen) + Shadow 3 EC (clethodim). Soil-applied herbicides were applied after sowing before emergence of chickpea. Foliar-applied herbicides were applied at stage of 6 - 8 leaves of chickpea. The highest yields value of chickpea seeds were obtained by foliar treatment with herbicide tank mixture Challenge + Shadow after soil-applied herbicides Pelican and Merlin flex value. High yields are obtained also by foliar treatment with herbicide tank-mixture Challenge + Shadow after soil-applied herbicides Stomp aqua and Dual gold value. The increasing of indexes beans number per plant, seeds number per plant, seed weight per plant leads to increasing of chickpea seed yield. The highest first beans was determinate when tank mixture Challenge + Shadow was applied after soil-applied herbicides Pelican, Merlin flex, Stomp aqua and Dual gold, followed by foliar treatment with herbicide Challenge after the four soil-applied herbicides.

**Key Words:** chickpea, herbicides, herbicide combinations, seed yield, structural elements.

## STABILITY AND SELECTIVITY OF SOME HERBICIDES AND HERBICIDE TANK MIXTURES ON DURUM WHEAT (*TRITICUM DURUM* DESF.)

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### ABSTRACT

The research was conducted during 2015 - 2017 on pellic vertisol soil type. Under investigation was Bulgarian durum wheat cultivar Elbrus (*Triticum durum* Desf.). Factor A included the years of investigation. Factor B included untreated control and 4 antigaminaceous herbicides – Axial 050 EC (pinoxaden) - 900 ml/ha, Topic 080 EC (clodinafop) - 450 ml/ha, Traxos 045 EC (pinoxaden + clodinafop) – 1.20 l/ha and Scorpio super 7.5 EB (fenoxaprop-ethyl) – 1 l/ha. Factor C included untreated control and 4 antibroadleaved herbicides – Biathlon 4 D (tritosulfuron + florasulam) – 55 g/ha, Lintur 70 WG (triasulfuron + dicamba) – 150 g/ha, Granstar super 50 SG (tribenuron-methyl + tiphensulfuron-methyl) – 40 g/ha and Secator OD (amidosulfuron + iodosulfuron) – 100 ml/ha. All of antigaminaceous herbicides, antibroadleaved herbicides and their tank mixtures were treated in tillering stage of the durum wheat. Herbicide tank mixture Traxos + Secator lead to obtaining of the highest grain yield. High yields of durum wheat grain also are obtained by herbicide tank mixtures Traxos + Biathlon and Axial + Biathlon. Tank mixtures Traxos + Granstar super, Axial + Granstar super and Scorpio super + Lintur are the most unstable for grain yield. Tank mixtures Traxos + Secator, Traxos + Biathlon, Axial + Biathlon, Axial + Sacator and Topic + Biathlon are technological the most valuable. They combine high grain yield with high stability with relation to different years. Herbicide combination Scorpio super + Lintur and alone applications of herbicides have low estimate and do not be used. For complete control of all weeds and self-sown plants in durum wheat crops, two herbicides should be combined - both antigaminaceous and antibroadleaved.

**Key Words:** durum wheat, herbicides, herbicide tank mixtures, grain yield, selectivity, stability.

## GERMINATION CHARACTERISTICS OF ARGAN SEEDS

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### ABSTRACT

The argan tree is an Algerian-Moroccan endemic species, which belongs to the *Sapotaceae* family. In Algeria, the tree covers the southeast margins of the distribution. This taxon is a source of socio-economic and ecological importance. However, the argan forest is facing degradation and natural regeneration is mainly absent. The study's aim is to improve knowledge of regeneration ecology by researching optimal germination conditions in order to ensure reforestation establishment by planting. To evaluate the morpho-physiological variability in response to improving different factors (harvest period, longevity, envelope, mother tree and biometrics of the seeds), we collected Argan fruits from Oued Elma (Tindouf) in June, July and August for four consecutive years. A quantitative evaluation of the amylase activity evolution of germinating seeds has been done. On average, walnuts showed the following dimensions: 1.96 cm long, 1.37 cm wide, 0.71 circularity index, 2.58 g weight, and two loculi. There was a significant correlation between weight and width and circularity index ( $p=0.01$ ). The harvest period has a significant effect on germination ( $P < 0.01$ ). The late-season seeds have a low germination potential, from which 79% was recorded for the June harvest, and 67% for the month of August. There was a decline in germination as storage durations increase, removal of shell improved germination parameters, with a shorter latency period (2-6 days) and an 80% germination rate for seeds harvested in June. These showed a rapid increase in amylase activity with peaked at 3rd week. In addition, the effect of the mother tree is not significant, which suggests that the Tindouf argan tree has very similar characteristics in terms of germination. The results obtained in this study provide a seed selection basis for reforestation programs.

**Key Words:** argania spinosa, biometry, amylase activity, germination, harvest date, longevity

# ALLELOPATHIC POTENTIAL OF ESSENTIAL OILS FROM ALGERIAN CITRUS

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## ABSTRACT

The phyto-allelochemicals play a key role in weed control, crop protection, and crop re-establishment, they present several advantages over herbicides, such as less toxicity, a shorter half life and higher water-solubility. In the present work, we have carried out *in vitro* experiments in order to verify the possible effects of citrus oils on germination and initial radical elongation of *Raphanus sativus* L. (radish) usually utilized in allelopathic assays. The essential oils of five Citrus species: *Citrus aurantifolia*, *Citrus lemon*, *Citrus maxima*, *Citrus sinensis* and *citrus aurantium* were extracted by cold pressure centrifugation and stored in freezer until the experiment started. The concentrations 0.5, 1 and 2 mg/mL of each oil were tested *in vitro* against *Raphanus sativus* L seeds, and their effect on germination, root and shoot length was determined. The essential oils showed different allelopathic activity. The essential oils isolated from *Citrus maxima*, *Citrus sinensis* and *citrus aurantium* had stronger inhibitory effects on germination and seedling growth, whereas those isolated from *Citrus aurantifolia* and *Citrus lemon* were the least activity. The oils, however, acted in a dose-dependent way and the dose of 2mg/mL tested was the more potent. The different allelopathic effects observed can be due to diverse chemical composition of the essential oils, and in particular to the content of limonene which is the main compound in the essential oil of citrus fruits. Findings of this study showed that essential oils from the tested Citrus species have allelopathic effects on radish plants and have potential as natural herbicides.

**Key Words:** Allelopathic effect, essential oils, weed control, natural herbicides, Citrus sp.

# HEPATOPROTECTIVE EFFECT OF AQUEOUS EXTRACT OF PISTACIA ATLANTICA DESF ON RAT'S MERCURY-INDUCED ACUTE HEPATOTOXICITY IN ALGERIA

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## ABSTRACT

**Objective:** The present study as an answer to the wonders that if a nutritional strategy likes chronic administration of aqueous extract of *P. atlantica* could efficiently prevent Hg-induced hepatotoxicity in terms of oxidative stress in rat. **Methods:** Determination of total phenolic and flavonoid contents as well as the antioxidant activity of the promising leaves extract was carried out. Adult Wistar rats weighing between 55 and 65 g were randomly assigned to 3 lots. The animals were administered with mercury chloride (HgCl<sub>2</sub>) intraperitoneally for 32 days. The group intoxicated were administered with 2.5 mg/kg of HgCl<sub>2</sub>, while the group of treated by HgCl<sub>2</sub> and P.at received 2.5 mg/kg of HgCl<sub>2</sub> and 150 mg/kg of aqueous extract of *P. atlantica*. The liver weight, the hepatic antioxidant parameters, liver marker enzymes (ALT, AST, and LDH), hepatic function enzymes, cholesteric markers (alkaline phosphatase, serum total protein content, direct and total bilirubin and lipid profile), and histopathological investigation were determinate. The tested extract showed antioxidant properties and high phenolic and flavonoid contents. **Results...** The tested extract showed antioxidant properties and high phenolic and flavonoid contents. The results showed significant changes in biochemical parameters and enzymatic activity. Characterized above all by a significant increase in the serum concentration of ALT, AST, Bilirubine, We also observed that the results obtained show a decrease in hepatic glutathione levels, the enzymatic activity of the antioxidant system CAT, GPx, GST in lipid peroxidation expressed by the high level of hepatic MDA. In addition, supplementation with the aqueous extract of Pistacia atlantica has modified the toxic effects of mercury by improving certain disturbances,

**Conclusion:** The results showed that administration of *P. atlantica* aqueous extract represents a promising candidate for the treatment of liver damages

**Key Words:** mercury, pistacia atlantica, hepatoprotective, histology, biochemical parameters, antioxidants activity

**TOXIC ACTIVITY OF THE ENTOMOPATHOGENIC FUNGUS *M. ANISOPLIAE*  
ON THE HEARTBEAT OF THE DESERT LOCUST *SCHISTOCERCA GREGARIA*  
(FORSKÅL, 1775).**

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**ABSTRACT**

Locust is causing significant losses in agricultural production in the countries concerned by the invasion. Up to the present control strategy has consisted only of the chemical treatment; this type of treatment has proven harmful to the environment. Therefore, there is a new biological control method discovered which is based mostly by using microorganism. That's why we have made our contribution by using of an entomopathogenic fungus *M. anosopliae* to see its heartbeat effect in the fifth instar locust *Schistocerca gregaria* (Forskål, 1775). Preliminary studies of the pathogenicity of *Metarhizium anisopliae* agent, was tested in the laboratory on L5 of *S. gregaria*, however we inoculated treatment on the cuticle of L5 of entomopathogenic solution with D1= 102 sp. / ml and D2=8,6 x 10<sup>5</sup>. At the same time we tested its effect on the heartbeat of the insects. The inoculum is sprayed directly on the L5 of *S. gregaria*. In the same time witnesses were sprayed with distilled water. The results showed that by using the high dose the heartbeat decreased from 82, 5 beats/mn in the witnesses to 37 beats/mn for D1 and 41,3 beats/mn for D2.

**Key Words:** biological control, *m. anisopliae*, toxicity, desert locust, heartbeat.

# INFLUENCE OF SACCHAROTHRIX ALGERIENSIS NRRL B-24137 ON THE EXPRESSION OF VASCULAR WILT OF CHICKPEA

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## ABSTRACT

Actinomycetes are filamentous bacteria that naturally inhabit soils. They are of great importance in biotechnological process because of their ability to produce a large number of antibiotics and other bioactive secondary metabolites. *Saccharothrix algeriensis* NRRL B-24137 (=DSM 44581) is an actinomycete isolated from Algerian Saharan soil. This strain produces several antibiotics with strong antifungal and antibacterial activities, which belong to dithiopyrrolone group. This group consists of a two-cycles (resulted from the condensation of two cystines) containing nitrogen and sulfur. Our study aimed to investigate the possible usefulness of *Saccharothrix algeriensis* (SA) to control *Fusarium oxysporum* f.sp *ciceris* (FOC) a persistent soilborne pathogen, which causes devastating wilt to chickpea. Antagonistic property of the strain SA was primarily evaluated *in vitro* on ISP2 medium by the streak method. This strain of actinomycete showed the significant antifusarium activity against FOC. Consecutively, strain SA and FOC soil-development were assed. The SA-soil treatment permitted an important decrease (3 times) of the FOC density infestation. Moreover the actinobacteria soil-density seemed maintaining after 7 weeks treatment at an appreciable level of  $0.044 \times 10^8$  cfu gds<sup>-1</sup>. Through different pot experiments, soil pre-treatment with the strain SA significantly reduced of the disease incidence of FOC. The effectiveness (% decrease of the disease) reached 61.2%. Other parameters were considered, such as, the presence or absence of soil microflora (sterile or non-sterile soil) and the influence of SA on germination and plant growth.

**Key Words:** *saccharothrix algeriensis*, *fusarium oxysporum* f.sp *ciceris*, fusarium wilt, chickpea, biocontrol.

## ETHNOBOTANICAL SURVEY ON THE USE OF INSECTICIDE PLANTS IN ALGERIA

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### ABSTRACT

Plants are a very rich source of bioactive molecules that can be used in traditional phytotherapy as well as in agriculture or animal husbandry, to fight against insect pests and pests (locusts, mites, flies, mosquitoes...). The present work is a contribution to the study of insecticidal plants used by the local population in Algeria. The ethnobotanical survey was carried out during 4 months in several regions (North, East, West and South of Algeria) with the help of survey sheets distributed among a population mainly composed of: herbalists, traditional practitioners, doctors, veterinarians, farmers, teacher-researchers, breeders... The analysis of the ethnobotanical survey sheets carried out reveals 34 families of insecticidal and medicinal plants used. The most commonly used plants belong to the Lamiaceae family with a frequency of use of 91.11%. The plants cited and belonging to this family are mainly: basil, Melissa, rosemary, thyme, sage, mint, lavender, oregano and peppermint with respective frequencies of 75.61%, 12.20%, 26.83%, 39.02%, 21.95%, 65.85%, 39.02%, 19.51% and 7.32%. Asteraceae constitute the second most used family with a frequency of 46.67%, the plants cited are: tansy, wormwood, mugwort, marigold and chamomile with frequencies of 9.52%, 14.29%, 42.86%, 4.76% and 28.57% respectively. The families Oleaceae, Liliaceae, Apiaceae, Fabaceae, Lauraceae, Malvaceae and Solanaceae are also cited, with frequencies of 11.11%, 24.44%, 33.33%, 4.44%, 26.67%, 8.89%, and 17.78% respectively.

**Key Words:** ethnobotanical surveys, insecticidal plants, method of preparation, therapeutic indication, target insects, chemical pesticides

# ASSESSMENT OF IRRIGATION WATER QUALITY OF THE DAM LAKES LOCATED IN THE NORTH – WEST PART OF MARMARA REGION (TURKEY)

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## **ABSTRACT**

Thrace Region is located in the north – west part of Marmara Region of Turkey and has a great agricultural potential because of its fertile soil and many freshwater resources. Altinyazı, Karaidemir, Kayalıköy, Kırklareli, Sultanköy and Süloğlu Dam Lakes, which were constructed by DSİ (State Water Works) in order to provide irrigation and drinking water and flood protection, are located in the Thrace Region. The aim of this research was to assess the water quality of these reservoirs in terms of irrigation by using Sodium Adsorption Rate (SAR), Sodium Percentage (Na %), Magnesium Rate (MR) and Kelly Index (KI). Water samples were collected in spring (rainy) season of 2018 from 15 selected stations and Na, K, Mg and Ca levels were investigated by using an ICP-MS. According to the results of applied irrigation water quality assessment indices, although it is known that almost all the aquatic habitats in the Thrace Region are exposed to agricultural pollution pressure, the investigated reservoirs were found as suitable for use as irrigation water, in general.

**Key Words:** thrace region reservoirs, irrigation water quality, indices based evaluation

# ASSESSMENT OF ERGENE RIVER BASIN IN TERMS OF IRRIGATION WATER SUPPLY: APPLICATION OF TRACE ELEMENTS BASED INDICES

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## **ABSTRACT**

Ergene River Basin is the main lotic ecosystem of Thrace Part of Marmara Region and the system has a great importance in terms of irrigation water supply for the region. The aim of this research was to assess the water quality of Ergene River Basin in terms of irrigation by using 4 commonly used macro element evaluation indices. Surface water samples were collected in spring (rainy) season of 2018 from 21 selected stations (2 of them were on the Meriç River, 9 of them were on the Ergene River and 10 of them were on the most significant tributaries) located on the basin and Na, K, Mg and Ca levels were investigated by using an ICP-MS. Sodium Adsorption Rate (SAR), Sodium Percentage (Na%), Magnesium Rate (MR) and Kelly Index (KI) were applied to detected data in order to evaluate the water quality in terms of irrigation. As a result of this research, it was determined that the investigated tributaries (except Çorlu Stream) and Meriç River were found as suitable for use as irrigation water, while the Ergene River and Çorlu Stream were found as not suitable for use as irrigation water, in general.

**Key Words:** ergene river basin, irrigation water quality, trace elements based indices

**ALLEVIATION OF ADVERSE EFFECTS OF SALT STRESS ON STEVIA  
REBAUDIANA BERTONI BY EXOGENOUS APPLICATION OF SALICYLIC ACID:  
MORPHOLOGICAL AND PHYSIOLOGICAL TRAITS**

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**ABSTRACT**

Salinization of the soil is a major limiting factor in plant productivity and an agent responsible for the degradation of agricultural land. By their excessive concentration of salts, saline soils constitute an unfavorable environment for the cultivation of most plants. *Stevia rebaudiana* Bertoni (Asteraceae), is known for its sweetness and non-caloric products (steviol glycosides). It can be considered as a plant for the future sugar industry and human health nutrition. The present work aims to study the modulation of salt stress (NaCl: 80mM) effects on *Stevia rebaudiana* Bertoni plants by an exogenous application of salicylic acid (0mM, 0.1mM and 0.5mM). The results obtained show that saline stress influences the morphological and physiological traits of the plant through several metabolism aspects. The exogenous application of salicylic acid to plants subjected to saline stress has improved plant biomass, stomatal conductance, antioxidant enzyme activity, MDA content and electrolyte leakage.

Analysis of all the results leads to the conclusion that saline stress at NaCl affects different physiological parameters of *Stevia rebaudiana* Bertoni, and that salicylic acid application in salinity conditions can reduce the harmful effects of the salt.

**Key Words:** salicylic acid, salt stress, stevia rebaudiana bertoni, growth and physiological attributes

## PGP-ACTIVITIES OF NEWLY ISOLATED RHIZOSPHERE STRAINS FOR ANTIFUNGAL BIOCONTROL

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### ABSTRACT

The use of antagonistic microorganisms as an alternative control to chemical pesticides has gained importance in recent years. An antifungal test was used to determine the PGP activity of the newly isolated strains to be used as biocontrol agents in plants diseases caused by micromycetic pathogens. Four newly isolated strains from different regions in Bulgaria were identified from genus *Bacillus* - *Bacillus subtilis* (M1, SZ1, SZ2 and AZ5) by classical phenotypic techniques and 16S rDNA sequence analysis. Antifungal activity of identified strains were estimated on single layer agar method against test micromycete strains *Penicillium claviforme*, *Trichoderma* sp., *Fusarium* sp. and *Aspergillus flavus*. Strain *Bacillus subtilis* SZ2 showed antifungal activity against all tested myctomycetes strains compare to the control variant. Complete inhibition of micromycete growth was observed by strain of *B. subtilis* M1 against *Trichoderma* sp. Strong antifungal activity (up to 55%) of strains *Bacillus subtilis* SZ2, *Bacillus subtilis* M1 and *Bacillus subtilis* AZ5 strains against the tested micromycetes *Penicillium claviforme*, *Trichoderma* sp., *Fusarium* sp. and *Aspergillus flavus* were observed. Based on the obtained data it could be stated, that tested *Bacillus* strains demonstrated a broad-spectrum antifungal activity against the four tested fungal species.

**Keywords:** bacillus subtilis, antifungal activity, penicillium claviforme, trichoderma sp., fusarium sp., aspergillus flavus.

**Acknowledgment:** This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme "Healthy Foods for a Strong Bio-Economy and Quality of Life" approved by DCM # 577 /17.08.2018"

# FIRST REPORT OF RHIZOCTONIA ORYZAE-SATIVAE CAUSING AGGREGATE SHEATH SPOT ON RICE IN TURKEY

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## ABSTRACT

Aggregate sheath spot caused by *Rhizoctonia oryzae-sativae* (Sawada) Mordue (teleomorph: *Ceratobasidium oryzae-sativae*) is one of the important rice diseases in the world. In 2019, in some rice fields in Edirne Province, 0.5-5 cm long oval lesions which straw color in the middle and surrounded by a red-brown border were observed on the leaves. Isolation of fungal pathogen was carried out by culturing the diseased portion on potato dextrose agar (PDA) medium at 25 0C. Two days after culturing, rectangular branching of mature hyphae, formation of a septum just after branching and constriction at the branching point were observed by light microscopy. White to pale brown coloured culture and brown irregularly globose sclerotia were observed on potato dextrose agar after one week. Identification of the agent was performed by sequencing analysis and pathogenicity test was done using plucked leaf method. The rDNA-ITS sequence of the isolate showed 99% similarity with in the genbank isolate (Acc. No: DQ307249) and the isolate's identity was determined as *R. oryzae-sativae*. This is the first report of *Rhizoctonia oryzae-sativae* that associated with rice aggregate sheath spot in Turkey. Initiate a breeding program for disease resistance and integrated disease management procedures are important to keep the disease under control.

**Key Words:** aggregate sheath spot, rice, its region

# DETERMINATION OF PESTS (DIPTERA: TEPHRITIDAE) IN FRUIT GROWING ON TURKISH REPUBLIC OF NORTHERN CYPRUS

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## ABSTRACT

Güzelyurt region of Turkish Republic of Northern Cyprus has a very important place in terms of fruit growing. Most of the subtropical fruits, especially citrus, olive, pomegranate and fig, are grown in the region. In order to determine the species belonging to the Tephritidae family, McPhail traps were prepared to be used in the orchards with 9 different fruit species selected in Kalkanlı, Yedidalga and Yeşilırmak villages of Güzelyurt between 10th September and 29th November 2016 and were hung in the specified orchards and renewed every week. As a result of this study, 5 species belonging to the Tephritidae (Diptera) family and 1 species of the Drosophilidae (Diptera) family, which are important for fruit growing, were determined. These species; Olive fruit fly (*Bactrocera oleae* (Rossi.)), Mediterranean fruit fly (*Ceratitis capitata* (Wiedemann)), Peach fruit fly (*Bactrocera zonata* (Saunders)), Celery fly (*Euleia heraclei* L.), *Trupanea amoena* (Frauenfeld) (Tephra) and Spotted wing drosophila (*Drosophila suzukii* (Matsumura)). Among these species, *B. zonata*, *E. heraclei*, *T. amoena* and *D. suzukii* were detected for the first time in the Turkish Republic of Northern Cyprus, and it is the first record for the insect fauna of the Turkish Republic of Northern Cyprus. *B. zonata* and *D. suzukii* are species that cause economic damage for fruit growing, while *T. amoena* is a phytophagous species that has also been reported in Turkey and is found in the natural flora. *B. zonata* is a polyphagous species and has been reported to cause damage during the growing season, especially in peach, mango and guava fruits. On the other hand, *D. suzukii* causes damage to different fruit species throughout the year and also causes fungal and bacterial diseases, which are secondary microorganisms, and is also a vector for secondary microorganisms such as fungal and bacterial diseases. In this study, fruit flies (Diptera: Tephritidae), which are also a problem in fruit growing, were detected in Kalkanlı, Yeşilırmak and Yedidalga villages in the Güzelyurt region. The results of this research consist of the first comprehensive data from Turkish Republic of Northern Cyprus and provide the basis for future studies.

**Key Words:** fruit, diptera, pest, TRNC

# PESTICIDE SELECTIVITY: COMPARATIVE TARGET-SITE ANALYSIS WITHIN ACARI

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## ABSTRACT

Most of the traditional broad-spectrum insecticides have been banned due to their adverse effect on the environment and human health. Today, the selectivity of a pesticide has been considered one of the most critical issues in modern agriculture and the pesticide industry. With the development of molecular techniques, mechanisms of pesticide selectivity have been uncovered in recent years. One such reason for selectivity is the differentiation of amino acid sequences by mutations resulting in structural changes in target-site proteins. However, there is still a huge gap to fill in our understanding of why pesticides kill some insects/mites and not some others. The subfamily Acari contains many predatory and phytophagous species having agricultural importance worldwide. In this study, the differentiation among voltage-gated sodium channels and acetylcholinesterases that are the target-sites of pyrethroid and organophosphate acaricides, respectively, belonging to plant-feeding and beneficial mites have been comparatively analyzed using bioinformatic tools. The results will contribute to sustainable mite management in agricultural fields considering the possible side-effects of widely used pesticide groups.

**Key Words:** pesticide selectivity, mites, Acari, voltage-gated sodium channel

**SYMPTOMATOLOGY AND PATHOGENICTY OF CACAO POD ROT (CAUSED BY PHYTOPHTHORA SP) INFECTION IN CACAO (THEOBROMA CACAO) IN CAGAYAN PROVINCE, PHILIPPINES**

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**ABSTRACT**

The study aimed to describe the Phytophthora pod rot (PPR) symptoms disease, and its pathogenicity of the disease in cacao. Specifically, it aims to: (a) characterize morphologically the pathogen attacking of cacao pods; and (b) describe the PPR disease symptom and to determine the pathogenicity of PPR disease to cacao seedlings, cacao flower and unripe and ripe pods. Cacao infected seedlings, flowers were grown in a staggered basis; cacao pods were collected, in a synchronize manner to make them available at time of inoculation. The PPR disease symptoms were described after inoculation was observed and recorded. The pathogen was re-isolated, confirmed and described by using the taxonomic key. Pathogenicity were carried out in getting daily disease progress in ripe, unripe cacao varieties and cacao seedlings and cacao flower. Symptoms manifested by cacao infected with PPR suggested all parts of cacao can be infected by the pathogen from cacao seedlings from 21-days old to 6 months shown by watersoaking cacao leaves can incite a leaf blighting symptoms, while infected flowers were found to have blighting and necrotic symptoms. It is generally observed that ripe variety could easily infected compared to unripe pod as shown by oily brown appearance and it changes from brown to black. White leathery structure or whitish appearance (sporangia) on the surface of the pods and mummified pods in advance stages. Pathogenicity test shows that the PPR is aggressive to incite disease as early as 4 days to 14 days after inoculation.

**Key Words:** phytophthora pod rot, pathogenicity, symptomatology, inoculation, pathogen, watersoaking, blighting, necrotic symptoms, sporangia, mummified

**ADULT FLIGHT PERIOD AND HOSTS OF TROPINOTA HIRTA (PODA, 1761)  
(CETONIIDAE; COLEOPTERA) IN ÇANAKKALE PROVINCE**

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**ABSTRACT**

The study was conducted with the purpose of determining the adult flight period and hosts of *Tropinota hirta* (Poda, 1760) (Coleoptera: Cetoniidae) in Central (Saraycık and Dardanos villages) and Ezine (Akköy village) districts of Çanakkale province, in 2021. Adult flight period was determined by capturing adults with basin traps containing 1/3 water and an attractant (1:1 Trans-anethol and Cinnamil Alcohol) on plum, peach, cherry, and quince orchards, on a broad bean field and on a meadow between 12th of February and 17th of May. It is determined that *T. hirta* adult flight has started in early February and has lasted until mid-June with highest adult numbers in March and April, in the study. In this timeframe, 44 adults in the meadow, 75 adults in the plum, 135 adults in peach and 79 adults in cherry were counted in Ezine, Akköy. Also, 22 adults in quince and 16 adults in broad bean were captured in the traps between 12.04 and 17.05. In Dardanos, 129 adults were counted in a field with abundant wild mustard. In Saraycık, number of adults was limited as 9 adults in cherry and 16 adults in peach with no adults in plum and quince. Population density of *T. hirta* was found to be significantly different in relation to vegetation regions and sampling locations. A total of 16 weed species from 7 families were determined as hosts during the adult flight period of *T. hirta* on different dates until 16th of June. First adult flight of *T. hirta* in Dardanos was recorded on the flowers of *Taraxacum officinale* on 22nd of February and on *Sinapis arvensis* and *Capsella bursa pastoris* on 4th of March. These hosts were observed as important in adult feeding for *T. hirta* at early spring. Also, adults of *T. hirta* were recorded on *Leontice leontopetalum*, *Raphanus raphanistrum*, *Bunias erucago*, *Lamium amplexicaule*, *Anthemis* sp., *Lamium albüm*, *Crepus rubra*, *Papaver* spp., *Carthamus tinctorius*, *Onopordum Illyricum*, *Rubus ulmifolius*, *Picris hieracioides* and *Dacus carota* on different dates and locations. As the result, in adult flight period of *T. hirta*, in addition to different fruit species, host weed species are also important as adult nutrition sources. This paper is a part of the master thesis of the first author which was supported by ÇOMÜ Scientific Research Projects Unit with the project no FYL-2021-3584.

**Key Words:** Çanakkale, tropinota hirta, sinapsis arvensis, taraxacum officinale

# AN INNOVATIVE APPROACH IN BIOCONTROLLING WOOD-BORING INSECTS USING, EPN-GEL

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## ABSTRACT

Entomopathogenic nematodes is very effective biocontrol agents due to their foraging behavior that actively seek an insect host that live in cryptic habitats. As a new application approach, we tested the efficacy of entomopathogenic nematodes (EPNs) formulated in a water-absorbing polimer against wood-boring insect pests living in tree trunk. We named this formulation as EPN-Gel. We hypothesized that the injection of EPN-Gel into galleries can better support nematode survival hence can enhance control of wood-boring insects compared to the standard application of aqueous nematode suspensions. The entomopathogenic nematode, *Steinernema carpocapsae*, was used in the experiments and the water-absorbing polymer was obtained from Isonem Company, İzmir, Turkey. Larvae of *Monochamus galloprovincialis* which completes its life cycle in Scots pine (*Pinus sylvestris* L.) logs was used as the model insect pest. Scot's pine logs is oviposited by laboratory population of *M. galloprovincialis* before the experiments. After one month, the EPN-Gel was injected into log galleries that exhibit larva activity and frass. Logs in the control group were treated with the standard aqueous nematode suspension. Survival rates of *M. galloprovincialis* were evaluated at the end of four months. Thought the number of alive *M. galloprovincialis* in EPN-Gel applied logs was lower than aqueous spray application, we did not detect any significant difference between EPN-Gel and aqueous application. As conclusion, the EPN-Gel can be a good option in controlling wood-boring insects.

**Key Words:** wood-boring insects, steinernema carpocapsae, EPN-Gel, water-absorbing polimer

# EVALUATION OF PHG-RESISTANCE GENES IN COMMON BEAN CULTIVARS IN TURKEY TO PSEUDOCERCOSPORA GRISEOLA, THE CAUSAL AGENT OF ALS DISEASE

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## **ABSTRACT**

Angular leaf spot caused by the fungus *Pseudocercospora griseola* is one of the most important disease in bean growing areas worldwide. The pathogen causes typical necrotic angular spots on the leaves, discolorations on seeds and lead to yield losses up to 80% under favorable conditions. Development of resistant bean cultivars is the most effective control method although different methods are recommended to manage the disease. Several resistance genes identified by *Phg* symbol have been characterized to provide resistance to *P. griseola*. This study aimed to evaluate resistance genes in common bean cultivars, commonly grown in Turkey by molecular markers. Forty common bean cultivars were grown *in vivo* conditions for 14 days, genomic DNA was extracted from the first trifoliolate leaves of plant and PCR analysis was performed with specific primers associated with *Phg* resistance genes. The primer SN02 linked to *Phg-2* gene produced a specific amplicon of 890 bp from all common bean cultivars except for Sofia. The primer g2303 linked to *Phg-ON* generated the expected 350 bp fragment from 27 common bean cultivars, while the primer SH13 linked to *Phg-1* produced no amplification product in any of the samples. Twenty-five common bean cultivars carried the combination of *Phg-2* and *Phg-ON* resistance genes. This study revealed the potential of using of molecular markers associated with *Phg*-resistance gene in common bean cultivars and contributed to the selection of common bean genotypes in breeding programs. Also, these cultivars carrying different resistance gene would be useful in breeding studies to ALS disease as candidate genitor plants.

**Key Words:** angular leaf spot, marker selection, pseudocercospora griseola, phg resistance gene

## OCHRATOXIN A IN OIL SEEDS

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### **ABSTRACT**

Sunflower, corn, and peanut, besides pistachios are used for fodder, oil, food in agricultural industries. The bad farming and harvesting practices and inappropriate drying, unfavorable storage conditions, poor processing practices, packaging, and transport are the main factors for the risk of fungal growth and mycotoxins production. Ochratoxin A (OTA) is one of the significant mycotoxins available in food and agricultural products causing damage to humans and animals. It is produced by a few fungi, such as *Aspergillus* and *Penicillium* species. This research purpose to determine the contamination of OTA in oilseeds samples from Adana, Osmaniye and Gaziantep during the harvest period in 2020. A total of 100 samples of sunflowers, corn, peanuts, and pistachios were investigated for OTA. All samples were analyzed by HPLC (High-Performance Liquid Chromatography). As a consequent of the 100 oilseeds for OTA analysis, 3.5-27.2 µg/kg was found in 23 corn samples out of 25 samples, 0.2–7.4 µg/kg in 15 sunflower samples out of 25 samples, 3.8–12.7 µg/kg in 22 peanut samples out of 25 samples and the lastly 2.0–15.8 µg/kg ochratoxin was determined in 20 pistachios samples out of 25 samples.

**Keywords:** Ochratoxin A, Mycotoxin, sunflowers, corn, peanuts, pistachios.

# NEW POTENT PHYTOPATHOGENIC BACTERIA ON BANANA PLANT: RHIZOBIUM RADIOBACTER

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## ABSTRACT

The occurrence of browning and decay of tissue-cultured banana plantlets was observed from private plant cultivator company in Adana Region in January 2019. Creamy white in colour bacterial colonies were isolated on King's medium B from symptomated plants. Obtained strains were negative in Gram reaction and not producing levan colony in SNA medium. They caused a color change violet to purple, within 10–30 seconds and were lack of Potato rotting ability and causing hypersensitive reaction on tobacco leaves. They also couldnt induce gal formation on carrot slices. Pathogenicity tests were conducted on banana plants cv. Grand naine in [L1] a greenhouse by inoculation with a bacterial suspension, and incubated at 26.5oC. Necrotic symptoms occurred at the infection point after eight days. Small regular punctures on leaves and brown blotches on stems were observed after three-four weeks. Re-isolation on King's B medium were confirmed Koch's postulation. Obtained colonies were identified using MALDI-TOF MS (Matriks assisted lazer desorption ionization time of flight massspectrometry) as *Rhizobium radiobacter* [L2].(Score value were 2.338 and 2.186). Browning and decay of banana plants from greenhouse was observed In Adana in 2020. Symptomatic plants were analyzed and similar colonies were isolated. All tests were repeated as before and same results were obtained. Re-isolates from banana plants were isolated and identified as *Rhizobium radiobacter* using MALDI-TOF (2.385 and 2.079). Further work is necessary for more refined categorisation of the pathogen in terms of biochemical profile or nucleotide sequence. This is the first study in our country that the identification of *Rhizobium radiobacter* on banana plants were determined.

**Key Words:** rhizobium radiobacter, phytopathogenic bacteria, MALDI-TOF MS, banana.

## REACTIONS OF SOME ADVANCE YIELD TRIALS BREAD WHEAT GENOTYPES TO RUSTS AND BUNT

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### ABSTRACT

Rusts (*Puccinia* spp.) and bunt (*Tilletia* spp.) can cause severe yield and quality loss when especially susceptible genotypes are grown up and appropriate growing environments are satisfying for the diseases. The goal of this experiment 24 bread wheat genotypes (20 Advance lines and 4 cultivars (Bayraktar 2000, Pehlivan, Sönmez 2001, Esperia) in advance yield trials developed by Central Research Institute for Field Crops (CRIFC) the Wheat Breeding Unit. Test materials were evaluated for seedling stage/greenhouse (Ankara/Yenimahalle, all rust) in February-April 2016 and adult plant/field stage reactions, Ankara (İkizce location- Yellow Rust (YR/*Pst*) and Bunt (BT/*Bt*)), Edirne (Merkez location- Leaf Rust LR/*Pt*)), Kastamonu (Seydiler location- Stem Rust (SR/*Pgt*)) in October 2015.

For all seedling test genotypes were sown in plastic pots with 3 replication and for all adult plant test materials were sown 3 replications. The research was conducted under artificial epidemic condition to *Pst* (virulent on; *Yr2*, 6, 7, 8, 9, 25, 27, *Sd*, *Su* and *A* resistance genes) and *Bt* (virulent on *Bt0*, 2, 3, 4, 6 and 7 resistance genes). The genotypes were tested under natural epidemic condition for *Pgt* (virulent on; *Sr5*, 6, 7b, 8a, 8b, 9b, 9g, 10, 30, *Tmp* and *Mcn* resistance genes) and *Pt* (virulent on; *Lr1*, 2c, 3a, 16, 26, 3ka, 11, 17a, 30, *B*, 10, 14a, 18, 3bg and 14b resistance genes). For seedling test, infections were be successful and the susceptible control check had 3-4 rust diseases severity in February-April 2016. For adult plant rust test; infection was be successful and the susceptible control check genotypes had 80-100S rust diseases severity in June-August 2016. Coefficient of infections under 20 was well-considered to be resistant. Infection was be successful and the susceptible control check genotypes had 80-100% bunt in August 2016. Less 25% were well-considered to be resistant.

When both seedling and adult plant tests are evaluated together; 6 (18%), 6 (25%) and 1 (4%) and 7 (29%) genotypes were resistant to *Pst*, *Pt*, *Pgt* and *Bt* respectively. Because of this study resistant lines have been selected as resistant both diseases for breeding programme.

**Keywords:** Bread wheat, rusts (*Puccinia* spp.), bunt (*Tilletia* spp.), reaction test, adult plant reaction

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## REACTIONS OF SOME ADVANCE YIELD TRIALS WINTER DURUM WHEAT GENOTYPES TO STEM, LEAF AND YELLOW RUSTS

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### ABSTRACT

Durum wheat is among the most cultivated herbaceous crops in the Turkey. Yellow, leaf and stem rusts are the most important fungal diseases limits grain yield and quality in Turkey. The objective of the research was determining of the reactions of the 24 winter durum wheat genotypes (20 Advance lines and 4 cultivars (Kızıltan 91, Eminbey, Çeşit-1252, Ankara 98)) in advance yield trials developed by Central Research Institute for Field Crops (CRIFC) the Wheat Breeding Unit. Test materials were evaluated for seedling stage/greenhouse (Ankara/Yenimahalle, all rust) in February-April 2016 and adult plant/field stage reactions, Ankara (İkizce location- Yellow Rust (YR/*Pst*)), Edirne (Merkez location- Leaf Rust (LR/*Pt*)), and Kastamonu (Seydiler location- Stem Rust (SR/*Pgt*) in October 2015. For all seedling test genotypes were sown in a plastic pot with 3 replication and for all adult plant test genotypes were sown 3 replications. The study was achieved under artificial epidemic circumstances to *Pst* (avirulent on *Yr5*, 8, 10, 15, 24, 26 and 27, resistance genes). The genotypes were observed under natural epidemic circumstances for *Pgt* (avirulent: *Sr24* and *Sr31* resistance genes) and *Pt* (avirulent on *Lr9*, *Lr11*, *Lr19*, *Lr20*, *Lr24* and *Lr28* resistance genes). For seedling test, infections were accomplished and the susceptible control check genotypes had 3-4 rust diseases severity in February-April 2016. For adult plant test, infections were accomplished and the susceptible control check genotypes had 80-100 S rust diseases severity in June-August 2015. Coefficient of infections under 20 was well-considered to be resistant. When both seedling and adult plant tests are evaluated together; 17 (71%), 5 (19%) and 0 (0%) genotypes were resistant to *Pst*, *Pt* and *Pgt* respectively. The resistant lines will be beneficial to achieve resistant cultivars.

**Key Words:** durum wheat, rusts (*puccinia* spp.), reaction test, seedling reaction, adult plant reaction

**EFFECTS OF SOME ESSENTIAL OILS (*CITRUS LIMON* AND *CITRUS SINENSIS*)  
AGAINST *APHIS FABAE* SCOPOLI (*HEMIPTERA: APHIDIDAE*)**

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**ABSTRACT**

Aphids can cause significant economic losses in agricultural productions because they have the ability of fast reproduction. In other hand, they are vector of several plant diseases and viruses. Therefore, in the scope of biological control studies, it is important to reveal the effects of some essential oils against aphids. In this study, essential oils of *Citrus sinensis* and *Citrus limon* were studied insecticidal effects on black bean aphid *Aphis fabae* Scopoli (Hemiptera: Aphididae). The lethal and sublethal effects of essential oils of *C. sinensis* and *C. limon* on one day old adults of *A. fabae* were investigated under laboratory conditions. The trials were evaluated at the different concentrations (0.5, 1, 2, 4, 6, 8, 10, 12  $\mu\text{L/L}$ ), for 24 h after treatments. After this process, lethal concentrations (LC50, LC90) of EOs were calculated according to the obtained data. Life table parameters of new emerged aphid surveyed at sub-lethal concentrations (LC40, LC30) of EOs and these parameters were calculated by Euler-Lotka equation. According to the results, the mortality rate of EOs increased with the increasing of concentration. Lethal concentrations (LC50, LC90) of *C. sinensis* were calculated as 3.89 and 43.77  $\mu\text{L/L}$ , respectively. Lethal concentrations (LC50, LC90) of *C. limon* were calculated as 2.47 and 27.51  $\mu\text{L/L}$ , respectively. Sub-lethal concentrations (LC40, LC30) of EOs caused decrease in adult longevity, fertility of surviving aphids and intrinsic rate of increase. It has been concluded that the essential oils can be used in the control of these pests.

**Key Words:** *aphis fabae*, essential oils, lethal effects, *citrus sinensis*, *citrus limon*

## THE ENHANCEMENT OF WATER STRESS RESISTANCE IN PALM DATE BY MYCORRHIZAL FUNGI AND PGPR BACTERIA

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### ABSTRACT

A good farming practice that gives high yield and inportente quality needs an extensive use of chemical fertilizers, which are costly and create environmental problems. Therefore the uses of bio-fertilizers containing beneficial microorganisms instead of synthetic chemicals are known to improve plant growth through the supply of plant nutrients and may help to sustain environmental health and soil productivity. Among the abiotic stresses, drought is the first environmental stress responsible for a decrease in agricultural production worldwide; it affects plants in various ways, like slowing plant growth, and disrupting its general physiology. Arbuscular mycorrhizal symbiosis and Plant growth-promoting Rhizobacteria (PGPR) are considered to be bio-ameliorator of the plant's resistance to water stress. The present study investigated the effects of inoculation with arbuscular mycorrhizal fungi (AMF) and PGPR on the water status and antioxidant enzyme activities of date palm seedlings grown under water stress conditions. The parameters related to the plant's water status were significantly ( $p < 0.05$ ) higher in the plants treated with Mycorrhizae, Mycorrhizae+Bacteria comparing to their respective controls, especially under water stress conditions. The maximum proline content was obtained in plants inoculated with the AMF species and PGPR (combined) under sever water stress conditions reaching a value of  $2.588 \pm 0.034$  in 25% field capacity, comparing to  $0.978 \pm 0.024$  for the control. In addition, the inoculated seedlings showed notably lower activities of superoxide dismutase (SOD), catalase (CAT), peroxidase (POX), and glutathione S-transferase (GST) in response to severe water stress compared to non-mycorrhizal seedling. Overall, the arbuscular mycorrhizal symbiosis and PGPR bacteria inoculation could be a promising method to enhance date palm resistance against oxidative stress.

**Key Words:** date palm, arbuscular mycorrhizal symbiosis, PGPR bacteria, antioxidant enzyme, reactive oxygen species.

# MOLECULAR AND MORPHOLOGICAL IDENTIFICATION IN SEVERAL THRIPS (THYSANOPTERA: THIRIPIDAE) SPECIES IN ARTVIN

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## ABSTRACT

Molecular techniques as a basic and correct approach identifying thrips species, when the morphological diagnose is unsure or even impossible. Several thrips species (Insecta, Thysanoptera) are universally known as crop pests and vectors of viral diseases, but their identification are hard because of their minor body size and hidden morphological differences. Additionally, DNA barcoding can be considered a valuable alternative to the classic morphology method for identification of major thrips. Sequencing variation in the *mitochondrial cytochrome oxidase I* (COI) region has been shown to be useful for identification not only thrips but also many insect pests. In that study, DNA barcoding for molecular identification was used to support characterization of the genus *Thrips* and *Frankliniella* species by two gene regions (the mitochondrial *cytochrome oxidase I* (COI) and Internal transcribed spacer (ITS) gene). This study also aimed to construct both a molecular and morphological identification key for several thrips species including (*Thrips physapus* Linnaeus, *T. meridionalis* (Priesner), *Frankliniella tenuicornis* (Uzel), *F. occidentalis* (Pergande) and *F. intonsa* (Trybom)). Individuals were collected from Artvin (Yusufeli) between 2016 and 2017. Molecular data indicate that different species in the genus *Thrips* are located in distinct groups from *Frankliniella* genus in the COI and ITS phylogenetic trees. Overall results show that molecular keys can be a useful on thrips identification for pest management and plant quarantine aimed.

**Key Words:** thrips, DNA barcoding, morphological identification, Artvin

**EFFECTS OF SOME COMMONLY USED INSECTICIDES ON THRIPS  
HAWAIIENSIS MORGAN (THYSANOPTERA: THIRIPIDAE) AND RECENT  
STATUS OF THIS PEST ON LEMONS IN ÇUKUROVA REGION**

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**ABSTRACT**

The Hawaiian flower thrips, *Thrips hawaiiensis* (Morgan) (Thysanoptera: Thripidae), is a common flower-dwelling thrips that is native to Oriental and Pacific regions. It has expanded its geographical range to Africa, America, Australia, and Europe through increasing international trade. In 2015, *T. hawaiiensis* was firstly detected in lemon orchards from Turkey. Following the introduction of the pest in this region, *T. hawaiiensis* has been established and caused economically damage in lemons. The control of this pest has been really on the chemical control in the region. Due to the cryptic behavior of the thrips and multiplying rapidly can restrict the control of this pest with insecticides. And also, the effectiveness of the insecticides on this pest has not been investigated until this time in Turkey. For this reason, the effects of seven insecticides on the larva and adults have been determined under laboratory conditions to obtain basic information on the control of this pest. Moreover, the recent status of this pest on lemons in the Çukurova region has been presented. With the laboratory studies, 5% Emamectin Benzoate (100%), 25% Spintoram (100%) and Spinosad (100%) are the most efficacious insecticides on the both stages of *T. hawaiiensis*. The effectiveness rates of the other insecticides (18 g/l Abamectin, 100 g/l Spirotetramat, 240 g/l Sulfoxaflor and 100 g/l Novaluron) on larvae and adults are ranged between 8.33-66.67% and 2-18% respectively. On the other hand, while the scarred fruit ratios were determined 70% in 2015, but the following years this ratio was found below the 40% in Erdemli, Mersin. In Adana, the scarred fruit ratios were found less than 5%. With the light of these results, *T. hawaiiensis* can considered major pest due to the direct damage of the lemon fruits in Mersin. In Adana, the population level and damage status of this pest should be checked following years due to its invasive potential. For further studies, the effectiveness of these insecticides on *T. hawaiiensis* should be determined under field conditions.

**Keywords:** Thrips, control, insecticides, Adana, Mersin.

# FIRST REPORT OF PLUM POX VIRUS ON PRUNUS SERRULATA KANZAN IN TURKEY

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## ABSTRACT

*Prunus serrulata* Lindl. cv. Kanzan (Japanese flowering cherry) is one of the most popular ornamental trees with light pink double flowers and unfolded from crimson buds. It is recommended for landscape architecture and gardening arrangements because of its mass floral display in the spring. *P. serrulata* Kanzan is grown as shade trees in home gardens, parks, and on the roadsides in Tekirdag province of Turkey. In 2019, some systemic disease symptoms such as mild diffuse chlorotic mosaic and slightly chlorotic local spots on leaves of some *P. serrulata* trees in Tekirdag province had been observed. To investigate the presence of PPV in 15 leaf samples, which were collected from *P. serrulata* trees growing on the roadside and home gardens of Tekirdag and were screened by DAS-ELISA and RT-PCR tests. Total RNA was extracted from symptomatic and asymptomatic fifteen leaf samples using Qiagen RNeasy plant mini kit and subjected RT-PCR using primers P1/P2 located at the C-terminus of the PPV CP gene as described by Wetzel et al. (1991), to amplify a 243 bp product. Two out of the fifteen samples were found infected with PPV by RT-PCR and ELISA. The amplicon of one positive sample was cloned and sequenced, and a partial sequence was deposited in GenBank under accession number MW017468. Analysis of the obtained sequence revealed that it had 100-94.23% nucleotide and 100-86.41% amino acid identities of PPV isolates deposited in GenBank from different *Prunus* species and regions. The highest identity based on CP has been observed with a PPV plum (isPl\_117) isolate (Accession no. KT827146) from Turkey. Phylogenetic analysis by the neighbor-joining method using MEGA X software indicated that it clustered with other Turkish PPV isolates. PPV is the agent responsible for the Sharka disease of stone fruits and ornamental *Prunus* trees. Up to now, the presence of PPV has been identified on stone fruits growing in Turkey such as peach, plum, apricot, nectarine, almond as well as blackthorn and Japanese plum as reservoir host of PPV. Moreover, several ornamental and wild *Prunus* species were identified as natural and experimental hosts of PPV in different countries. No information is available on the occurrence as a natural host of PPV on *P. serrulata* Kanzan. To our best knowledge, this is the first report of PPV on *Prunus serrulata* Kanzan in the Tekirdag province of Turkey.

**Key Words:** PPV, *Prunus serrulata*, Japanese flowering cherry

**DETERMINATION OF CONTACT AND REPELLENT EFFECT OF SIĞLA  
(LIQUIDAMBAR ORIENTALIS MILL.) OIL ON PHYTOSEIULUS PERSIMILIS  
ATHIAS-HENRIOT (ACARI: PHYTOSEIIDAE)**

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**ABSTRACT**

One of the most effective methods in the control of pests that cause reductions in yield and quality in economically produced plants is the use of chemical compounds. The unconscious and intensive use of these compounds, also called pesticides, has serious negative effects on both the environment and human health in the short and long term. In addition, as a result of using the same pesticide against a pest or pesticides with the same mechanism of action for a long time, first a decrease in sensitivity and then resistant populations are formed. In this respect, alternative control methods such as the use of plant extracts are gaining importance in the fight against pests in agricultural production. In this study, *Phytoseiulus persimilis* Athias-Henriot (Acari: Phytoseiidae), the predator of the Two-Point Red Spider [*Tetranychus urticae* (Acari: Tetranychidae)], was obtained from the oil the sweetgum tree (*Liquidambar orientalis* Mill.) endemic in the South-West Anatolia Region of our country. Lethal and repellent effects on female individuals were determined by using leaf dipping and spraying methods. Concentrations of 1, 3, 6 and 12 % of frankincense oil were tested by spraying method in lethal effect trials, and 1, 3, 6 and 12% concentrations were tested using leaf dipping method in repellent effect trials. The experiments were carried out under laboratory conditions at  $25 \pm 2$  °C and  $65 \pm 10\%$  proportional humidity, and spraying method from 30 cm to female individuals on bean [*Phaseolus vulgaris* (Fabaceae)] leaf discs placed between 60 x 45 mm and 3 mm thick plexiglass sheets. Dead and live adult females of *P. persimilis* were observed and recorded at 24, 48, 72 and 96 hours in the lethal effect trials, and 2, 24, 48, 72 and 96 hours after the adult females were released in the repellent effect trials. Experiments were carried out with 10 replications. As a result of the studies, the highest number of deaths was recorded at 6% concentration of sweetgum oil. The highest repellent effect was observed at a concentration of 12% at a rate of 94% at the 24th hour. As a result, it is thought that studies on the effects of different concentrations of herbal extracts on beneficial species will make significant contributions to the success of biological control.

**Key Words:** contact, repellent effect, siğla oil, phytoseiulus persimilis

**DETERMINATION OF CONTACT AND REPELLENT EFFECT OF SIĞLA TREE  
(LIQUIDAMBAR ORIENTALIS MILL.) STORAX ON TETRANYCHUS URTICAE  
KOCH (ACARI: TETRANYCHIDAE)**

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**ABSTRACT**

Two-spotted spider mite [*Tetranychus urticae* (Acari: Tetranychidae)] causes significant damage to many crops such as vegetables, fruits and ornamental plants in our country. Many pesticides are widely used in pest control. However, long-term use of pesticides is known to cause serious adverse effects on the environment and human health, as well as resistance formation in pests. In this respect, alternative control methods are gaining importance in the fight against pests in agricultural production. Recently, the use of herbal extracts in the fight against pests is seen as an alternative control method against pesticides. In this study, the lethal and repellent effect of the plant extract obtained from the sweetgum tree (*Liquidambar orientalis* Mill.), which grows endemic in the South-West Anatolian Region of our country, on adult females of Two-spotted red spider (*T. urticae*) was tested by leaf dipping method. Laboratory experiments were carried out in specially designed plastic petri dishes with a diameter of 5 cm. Bean [*Phaseolus vulgaris* (Fabaceae)] leaf discs were placed on the bottom of the petri dishes by laying moistened cotton and blotting paper in order to keep the leaf discs fresh for a long time. In the lethal effect trials, 1, 3, 6 and 12% concentrations of the extract were used, and the numbers of dead-alive individuals were checked and recorded at 2, 24, 48, 72 and 96 hours after application. Experiments were set up with 10 replications for each concentration and 10 adult females per replication. In the control groups, a mixture of 50% distilled water and 50% acetone was used. Concentrations of 1, 3, 6 and 12 % of the extracts were used in the repellent effect trials and the counts were made at 2, 6, 24, 48, 72 and 96 hours after the application. According to the results obtained from the study, the most death occurred in the lethal effect of sweetgum oil at a concentration of 12% with a rate of 75%. In the repellent effect, the highest mortality rate was determined as 72% at 12% concentration. As a result, it is thought that the increase in the number of studies investigating the effects of herbal extracts on agricultural pests will contribute to the development of alternative control methods against pesticides.

**Key Words:** siğla tree storax, tetranychus urticae, contact, repellent effect

# FIRST REPORT OF BARLEY YELLOW DWARF VIRUS-PAS (BYDV-PAS) IN GERANIUM DISSECTUM IN TURKEY

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## ABSTRACT

*Geranium dissectum* L. is a weed with flowers from dicotyledonous belonging to the Geraniaceae family. It is native to Europe and introduced in North America, is widely found in disturbed habitats such as roadsides, old fields, waste places, and cultivated fields in Turkey. *Barley yellow dwarf virus-PAS* (BYDV-PAS) is a member of the genus Luteovirus in the family Luteoviridae consisting of barley yellow dwarf viruses, causing yield and quality losses on cereals worldwide. BYDV-PAS has previously been separated from BYDV-PAV (type isolate PAV-129) according to virus genotype and hosts; hereafter, it was recently identified on grasses from the Poaceae family as well as cereal crops. However, BYDV-PAS has not been identified in Turkey so far. A total of 23 monocotyledon and dicotyledon weed samples from the border of the cereal fields in Trakya, Turkey, were collected to identify known and unknown viruses. Total RNA extracted from each infected sample was separately subjected to high throughput sequencing on an Illumina Hi-seq 3000 system. BBSplit 38.90 was used to remove the adapter and barcode leftover sequences from raw reads. The processed reads were assembled using the SPAdes tool, then annotated with NCBI BLAST against ViralDb. One *Geranium dissectum* sample, collected at Tekirdağ province of Trakya region in Turkey, contained 43120 contigs, comprising 9941 aligned reads related to BYDV-PAS sequence. The complete nucleotide sequence of BYDV-PAS comprised 5629 nt in length (Accession no. MZ612011). Analysis of open reading frames (ORFs) revealed that the BYDV-PAS genome contained six ORFs with sizes of 1024 nt (ORF1), 1586 nt (ORF2), 603 nt (ORF3), 462 nt (ORF4), 1356 nt (ORF5), and 126 nt (ORF6). ORF1 encodes P1 protein (RdRp) (341 aa), ORF2 encodes P1-P2 fusion protein (869 aa), ORF3 encodes CP protein (201 aa), ORF4 encodes MP (154 aa), ORF5 encodes RTP (452 aa) and ORF6 encodes putative P6 protein (42 aa). To our knowledge, this is the first report of BYDV-PAS in Turkey, more importantly, this would be the first report of BYDV-PAS infecting a dicotyledonous plant species. Acknowledgement: This study was founded by the Scientific and Technological Research Council of Turkey, International Postdoctoral Research Scholarship Program (TUBITAK-BIDEB), and Tekirdağ Namık Kemal University, The Scientific Research Projects Coordination Unit (NKU-BAP) to HI, and the DARPA Insect Allies Program to WAM.

**Key Words:** BYDV-PAS, weed, dicotyledon

# **BANANA BUNCH TOP DISEASE (BBTD) SITUATION IN CAGAYAN, PHILIPPINES**

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## **ABSTRACT**

Banana is one of the most important fruit crops of the Philippines (Damasco, et al.,2019). In Cagayan Valley, banana is the prime commodity under fruit crops. The production in 2019 was pulled down due to the occurrence of super typhoons in 2nd semester of 2018 (PSA, 2019). Aside from the typhoon, the occurrence of pest and diseases especially the banana bunchy top disease (BBTD) is one of the major constraints in the production. In Cagayan province, a study was conducted to determine the occurrence and distribution of BBTD in the banana farms using the Geographic Information System (GIS). A survey and mapping were used to the major banana growing municipalities namely: Allacapan, Lasam, Gattaran and Baggao. The NAMRIA form was used to gather data to the banana farmers thru an individual interview from October to December 2020. The data gathered from the respondents were analyzed using frequency counts, weighted means, and percentages. The geo-referenced locations of the banana farms were analyzed using the QGIS software. Results revealed that the banana growers had no management to the BBTD or commonly called "tungro". In the actual farm visits, GPS recordings and collection of BBTD samples were done from March to May 2021. The highest BBTD incidence was obtained in Gattaran with 24.9 % followed by Allacapan and Baggao with 20.77% and 6.97%, respectively. With this situation, as part of the BBTD management of the project, a series of trainings was immediately conducted to the selected banana farmers due to IATF/health protocols. The site selection and validation for the BBTD rehabilitation and processing of collected banana samples are the on-going activities of the project.

**Key Words:** BBTD, occurrence, BBTV, incidence, GIS, survey

# PROMISING RESULTS OF FIELD TESTS OF 4 NEW ALTERNATIVES FOR COPPER PPP'S REDUCTION/REPLACEMENT IN ORGANIC PRODUCTION OF OIL BEARING ROSES (ROSA DAMASCENA)

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## ABSTRACT

RELACS <https://relacs-project.eu/> is a European project, funded by the European Union's Horizon 2020 research and innovation programme with the focus on replacement of contentious inputs in organic farming (grant agreement No 773431). One of the tasks is to evaluate the potential of new alternative plant protection products (PPP) for replacement/reduction of the use of copper PPP on different crops in Europe. Foundation Bioselena together with the Research Institute of Roses and Etheric plants in Kazanlak (Bulgaria) tested for three consecutive years the efficacy of four alternatives investigated in RELACS (LIC; LAR; SUMB; TAG) against two of the most important fungal diseases on rose: rust (*Phragmidium mucronatum* Pers) and black leaf spots (*Diplocarpon rosae* Wolf). LIC, LAR and SUMB are plant extracts, TAG is a rare sugar. All four alternatives reduced infestation with rust compared to the control. The copper reference showed highest efficacy. The yield of rose flowers and of rose oil after application of the new test products was up to 12.5% higher compared to the copper reference. Reported results from this field experiment are encouraging. Different strategies for replacement or reduction of copper use in organic cultivation of roses can be developed on this basis.

**Key Words:** organic farming, oil bearing roses, Rosa damascena, copper products, copper replacement

# STUDY ON COMMON WINTER WHEAT LINES FOR RESISTANCE TO PUCCINIA TRITICINA

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## ABSTRACT

The response of 250 common winter wheat lines for resistance to cause agent of leaf rust *Puccinia triticina* was studied. The study was conducted during the period 2014-2016 in the infection field of the Dobrudzha Agricultural Institute - General Toshevo, Bulgaria. The selected 20 lines show a certain degree of resistance under field conditions and response to one or more pathotypes at the young stage under greenhouse conditions. The multipathotype test was used to study the response of lines in greenhouse conditions. The inoculations of the plants, both under field conditions and under greenhouse conditions was performed according to the requirements in the methodology for work with rusts. The identification of the pathotypes used in the multipathotype test was made based on the reaction type of 15 isogenic lines. As a result of the study, we found that 15% of the lines carriers of race-specific resistance. These lines in the future will be the subject of further genetic selection research to prove the presence of a race-specific gene. Thirty percent of the lines combine partial resistance, race-specific in the young stage with race-non specific resistance in adult stage. Forty percent of all lines have race-non specific resistance, and 15% of lines have "slow rusting " resistance. As a result of the study, the lines showed stable resistance can be included in the selection programs in the creation of varieties resistant to *Puccinia triticina*.

**Key Words:** wheat, puccinia triticina, pathotypes, multipathotype test, types of resistance

# FIRST BIOLOGICAL AND SEROLOGICAL CHARACTERIZATION OF ZYMV AND ITS INFECTION OF SQUASH PERCENT IN MID OF IRAQ FOR TWENTY ONE YEARS

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## ABSTRACT

The emergence and spread of yellow mosaic disease in cucurbits was first observed in Iraq in 1996. To separate and diagnose the causal agent of this disease than other similar diseases infecting cucurbits, the following biological and serological means were used: The continuation and description of the infection symptoms development on different cucurbits members, moreover the symptoms of infection on the differentiation plants which selected from the range of different plant families of the causal agent; in addition to this disease methods of transmission; and eventually study of the physical properties; Results revealed that Among 24 species only 9 species were infected, seven of them were of cucurbits, which observed systemic yellow mosaic, blisters, with leaf and fruit malformation, but only sponge gourd (*Luffa acutangola*) showed only chlorosis . Out of cucurbits chlorotic local lesions were developed on *Chenopodium amarantcolor*. First registrant of red frame around 1- 5 mm pale brown necrotic lesion on Euphrbia (*Picris hieracioides*) old leaves was performed. The pathogen was mechanically, aphids, and weak seeds transmitted. Comparison of these identification methods with the previous studies indicated that the causal agent of this disease was Zucchini Yellow Mosaic Virus (ZYMV). The biological identification of the causal agent of yellow mosaic of squash was indicated by a standard antiserum obtained from (ICARDA). A laboratory preparation of antiserum was done and used to determine the prevalence rate of ZYMV infection in the fields of the mid region of Iraq since its early dissemination in 1997. Result revealed that infection was rose to almost 95% of the fields in the early years of the infection followed by gradually decreasing to about 20% through the period 2004 – 2012, but then it rose to 65 – 77% through the last three years, and then suddenly decreased to about 10% in 2016 or a little more in the following two years.

**Key Words:** ZYMV, cucurbits viruses, squash diseases, virus identification, virus serological characterization

**SYNERGISTIC APTNESS OF ENTOMOPATHOGENIC BEAVERIA BASSIANA AND ENHANCED DIATOMACEOUS EARTH (DEBBM) TO MANAGE RICE WEEVIL, SITOPHILUS ORYZAE L. (CURCULIONIDAE: COLEOPTERA)**

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**ABSTRACT**

*Sitophilus oryzae* (rice weevil) is a stored product insect pest that damages grains of several crops including wheat, rice and maize. A formulation of diatomaceous earth enhanced with bitterbarkomycin (DEBBM) and combined with entomopathogenic fungus, *Beauveria bassiana* was used to control rice weevil. DEBBM was applied at the rates of 20 and 40 ppm alone and also in combination with  $6.69 \times 10^5$ ,  $6.69 \times 10^7$  and  $6.69 \times 10^9$  conidia/kg of rice. Insect bioassays were executed at 25, 30, and 35°C with 70% relative humidity. The mortality of treated weevils was recorded after 7, 14 and 21 days of exposure whereas 60 days post exposure, emergence of progeny was also assessed. The use of DEBBM in combination with *B. bassiana* considerably increased pest mortality at increasing temperatures and longer exposure intervals. Lower progeny production was observed in rice treated with high application rates of DEBBM + *B. bassiana*. In the cadavers, percent mycosis was the maximum where *B. bassiana* was applied at low rates. A combination of DEBBM and *B. bassiana* provided the effective control of rice weevil in rice grains.

**Key Words:** rice weevil, *Beauveria bassiana*, DEBBM, mortality and mycosis

# PROSPECTS FOR ENGINEERING CEREALS TO FIX ATMOSPHERIC NITROGEN

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## **ABSTRACT**

Cereals (wheat, maize, sorghum and rice) are most important crops from agriculture point of view. They make major part of human nutrition but are mostly dependent on chemical fertilizers. The use of these fertilizers is economically beneficial but pollution from these synthetic fertilizers to aquatic environment and atmosphere has become a major global issue. Development of biological nitrogen fixation in cereals have always been a desire. In cereals, the quest for nitrogen fixation started long ago to alleviate negative effects on nature and increase availability of reactive nitrogen. Naturally, legume crops are able to fix nitrogen symbiotically by their interaction with soil inhabiting rhizobia that become established intracellularly within nodules but cereals lack that mechanism. There are three major strategies to engineer cereal plants; firstly, by transferring active nitrogenase genes into crop plants, for this there is dire need to target *Nif* genes to mitochondria. Secondly, development of a root nodular symbiosis in cereals by introducing Nod factor receptors and the third one is development of diazoplasts, which can be quite good because they need just introduction of *Gluconacetobacter diazotrophicus* which has many characteristics that made it best one for intracellular symbiotic nitrogen fixation in cereals.

**Key Words:** cereals, nitrogen fixation, genetic engineering, symbiosis

# COMPARATIVE EFFECT OF NATURALLY SYNTHESIZED BIOSTIMULANTS OF PGPR ON GROWTH OF MAIZE CROP (ZEA MAYS)

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## ABSTRACT

Maize is one of the three major food staple crops for the world's population. Although it has high grain and biomass yield due to high photosynthetic activity but yield losses are more due to poor growth. Application of PGPR have been found to have promising effect on growth and yield of Maize. Plant growth promoting rhizobacteria (PGPR) are beneficial rhizospheric bacteria that promote plant growth by increasing availability of nutrients through different mechanisms such as by fixing nitrogen (BNF), solubilizing phosphorous, zinc or inhibition of the activity of plant pathogens etc. Keeping in view the above stated facts a pot study was conducted in glass house of Soil Bacteriology Section, Ayub Agriculture Research Institute, Faisalabad to evaluate the comparative effectiveness of metabolites of sole strain of PGPR on growth and yield of maize (*Zea mays*). Purified culture of five different PGPR species such as *Azotobacter*, *Azospirillum*, *Pseudomonas*, *Bacillus*, *Rhizobium* was prepared and applied as seed treatments. The study was laid out in completely randomized design (CDR) with three replications. Results revealed enhanced physical parameters as well as Chlorophyll contents (mg/g) and IAA equivalents ( $\mu\text{g/ml}$ ) for all treatments compared to control. Overall physical parameters like root length (cm), shoot length (cm), Fresh root mass (g), fresh shoot mass (g) along with Chlorophyll contents (mg/g) and IAA equivalents were observed highest for *Azospirillum sp.* Results shows that application of all plant growth promoting rhizobacteria enhanced the growth of maize (*Zea mays*) but *Azospirillum sp.* shows comparatively significant effect on all growth parameters. So it is concluded that by the application of Plant Growth Promoting Rhizobacteria we can increase the growth of maize crop.

**Key Words:** microbes, culture, maize, BNF, PGPR.

# CHARACTERIZATION OF RHIZOBIA FROM ROOT NODULE AND RHIZOSPHERE OF VICIA FABA IN ALGERIA

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## ABSTRACT

Nitrogen fixation resulting from mutual symbiosis of rhizobia and cultivated legume plants is therefore critical to food security as it directly affects agricultural production. Biological Nitrogen Fixation (BNF) can be an important factor in sustainable agriculture. A collection of 20 isolates from fresh Nodules of the legume plant *Vicia faba* was isolated from five soil of Algeria. The soil from each region has undergone physical-chemical analysis: (granulometry, total carbon, organic matter, pH, and electrical conductivity, determination of available phosphorus and determination of total nitrogen). A media viz., Glucose-Peptide Agar (GPA), Congo red, Yeast Mannitol Agar (YMA) containing 2% NaCl were employed to make presumptive decisions on the recognition and classification of the isolated bacterial strains. All the isolates were found with poor absorption of dye Congo red and little or no growth on the media of GPA and without altering the pH. Almost all of the isolates exhibit good growth on 2% NaCl, poor growth on GPA, thus confirming the rhizobia. After biochemical tests like catalase test and citrate utilization test isolates were confirmed. The presence of rhizobia on root nodules of leguminous plant. Nitrogen fixation resulting from mutual symbiosis of rhizobia and cultivated legume plants is therefore critical to food security as it directly affects agricultural production. Biological Nitrogen Fixation (BNF) can be an important factor in sustainable agriculture. A collection of 20 isolates from fresh Nodules of the legume plant *Vicia faba* was isolated from five soil of Algeria. The soil from each region has undergone physical-chemical analysis: (granulometry, total carbon, organic matter, pH, and electrical conductivity, determination of available phosphorus and determination of total nitrogen). A media viz., Glucose-Peptide Agar (GPA), Congo red, Yeast Mannitol Agar (YMA) containing 2% NaCl were employed to make presumptive decisions on the recognition and classification of the isolated bacterial strains. All the isolates were found with poor absorption of dye Congo red and little or no growth on the media of GPA and without altering the pH. Almost all of the isolates exhibit good growth on 2% NaCl, poor growth on GPA, thus confirming the rhizobia. After biochemical tests like catalase test and citrate utilization test isolates were confirmed. The presence of rhizobia on root nodules of leguminous plant.

**Key Words:** root, nitrogen fixation, *vicia faba*, nodule.

# HALOPHYTIC PLANTS, AN ALTERNATIVE FOR THE REHABILITATION OF SALINE SOILS TO THE DEVELOPMENT OF AGRICULTURE IN ALGERIA.

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## ABSTRACT

Soil salinity becomes one of the factors responsible for the degradation of agricultural land estimated around 800 million hectares of land worldwide (FAO, 2017). To this must be added the climate change and galloping demography to meet the needs of the food security. Salinity is recognized as a major constraint of agricultural production with annual yield losses of up to 6.3% worldwide. The rehabilitation of areas affected by salinity requires to orient oneself towards the ecophysiological approach of adapted plants to this constraint. Under these stressful conditions, plants trigger defense mechanisms to survive. To meet this objective, two halophytic species *Atriplex halimus* L. and *Atriplex canescens* P.N. are chosen because they have developed a level of resistance to cope with the presence of salt. However, the choice of these species requires knowledge of certain mechanisms involved to assess their tolerance level under high salt stress. The main of this study is to examine the cationic responses of young plants stressed, after the 150th day of sowing, with NaCl at 100, 300 and 600 mM.l-1 of the Hoagland solution. The analysis of Na<sup>+</sup> and K<sup>+</sup> variations from leaves and roots, then the calculate of ratio K<sup>+</sup>/Na<sup>+</sup> to determine ionic selectivity, and finally the Relative Salt Sensitivity Index (RSSI) obtained from fresh and dry weights of leaves and roots of each species are proposed.. The results conclude that:

- The amount of Na<sup>+</sup> increases with the concentration of NaCl in the medium in the leaves of plants of both species and Na<sup>+</sup> charge remains significantly higher under 300 and 600 mM NaCl.
- The accumulation of Na<sup>+</sup> towards the leaves of *Atriplex canescens* plants accumulate double compared to *Atriplex halimus* L. Regardless of the NaCl treatment.
- A strong highly significant migration of K<sup>+</sup> to the leaves of both species with levels increasing with the NaCl treatment compared to Na<sup>+</sup> in the same organs under all treatments.
- Leaf contents in K<sup>+</sup> are two and a half times higher under moderate (300 mM) and severe stress (600 mM NaCl) with regard to the charge of Na<sup>+</sup> in the leaves of two species.
- Under 600 mM NaCl treatment, K<sup>+</sup> represents contents multiplied approximately by three and four respectively in the leaves of *Atriplex halimus* and *Atriplex canescens* compared to Na<sup>+</sup> in the same organs.
- K<sup>+</sup>/Na<sup>+</sup> ratio discriminates between the responses of both species: *Atriplex halimus* L tolerates NaCl up to 100 mM (Ratio = 4.03) while this tolerance of *Atriplex canescens* only manifests itself under severe stress 600 mM NaCl (Ratio = 3.87) which indicates a level of adaptation of *Atriplex canescens* to high salinity environments; this is moreover confirmed by the values of R.S.S.I (1.80 for *Atriplex halimus* against 0.04 for *Atriplex canescens*).

**Key Words:** rehabilitation, salinity, atriplex, cations, ratio K<sup>+</sup>/Na<sup>+</sup>, R.S.S.index.

## **PASSIBLE USE OF HYPERACCUMULATOR OF PLANTS FOR THE REMEDICATION OF CADMIUM-POLLUTED SOILS**

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### **ABSTRACT**

In recent years, heavy metals have been accumulated greatly due to increased industrial effluents and, purification systems along with the rapid increases of population growth. Heavy metals that reach the plant structure inhibit the physiological and biochemical activities of plants and decrease their productivity and lead to a decrease in product quality and quantity loss. Various methods have been d for the removal of heavy metals from the environment. Phytoremediation is one of the cost-effective, environmentally friendly and practical methods. Phytoremediation method aims removing or neutralizing pollutants in various hyperaccumulator plants used. Plants accumulate toxic heavy metals in their roots or other vegetative organs. This reviver has focused on the application of phytoremediation technology, hyperaccumulator plant species, and the biochemical mechanisms of those plants.

**Keywords:** Phytoextraction, Hyperaccumulator Plant, Cadmium

## ORGANIC MATTER AS AN EXTERNAL FACTOR IN RESISTANCE TO WATER STRESS IN REINA MORA VARIETY OF BEAN (*VICIA FABA* L.)

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### ABSTRACT

The present study objectives are to analyze the physiological responses to water stress of the Reina Mora variety of bean, introduced in Algeria, and assess the importance of the growing substrate as an external factor promoting the resistance of the beans to water stress. The experiments were carried out in a controlled greenhouse at the University of Oran 1, Algeria. After one month, the young seedlings transplanted into pots containing three types of well-watered substrates (Sand, Peat and sandy-clay soil) were subjected to moderate water stress at 40% and severe at 10% of the retention capacity for 60 days. The criteria for physiological evaluation of resistance to water stress concerned qualitative morphophysiological parameters (leaf orientation, leaf chlorosis and presence of leaf necrosis) and quantitative morphophysiological parameters and their sensitivity index such as stem and root length, aerial and root dry weight, number and weight of pod/plant). The results obtained show that severe water stress had a serious impact on the growth and productivity of plants cultivated in sandy-clay soil, probable cause of the clay drying out and the development of a high suction pressure for the water which can oppose that of the roots. Grown in the presence of peat, plants are more predisposed to protect themselves from water stress by lengthening their roots in search of water than by changing the orientation of their leaves to reduce transpiration and maintain a high water potential which is reinforced by the presence of organic matter very hydrophilic and rich in mineral elements easily assimilated by the roots. Water stress negatively affects plant growth and yield. The leaves turn yellow and show necrosis, a response probably due to the particles of the sandy soil which are spaced, dry, poor in nutritive substances and very draining.

**Key Words:** water stress, substrate, bean, growth, yield, resistance

# ASSESSMENT OF MYCORRHIZAL INFECTIOUS POTENTIAL OF *RETAMA MONOSPERMA* RHIZOSPHERIC SOILS IN MARRAKECH-SAFI REGION OF MOROCCO

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## ABSTRACT

In the present study, we evaluated the mycorrhizal status of *Retama monosperma* in Marrakech-Safi region, southern of Morocco; and so on isolated different Arbuscular Mycorrhizal Fungi (AMF) species found in these soils, characterized their mycorrhizal potential, assessed their contribution as a source of a natural inoculum and investigated their influence on the growth of *Retama monosperma* in greenhouse conditions. According to morphological characters (color, size, shape...) of the spores, a diversity of AMF was highlighted in the different study sites, which showed a significant richness, we recorded approximately 900 AMF spores per 100 g of soil collected under *Retama monosperma* against 48 AMF spores per 100 g of bare soil (control); We also could have identified at least four different morphotypes of AMF under *Retama monosperma* in the Marrakech-Safi region. The obtained results showed a higher mycorrhizal potential in the rhizosphere of *Retama monosperma* (830 infectious propagules/100 g of soil) compared to the non-rhizospheric soils (15 infectious propagules/100 g of soil). Additionally the growth of *Retama monosperma* seedlings in greenhouse conditions was significantly higher in soils collected under the rhizosphere of this species than in control soil. These results imply strongly the beneficial effect of AMF in plant growth as well as in mineral nutrition.

**Key Words:** arbuscular mycorrhizal fungi (AMF), *retama monosperma*, inoculum, growth

# COMPARATIVE EFFECT OF NITROGENOUS FERTILIZERS ON MOBILIZATION AND ABSORPTION OF PHOSPHORUS BY WHEAT IN SALINE-SODIC SOIL

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## ABSTRACT

Comparative Effect of Nitrogenous Fertilizers on Mobilization and Absorption of Phosphorus by Wheat in Saline-Sodic Soil Maham Noreen<sup>1</sup>, Muhammad Sabir<sup>1\*</sup>, Hamaad Raza Ahmad<sup>1</sup>, Saddam Hussain<sup>2</sup> <sup>1</sup>Institute of Soil and Environmental Sciences, University of Agriculture, Faisalabad-38040, Pakistan <sup>2</sup>Department of Agronomy, University of Agriculture, Faisalabad-38040, Pakistan Correspondence: [cmsuaf@gmail.com](mailto:cmsuaf@gmail.com)

Salinity is a major issue of arid and semi-arid regions which drastically affect the crop yield. Nitrogenous fertilizers can enhance plant growth in saline-sodic soils. A pot trial was conducted in wire house to study the growth response of wheat (*Triticum aestivum* L.) to the use of nitrogenous fertilizers and to check the mobilization and absorption of phosphorus (P) by wheat in saline-sodic soil. Three forms of N as urea, calcium ammonium nitrate and ammonium sulphate and control (No N fertilizer) were statistically combined with two levels of salinity and a normal soil to give a total of 12 treatments with three replications for each, following completely randomized design (CRD). Nitrogen sources urea, CAN and ammonium sulfate were applied as 0.15 g, 0.26 g and 0.32 g respectively along with the basal dose of  $7.42 \times 10^{-5}$  g and 0.22 g of K and P per kg of soil. The pots without addition of any fertilizer were taken as control. Salinity was developed using calcium (Ca), Magnesium (Mg) and sodium (Na) salts to attain two levels of EC and SAR i-e, (EC=6 d S m<sup>-1</sup>, SAR=19) and (EC=12dS m<sup>-1</sup>, SAR=26), denoted as L1 and L2 using quadratic equation. At vegetative stage, crop was harvested. Soil properties like pH, EC, organic matter, textural analysis, carbonates, bicarbonates, Cl<sup>-</sup>, Ca + Mg and also nitrogen, potassium and phosphorus concentration in soil samples were determined. For plants, chlorophyll content, plant height, root, shoot fresh and dry weight were attained via standard procedures. Nitrogen, phosphorus and potassium concentration in plant sample<sup>7</sup> was investigated after digestion. Collected data examined statistically and mean of each treatment was evaluated and linked via basic statistical procedure. The maximum shoot fresh weight (6.6 g), shoot dry weight (3.26 g), root fresh weight (0.77 g) and root oven dry weight (0.39 g) was observed in soil of EC=12 and SAR=26 with the application of ammonium sulphate and maximum plant height (68 cm) was observed in normal soil with the application of ammonium sulphate as compared to control.

**Key Words:** saline-sodic soils, nitrogenous fertilizers, phosphorus

# EVALUATION OF SOILWAT MODEL FOR SOIL PHYSICAL PROPERTIES IN THE DIFFERENT LAND USE

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## ABSTRACT

In sustainable soil management, it is necessary to determine the physical properties of the soil and to provide ideal conditions. Aeration, root development, water, and nutrient movements are closely related to soil physical properties. In this study, the estimation accuracy of the SOILWAT model (version 6.1.52) in the Soil-Plant-Air-Water (SPAW) program developed by the USDA Agricultural Research Service was calculated for different land-use types (dry farming, irrigated farming, pasture) in the territory of Isparta-Güneykent town. Observed and predicted values of saturation (ST), field capacity (FC), wilting point (WP), available water content (AWC), and bulk density (BD) were compared by using sand, clay, organic matter, EC, and penetration resistance values of the soils. In the study, it was determined that there were no significant changes in the predictive accuracy of the model according to different land-use situations. The mean absolute error (MAE) values for the examined properties were determined as 4.93%, 5.27%, 3.83%, 3.53% and 0.13 g cm<sup>-3</sup>, respectively. The R<sup>2</sup> values obtained in the comparison of the linear relationship between the actual and predicted values of the field capacity and wilting point properties were found to be 0.54 and 0.68, and the R<sup>2</sup> values for the other properties were obtained quite low. The lowest mean absolute percent error (MAPE) was obtained in the bulk density estimation (9.74%). The highest error rate was determined with 27.26 % in the available water content of the soils. The RMSE values obtained as a result of the estimation of the field capacity and wilting point of the soils were found as 6.23% and 4.51 %. As a result of the study, it has been revealed that the SOILWAT model can be used successfully in the prediction of ST, FC, WP, and BD properties of soils under different land use, and the error rate in the estimation of AWC is higher than other properties.

**Key Words:** SPAW, moisture constants, soil physical properties

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# ISOLATION AND CHARACTERIZATION OF ARBUSCULAR MYCORRHIZAL (AM) FUNGI SPORES FROM DATE PALM RHIZOSPHERE IN AN ARID REGION.

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## ABSTRACT

The arid lands are the most disturbed and degraded, mainly because of the wind, water shortage, and salinization. With loss of vegetation and loss of productive surface soil as primary factors. In these areas, the protection and regeneration of degraded lands are critical for sustainable agriculture, and for dryland ecosystem's enhancement. Mycorrhizal fungi represent a significant portion of soil rhizosphere microflora and play an important role in plant growth. In this context, a study of mycorrhizal spores isolated from the rhizosphere of date palm in the palm groves of Zagora (Moroccan desert) was conducted. The collected soil samples were analyzed for chemical and physical properties and spores were separated from the soil and examined. Root colonization, spore density, abundance and morphological studies, were the considered parameters. The average frequencies and intensities of colonization were 66% and 7.34% respectively. The maximum spore density was at 34,165 spores / 20 g of soil, and the lowest was at 22,015 spores / 20 g according to the site. Twenty-eight species belonging to seven genera of arbuscular mycorrhizal fungi were identified in all study sites. These endomycorrhizal were significantly similar in the four different soil samples. The "Zagora" inoculum contains a mixture of the mycorrhizal spores previously mentioned.

**Key Words:** arid, mycorrhizal fungi, spores, rhizosphere, phoenix dactylifera,

# **SIGNIFICANCE OF ZINC FERTILIZATION ON NUTRIENT CONTENT AND UPTAKE BY RICE CROP GROWN IN LATERITIC SOIL OF WEST BENGAL, INDIA**

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## **ABSTRACT**

Field experiments with rice crop grown on Zn deficient lateritic soil of West Bengal, India was conducted to study the effect of zinc (Zn) fertilization on the concentration and uptake of iron (Fe), manganese (Mn) and copper (Cu) during wet and dry season. The aim of this experiment was to check how Zn fertilization affects translocation of other nutrients in grain and straw samples. Eight treatments including soil ZnSO<sub>4</sub>.7H<sub>2</sub>O application and 0.30% nano-ZnO foliar spray along with the recommended dose of N, P, K fertilizers in a completely randomized block design were set up. Result of the present investigation showed that the effect of Zn fertilization on grain and straw Fe, Mn, Cu concentrations were significant. Zn fertilization significantly decreased Fe, Mn, Cu concentrations in grain and straw. Zn applied treatments resulted in significantly higher Fe, Mn and Cu uptake by grain and straw over control plot. Zn application causes reduction in available Fe, Mn and Cu content in post harvest soil. This study analyzed the effectiveness of the Zn application method on micronutrient concentration (Fe, Mn, Cu) in grain and straw and their uptake by rice crop.

**Key Words:** Zn fertilization, grain Fe, Mn, Cu content, straw Fe, Mn, Cu content, Fe, Mn, Cu uptake by rice crop, soil Fe, Mn, Cu content.

# THE EFFECTS OF CORN AND SUNFLOWER STRAW ADDED TO A SOIL WITH HIGH CLAY CONTENT ON WATER HOLDING AND MODULUS OF RUPTURE VALUE OF SOILS

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## **ABSTRACT**

As in the whole world, corn and sunflower are among the main food sources in Turkey. Due to the fact that both products have high nutritional value, the storage, transportation and processing process is easier than many products, and they adapt to the environment very quickly, their cultivation has increased in our country in recent years. However, corn and sunflower straw have the capacity to contribute high organic matter to soils. In this study, an incubation experiment was established in 5 kg pots by mixing 0.5%, 1, 2 and 4 % corn and sunflower straw in a soil with high clay content. Sampling was made after the 30th day of the established trial, and field capacity and wilting point and modulus of rupture values of the soils were analyzed. As a result of the analysis, it was found that the field capacity value increased from 37.99% to the highest 43.17%, and there was no statistically significant difference in the wilting point value. The modulus of rupture value, which was measured as 2910 mbar in the control soil, decreased as the dose rates increased, and it was measured as 552 and 993 mbar at the highest doses of corn and sunflower straw, respectively. According to the results of this short-term incubation, it has been observed that corn and sunflower straw have a great effect on the physical properties of the soils, and it is anticipated that it will shed light on other field studies.

**Key Words:** corn straw, sunflower straw, field capacity, modulus of rupture

## SAFFRON CULTIVATION IN TURKEY

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### ABSTRACT

Turkey is one of the countries with a rich flora, which contains many medicinal and aromatic plants. The reason for this is that it is located at the intersection of three phytogeographic regions and is the origin and differentiation centre of many genera and sections. Our country is among the leading countries in the trade of medicinal aromatic plants, as it is in a position to supply raw materials to important sectors such as herbal medicine, plant chemicals, food additives, cosmetics and perfume industry and paint industry. Saffron is one of the most expensive medicinal plants in the world. The demand for saffron (*Crocus sativus*) is increasing worldwide due to its use as a spice and flavouring to flavour and colour desserts in the kitchen, its use in the manufacture of medicines in medicine, and its interesting role in cosmetics. Successful experiments on saffron cultivation have been carried out in all seven regions in Turkey. Karabuk province with Safranbolu district is the main centre of saffron production. In this study, a review was made about the current situation of saffron cultivation in our country and important of the plant nutrition in saffron.

**Key Words:** saffron (*crocus sativus*), cultivation, plant nutrition, medicinal and aromatic plants,

# THE EFFECT OF POTASSIUM ON SOME PHYSIOLOGICAL PARAMETERS UNDER SALT STRESS

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## **ABSTRACT**

Salt stress is an important type of abiotic stress that limits vegetative production in the world, particularly in arid and semi-arid climatic areas. The aim of this study is to mitigate salt stress damage in the sugar beet plant, which is an important part of crop production, with potassium application. An experiment was designed according to a design of random blocks with 4 different doses (10, 20, 40, 80 mg kg<sup>-1</sup> K) of potassium and 3 different salt levels (0, 100, 150 mM NaCl) and 3 replicates. The plants were grown with Hoagland nutrient solution in the growth chamber. Chlorophyll content, stomatal conductance, protein, phenol, vitamin C and SH compounds content was determined after harvest. The data obtained from the experiment were evaluated by one-way analysis of variance (One-Way ANOVA). According to the results of variance analysis, protein, phenol, vitamin C and SH compounds content were found to be statistically significant in salt x potassium interaction. Due to the positive effects of potassium on the parameters known to increase the plants' stress tolerance, it is thought that it may be beneficial in reducing the salt stress in order to make the sugar beet less affected by salt stress.

**Key Words:** potassium, salt stress, sugar beet

## THYME CULTIVATION IN TURKEY

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### ABSTRACT

Turkey is one of the most important countries in the world with the production and export of thyme plant, which is collected from natural flora or cultivated. Considering the production and export values of the thyme (*Thymus vulgaris*), along with its many uses in the spice, medicine, chemical and cosmetic sectors, it is an important medicinal and aromatic plant for our national economy. Our country has a very important place in the world thyme trade with a 60-70% share. According to the data obtained in 2016, 14,724 tons of production was realized from an area of 121 thousand decares. Denizli, which is in the first place, has a share of 90% in terms of cultivation area and 85% in terms of production. Following that, Manisa, Kütahya and Uşak provinces are other important provinces that make up the production share. In this study, a review was made about the current situation of thyme cultivation in our country and the relationship of plant nutrition in thyme.

**Key Words:** thyme (*thymus vulgaris*), cultivation, plant nutrition, medicinal and aromatic plants.

## **EFFECTS OF IRRIGATION WITH WATER FROM DIFFERENT SOURCES ON VARIOUS CHEMICAL PROPERTIES OF THE SOIL**

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### **ABSTRACT**

The present study aimed to investigate the impacts of irrigation using treated wastewater on various soil chemical properties. The research was conducted over three years by completely randomized design with three replications. Treated domestic wastewater, well water and Gediz River water were used in the experiment. Three different irrigation treatments were designed. According to the results of analysis in the soil to a depth of 120 cm, generally Na, K, Ca, Mg, Cl and SO<sub>4</sub> in soil extracts increased very slightly, while K there is no change, HCO<sub>3</sub> decreased slightly irrigated with irrigated treated domestic wastewater and Gediz River water were used. But Na, Mg and SO<sub>4</sub> in soil extracts increased very slightly, while K, Ca, Cl there is no change, HCO<sub>3</sub> decreased slightly irrigated with well water.

**Key Words:** domestic wastewater, Gediz River water, well water, irrigation, water properties, soil extract properties

# TOTAL PHENOLICS, FLAVONOIDS CONTENTS AND ANTIOXIDANT PROPERTIES OF DIFFERENT EXTRACTS OF CYMBOPOGON CITRATUS LEAVES FROM ALGERIA

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## ABSTRACT

*Cymbopogon citratus*, commonly known as lemon grass, mainly used in food and Algerian traditional folk medicine for the treatment of nervous and gastrointestinal disturbances. The aim of the present study is to investigate the antioxidant activities of different extracts (ethanol extract, infusion and decoction) obtained from Algerian lemon grass leaves using different tests such as DPPH (1, 1-diphenyl-2-picrylhydrazyl radical) and  $\beta$ -carotene assays. The total phenolic and flavonoid contents were determined using Folin-Ciocalteu and aluminium chloride assays respectively. The quantitative estimation of total polyphenols and flavonoïds showed their existence in all extracts, where ethanol extract of *Cymbopogon citrates* is the richest in phenolic compounds ( $4.40 \pm 0.52$  mg equivalent of gallic acid/g of extract) compared with infusion and decoction ( $1.32 \pm 0.09$  and  $0.52 \pm 0.03$  mg equivalent of gallic acid/g of extract respectively). The evaluation of the antioxidant activity by DPPH showed that the studied extracts have a very good antioxidant activity, especially the ethanol extract of *Cymbopogon citrates* with an IC<sub>50</sub> of 10.6  $\mu$ g/ml, followed by infusion and decoction extracts with an IC<sub>50</sub> value of 13.3 and 15.1  $\mu$ g/ml, respectively. In  $\beta$ -carotene bleaching test, the oxidation of  $\beta$ -carotene was effectively inhibited by different extracts of *C.citrates*, especially the ethanol extract. As a conclusion, the results of the present study indicate that the aerial part extracts of *Cymbopogon citrates* is a good source of natural antioxidant constituents.

**Key Words:** cymbopogon citrates, total polyphenols, flavonoïds, antioxidant activities.

# PHYTOCHEMICAL SCREENING, PHENOLIC CONTENT AND ANTIOXIDANT EFFECTS OF CLEOME ARABICA LEAF CRUDE EXTRACT AND ITS DIFFERENT FRACTIONS

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## ABSTRACT

*Cleome arabica* L. (Capparaceae) is a desert plant widely distributed in the north part of Africa. It is used as medicine for the treatment of abdominal and rheumatic pains. The aim of the present study is to investigate the antioxidative activity of *Cleome arabica* leaf methanolic crude extract and its different fractions *in vitro*. First, a preliminary phytochemical screening was performed using standard protocols. Total phenolics and total flavonoids contents of the extracts were measured by Folin Ciocalteu and Aluminium chloride methods respectively. The obtained results showed that qualitative phytochemical screening, using standard procedures, revealed the presence of alkaloids, tannin, flavonoids, phenolics, saponins, steroids, triterpenes, Anthocyanin and anthraquinones in all fractions. Total phenolics and total flavonoids varied from 30.65 to 127.17 mg GAE/g and from 4.51 to 36.81 mg QE/g in each fraction respectively. The ethyl acetate (EAF) fraction contained the highest amount of flavonoids and polyphenols compared to other fractions. Further more it showed the highest DPPH radical scavenging activity and in a dose dependant manner with an IC<sub>50</sub> value of 31.84 µg/ml, followed by diethyl ether fraction (DEF) and crude methanolic extract (CME) with an IC<sub>50</sub> values of 74.64 and 75.64 µg/ml, respectively. Furthermore, EAF showed a high reducing power as compared to other fractions. In β-carotene/linoleic acid assay, the best inhibition was found in chloroform fraction. As a conclusion, the results of the present study indicate that the aerial part extracts of *Cleome arabica* are a good source of natural antioxidant constituents.

**Key Words:** cleome arabica, antioxidant activity, phytochemical screening, polyphenols flavonoids.

## PHYTOCHEMICAL ANALYSIS, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF ALGERIAN THYMELAEA HIRSUTA L. CRUDE EXTRACT

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### ABSTRACT

Consumer awareness about possible negative health effects resulting from the widespread use of synthetic and artificial preservatives in food. As a result, an increased interest in the potential use of plant extracts as natural antioxidants and antimicrobial agents. *Thymelaea hirsuta* is a plant belonging to *Thymeleaceae* family commonly known as “Methnane” in Morocco, Tunisia and Algeria. The aerial part of this plant has been used in folk medicine. In this study, the antioxidant and antimicrobial effects of this plant was studied *in vitro*. First, an ethanolic extract was prepared from the aerial parts of the plant and screened for major classes of phytochemicals. Then, the amount of flavonoids and polyphenols was determined spectrophotometrically according to the method of Bahorun et al. (1996). Second, the extract was evaluated for its antioxidant activity using DPPH• free radical test and for its antimicrobial activity using disc diffusion and the minimum inhibitory concentration methods (MIC) for five types of bacteria *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Staphylococcus aureus*, *Agrobacterium tumefaciens* and *Escherichia coli*. Results showed that qualitative phytochemical screening, using standard procedures, revealed the presence of alkaloids, tannin, flavonoids, phenolics, saponins, steroids, triterpenes and anthraquinones. The total phenolic and the total flavonoid contents were  $142.2 \pm 6.1$  mg GAE/g dry weight and  $4 \pm 0.03$  mg QE/g dry weight respectively. The antioxidant activity determined by the DPPH• method revealed that the extract had a strong antioxidant activity on DPPH• free radical and in a dose dependant manner with an IC<sub>50</sub> of 20 µg/ml in comparison with BHT used as a standard which showed an IC<sub>50</sub> value equal to  $44.35 \pm 1.89$  µg/ml. A significant correlation was observed between total phenolics and the antioxidant activity found in many plant species. Moreover, this extract exerted a good antibacterial effects with a MIC ranged between 3.12 and 6.25 mg/ml for all bacteria tested. As a conclusion *Thymelaea hirsuta* is a medicinal plant rich in phenolics. Thus, it represents a potential source of natural antioxidants and antimicrobial agents. Purified compounds may be used as natural antimicrobials in food systems, as well as to prevent the growth of food born bacteria resulting in extension of the shelf life of processed food.

**Key Words:** thymelaea hirsuta, flavonoïds, phenolics, antioxidant activity, antimicrobial effect

# PHYTOCHEMICAL PROFILING, ANTIOXIDANT AND ANTI-INFLAMMATORY BIOACTIVITIES DEMONSTRATION OF ALGERIAN *OSYRIS QUADRIPARTITA* SALZM. EX DECNE LEAVES EXTRACTS

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## ABSTRACT

As in many countries of the world, traditional medicine, in particular the herbal medicine is part of the Algerian culture. The rich flora of Algeria with great variety of medicinal plants contributes to this practice among them *Osyris quadripartita* Salzm. Ex Decne. In this study, we evaluate the radical-scavenging effect using DPPH assay, reducing power (FRAP),  $\beta$ -carotene and TBARS assay, anti-inflammatory effect for the inhibition of NO production in the LPS-stimulated RAW264.7 cells of the aqueous extract and its ethyl acetate and butanol sub-fractions, providing a detailed description of their phytochemical composition using the high performance liquid chromatography with diode-array coupled to electrospray ionization tandem mass spectrometry (HPLC-DAD-ESI / MSn). All the extracts for all the assays demonstrated strong antioxidant properties, displaying the ethyl acetate fraction the greatest inhibition effect, followed by the butanol fraction and the crude aqueous extract. The ethyl acetate fraction showed appreciable levels of inhibitory activity on NO production (EC50 at  $78 \pm 7$   $\mu\text{g/mL}$ ) than the butanol fraction and aqueous extract respectively (EC50 at  $194 \pm 5$  and  $211 \pm 4$   $\mu\text{g/mL}$ ). The phytochemical analysis enabled us to find for the first time twenty-eight phenolic compounds have been identified as derivatives of flavonoids which are fifteen flavan-3-ols, six flavones, four flavonols, two phenolic acids and one flavanone derivative. The results suggest that the *O. quadripartita* aqueous extract and its fractions effectively inhibited efficiently the NO production, might be useful in preventing inflammatory diseases mediated by excessive production of NO with a significant contribution of the polyphenolic compounds.

**Key Words:** *osyris quadripartita*, anti-inflammatory; antioxidant; phenolic; flavonoids; HPLC-DAD-ESI/MSn

# GREEN EXTRACTION AND CHROMATOGRAPHY OF CAROTENOID FROM TOMATO

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## ABSTRACT

Lycopene is the main carotenoid in tomato. Used a long time like simple food dye, it is today the subject of many studies as for its positive effects on health. To avoid this shortcoming, a useful and green method for the extraction of lycopene with a new procedure using d-limonene (bio-solvent) a substitute for petroleum solvent has been proposed. d-limonene from the orange peel was extracted through a steam distillation procedure followed by a deterpenation process and combining this achievement by using it as a solvent for extracting lycopene from tomato fruit as a substitute of dichloromethane. Lycopene extracted from tomato fruit were compared with both conventional petroleum and bio-solvent in terms of qualitative and quantitative determination. No significant difference was obtained between each extracts allowing us to conclude that the proposed method is effective and valuable. The proposed approach using a green solvent to perform extraction is useful and can be considered as a nice alternative to conventional petroleum solvent where toxicity for both operator and environment is reduced.

**Key Words:** D-limonene, Lycopene extraction, clean method.

**EFFECT OF THE AROMATISATION WITH SUMMER SAVORY (*SATUREJA HORTENSIS* L.) ESSENTIAL OIL ON THE OXIDATIVE AND MICROBIAL STABILITIES OF LIQUID WHOLE EGGS DURING STORAGE**

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**ABSTRACT**

The Algerian essential oil (EO) extracted by hydro-distillation from *Satureja hortensis* L. (*S. hortensis*) was characterised by gas chromatography–mass spectrometry (GC-MS). *S. hortensis* (summer savory) was chemotype carvacrol (54.2%) and  $\gamma$ -terpinene (21.1%). In its second part, the present study was conducted to evaluate in vitro, antioxidant activity of savory EO using the 2, 2-di-phenyl-1-picrilhydrazyl (DPPH•) free radical scavenging assay. Finally, the EO was screened for biological activities in liquid whole eggs (LWE). The ability of savory EO to scavenge the free radical (DPPH•) was very high, exceeding 80%. The long-term oxidative and microbial stability of LWE was positively influenced by EO treatments, increasing the shelf life to more than eight (> 8) days under refrigeration. Therefore, the results obtained in this work confirm savory EO treatment as a promising technology to extend the commercial shelf life of liquid egg products, as well as to maintain the quality of LWE as ingredient in innovative food products.

**Key Words:** summer savory; essential oil; GC/MS; liquid whole eggs; aromatisation; shelf life

## BIOACTIVE PROPERTIES OF THE ENDEMIC ALGERIAN MYRTUS NIVELLII BATT & TRAB. SCIENTIFIC APPROACHES TO THE TRADITIONAL USES

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### ABSTRACT

*Myrtus nivellii* leaves are widely used in the Algerian folk medicine, due to its health-promoting properties attributed to the phenolic composition. In this context, bioactivities of the aqueous extract and its organic sub-fractions (ethyl acetate and butanol) were evaluated with focus on antioxidant properties (free radicals' scavenging activity, reducing power, inhibition of  $\beta$ -carotene blanching and lipid peroxidation), anti-inflammatory potential (inhibition of NO production in lipopolysaccharide-stimulated RAW 264.7 macrophages), cytotoxicity for human tumor cells and normal porcine liver primary cells, and antibacterial activity against ten clinical isolates. The obtained results indicate high activities for all the tested samples; the antioxidant activity was higher than that obtained for Trolox (positive control), showing the ethyl acetate fraction the highest activity as also the highest inhibition of NO production ( $EC_{50} = 104 \pm 6 \mu\text{g/mL}$ ) and cytotoxicity for all the tested tumor cell lines (HeLa-  $15.39 \pm 1 \mu\text{g/mL}$ , MCF-7-  $16.12 \pm 1 \mu\text{g/mL}$ , NCI-H460-, HepG2-  $17.67 \pm 1 \mu\text{g/mL}$  and  $49.01 \pm 3 \mu\text{g/mL}$ ). The butanol fraction and the crude aqueous extract presented the highest antibacterial activity. Overall, this study highlights the potential of *M. nivellii* leaves in the preparation of bioactive ingredients.

**Key Words:** myrtus nivellii, extract/fractions, antioxidant, anti-inflammatory, cytotoxicity, antibacterial

## SWELLING AND EROSION OF NATURAL MATRIX TABLETS

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### ABSTRACT

The present study aimed to elaborate matrix tablets from powder mixture (2:1 ratio) of Algerian date (*Phoenix dactylifera* L.) fruit and lyophilized berries (LB) (*Arbutus unedo* L.), using the direct compression technique. In a first part, the physicochemical properties, including the X-ray diffraction, of individual powders and their mixture were determined. In the second step, the swelling, erosion and in vitro release rate characteristics of tablets were studied. Taking into account the nutritional and physiological potentials of the basic components of the analyzed powder, the obtained tablets may be successfully used as dietary supplement and/or as excipient in the pharmaceutical industry

**Key Words:** arbutus berries, date fruit, tablet, dissolution, swelling, erosion

# CHARACTERIZATION OF BACTERIAL PATHOGENS FROM COMMERCIALY AVAILABLE READY TO EAT (RTE) SALAD SOLD AT HYDERABAD, SINDH PAKISTAN

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## ABSTRACT

Vegetables used in salad either prepared at homes or in restaurants are consumed raw, these vegetables are handled and processed under unhygienic conditions which favor the growth of pathogenic microorganisms. This may cause the food borne disease outbreak in the communities due to the presence of pathogens. The present study is therefore planned to isolate and characterize the pathogens present in ready to eat salads and vegetables used in salad. For this purpose, a total of 60 samples including 30 samples of different commercially available ready to eat (RTE) salads (vegetable salads, fruit salads, cream salads) and 30 different vegetables used in salad (cucumber, cabbage, lettuce) samples sold in Hyderabad, Sindh, Pakistan were analyzed. The results revealed that the major pathogens isolated were *Escherichia coli* (45%), *Klebsiella pneumoniae* (18.3%), *Staphylococcus aureus* (15%) *Streptococcus* spp. (11.6%) and *Salmonella enterica* (8.3%) from the analyzed samples. The antibiotic sensitivity test of all the isolates was determined by Kirby Bauer-disk diffusion method with antibiotic containing discs on Mueller-Hinton Agar media. The results revealed that *Escherichia coli* was resistant to ampicillin, enrofloxacin, tetracycline, oxytetracycline and ciprofloxacin and sensitive to norfloxacin. *Klebsiella pneumoniae* were resistant to ampicillin, enrofloxacin, tetracycline, ciprofloxacin and oxytetracycline and norfloxacin. *Staphylococcus aureus* were resistant to ampicillin, norfloxacin tetracycline, oxytetracycline and enrofloxacin and sensitive to ciprofloxacin and *Salmonella enterica* were resistant to ampicillin, oxytetracycline, tetracycline, ciprofloxacin and enrofloxacin and sensitive to norfloxacin.

**Key Words:** identification; bacterial pathogens; RTE salad; vegetables; antibiotic sensitivity

## ASSESSMENT OF HEPATOPROTECTIVE ACTIVITY OF SQUALENE EXTRACTED FROM OLIVE OIL LEES (AMURCA) ON THE RAT'S LIVER

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### **ABSTRACT**

The health benefits of squalene extracted from shark's oil was reported earlier. In this study crude squalene was extracted from olive oil lees (amurca) to assess its hepatoprotective activity in comparison with synthetic squalene in Sprague Dawley rats. Rats were given squalene via gavage for five days. On the 6th day, a single dose of 3g/kg body weight of paracetamol was given to the rats via gavage, and 48 hours later, blood samples were collected via heart puncture and liver function tests were performed. The optimum concentration of at which synthetic and crude squalene was found to possess the best hepatoprotective activity against paracetamol intoxication was 5 mg/kg body weight. This concentration was able to decrease plasma bilirubin level, AST, ALT and ALP significantly ( $p < 0.05$ ) in comparison with the control (paracetamol only group). In conclusion, squalene acts as a hepatoprotective agent against paracetamol induced liver damage in the rat. Nevertheless, further studies are needed to confirm these results in humans.

**Key Words:** squalene, olive oil lees (amurca), liver function tests, hepatoprotective,

# IMPROVING POSTHARVEST STORABILITY OF “CYPRUS LEMONS” BY THE APPLICATION OF OZONE, ROSEMARY OIL, STRAW COVERAGE AND/OR/WITH MODIFIED ATMOSPHERE PACKAGING

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## ABSTRACT

This research was conducted to investigate the influence of modified atmosphere packaging, ozone treatment, rosemary oil application, wrapping in straw and some of their combinations on the postharvest storage of Cyprus local lemons (*Citrus lemon* L. Burman f.). Lemon fruits were collected at the beginning of the green-yellow stage on the 1st of November. This experiment consisted of fourteen different treatments and was planned to continue for 210 days (7 months). The measurement points were defined as 30 d, 60 d, 90 d, 120 d, 150 d, 180 d and 210 d (7 different measurement points). The results of the current study showed that all tested applications have an important effect on the fruit weight, visual quality, decay incidence, fruit firmness, vitamin C content and fruit colour. According to the results obtained, modified atmosphere packaging alone, or in combination with ozone, fungicide, rosemary oil (0.2%) or rosemary oil (1.0%) treatments were effective in protecting the postharvest quality and marketability of the lemons. All of those treatments were also found to provide around 13-16% weight loss, 2.6-3.2 visual quality score, 0.6-1.0 score of decay incidence, 0.46-0.48 kg cm<sup>-2</sup> fruit firmness, 10.20-10.88% soluble solids concentration, 6.51-7.54 g 100 g<sup>-1</sup> citric acid titratable acidity, and 44.88-52.99 g 100 g<sup>-1</sup> vitamin C in 210 days of storage. Overall, results suggest that those treatments can be used to store lemon fruits for 210 days in the cold room with acceptable marketing quality.

**Key Words:** lemon colour, weight loss, titratable acidity, fruit decay, fruit quality

## CEREAL B-GLUCANS IN NUTRITION

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### **ABSTRACT**

$\beta$ -glucans ((1/3,1/4)-  $\beta$ -D-glucans) are the major components of cell wall structure of cereal grains such as barley and oats. The  $\beta$ -glucans in the endosperm cell walls may be covalently bonded to protein, forming large molecules. Levels of  $\beta$ -glucan can vary dramatically between varieties, but usually range from 2 to 9% dry weight. Genetic and environmental factors impact on  $\beta$ -glucan content of the cereals. Despite their relatively small contribution to the total weight of the grain, it is clear that  $\beta$ -glucans have a disproportionate impact on the nutritional value of the grain and the technology of cereal utilisation as well. Cereal  $\beta$ -glucans possess a number of functionalities and roles that make it unique as a plant cell wall component and as a dietary fibre. It is classified generally as a soluble dietary fibre which attenuate postprandial blood glucose and insulin levels and lower serum cholesterol levels. In this presentation it was aimed to review the potential effects of cereal  $\beta$ -glucans in nutrition.

**Key Words:**  $\beta$ -Glucans, cereals, nutrition, dietary fiber

# MILLET GRAIN: NUTRITIONAL COMPOSITION AND POTENTIAL HEALTH BENEFITS

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## **ABSTRACT**

The development of policy statements about drought-tolerant grains is increasing in many countries due to climate changes, water scarcity, and increasing populations. Cereals are the major food source and have a significant role in the human diet throughout the World. As a cereal, millet is one of the most important drought-resistant crops and the 6th cereal crop in terms of world agriculture production. Also, millet has resistance to pests and diseases, short growing season, and productivity under drought conditions, compared to major cereals. Millet is widely grown in the semiarid regions and constitutes a major source of carbohydrates and proteins for people living in these areas. On the other hand, it's gaining importance as an ingredient in multigrain and gluten-free cereal products particularly in North America and European countries because of its rich contents of phytochemicals and micronutrients. Therefore, millet grain is receiving increasing interest from food scientists, technologists, and nutritionists in the latest years. This presentation aimed to review the nutritional composition and potential health benefits of millet grain.

**Key Words:** millet, nutritonal composition, health benefits, micronutrient

# THE QUALITY CHARACTERISTICS OF DRIED RED CAPIA PEPPER

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## **ABSTRACT**

Convective drying (CVD) at 50, 60 and 70 oC was applied to obtain dried red capia peppers. The effects of CVD on color values ( $L^*$ ,  $a^*$ ,  $b^*$ ), rehydration capacity, and selected chemical properties including dry matter, pH and titratable acidity of seven dried red capia peppers were compared. In addition, the effects of the cutting types (ring and cube) on the final quality of pepper samples were determined at room temperature. The samples dried at 60 oC and cut in ring forms (6-R samples) resulted with high-quality dried peppers. 6-R samples showed the highest dry matter, pH, titratable acidity and rehydration capacity (87.06%, 5.69, 807.15 mg citric acid/100 g, 6.72%, respectively). The closest  $L^*$ ,  $a^*$ ,  $b^*$  values to the fresh pepper samples were achieved for 6-R samples ( $L^*$ : 29.87,  $a^*$ : 12.83, and  $b^*$ : 17.03). In overall, dried red capia peppers in ring forms at 60 oC can be used to acquire a high-quality food material along with an enhanced color, physical and chemical properties.

**Key Words:** Color, convective drying, red capia pepper, rehydration capacity, titratable acidity

## **BIOCHEMICAL EVALUATION OF FOUR LENTIL (LENS CULINARIS) ALGERIAN ACCESSIONS FOR NUTRITIONAL VALUE**

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### **ABSTRACT**

**Context:** Lentil (*Lens culinaris* Medik) is an important dietary source of energy, protein, carbohydrates, fiber, minerals and vitamins. The nutritional status of four lentil Algerians cultivars (Metropol, Idleb, Syrie229 and Ibla), were accessed. Carbohydrate composition, Crude proteins, Fiber, Dry matter, Fats and Ashes were determined in the genotypes of lentil. The culinary qualities and sensory analysis are respectively based on cooking time and tasting tests which carried out with 10 samples of consumers.

**Results:** The highest protein contents were recorded in Idleb1 (23.5 %) followed by Ibla (25.7 %). Metropol presented the highest Fates content (1.7 %) and the lowest value was recorded in Ibla (0.19 %). The highest Carbohydrate and Dietary fiber contents were shown by Ibla with 60% and 23% respectively. However, syrie229 and Idleb1 exhibit the lowest value with respectively 49 % and 3.5 %. Descriptive sensory analysis of prepared samples showed that all extruded treatments were similar to each other. By applying statistical techniques, consumer acceptability testing (10-point hedonic scale) indicated that there were no significant differences ( $P < 0.05$ ) in acceptability among the selected treatments.

**Key Words:** lentil, protien contents, carbohydrat, sensory analysis

## NUTRITIONAL VALUES OF PLANT RESIDUES OF BEAN VARIETIES GROWN AS SECOND CROPS

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### ABSTRACT

Bean plant is produced for fresh, canned and dried grain. The green pods of 11 bean varieties, which were grown in Kahramanmaraş conditions as second crops, were harvested due to the cold weather in November. After the fresh pods are taken, the nutritional values of the plant residues were examined by taking into account the contribution they will make to the feed or soil. In the plant residues of bean varieties used in the research, the green and dry weight, amount of dry matter, Protein, Ca (Calcium), Mg (Magnesium), K (Potassium), P (Phosphorus), ADF (Fiber Insoluble in Acid Detergent), ADP (Protein Insoluble in Acid Detergent), NDF (Insoluble Fiber in Neutral Detergent) ratios were investigated. At the end of the research, it was noted that the average values were varies plant residues weight from 155.29 to 39.29 kg/ha, dry weight from 120.25 to 21.73 kg/ha, dry matter content from 89.54 to 88.92%, protein from 17.09 to 8.49%, Ca from 1.91 to 1.42%, Mg from 0.67 to 0.51%, K from 1.23 to 0.55%, P from 0.30 to 0.21%, ADF from 76.70 to 38.03%, ADP from 1.46 to 0.9%, NDF from 66.74 to 46.39%. It was thought that it would be a very good pre-plant for the plant to be planted in winter, as it provides organic matter to the soil and fixes nitrogen to the soil with the help of nodosity formed in the plant roots. In addition to being used as fodder.

**Key Words:** residues of bean, nutritional content, second crops

# **EFFECT OF DIFERENT FATTENING SISTEMS ON FATTENING PERFORMANCE, AND CLINICAL INDICATIONS IN SHARRI LAMBS**

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## **ABSTRACT**

Determining the impact of fattening systems on fattening performance and clinical characteristics in sharri lambs is the aim of this research. Two different groups of lambs were formed: the control group (n = 12) cultivated and fed in the traditional form that is also practiced on most farms in Kosovo, and the experimental group (n = 12) cultivated and fed with concentrated mixtures dedicated to lamb fat and quality hay. The studies were completed in a period of 100 days, for which time the weight of the lambs in the control group was 24,903 kg, while in the experimental group 27,704 kg (P <0.01), and the daily live weight gain (DLWG) in the control group was 0.207 kg, while in the experimental group 0.240 kg (P <0.01), the yield of hot bodies (53,017% and 53,241%), the yield of cold bodies (52,006% and 50,406%)

**Key Words:** fattening systems, Fattening performance, clinical characteristics and Sharri lambs

# EFFECT OF THE BREED AND DIET ON CARCASS AND MEAT QUALITY TRAITS OBTAINED FROM KOSOVO LAMBS

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## ABSTRACT

The paper presents the results of the effect of breed and diet on carcass and meat quality parameters of lambs from Kosovo. Investigations were carried out on forty-eight lambs from the Sharri breed of sheep and the Kosovo sheep breed. Lambs have been cultivated and bred in a traditional manner practiced in Kosovo. The lambs are kept together with their mothers until the slaughterprocess. During the day, they were harvested and fed with meadow and milled maize, and in the evening when the sheep were returning from graze they were fed with their mother's breast milk. Lambs from the Sharri breed had higher ( $p < 0.01$ ) carcass weight, dressing percentage, skin, and weight of all analyzed internal organs than lambs from the Kosovo sheep breed. Differences were found in chemical composition as well as pH measured after 24 h post-slaughter in the *m. longissimus dorsi* (LD). Consequently, the effects of breed and diet should be considered to obtain better carcass traits and meat of more desirable quality.

**Key Words:** quality, breed, meat, carcass, slaughtering

# PACKAGING AND STORAGE - FACTORS THAT AFFECT THE QUALITY OF KULEN AS A FERMENTED MEAT PRODUCT

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## **ABSTRACT**

Kulen, as a product of minced meat of the first (second) category of quality as well as hard fat tissue (bacon) with spices, packed in natural or artificial collagen intestines, is most present in the Balkan countries and in Croatia. The ripening of the kulen happens over the course of two to six months, eventually eight. In retail, kulen comes packaged in vacuum foil in order to prevent loss of mas, to maintain freshness and softer consistency as well as to maintain the price of the product. It takes place in controlled conditions in refrigerated cabinets at 4-8 ° C. Kulen in retail comes also as a bulk product. Reference methods were used to examine the qualitative-quantitative representation of nutrients (Soxlet method - fat, Kjeldahl method - total nitrogen, Mohr method salt, minerals by combustion). During the production process as well as during storage, biochemical changes occur as a result of reducing the content of water, carbohydrates and nitrites and increasing fats, proteins and total minerals. In the bulk kulen, the loss of mas on the 40th day is 7.4626%, on the 15th day is 2.985% and on the 8th is 1.51%. While pH - 4.95-5.00. In vacuum packed kulen the loss of mas on the 8th day is 0.5479% while on the 15th day there is no appearance of loss of mas and no change in pH. On the 40th day the loss of mas is 1.37% and the pH is 5.00. According to the test we can conclude that packaging in vacuum foil prevent kulen quality.

**Key Words:** meat, loss of mas, adipose tissue, storage, packaging

# CHEMICAL COMPOSITION AND TECHNOLOGICAL QUALITY OF EINKORN WHEAT (*TRITICUM MONOCOCCUM* L.)

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## **ABSTRACT**

Einkorn (*Triticum monococcum* L.), a diploid hulled wheat species carrying the A genome, was the first wheat to be domesticated some 12,000 years ago in South-East Turkey. It was extensively cultivated in the Middle-East, the Balkans and Caucasus, Europe and North-Africa in the Neolithic Age. Today, einkorn is only planted in marginal areas of Turkey, the Balkan countries, Germany, Spain, Italy and some other European countries. In the last decades, there is a growing interest for einkorn due to its nutritional qualities, adaptation to poor soils and high level of resistance to pests and diseases. A high proportion of hulls remained attached to kernels of einkorn. Kernel and flour characteristics shows that einkorn has small seeds, with very soft texture, high protein, ash, carotenoids, tocols content and good pasting properties. Einkorn flour is usually considered to have poor dough and baking properties however, the existence of einkorn accessions with high breadmaking quality is confirmed. In comparison to common wheat the flours ancient einkorn species yield softer doughs with low elasticity and high extensibility because of the poor gluten quality. Some research results concluded that einkorn is a promising candidate for the development of special foods such as bakery products including cookies, baby food or products with high content of dietary fiber, carotenoids and tocols.

**Key Words:** einkorn, chemical composition, technological quality

## **EFFECT OF COOKING METHODS ON SULFITES CONTENT OF DRIED FRUITS**

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### **ABSTRACT**

Sulfites are chemical preservatives widely used in a variety of foods. However, their use has long been controversial because of the possible adverse effects on consumers' health. In this context, a study was carried out to determine the impact of cooking by different modes on the sulfite content in dried fruits (grapes, apricot) available on the Moroccan market. Boiling reduces sulfites by 35% in dried apricots and 40% in raisins. The steaming reduced the sulfite content to around 25% in dried apricots and 20% in raisins. As for the caramelization, it allowed the elimination of 10% of sulfites for the dried apricots and 15% for the raisins. However, in traditional Moroccan cuisine, the caramelization method was the most use, which leaves a high percentage of this sulfite in prepared foods.

**Key Words:** sulfites, cooking methods, dried fruits

# THE POSSIBLE USE OF UV-VIS SPECTROPHOTOMETRIC DATA FOR CLASSIFICATION OF VIRGIN OLIVE OILS

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## **ABSTRACT**

Olive oil is a significant economic and cultural value, especially for the Mediterranean and Balkan countries. According to the legislation, the quality class of virgin olive oil depends on chemical and sensorial properties. However, some other factors such as the geographical origin, olive variety, production method can play a key role to determine marketing value beyond the legal basis for virgin olive oil. Several chemometric studies are combining the chromatographic data with multivariable analysis methods to classify virgin olive oils according to these so-called side factors. In addition, these studies also involved the detection of adulteration for virgin olive oils. However fast and undestructive testing methods such as FTIR spectrometry, RAMAN, and NIR have become an important topic for scientific studies. In addition in some studies, it has been investigated that even UV-VIS spectrophotometric data has some potential to reveal virgin olive oil adulteration to some degree. In our study, the potential of UV-VIS spectrophotometric data to classify Turkish virgin olive oils with geographical indication was investigated. Results revealed that not only the geographical origin but also variety was a significant factor to create disturbances in the UV-VIS data of virgin olive oils. The carotenoid and chlorophyll content of the sample has significantly affected possible classification. Acknowledgment: I would like to thank the TUBITAK for supporting this study under project number 120O872.

**Key Words:** virgin olive oil, UV-VIS, spectrophotometry, chemometry, classification

# TRANS FATTY ACID FORMATION IN VEGETABLE OIL PRODUCTION TECHNOLOGY: AFFECTING FACTORS AND MINIMIZING PROCESSES

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## ABSTRACT

Trans fatty acids (TFAs) are unsaturated fatty acids with most unsaturated cis bonds and at least one double bond in the trans structure. Trans fats are naturally present in the milk of ruminant animals in nature, and occur mainly during partial hydrogenation, which is one of the modification processes of fats. In general, three main factors, namely industrial hydrogenation of vegetable oils, high temperature oil refining and biohydrogenation, cause the formation of trans fat. While 82-90% of trans fatty acids in the diet are formed as a result of industrial partial hydrogenation processes, it is stated that some amount is formed during other oil processing processes such as deodorization. Hydrogenation is applied in the food industry in order to increase the flavor stability by reducing the susceptibility to oxidation in oils and to increase the usage areas of the product by changing the physical properties of the oil. Depending on the hydrogenation conditions (temperature, stirring rate, hydrogenation pressure, catalyst and concentration) three types of reactions can occur: Firstly; Hydrogen can be added to the cis-carbon carbon double bond and saturated with hydrogen. Alternatively, the cis form can isomerize to the trans form without taking up hydrogen. In addition, position (local) isomers can be formed by movement of the double bond along the fatty acid molecule. It is possible to use different fat modification techniques such as interesterification, fractionation and making various combinations (mixes) as an alternative to hydrogenation in order to use healthier oils that will eliminate or reduce the use of trans fatty acids in food production.

**Key Words:** trans fatty acids, vegetable oil production technology, hydrogenation, preventive solutions

# FACTORS INFLUENCING THE QUALITY OF CRUDE OIL PRODUCTION

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## **ABSTRACT**

Crude oil quality is important to ensure oil quality, even after refining process. Both the minimization of refining losses and the preservation of the desired minor components in vegetable oils are strongly dependent on the workflow during crude oil production. The use of quality raw materials, the management of warehouses in the process from raw material purchase to processing, the follow-up of the pressing and extraction processes are very important to obtain a quality product. All conditions such as temperature, solvent, pressure adjustment in presses should be recorded and controlled. The purpose of storage is to preserve the properties and freshness of the product until it is marketed or used for another purpose. Storage is done not to improve the quality of the product, but to preserve the harvest quality of the product. Seeds with high oil content are more affected by increases in storage temperature. The life of the stored product doubles for every 5 °C decrease in temperature, likewise, every 1% reduction in moisture content (between 5-15% moisture content) doubles the life of the product. Temperatures between 0 and 5 °C are optimal for storage. Furthermore, the methods used during the processing of oilseeds into oil are very effective on crude oil quality and refining conditions. Although crude vegetable oils are generally refined; in recent years, the interest in cold-pressed oils has increased with the increase in the number of studies on the nutritional values found in cold-pressed oils. This situation has led to an increase in the importance given to the cold or hot pressing quality of crude oils.

**Key Words:** crude oil quality, oil production, refining process

# THE EFFECT OF ADDING CHILI ON THE SENSORY CHARACTERISTICS OF CHEESE MADE BY DIFFERENT COAGULANTS

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## **ABSTRACT**

One of the key areas of innovation in the cheese industry is the production of cheeses with new sensory and textural features. In this study, two coagulants (vegetable and microbial) are used to produce fresh cheese; on the other hand, chili powder is used to study their effect on the sensory characteristics of these cheeses. The results showed that the vegetable coagulant gives a more acidic and more porous cheese than the microbial coagulant. In addition, Chili powder has a positive effect on the masking of taste and odor acidity, creamy odor, and bitter aftertaste in both types of cheese. It should be noted that the smell of cream was less intense in the case of using the vegetable coagulant than the microbial. Adding that Chili makes these two types of cheese more acceptable by consumers and changing their textural characteristics.

**Key Words:** vegetable coagulant, microbial coagulant, chili powder, fresh cheese, sensory characteristics.

## PHOSPHOMOLYBDATE TEST METHOD FOR ANTIOXIDANT ACTIVITY IN EXTRACTS OF ANIMAL FEED

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### ABSTRACT

Antioxidant activity in feed from plant sources are pharmacologically potent sources and have little or no effects on the health of livestock and through its diet and at humans. For this aim used method to reduction of Mo (VI) in Mo (V), by samples of animal feed. Extracts obtained with methanol + ethanol (0.6M H<sub>2</sub>SO<sub>4</sub>, 28mM Na<sub>2</sub>PO<sub>4</sub> and 4M (NH<sub>4</sub>)<sub>2</sub> MoO<sub>4</sub>, Soxlet method: Green complexes formed at acidic pH value are spectrophotometric in the UV range at wavelength  $\lambda = 695$  nm. The values of milk primers are compared with respect to the calibration curve of IUPAC (3, 4,5-Trihydroxybenzoic acid) or gallic acid. Extracted samples of feed tested for antioxidant activity than make statistics in Excel. Measurements were made on samples of animal feed natural plant as alfalfa, silage and concentrate. The results of the concentration of nine feed samples range  $c = 3, 25 - 18,0 / (\mu\text{g} / \text{ml})$ . The highest value of antioxidant activity is in alfalfa versus concentrate, which is result of quantity of vitamin C. It was concluded that the total antioxidant activity in natural plant food extracts is higher than concentrates that have antioxidant supplements.

**Key Words:** antioxidants, antioxidant activity, animal feed, alfalfa, concentrate

# PHYSICO-CHEMICAL AND RHEOLOGICAL STUDY OF MOROCCAN RAW CAMEL MILK'S, CASE OF BENI MELLAL-KHENIFRA REGION

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## ABSTRACT

Milk is considered an essential nutrient for human health; this vital nutrient has many outstanding therapeutic properties. However, understanding these properties is important for the dairy industry as they affect most unit operations, e.g., fluid flow, mixing, homogenization, freezing, and sterilization processes. For this purpose, the aim behind this work is to carry out a comparison between three samples of camel milk of the Grezni genotype in terms of physicochemical and rheological behaviors. During this work, milk samples were provided by the local cooperative and prepared for physicochemical and rheological investigations. The results show that the viscosity is relatively decreased with decreasing fat content; on the other hand, the viscosity is relatively decreased with increasing protein content. However, the increase in temperature had a small effect on the decrease in viscosity.

**Key Words:** camel milk, physicochemical, rheology

# ALLEVIATING EFFECTS OF ASCORBIC ACID ON RED RADISH (*RAPHANUS SATIVUS* L.) LEAVES TREATED WITH EXCESS COPPER

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## **ABSTRACT**

Ascorbic acid (AsA) is one of the most important water soluble antioxidants, playing important roles in abiotic stress tolerance. Considerable interests have focused on AsA due to its ability to induce a protective effect on plants under stress. Radish leaves subjected to 0 (Control) and 100  $\mu$ M CuSO<sub>4</sub> solution were supplemented with 0 and 100 mg L<sup>-1</sup> AsA for 21 days. Changes in the levels of several important parameters related with oxidative stress, lipid peroxidation and antioxidant enzymes were measured. Treatment with 100 mg L<sup>-1</sup> AsA is found to alleviate the adverse effects of Cu on radish leaves. The level of the Cu-induced accumulation of active oxygen species, peroxidase activity and lipid peroxidation in seedlings treated with AsA were lower than in untreated seedlings. Exogenous application of AsA had a protective effect on pigment content and enzyme activities of red radish against Cu-induced oxidative stress. It has been suggested that AsA-induced increases in the resistance of plants on heavy metal stress. Effects of exogenously applied AsA under copper stress on the photosynthetic pigments, anthocyanin content, antioxidant enzyme activity of plant are not still clear or lacks information. The physiological basis of the mechanism of plant resistance induced by AsA are not still well known. The aim of this paper was to report the effects of AsA on antioxidant activities grown under copper (Cu) stress conditions, and also to examine changes in membrane permeability, lipid peroxidation (MDA concentration), H<sub>2</sub>O<sub>2</sub> concentration and photosynthetic and anthocyanin pigments.

**Key Words:** ascorbic acid, red radish, copper, antioxidant activities

## **DIET-EPIGENOME INTERACTIONS: EPI-DRUGS MODULATING THE EPIGENETIC MACHINERY DURING CANCER PREVENTION**

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### **ABSTRACT**

The roles of diet and environment on health have been known since ancient times. Cancer is both a genetic and an epigenetic disease and a complex interplay mechanism of genetic and environmental factors composed of multiple stages in which gene expression, protein and metabolite function operate synchronically. Disruption of epigenetic processes results in life-threatening diseases, in particular, cancer. Nutrient intake is an environmental factor, and dietary components play an important role in both cancer development and prevention. Diet considered as a source of either carcinogens that are present in certain foods or acting in a protective manner such as vitamins, antioxidants, detoxifying substances, chelating agents etc. Thus, dietary phytochemicals as epigenetic modifiers in cancer and effects of dietary phytochemicals on gene expression and signaling pathways have been widely studied in cancer. In this study, current knowledge on interactions between cancer metabolisms, epigenetic gene regulation, and how both processes are affected by dietary components are summarized. A comprehensive overview of natural compounds with epigenetic activity on tumorigenesis mechanisms by which natural compounds alter the cancer epigenome is provided. Studies made in epigenetics and cancer research demonstrated that genetic and epigenetic mechanisms are not separate events in cancer; they influence each other during carcinogenesis, highlighting plant-derived anticancer compounds with epigenetic mechanisms of action, and potential use in epigenetic therapy. Recent investigations involving epigenetic modulations suggest that diet rich in phytochemicals not only reduce the risk of developing cancer, but also affect the treatment outcome.

**Key Words:** epigenetics, diet, cancer

# SCREENING OF LACTIC BACTERIA BASED ON ITS PROTEASE ACTIVITY FOR COLLAGEN EXTRACTION FROM SHRIMP (*PARAPENAEUS LONGIROSTRIS*) BYPRODUCTS

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## ABSTRACT

The industrial processing of shrimp produces massive quantities of solid waste that is a notable source of animal protein (collagen, gelatin...) and other bioactive compounds that are not appropriately utilized. Collagen is usually extracted using porcine-derived pepsin which is not accepted by a large number of people due to religious constraints. The aim of this study was to explore and select nonpathogenic bacteria in order to produce bacterial collagenolytic proteases to extract collagen from shrimp byproducts. Determination of collagenolytic activity was carried out through specific medium. Formation of clear zones around colonies indicate that bacteria have collagenolytic activity. Five lactic bacteria strains L8, L24, L36, L46 and L60 were selected and was measured for their specific activity and for protein concentration that was measured as dissolved protein. Crude extract of protease from the five strains showed that L24 have the highest activity with 7, 01; L46=6, 61; L60=6, 36; L36=5, 77 and L8 was the lowest with 4, 5 U/mg. Furthermore, the five strains L24, L46, L60, L36 and L8 successively have produced protein with concentration of 0,42;0,38;0,27;0,2;0,15 mg/g. In order to enhance collagen production, protein concentration was measured for protease mixture of L24+L60; L46+60 and L24+L46, successively proteins concentration was 0, 4; 0, 46 and 0, 63 mg/g. Therefore, the mixture L24+L46 have been selected for shrimp byproducts for collagen extraction.

**Key Words:** collagen, protease, lactic bacteria, shrimp byproducts

# ASSESSMENT OF THE EFFECTS OF WATER STRESS AND SUBSTRATE ON FLOWERING, PODDING AND MYCORRHIZAE PRESENCE IN FABA BEAN LEGUME (*VICIA FABA* L.).

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## ABSTRACT

The bean is a legume rich in vegetable protein, carbohydrates, vitamins and fiber. It is one of the most cultivated vegetables in the Mediterranean basin and the most influenced by water deficit. Our goal is to study the combined effect of water stress and growing substrate on bean productivity. The substrates used in this study are: (1) soil taken from a bean field (sandy clay); (2) washed and rinsed sea sand and (3) a substrate made of a sand / peat mixture (rich in dry organic matter, phosphorus and potassium). The plants were followed for two months of the severe water stress application (10% retention capacity). The flowering precocity, weight pods per plant as well as mycorrhizae presence or absence were measured. The results obtained indicate that bean seems to express sensitivity to water stress action which is closely dependent on the substrate. In addition, peat composed substrate, rich in hydrophilic organic matter, allows a better plants water deficit resistance. In this state, plants are precocious, they flower quickly to avoid water stress and they are most productive in absence of any mycorrhization. The water restriction more affected the plants growing in the soil taken from the bean field compared to other substrates and acted as a brake on plants flowering and podding despite a significant colonization of the roots by arbuscular mycorrhizal fungi. This could result in the clay drying out and the development of a high suction pressure for the water which can oppose that of the roots of the plants. Sand culture is interesting under water stress thanks to its very filtering and very light texture. However, its lack of organic matter and its low water retention capacity are the cause of a low retention capacity of mineral elements, making it unfavorable to the development of mycorrhizae.

**Key Words:** *vicia faba* L., water stress, substrate, mycorrhization, flowering, podding, seed yield

## EFFECT OF $\Gamma$ -IRRADIATION ON PIPERINE CONTENT AND MICROBIAL QUALITY OF BLACK PEPPER

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### ABSTRACT

The aim of this study was to investigate the effects of different doses of ionizing radiation on the content of piperine in irradiated black pepper (*Piper nigrum*) and compare it with the unirradiated control sample. Samples were irradiated with <sup>60</sup>Co  $\gamma$ -rays (at absorbed doses of 0.5 kGy, 1 kGy, 3 kGy, 5 kGy, 7 kGy, 10 kGy and 12 kGy) at the Vinca Institute for Nuclear Science in Belgrade. Piperine from powdered black pepper (10 g) was extracted with 100 mL methanol by using Soxhlet extractor for 4 h. By combining methods, TLC (samples were dissolved in methanol) and the UV-Vis spectrophotometry at 342 nm against methanol as blank, one can identify piperine content in samples. TLC was performed in three mobile phases (the first: toluene: ethyl acetate, 7:3 v/v; the second: acetone: *n*-hexane, 6:4 v/v; the third: toluene: methanol, 8, 5:1,5 v/v) and the retention factor (*RF*) value for piperine was equal to 0.66, 0.94 and 0.67, respectively. In accordance with radiation doses it was found that piperine crude yield from black pepper was from 1.10 % (the unirradiated sample) to 1.69 %, 1.07 %, 0.60 %, 0.90 %, 0.30 %, 1.20 %, 0.80 % for irradiated samples, respectively. The impact of  $\gamma$ -irradiation has not been observed to decrease significantly the piperine content in the irradiated samples. Microbiological analyses were performed with standard plate count method, which resulted in a decreasing number of the total cell count of microbial cells with increasing the radiation dose.

**Key Words:**  $\gamma$ -irradiation, piperine, black pepper, TLC, UV-Vis spectrophotometry

## ADDITION OF NATURAL TANNINS DURING FERMENTATION TO STABILIZE THE COLOR OF RED WINE FROM VAR. "SHESH I ZI"

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### ABSTRACT

Wine is a complex alcoholic beverage, containing many components that affect the quality of the wine. Phenols are the main ingredients widely known in wine as ingredients with a substantial impact on the quality of red wine. Among the phenolic compounds, tannins are of special importance in red wine. In Albania, one of the most widely used grape varieties for the production of red wine is var. "Shesh i Zi". The wines produced from this variety are characterized by having a low alcoholic strength (~ 12% vol.) and storage for more than three years is not recommended. During aging, the wine is characterized by loss of color. Therefore, this study took into account the evaluation of the addition of natural tannic compounds (stems and oak chips) during fermentation and its impact on the preservation of color in aging. In this study, 100 kg of grapes of var. "Shesh i Zi" from the Tirana area were used in three harvests (2017-2018-2019). Three vinification schemes were used (SLC - classic, SLCH - oak chips and SLF - stems). The evaluation of the polyphenolic components (total polyphenols, total tannins, total anthocyanins, color parameters) was carried out by spectrophotometric methods. From the results obtained, it was observed that the wines produced in the presence of the stems had a significant impact on the total anthocyanin content and the color parameters.

**Key Words:** alcoholic fermentation, total tannins, total anthocyanins, color of wine, var. 'Sheshi I Zi'

## EVALUATION OF THE PHYSICAL-CHEMICAL CHARACTERISTICS OF THE APPLE VARIETIES FOR THE PRODUCTION OF APPLE – CIDERS

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### ABSTRACT

The apple is one of the main fruits of consumption in Albania. This consumption is mainly focused on fresh apple and its unfermented juice. In recent years, there has been a great demand for fermented apple juice (cider). Apple cider production is an incredibly complex process that involves a variety of biochemical reactions. The quality of the cider is influenced by many factors such as apple varieties, yeast strains, fermentation conditions, production process, and treatments during aging, etc. The purpose of this study is to determine the appropriate varieties grown in Albania for cider production. The apple varieties used in this study are varieties grown in the Korça area, in Albania. In this study, six varieties of apple were taken, in which the physical-chemical characteristics suitable for the production of cider were evaluated. From the results obtained, only two varieties of apples were selected that comply the requirements for cider production (Jonagold and Annagold). The technological scheme used in this study is the classic fermentation of apples. The evaluation of the quality parameters of the cider (volatile and total acidity, pH, SO<sub>2</sub> and dry extract) and the polyphenolic components (total polyphenols, total flavonoids and color parameter) were carried out according to the standard methods of the OIV and spectrophotometric methods. The results obtained from this study showed that the quality parameters for the two selected varieties were within the limits established according to the EEC standard, 2008. The cider produced by the *Jonagold* variety presented higher values in its polyphenolic content compared to the cider produced by var. *Annagold*. These preliminary results will be accompanied by new studies taking into account the combination of other varieties for the production of a higher quality cider.

**Key Words:** apple variety, apple cider, physical parameters, chemical parameters, quality parameters, phenolic compounds.

# ASSESSMENT OF SAMET (GRAPE SYRUP) PHYSICO-CHEMISTRY AND MICROBIOLOGICAL CHARACTERISTICS

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## ABSTRACT

Samet, grape syrup typical of the province of Chefchaouen in the north of the kingdom of Morocco, is a local product identified by various authorized organizations. Its production is endemic and also informal, which currently limits its reach on the local market. This product, used in herbal medicine since the middle Ages, is now increasingly tending to disappear in the consumption of Jbala households. The objective of the present study is to determine the physico-chemical composition and to assess the microbiological characteristics of this local product. The physico-chemical analyzes give fairly appreciable results on average for the acidity (25.58 meq/ Kg of samet), ° Brix (76.37%), pH (3.9), Humidity (31.48%) and dry matter (68.52%). In terms of microbiological quality, all the specimens don't represent any risk to consumer health. Indeed, no colony for total germs and for fungi, yeasts, molds and coliforms was detected.

**Key Words:** samet, grape syrup, local product, physico-chemical analyzes, microbiological analyzes,

## MARKER GENES RELATED TO FATTY ACIDS COMPOSITION OF BEEF

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### ABSTRACT

The taste, flavor, tenderness and juiciness of the meat have a great impact on the choice of meat, as well as the health benefits. One of the meat quality criteria is the marbling of the meat. Marbling is the homogeneous distribution of fat in the intramuscular tissue of the meat. As marbling is important, it is also important which fatty acids form the intramuscular adipose tissue. Studies have shown that the ratios of fatty acids in the resulting fatty acid composition are closely related to the taste of meat. It has been associated with health as well as affecting the taste. The fatty acid composition of the intramuscular tissue of meat has become important in the meat industry. Adipose tissue with abundant monounsaturated fatty acids gives it a lower melting point. Thus, it contributes positively to the flavor of the meat by making a positive contribution to the aroma and tenderness of the meat. One of the biggest drawbacks in consuming meat is the fatty acid composition of meat. It is seen that the greatest interest in fatty acids is in terms of saturated and unsaturated fatty acids. Dietitians and health experts have suggested that because saturated fatty acids (SFA) increase LDL cholesterol, they are associated with cardiovascular disease, reducing or excluding the consumption of SFA-rich foods such as meat. Animal fats; They are an important food source because they contain high energy levels, essential fatty acids ( $\omega 3$ ,  $\omega 6$ ) and essential fatty acids for human health such as conjugated linoleic acid (CLA). Amount of  $\omega 3$ ,  $\omega 6$ , CLA, eicosapentaenoic acid (C20:5- $\omega 3$  EPA) and docosahexaenoic acid (C22:6- $\omega 3$  DHA) in meat, polyunsaturated fatty acid (PUFA)/Saturated fatty acid (SFA) and  $\omega 6/\omega 3$  ratios, closely related to human health. In particular, CLA has an inhibitory effect on the formation of many diseases that are frequently seen in our age, such as cancer, diabetes, obesity and cardiovascular diseases. The main source of CLA in the human diet is ruminant meats and milk. As the results of studies on the aspects of fatty acid content that positively affect human health become widespread, the fatty acid content will become an effective factor in the pricing of carcass regions. In recent years, it is aimed to increase the meat yield in the meat industry as well as to obtain better quality meat and meat products. In the light of quantitative determination of fat quality, which is one of the meat quality parameters, it is necessary to evaluate the effects of candidate genes that should be considered in genetic studies and that directly or indirectly affect meat fat. Various genetic studies have been carried out on meat quality and linear correlation relationships with various polymorphisms have been determined. Studies at the molecular level in recent years have revealed that genetic structure has very important effects on the evaluation of the characteristics related to meat yield and quality. In this context, many genes associated with growth rate, carcass weight, lean meat yield, mosaic fat distribution, meat and fat color, water retention properties and texture were identified. FABP4, SCD, FASN, CAST, CAPN, LEPTIN genes are examples. Achieving permanent and continuous progress in breeding studies aiming at improving the economically important traits qualitatively and quantitatively depends on changing the genetic structure in the desired direction.

**Keywords:** Fatty acids, Conjugated linoleic acid, Marker gene, Polymorphism

## A NOVEL TECHNOLOGY FOR FOOD PROCESSING: COLD PLASMA

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### ABSTRACT

Plasma is the fourth state of matter, which is an ionized gas containing an array of active species, i.e., electrons, free radicals, ions. In recent years, cold plasma technology is gaining importance because it is a non-thermal process and studies are carried out on many issues in the food industry. CP first used to improve printing and adhesion properties of polymers, increasing surface energy of materials and a variety of usage domains in electronics. Researches in recent years demonstrate that CP technology is a powerful and profitable technology for the food industry. Non-thermal technology is highly advantageous for microbial decontamination of food products including spore and spoilage/pathogenic organisms. CP has also been used for processing packages. In this process, the purpose is to improve barrier properties and to gain antimicrobial properties of the material. Apart from microbial decontamination of food products and processing packages, CP technology has found use in various fields in the food industry. Chemical augmentation is the other process which produce plasma-activated water (PAW). It was observed that softening was delayed and bacterial and fungi population decreased in paw-treated mushrooms. CP technology is also used for modification of food components like starch modification. It can change the configuration of starch molecules causing them to gain different pasting characteristics, water absorption, solubility and thermal properties. It also positively affects the surface properties of grain and derivative products. Besides this, there are new searches show that CP can alternatively used for degradation of residual pesticides. These gains are due to the reactive oxygen species (ROS) contained in the plasma. There are future application trends of cold plasma technology like hydrogenation of edible oils, mitigation of food allergens and anti-nutritonal factors, modification of seed germination performance. Studies in recent years have focused on the use of CP process in foods, especially since it is a non-thermal process.

**Key Words:** cold plasma, novel technology, non-thermal process

# PROTEIN OXIDATION IN ULTRAVIOLET LIGHT-TREATED DAIRY PRODUCTS

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## ABSTRACT

Several non-thermal technologies can be used in the dairy industry to ensure the safety and extend the shelf life of food products. Ultraviolet (UV) light radiation, one the non-thermal technology, is considered safe and non-toxic and provides many advantages such as low investment and maintenance cost. However, UV light application can cause oxidative changes which probably result in some detrimental sensorial defects depending on the application doses and the food matrix. Therefore, in this study, it is aimed to reveal the protein oxidation mechanism and measurement methods for several dairy products and to review the association between the protein oxidation and UV light application. Oxidative changes can cause deterioration in several dairy products. Both milk protein and fat plays major roles in dairy products from nutritional, sensorial and technological points of view. Milk proteins are one of the major components in dairy products that are beneficial to human health. However, proteins are oxidized and oxidation products are accumulated during the processing and storage period. Also, UV light application may cause protein oxidation in dairy products. To determine these protein oxidation products, total carbonyl content,  $\alpha$ -amino adipic semialdehyde (AAS) and  $\gamma$ -glutamic semialdehyde (GGS), dityrosine and sulfhydryl contents can be measured. Spectrophotometric and chromatographic methods are generally used. Protein oxidation, which may occur as a result of UV-C light applied to dairy products, also can play a role in sensory changes. Sensory changes stand out as undesirable taste and odor depending on the application dose, product type and nutrient content. As a result, it is necessary to focus on the protein oxidation mechanisms and to investigate the changes in the protein oxidation products when considering the effects of the UV light application on dairy products.

**Key Words:** protein oxidation, carbonyl groups, dityrosine, UV-C light, dairy products

# THE EFFECT OF STORAGE ON THE TEXTURE QUALITY OF HAZELNUT CHIPS PRODUCED IN DIFFERENT FORMULATIONS

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## ABSTRACT

In recent years, changing consumption habits with the trend of healthy eating have made it necessary to produce products with different tastes and varieties. Accordingly, post-harvest processing of hazelnuts has been emphasized and it has been brought to the market after processing into different products. As an alternative product in the snack type food industry, which has recently become widespread and widely consumed chips, with the project number TAGEM / HSGGYAD / 15 / A05 / P03 / 94 supported by TAGEM and carried out in the Hazelnut Research Institute Directorate between 2015-2018. The production possibilities of the hazelnut chips considered were investigated. It is aimed to develop a healthier and more nutritious product as an alternative to the existing chips with low nutritional properties. In the study carried out for this purpose; First of all, the usability and usage rates of hazelnut flour together with wheat flour in the production of chips were determined. Chips were produced by adding spices from hazelnut flour and wheat flour blends in determined proportions, packed under nitrogen gas, and stored at 3 different storage temperatures (4° C, 20° C and 30° C) for 12 months. During the storage period of hazelnut chips, texture analysis was carried out at 2-month intervals, and the hardness value (N) and average number of cracks were determined. Depending on the increase in the amount of hazelnut flour use, it was determined that there was a decrease in the hardness ratio and an increase in the number of cracks in hazelnut chips. In the texture analyzes made during the storage period of the chips, the highest hardness value (3.08 N) at the beginning of storage was found in the chips formed with 50% hazelnut flour and 50% wheat flour, and the lowest hardness value (1.87 N) was 70% hazelnut flour 30% wheat. It was determined in the chips produced with the formulation formed with flour. Considering the storage temperatures and storage times, an increase was detected at the end of storage compared to the beginning of storage, regardless of the formulation, in the hardness values, while fluctuations were observed in the crack number values of the chips. While the chips formulation made with 50% hazelnut flour and 50% wheat flour stood out in terms of hardness value, the formulation formed with 70% hazelnut flour and 30% wheat flour came to the fore when the cracking numbers of the chips were taken into consideration. As a result of the study, it has been determined that storage at 4°C stands out in terms of hardness value and breakage number during 12 months of storage.

**Key Words:** hazelnut, chips, new product, fatty acidity, storage

# FORTIFIED CAKE WITH POMEGRANATE AND ORANGE PEELS POWDER AS A FUNCTIONAL PRODUCT

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## ABSTRACT

Fruits peels as a by-product of the juice processing industry contains a range of valuable bioactive and nutritional compounds. Its application as a food supplement leads to enhancement of the nutritional value, healthy properties, physicochemical and sensory properties of final products. The present study aims to evaluate physicochemical and sensory properties of sponge cake supplemented with pomegranate and orange peels powders (PEG and PEO) as partially substituted of flour at different levels (2.5 and 5 %) during 21 days of storage at room temperature. Total phenolic compounds, total flavonoid and total proanthocyanidins contents of PEG and PEO ethanol extracts were determined by spectrophotometer methods. The contents are about 2.11 and 0.76 mg EGA / g DM; 5.49 and 2.68 mg EQ/g DM; 13.90 and 2.182 mg EC/g DM, respectively. The prepared cakes show an enhancement of texture properties, specific volume, moisture and color parameters compared to sample control. In addition, the sensory evaluation reveals that the substitution with 2.5% PEG + PEO improve the appreciation of cake sensory characteristics: color, odor and taste, aftertaste. The peroxide value in cakes stored at room temperatures for 21 days of storage under room temperature decreased with increasing fruits peels powder levels. The results also show the sponge cakes with PEG and PEO supplementation had good antioxidant activity compared with the control. This can suggest that the shelf-life of these cakes could be extended as a consequence.

**Key Words:** cake, pomegranate peel, orange peel, polyphenols, oxidation, antioxidant activity

## CHEMICAL PROPERTIES AND BIOACTIVE COMPONENTS OF PEANUT OIL

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### ABSTRACT

Peanut (*Arachis hypogaea* L.) is a significant oilseed in terms of human nutrition since it belongs to the legume family and contains oil (44-56%), protein (22-30%), carbohydrates (9.5-19%), vitamins (niacin, folate and vitamin E) and minerals (magnesium, copper, phosphorus and potassium). Peanut seed contain 44-56% oil depending on the variety and growing conditions, hence it is a good source of oil. The main fatty acids in peanut oil are oleic (35.7%–55.3%), linoleic (20.4%–39.1%), and palmitic acid (9.4%–15.0%). Peanut oil, which has high oxidation stability, is preferred worldwide as cooking and frying oil. In addition to the fatty acids it contains, peanut oil is considered nutritious and healthy due to the presence of natural bioactive components such as squalene, phytosterols ( $\beta$ -sitosterol, campesterol and stigmasterol), phenolics (resveratrol and p-coumaric acid), tocopherols and tocotrienols. Various studies on the subject have indicated that these compounds can be used in the prevention of diseases due to their antioxidant activities. The content of these bioactive components varies according to the peanut variety, climatic conditions, crop year, ripening, processing methods and storage conditions. Turkey has suitable climatic conditions for peanut production, therefore peanuts can be grown as an alternative plant for vegetable oil production. Moreover, it demonstrates that in terms of oil ratio and qualitative attributes, peanut oil from types that can be grown in Turkey has the potential to be utilized as an oil. However, peanuts, which can be cultivated in much larger areas in Turkey, are grown in a relatively narrow area today and almost all of these peanuts are used as snacks. In terms of oil crop cultivation, Turkey needs to turn to different oil seeds in order to reduce the import burden, and peanut oil is of great importance in this sense. This review aims to provide an overview of the chemical properties of peanut oil, its importance in nutrition and peanut production in Turkey.

**Key Words:** peanut oil, *arachis hypogaea* L., fatty acid composition, chemical properties, bioactive components

# ALGERIAN HERBAL MEDICINE IN THE TREATMENT OF GASTROINTESTINAL DISEASES

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## **ABSTRACT**

An ethnobotanical and pharmacological survey was carried out in some cities in the northeast of Algeria, 154 plant species distributed among 64 families, represented mainly by Asteraceae, Lamiaceae, Rosaceae and poaceae, were reported to treat 18 ailment categories. This study also exhibits digestive disorders (diarrhea, constipation, and stomach bloating) as the most frequent treated disease, a correlation between plants used parts, methods of preparation and therapeutic effect will be given.

**Key words:** gastrointestinal pathologies, herbal medicine, ethnobotanical

# IDENTIFICATION OF YEASTS ISOLATED FROM NATURALLY FERMENTED GREEN OLIVES WITH MOLECULAR BASED METHODS

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## ABSTRACT

In this study NaCl content, titration acidity, pH values of 15 table olive brines were determined. The yeasts presenting in brine were isolated and purified. For the purpose of identification D1/D2 domain of 26S rRNA genes of 61 isolate were amplified and sequenced. The sequences obtained were compared with those deposited at databases and isolates were identified at species level as their closest relative reference. NaCl content of brine samples were found 11.2-11.6 g/L and total yeasts counts in brines were in the range of 4.1-4.5 log cfu/mL. Identification results showed that isolates were belong to species of *Debaryomyces hansenii*, *Candida oleophila*, *Candida zeylanoides*, *Candida diddensiae*, *Rhodotorula mucilaginosa* and *Candida zeylanoides* (%40), *Debaryomyces hansenii* (%23), *Candida oleophila* (%23) were predominant yeasts and to a lesser extent *Candida diddensiae* (%10), *Rhodotorula mucilaginosa* (%4) were part of the brine microbiota.

**Key Words:** yeast, table olive, molecular methods, identification

## **SOME PROPERTIES OF ACUR PICKLES PRODUCED USING SALT AND VINEGAR AT DIFFERENT CONCENTRATIONS**

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### **ABSTRACT**

Pickles are products formed by lactic acid fermentation in fruits and vegetables in vinegar and / or brine or in diluted acetic acid. In this research, it was aimed to determine some physical and chemical properties of cucumber pickles and to compare them with Turkish Standards and determine their differences. Different salted and salted brine were used in the production of Acur pickles. Chemical analyzes were counted such as the pH of the cucumber pickle 3,27-3,99, salt 2,85-8,15%, titration acidity 0,51-0,97%, dry matter 4,80-8,35%, vitamin C 4,15-6,81 mg/100mL, lactic acid 0,229-0,530 mg/mL, acetic acid 0.137-0.256 mg/mL, propionic acid 0.027-0.085 mg/mL; total mesophilic aerobic bacteria  $1,1 \times 10^2$ - $3,5 \times 10^2$  cfu / mL, lactic acid bacteria  $0,1 \times 10^5$ - $3,8 \times 10^5$  cfu / mL and yeast-mold yeast:  $1,0 \times 10^4$ - $6,5 \times 10^4$  cfu / mL-mold:  $<10^1$ - $4,0 \times 10^3$  cfu/mL. It has been determined that all cucumber pickles obtained are in conformity with TS11112 standard.

**Key Words:** cucumber pickle, fermentation, lactic acid

# HYDROLOGICAL DROUGHT ANALYSIS AND DROUGHT HYDROLOGY

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## ABSTRACT

Drought is a natural phenomenon that adversely affects land and resource generation systems as a result of rainfall falling significantly below normal levels, leading to serious hydrological imbalances. Low flow is the decrease of flow in a stream and low flow is indicative of the minimum expected flow level given usage and environmental needs. Drought and low flow are interrelated, and while low flows can be observed during dry periods, not every low flow is indicative of drought. Within the scope of this research, a sample drought analysis study was conducted with Standardized Precipitation Index (SPI) using the R program. Turkey has observed the negative effects of climate change are located in the Mediterranean Basin and shows middle-arid climate. It is necessary to evaluate low flow analyzes supported by drought analyzes in order to use water with maximum efficiency in wet periods and in periods when rivers may dry up or when water is reduced. Therefore, in this study, it was concluded that low flow analyzes in our country, which is expected to encounter more drought disasters in the future, should be evaluated by supporting with drought analyzes.

**Key Words:** low flow, drought, low flow analysis, hydrological drought analysis

# ANATOMICAL, PALYNOLOGICAL AND MICROMORPHOLOGICAL STUDIES ON COUSINIA AUCHERI, AN ENDEMIC SPECIES FOR TURKEY

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## ABSTRACT

The genus *Cousinia* is one of the largest genera of the Asteraceae family and is represented by about 700 species. The *Cousinia* is represented with 40 taxa, of which 28 (70%) endemic to Turkey. In the present study, the main purpose is to investigate anatomical, palynological and achene micromorphological characteristics of *Cousinia aucheri* DC. and to contribute to the systematics of *Cousinia*. In this study, the plant samples of *C. aucheri* were collected from natural habitats. The specimens have been kept in Selçuk University Herbarium (KNYA). The pollen grains of *C. aucheri* were obtained from dried herbarium specimens. The pollen slides were prepared according to Wodehouse (1935) method for LM study. For anatomical studies, the specimens were stored in 70% alcohol before being sectioned. Sections of stems, leaf and midrib were used in paraffin method. The sections were taken by microtome and stained with safranin and fast green (Johansen 1940). Some anatomical characters such as the size of the vascular tissue, the shape of the midrib, and the number of vascular bundles in the midrib provide important taxonomic information. In stem anatomy, as a protective tissue, the periderm which has 1 layer was located in the outermost layer. Under the epidermis, there were cortex parenchyma. The cortex is composed of 7–8 layers of oval, cylindrical, or rectangular parenchymatous cells. In the cross section of the leaf, it was possible to observe a single layer of regular and rectangular epidermal cells on both the upper and lower sides. The midrib shape is rectangular. A total of 6 vascular bundles, 3 large and 3 small, were identified in the midrib. The pollen grains of *C. aucheri* are radially symmetrical, isopolar and have a tricolporate aperture. Their shape is subprolate, large size. Surface ornamentation of achene coat was irregularly foveolate. Acknowledgement: I would like to express our appreciation to the Selçuk University Scientific Research Project Commission, which supported this study (Project No: 20401134).

**Key Words:** anatomy, *cousinia*, endemic, palynology, Turkey.

# COMPARATIVE ANALYSIS OF RICE PERFORMANCE AND PROFITABILITY WITH THE SYSTEM OF RICE INTENSIFICATION (SRI) AND TRADITIONAL PRACTICES (TP) IN ZIGUINCHOR DISTRICT, SENEGAL

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## **ABSTRACT**

The "System of Rice Intensification"(SRI) is a combination of three elements (soil, water, plant and light) that allow the plant to express its production potential hidden by inappropriate farming practices. It represents a sustainable alternative to improve household yields and incomes. The aim of this study was to evaluate the yields and the profitability of the SRI and the Traditional Practices (TP) in Ziguinchor district, Senegal. A directed sampling based on criteria for selecting the system used and the cultivated varieties common to both systems was applied to collect the yield parameters and yields of paddy rice. Thus, 18 producers in the Badiate, Essyl and Fanda sites were selected, nine per system and four 1 m<sup>2</sup> yield squares were installed in each selected producer plot. A total of 72 yield squares, 36 per system, were installed, and an individual questionnaire was randomly administered to 55 producers using at least one of the systems to collect data on rice production and costs. The yield parameters including the number of fertile tillers per m<sup>2</sup>, the number of spikes, the weight of the 1000 grains are significantly higher ( $p<0.05$ ) in the SRI including yield compared to the traditional system. Transplanting density and plant duration are higher in TP ( $26\pm 5.6$  plants/m<sup>2</sup> and 26 days) than in SRI ( $16\pm 0.4$  plants/m<sup>2</sup> and 16 days). The lower the transplanting density, the higher the yield parameters and the yield. The economic profitability, determined on the basis of the benefit/cost ratio, is higher in SRI (1.5) than in TP (1.2). The SRI required a lot of technicality in its implementation and generated more cost of production. However, SRI was more productive and economically more profitable than the traditional system.

**Key Words:** SRI, traditional practices, rice, performance, productivity, profitability

## VALORIZATION OF FIG TREE (*FICUS CARICA*)

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### **ABSTRACT**

The fig tree (*Ficus carica* L.) is one of the most economically and socially important fruit species, it is one of the three main fruit productions of Algeria. This importance is mainly related to a multiplicity of uses and the exchange of genetic material, which led to its diversification and spread. In this case, genetic improvement is becoming an important area of research to have better crops, and a prior collection of information is needed mainly with regard to its genetic variability. For a first step of improvement we focused on a description and identification of the local fig varieties existing in Algeria. Whose prospecting led us to know the varietal diversity of the fig tree (the appointment and dispersion of varieties in several regions of Algeria) so this survey put us first cultural interest of the fig tree in Algeria; while the importance of *F. carica* as an alternative to the healing of certain diseases has been recognized throughout the centuries, and today it appears in several pharmacopoeias and books devoted to medicinal plants. As well as is among natural products that are used as a rich source of bioactive compounds of high economic value, due to their use in the cosmetic, pharmaceutical, and agricultural industries. These results of the survey led us to launch a genetic study in order to characterize and slice between existing varieties, this work is considered as a starting point towards genetic improvement which leads to the recovery and sustainable management of this species.

**Key Words:** fig tree, local varieties, valorization, Algeria

# EFFECTIVE ORGANO-MINERAL FERTILIZERS OF PROLONGED ACTION FROM THE PROCESSED ORGANO-CONTAINING WASTES OF VARIOUS ORIGIN

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## ABSTRACT

Nowadays, the use of organo-mineral fertilizers in agricultural production is one of the main measures to address the environmental and food security of the country. Our research suggests that excess sludge from the aeration station and processed vegetable waste in the OMF are valuable raw materials for the creation of granular agrochemically effective fertilizers to improve the mineral nutrition of crops, including phosphorus. The loose structure of such fertilizers promotes adsorption and retention of soil moisture, which allows to inhibit the processes of weathering and soil erosion. The high adsorption properties of the new OMFs prevent the chemical binding of phosphorus to the soil and promote its mobilization from hard-to-reach soil phosphates and fertilizers. Phosphorus removal rates by plants in the experiment increased by 51-79% with the use of OMF. The results of field research in 2018-2019 with Moskito corn hybrid (*Zea mays L.*) and Sumico sunflower hybrid (*Helianthus annuus L.*) on dark-gray podzolic soil confirmed the high agrochemical efficiency of our proposed fertilizers. This affected a significant increase in the yield of these crops (by 5.1 and 0.7 t/ha, respectively) and improved grain quality indicators. Namely, the protein content in corn grain increased by 20%. Determination of the after-effect (1st year) of OMF after corn in the sunflower feeding system confirms the effect of prolonged fertilizer action (increase in grain productivity of the plant by 21%). The use of such fertilizers is characterized by a complex effect on soil processes and soil bioproductivity, which ensures the preservation of soil organic matter.

**Key Words:** organo-mineral fertiliser, phosphoric nutrition, plant waste, corn, sunflower, crop yields, quality

# STUDY OF THE CHEMICAL COMPOSITION, ANTICANDIDA AND ANTIOXIDANT ACTIVITIES OF WILD AND CULTIVATED *ORIGANUM COMPACTUM* ESSENTIAL OIL FROM THE MUNICIPALITY OF CHAOUN IN MOROCCO

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## ABSTRACT

*Origanum Compactum* is one of the endemic Moroccan medicinal species that are intensively exploited in nature due to its many therapeutic properties. In order to highlight the importance of this plant species, the chemical composition of their essentials oils and their biological activities are studied. The chemical composition was identified by gas chromatography coupled with mass spectrometry. The yield of essential oils was 3.5% for the wild plant and 3.36% for the cultivated plant. 12 compounds have been identified in the essential oil of the wild plant. Carvacrol was the predominant compound 58.95%, followed by p. cymene 18.38 (%) and gamma-terpinene 8.36%. For the cultivated plant 27 compounds were identified Carvacrol was the predominant compound 45.33% followed by p-cymene 22.19% and gamma-Terpinene 10.06%. The essential oil of both plants was studied for its antimicrobial activity *in vitro* against four fungal strains using aromatogram method the minimum inhibitory concentration (MIC) and the minimum fungicidal concentration (MBC). In solid medium, it was found that the essential oil was active against the strains tested. In liquid medium, MIC and MBC ranged from 216 to 288 µg/ml. Antioxidant activity was investigated by 1, 1-diphenyl-2-picrylhydrazyl radical scanning assay (DPPH). The results of this study revealed that the essential oil of both plants has a good antioxidant effect. In conclusion, the antimicrobial effect and the antioxidant property of the essential oil of *Origanum Compactum* can present a promising and less riskier alternative than the synthetic antimicrobien and antioxydant used in conservation. Applications in the pharmaceutical and food industry are now possible; furthermore, culture could be a promising solution to ensure sustainable use of this medicinal species endemic and endangered.

**Key Words:** essential oil, *Origanum Compactum*, chemical analysis, antimicrobial activity, antioxidant activity, spontaneous, cultivated plant

# **DIGITAL MARKETING IN SMEs OPERATING IN THE AGRICULTURAL FOOD INDUSTRY OF TURKEY: CHALLENGES, OPPORTUNITIES AND STRATEGIES TO FOLLOW**

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## **ABSTRACT**

The permeation of new technologies combined with the high cost for running a shop force enterprise to search for new sales methods. Network applications and ICT (Information and Communication Technology) can help achieve e-commerce goals. This study contributes to the emerging digital marketing literature by providing an overview of digital marketing use, objectives, drivers and challenges, opportunities and strategies to follow in SMEs marketing agri-food products. In the light of the widespread use of internet and social media in our country, the results of this research are discussed which Digital Marketing Strategy is the best strategy to follow in the marketing of agricultural food products. These strategies are; search engine marketing, local search marketing, content marketing, social media marketing, email marketing, mobile marketing, pay per click marketing. In addition, it reveals that SMEs face difficulties in terms of information and personnel, content: originality, value, search engine marketing, goal setting, and measuring the return on investment in digital marketing.

**Key Words:** digital marketing strategy, smes marketing agri-food products, smes face difficulties,

# DETERMINATION OF TRACTOR USAGE PREFERENCES IN AGRICULTURAL ENTERPRISES

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## ABSTRACT

Agricultural mechanization is a complementary production technology that increases efficiency, provides economic efficiency and improves working conditions in agricultural production. The use of tractors with features that will meet the needs of agricultural enterprises is important for enterprises to make an economical production. In the study, a survey is conducted with 113 farms producing sunflower and wheat in the Trakya region. The aim of the study is to determine the size and tractor assets of farms and tractor usage preferences of the farmers. In addition, the mechanization indicators of the farms are calculated and compared with Turkey. When the relationship between tractor ownership and land size is examined, 51,16% of the enterprises with a land size of less than 150 decares and 84.29% of the enterprises with a land size of more than 150 decares consider the size of the land sufficient to own a tractor. 98.23% of the enterprises do not rent their tractors to outside and 97.35% do not rent tractors from outside. The number of tractors per 1000 hectares and the tractor power per 1 hectare were calculated as 61.68 units and 5.27 hp/ha, respectively. Indicators show that the number of tractors and tractor power in the Trakya region is higher than Turkey's' average. Jointly use of tractors and agricultural tools-machines is not common in the region. 60.18% of farmers think that it would be beneficial to establish a cooperative for the use of common tools - machines and common tractors. Since joint use is not common, farmers buy tractors and agricultural tools-machines regardless of the farm size. This situation causes farms to allocate more capital than they need for mechanization. With the widespread of joint use, the profitability of farms can be increased by using the capital allocated for mechanization to other production factors.

**Key Words:** mechanization indicators, farmer preference, farm tractor, Trakya region

## COMPARISON OF FERTILIZER USE EFFICIENCY IN BALKAN COUNTRIES

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### **ABSTRACT**

Changes in the ecological system due to climate change and the negative effects caused by the increase in the demand for agricultural products have increased the tendency of imbalances in agricultural products markets all over the World. These developments have been made agricultural production efficiency more important than ever. In order to meet the rapidly increasing food demand of human beings, it has become necessary to increase productivity. The main way to achieve this is through the conscious and effective use of modern agricultural techniques. Chemical fertilizers play an important role in increasing productivity in agricultural production. The use of chemical fertilizers has increased rapidly all over the World, but a quality and sustainable production model has not been reached. The aim of the study is to determine the efficiency of chemical fertilizer use in plant production and to compare the differences between Balkan countries. These countries are Albania, Bulgaria, BOSNIA and HERZEGOVINA, Croatia, Greece, Montenegro, North Macedonia, Romania, Serbia and Turkey. Data Envelopment Analysis was used in the efficiency analysis under the assumption of variable returns to scale. The input variables used in the analysis were determined as the crop production areas of the countries, the total amount of nitrogen, phosphorus and potassium and the output variable as the total crop product income of the countries. The data covers the years 2015-2018 and is obtained from the FAO database. As a result of the study, the average fertilizer use efficiency score is found to be 0.832 in the Balkan countries. Accordingly, the same crop production value is possible to achieve by using 16.8% less input. Albania, Montenegro, North Macedonia, Greece and Turkey are determined as efficient countries. While efficient countries do not need to make any changes in their inputs, other countries need to reduce their input use by up to 50% or include products that will provide higher returns in their production patterns.

**Key Words:** data envelopment analysis, crop production, economic efficiency

# CHEMICAL, BIOCHEMICAL AND VOLATILE PROFILES OF SAFFRON (*CROCUS SATIVUS* L.) FROM DIFFERENT GROWING AREAS OF MOROCCO

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## ABSTRACT

The saffron (*Crocus sativus* L.) cultivation has made remarkable progress in surface area and production in recent years. This crop is no longer restricted to the Anti Atlas (Taliouine and Taznakht) but it spread over several areas across Morocco, in particular Middle and High Atlas. Therefore, this study aimed at categorizing and evaluating the quality of 11 saffron stigmas samples from the aforementioned environments based on chemical and biochemical composition. According to ISO3632 standard method, the results underlined that 7 samples are belong to category I ((S2, S10, S11 (Boulmane); S4, S7(Timjicht-Siroua /Taznakht); S5(Azilal); S6(Taliouine/Dar Zaefaran)) while 4 others samples S1(Askaoun/Taliouine), S3(Ain Leuh/Ifrane), S8 (Khouzama/Taznakht) and S9 (Ourika) are situated in category II. Two clusters were identified based on Euclidean Squared Distance Metrics. The saffron samples in each cluster displayed similar organoleptic properties (color, taste and aroma). The first cluster comprises 7 zones and subdivided into two distinct subgroups. Samples from the first subgroup (Tamjicht, Azilal, Elmers and Siroua) are characterized by a stronger color, taste and aroma, the second for Serghina, Taliouine and Ain Atia for which stronger color and medium taste and aroma were observed. However, samples from second cluster Askouan, Ain Leuh, Kouzama and Ourika, had a medium color, taste and stronger aroma. Furthermore, biochemical analysis evidenced that samples from Boulmane (Serghina and El Mers) are rich in polyphenols and antioxidant power compared to those from Taznakht and Taliouine known for their higher organoleptic quality. Interestingly, volatile profiling by GC-MS chromatography identified several volatile compounds in saffron samples from different regions and main volatiles components are safranal (1,3-Cyclohexadiene-1-carboxaldehyde,2,6,6-trimethyl-), isophorone and 2,6,6-Trimethyl-2-cyclohexene-1,4-dione. The highest level of safranal was recorded in samples from Ain Leuh and Taliouine. In contrast, For isophorone was abundant in sample from Taliouine, Taznakht and Boulmane (Serghina) whereas the third main compound (2, 6,6-Trimethyl-2-cyclohexene-1,4-dione) was important in samples from Azilal. From this study, it was concluded that samples of saffron from different region of Morocco presented substantial differences in chemical and biochemical properties, and results of the samples from new sites are very encouraging thus allowing to promote there the cultivation of saffron and constitute a substitute culture for the socio-economic development of these areas.

**Key Words:** saffron (*Crocus sativus* L.), regions, secondary metabolites, biochemical parameters, volatile profile.

# CHARACTERISTICS OF LIVESTOCK FARMERS AND TRADERS PARTICIPATING IN LIVESTOCK MARKETS: A CASE STUDY FROM THE REPUBLIC OF BENIN

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## **ABSTRACT**

Livestock farming system in Africa is mostly extensive (traditional). Most of the West African countries have a pasture-based livestock system. Livestock farming in Benin is mainly family production system and practiced by pastoralists and agro-pastoralists. It is applied with a minimum monetary investment. Farmers market their animals in different type of livestock markets. In this study, primary data were collected from face-to-face surveys of a random sample of 600 respondents consisting of livestock farmers and livestock traders participating in self-managed livestock markets (MBA) and traditional livestock markets (MT). MT livestock markets are the oldest livestock trading system in the study areas. The MBA are the modern livestock markets where transactions are under strict control. In both livestock markets, cattle and small ruminants (sheep and goat) are traded live. This study was conducted to describe the participants in the MBA and MT livestock markets and to compare the two marketing systems. The results showed that in both markets, 97.67% and 98% of farmers and traders respectively were men and only 2.33% and 2% of farmers and traders respectively were women. Of the farmers, 45.33% are between 41-60 years old, and 48.33% of traders are between 21-40 years old. Most farmers and traders in both markets had completed primary education, but those in the MBA markets had the highest level of education. The family size of 40% of the farmers is less than 3 members, followed by those (38.6%) who have a family size between 4-7 members and 42% of traders have a family size between 4-7 members. Of the farmers, 49.67% have more than 21 years of experience in livestock farming and 29.66% traders have between 6-10 years in livestock marketing. Most of the farmers have been involved in animal husbandry since childhood.

**Key Words:** self-managed livestock markets, traditional livestock markets, Republic of Benin, pastoralists, agro-pastoralists, marketing systems

# CONSTRAINTS OF LIVESTOCK MARKETS IN THE REPUBLIC OF BENIN AND SUGGESTIONS

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## ABSTRACT

Livestock and livestock markets are important foundations of the rural economy, food and nutrition security and regional integration in West Africa. The livestock sub-sector is characterized by a low-yield production system, a pastoral and agro-pastoral type, a large number of low-productivity animals and the marketing of live animals. Livestock marketing generates income for pastoralists and agro-pastoralists and for other actors in the value chain (traders, transporters, butchers, etc.). Despite these multiple benefits in terms of food and nutritional security, wealth creation, etc., livestock marketing still faces several challenges. To address these challenges that undermine the livestock marketing system, it is important to conduct scientific research on the subject. This study was conducted to identify the main constraints that undermine the development of livestock markets in the Republic of Benin and make suggestions for its improvement. Primary data were collected from face-to-face surveys of a random sample of 600 respondents consisting of livestock farmers and livestock traders participating in self-managed livestock markets (MBA) and traditional livestock markets (MT). SEPO analysis was also used to evaluate the Successes, the problems or Failures, the potentials and the obstacles of livestock markets in the study area. The results of the study showed that the poor road infrastructure, the multiple taxes collected on the livestock markets, the lack of financial support for market actors, and the poor market infrastructure are the first major constraints of the livestock markets. To address these problems, the government should improve road infrastructure, regulate the taxes, and facilitate access to credit for market participants. Addressing these constraints will not only allow actors in the livestock sub-sector to improve their income, but will also contribute to the effective improvement of the livestock marketing system, to the development of the rural economy and thus to the reduction of poverty in rural areas.

**Key Words:** constraints, SEPO analysis, self-managed livestock markets, traditional livestock markets, Republic of Benin, pastoralists

# THE SUSTAINABILITY AND THE CREDIT USE IN APPLE PRODUCTION IN ISPARTA PROVINCE IN TURKEY

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## ABSTRACT

In this study, it has been tried to determine the producer's views on the use of credit and the sustainability in apple growing enterprises in Isparta Province. In the enterprises examined within the scope of the study, demographic characteristics, people who are influential in decision making, reasons for agricultural production, factors that will help to continue agricultural activities, future goals and objectives, information sources, credit sources, purposes of using credit, evaluations for credit use, evaluation of agricultural income etc. topics are included. The material of the study consisted of data obtained from primary and secondary sources. In terms of representing the province of Isparta, the data collected from the agricultural enterprises in Eğirdir district through a questionnaire is the primary source of the study. In the research, a questionnaire was applied to the producers in 50 apple growing enterprises. The data obtained by the survey application were evaluated using the SPSS package program, and the results were summarized in the tables. According to the research results, the average experience period of producers is 25.84 years. The average family size in the surveyed farms is 4.22 people. Making profit and owning land are the most important factors among the reasons for the producers to make agricultural production. 18% of the youth in the surveyed enterprises do not want to continue agricultural activities in the future. In the research, it was determined that Ziraat Bank took the first place among loan sources.

**Key Words:** apple growing, credit, sustainability, decision-making, ziraat bank, Isparta

## **RISK AND SUSTAINABILITY IN OVINE LIVESTOCK ACTIVITY: ANTALYA PROVINCE CASE**

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### **ABSTRACT**

In this research, it is aimed to determine the risk sources and the risk management strategies they apply in agricultural production of the producers engaged in ovine breeding in Antalya. In addition, in the study, the future thoughts of producers in ovine breeding and whether they will continue their activities were examined in terms of sustainability. The research area is the Döşemealtı district of Antalya province, and the data obtained from the questionnaires applied to 47 ovine breeders were used in the evaluations. In the study, the data obtained from the questionnaire application were evaluated in the SPSS package program and summarized in the tables. Factor analysis was applied to the risk sources and risk management strategies encountered in ovine breeding activities, reducing the number of variables and grouping them under meaningful headings. According to the results obtained from the research, the most important sources of risk in ovine breeding are the changes in the policies implemented and the changes in the country's economy. In addition, the difficulties encountered in finding foreign labor in the examined enterprises and the changes in the presence of animals were determined as risk sources that are not considered very important. The risk management strategies that the producers stated as important within the scope of the research are financial management tools such as saving and finding capital resources.

**Key Words:** ovine breeding, risk sources, risk management, sustainability, Antalya.

# THYMUS CAPITATUS HOFF, AND THYMUS FONTANESII BOISS & REUT EXTRACTS FROM ALGERIA, PHENOLIC FLAVONOIDS CONTENTS AND BIOLOGICAL ACTIVITIES.

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## ABSTRACT

The areal part of *Thymus capitatus* and *Thymus fontanesii* from Azaba Skikda and sour el Gazlene Bouira province respectively were subjected to decoction, infusion, hydro-alcoholic, and acidified hydro-alcoholic extraction. Phenol, flavonoids, and tannin contents were estimated by Folin-Ciocalteu, AlCl<sub>3</sub>6H<sub>2</sub>O and vanillin methods respectively. For the biological activities the antioxidant activity was done by scavenging activity of DPPH free radical, RP test and TAC assay, furthermore, the antimicrobial activities were realized by disc diffusion and agar dilution methods. Herein the results of the yield of extraction were higher for the hydro-methanolic and acidified hydro-methanolic extracts than those of decoction and infusion for both species that was the same finding for TPC and TFC but for CT the infusion and decoction demonstrated higher content. Concerning the antioxidant activities decoction of *T. capitatus* has given a EC<sub>50</sub> of 9.42±0.56 µg/mL and the acidified hydro-alcoholic of *T. capitatus* 180.03 ±2.46 µg/mL in anti-DPPH test, also for RP assay decoction of *T. capitatus* has given at the second time an EC<sub>0.5</sub> of 9.33± 0.25 µg/ml and hydro-alcoholic of *T. capitatus* 1137.33 ±2.36 µg/mL as EC<sub>0.5</sub>, on the contrary decoction of *T. capitatus* had give the lowest content 6048.61 ±540.19 mg GAE/g d.w. and acidified hydro-alcoholic of *T. fontanesii* had given the higher content 11569.44 ±294.87 mg GAE/g d.w. In the end, our extract was more active against Gram- bacteria than Gram+ bacteria and antifungal were higher than antibacterial. Data obtained may support the idea that compounds with strong antioxidant and antimicrobial activities are alcoholic soluble, also water-soluble, each solvent used and each mode of extraction has its own characteristics from the point of view, extraction yield or biological activities.

**Key Words:** *T. capitatus*, *T. fontanesii*, mode of extraction, biological activities

# PHYTOCHEMICAL SCREENING, TOTAL PHENOLICS, FLAVONOIDS CONTENTS, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF THE ETHANOL EXTRACTS OF FORTUNELLA MARGARITA OF LEAVES AND PEELS

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## ABSTRACT

**Objectives:** The genus *Fortunella* has been used in folk medicine to treat fevers, gallstones, indigestion, hepatitis, asthma, pneumonia and respiratory congestion. The present study was conducted to determine antioxidant and antimicrobial activities of ethanolic extracts of *F.margarita* of leaves and peels. In addition, a phytochemical study was also carried out to identify the different families of chemical compounds contained in these extracts.

**Materials and Methods:** Phytochemical constituents like alkaloids, anthraquinones, saponins, steroids, tannin and terpenoids of the leaves and peels of *F.margarita* were examined. The total phenolic and flavonoid contents were determined using Folin-Ciocalteu and aluminium chloride assays respectively. The antioxidant activity was tested by different methods: DPPH, reducing power and  $\beta$ -carotene bleaching assays. The antimicrobial activity was evaluated by using disk diffusion method. **Results:** Phytochemical analysis revealed the presence of major phytochemicals like alkaloids, Tannin, Saponin and Steroids. The quantitative estimation of total polyphenols and flavonoids showed their existence in extract leaves, with a rate of  $73.6 \pm 1.7$  mg GAE /g of extract  $3.6 \pm 0.25$  mg QE/g of extract respectively. The evaluation of the antioxidant activity by DPPH showed that ethanol extracts of the leaves of *F.margarita* ( $IC_{50} = 0.054 \pm 0.001$  mg/mL), had higher activity than that of the peels ( $IC_{50}$  value  $16.50 \pm 0.03$  mg/ml). Also, the method of reducing power showed that the studied extracts have a very good antioxidant activity. On the other hand,  $\beta$ -Carotene bleaching assay was found, BHT had the highest antioxidant power, followed by ethanol extracts of the leaves and peels of *F.margarita*. The antimicrobial activities of extracts had a strong activity against *Pseudomonas aeruginosa* and moderate activity against *Bacillus subtilis*, *E.Coli*, *Candida albica*. Additionally, no inhibitory effect on the growth of either fungi. **Conclusion:** The results of the study indicate that *F.margarita* leaves and peels are a promising source of natural antioxidants.

**Key Words:** antioxidant activity, antimicrobial activity, phytochemical screening, total phenolic, flavonoid, *Fortunella margarita*.

# REMOVAL OF CONGO RED (CR) FROM AQUEOUS SOLUTIONS BY ADSORPTION ONTO APRICOT STONE ACTIVATED CARBON (ASAC)- THERMODYNAMIC AND KINETIC MODELING

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## **ABSTRACT**

The preparation of activated carbon from apricot stone (ASAC) with H<sub>3</sub>PO<sub>4</sub> and its ability to remove the Congo Red (CR) used in textile industry from aqueous solutions are reported in this study. The FTIR spectroscopy is used to get information on interactions between the adsorbent and CR. A series of contact time experiments were undertaken in stirred batch adsorber to assess the effect of the system variables. The results were discussed and showed that ASAC can be used in the wastewater treatment. A comparison of two models on the overall adsorption rate showed that the kinetic of adsorption was better described by the pseudo-second order model. The adsorption isotherms of CR onto ASAC are determined and correlated with common isotherms equations. The smaller RMSE values obtained for the Langmuir and Dubinin-R models indicate the better curves fitting, the monolayer adsorption capacity of CR is found to be 32.85 mg.g<sup>-1</sup> at temperature 25 oC and 23.42 mg.g<sup>-1</sup> at temperature 65 oC at pH 13. The thermodynamic parameters indicate the spontaneous and endothermic nature of the adsorption process. The positive value of the entropy  $\Delta S$  clearly that the randomness indecreased at the solid-solution interface during the CR adsorption onto ASAC, indicating that some structural exchange may occur among the active sites of the adsorbent and the ions.

**Key Words:** apricot stone, congo red, kinetic, isotherm, adsorption, thermodynamic

# TOTAL PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF ANAGALLIS MONELLI L. FROM ALGERIA

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## **ABSTRACT**

This work deals with the determination of the total phenolics, flavonoids and in vitro antioxidant activities of extracts of the aerial parts of the Algerian plant *Anagallis monelli*. The results show that the polyphenol contents of ethyl acetate extract is the highest ( $922.75 \pm 3.07$  mgEAG/g.d.e) while the largest amounts extracts of flavonoids were observed in diethyl ether ( $71.71 \pm 0.84$  mgEQ/g.d.e), the test for antioxidant activity that were performed using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) indicated that the diethyl ether extract was found to be more active than other extracts and demonstrated strong free radical scavenging activity (SC50=  $8.14 \mu\text{g/mL}$ ).

**Key Words:** *anagallis monelli* l., antioxidant activity, total phenolic

# A CONVENIENT SOLVENT FREE MICROWAVE EXTRACTION OF NATURAL PRODUCTS

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## ABSTRACT

One of the principal aims of sustainable and green processing development remains the dissemination and teaching of green chemistry to both developed and developing nations. This paper describes one attempt to show that “north-south” collaborations yield innovative sustainable and green technologies which give major benefits for both nations. In this paper we present early results from a solvent free microwave extraction (SFME) of essential oils using fresh orange peel, a byproduct in the production of orange juice. SFME is performed at atmospheric pressure without added any solvent or water. SFME increases essential oil yield and eliminate wastewater treatment. The procedure is appropriate for the teaching laboratory, and allows the students to learn extraction, chromatographic and spectroscopic analysis skills, and are expose to dramatic visual example of rapid, sustainable and green extraction of essential oil, and are introduced to commercially successful sustainable and green chemical processing with microwave energy.

**Key Words:** essential oil, processing microwave, extraction.

# PHENOLIC CONTENT AND ACTIVITY ANTIOXIDANT OF METHANOLIC AND AQUEOUS EXTRACTS OF ALOEA VERA LEAVES.

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## ABSTRACT

Plant extracts are currently the subject of much research scientists aiming to explore and exploit their much appreciated biological properties in therapeutic, food, cosmetic and pharmaceutical fields. The antioxidant compounds are the subject of many works because, in addition to their use as conservatives in the foodstuffs by replacing synthesis antioxidants, they intervene in the treatment of many diseases. In order to evaluate the therapeutic potential of polyphenolic extracts from leaf of *Aloea vera*, we have determined the content of various polyphenols in aqueous and ethanol (EtOH) extract by the Folin-Ciocalciu reagent, the aluminium trichloride and the vanillin test respectively. The second part is the study of the antioxidant activity of this plant using technique: DPPH radical scavenging. The results obtained showed that the aqueous extracts of the leaves of this plant reveal a higher content of phenolic compounds than the ethanolic extracts which are respectively  $3,45 \pm 0.24$  mg AGE / g Ext against  $0.20 \pm 0.11$  mg AGE / g Ext. The evaluation of the in vitro antioxidant power revealed antioxidant capacity in all extracts. The most potential activities by DPPH method have been shown by *Aloea vera*, leaf extract (IC<sub>50</sub> 8, 1 mg/ml) which has a very important activity compared to that obtained from the éthanolic extracts. These data suggest that the the aloéa leaf has antioxidants effects *in vitro* and is therefore likely to be proposed as a food additive to protect against damage from oxidative stress.

**Key Words:** aloea vera, total phenolic, flavonoid, aqueous extracts, ethanol extract, folin-ciocalciu reagent, aluminium trichloride, vanillin test, Antioxidant activity, DPPH radical.

# EFFECT OF EXTRACTION MODE ON PHENOLIC FLAVONOIDS CONTENTS AND BIOLOGICAL ACTIVITIES OF THYMUS CAPITATUS HOFF, AND THYMUS FONTANESII BOISS & REUT EXTRACTS FROM ALGERIA.

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## ABSTRACT

The areal part of *Thymus capitatus* and *Thymus fontanesii* from Azaba Skikda and sour el Gazlene Bouira province respectively were subjected to decoction, infusion, hydro-alcoholic, and acidified hydro-alcoholic extraction. Phenol, flavonoids, and tannin contents were estimated by Folin-Ciocalteu, AlCl<sub>3</sub>6H<sub>2</sub>O and vanillin methods respectively. For the biological activities the antioxidant activity was done by scavenging activity of DPPH free radical, RP test and TAC assay, furthermore, the antimicrobial activities were realized by disc diffusion and agar dilution methods. Herein the results of the yield of extraction were higher for the hydro-methanolic and acidified hydro-methanolic extracts than those of decoction and infusion for both species that was the same finding for TPC and TFC but for CT the infusion and decoction demonstrated higher content. Concerning the antioxidant activities TC1 given a EC<sub>50</sub> of 9.42±0.56 µg/ml and the TC4 180.03 ±2.46 µg/ml in anti-DPPH test, also for RP assay TC1 given an EC<sub>0.5</sub> of 9.33± 0.25 µg/ml and TC3 1137.33 ±2.36 µg/ml, on the contrary TC1 had give the lowest content 6048.61 ±540.19 mg GAE/g d.w. and TF4 had given the higher content 11569.44 ±294.87 mg GAE/g d.w. In the end, our extract was more active against Gram-bacteria than Gram+ bacteria and antifungal were higher than antibacterial. Data obtained may support the idea that compounds with strong antioxidant and antimicrobial activities are alcoholic soluble, also water-soluble, each solvent used and each mode of extraction has its own characteristics from the point of view, extraction yield or biological activities.

**Key Words:** mode of extraction, biological activities *T. capitatus*, *T. fontanesii*

# ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENT OF EDIBLE AND NO-EDIBLE PARTS OF CUCUMIS METULIFERUS FRUIT EXTRACTS FROM ALGERIA

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## ABSTRACT

The study was carried out to determinate the total polyphenols and flavonoids content, and the antioxidant activity of the ethyl acetate fraction of hydro-methanolic extracts of Cucumis metuliferus fruit (seed, peel and pulp). The results show that the total polyphenol content in seed ethyl acetate extract is the highest ( $149.65 \pm 0.25$  mgEAG/g.d.e) comparing with the peel and the pulp extracts. On the other side, the all extracts did not have high flavonids content and the largest amount extract of flavonoids was observed in pulp extract ( $1.075 \pm 0.002$  mgEQ/g.d.e). The antioxidant activity was evaluated based on the ability of the fruit ethyl acetate extracts to scavenge 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical, the test indicated that the seed ethyl acetate extract was found to be more active than other extracts and demonstrated a good free radical scavenging activity (SC50= 0.21 mg/mL).

**Key Words:** cucumis metuliferus, antioxidant activity, total phenolic.

# IMPACT OF VARICOCELE ON MALE FERTILITY IN THE WESTERN REGION OF ALGERIA

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## ABSTRACT

**Introduction:** One of the most common causes of male infertility is varicocele. This study attempts to determine the prevalence of varicocele in male infertility and assess the impact of this disease in semen quality parameters. **Materiel and methods:** We conducted a cross section study in a period of one year, starting from January 1st, 2014 to December 31st, 2014, on 320 patients consulting for fertility disorder at the Medical Assisted Procreation Unit (MAP) of Oran, in Western Algeria. The patients participated in an interview with a questionnaire inquiring about their demographics, general health issues, lifestyles and infertility factors. **Results :** The results show that the average age of patients was  $40.39 \pm 7.59$  years, more than 73% of them were 35 years of age or older. The infertility was of primary type in 82% of patients; the average duration of infertility was  $5.20 \pm 3.79$  years. Regarding the different aetiologies of male infertility, 29% of the patients had it from idiopathic causes. The first main known reported cause of infertility was varicocele in 24% (n=76) of cases in which 83.5% concerned the left varicocele, 2.5% the right varicocele, and 14% were bilateral. The study showed that the majority of cases include quantitative and qualitative anomalies of the sperm analysis. **Conclusion:** Our conclusion is that varicocele has a significant impact on male fertility; its prevalence is 24 %. This affection alters both the quantitative and qualitative parameters of sperm. Varicolectomy seems to be a potential cure.

**Key Words:** infertility, varicocele, sperm analysis, oran

# IMPACT OF CLIMATE CHANGE ON APICULTURE IN BOSNIA AND HERZEGOVINA AND THE SUB-MEDITERRANEAN CLIMATE ZONE WITH A FOCUS ON *TILIA TOMENTOSA* (MOENCH.)

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## ABSTRACT

Apiculture is important part of Agroforestry in the world. Honey is one of the healthiest healing foods in daily nutrition and alternative medicine. The accelerated processes of climate change and the increase of CO<sub>2</sub> concentration in the atmosphere, have led to an increased synthesis of caffeine in linden flowers, making populations of bees, feeding in linden forests, particularly vulnerable. *Tilia tomentosa* is a species of linden with a very large flower. The presence of this species in mixed forests increases not only the level of biodiversity, but overall ecosystem health condition, the level of development of bee populations' potential, and finally – it helps the overall production of honey. With the drought index increasing, the number of fruits decrease, but with the increased number of sunny days, with favorable humidity conditions, the number of fruits is increased and the retention of flowers and fruits is longer. *Tilia tomentosa* is a xerothermic tree species and therefore withstands the effects of climate change easier, especially at the terrain affected by an increase in annual temperatures, during flowering and fruiting days. The analysis of the morphological ( $P<0.001$ ) and phenological ( $P<0.001$ ) parameters of the *T. tomentosa* tree included a total of 104 trees: 30 in the area of the Neretva River Canyon; 14 in the Trebizat River Valley; 50 in the Sana River Valley, and 10 trees in the Drina River Canyon. Morphological ( $P<0.001$ ) parameters of 20 leaves and 40 fruits and flowers ( $P<0.001$ ) from each tree were measured, and data were obtained and analyzed in scope of two-way ANOVA. Phenological analysis included monitoring of the flowering and fruiting of trees at all four sites. The main results of the research indicate an extension of the vegetation period by 8.4 days, increased number of fruits and its' dimensions, and genetic tests shown presence of interpopulation viability.

**Key Words:** apiculture, bee, honey, *tilia tomentosa*, morphology, phenology

# FRUIT AND LEAF VIABILITY OF *TILIA CORDATA* (MILL.) IN MIXED LINDEN FORESTS IN CONTEXT OF CLIMATE CHANGE WITH FOCUS ON CLIMATE ZONES IN BOSNIA AND HERZEGOVINA

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## ABSTRACT

Temperature is an ecological factor in the viability of genetic material, and given to its value, cyclical and acute changes and synergistic effects on forests and soils, different environmental conditions are formed, to predispose the genetical changes. The phenotypic forms of *Tilia cordata* are particularly noticeable when analyzing plant material from the aspect of temperature variability and zones. In this study, the morphological variability of *T. cordata* species in mixed lime standings was investigated for 5 populations: Gorazde - in continental climate zone with a microlocality of xerothermal habitat; Tomislavgrad - micro-locality with characteristics of Mediterranean climate; Kakanj - sub-mountain climate zone; Bosanski Petrovac - zone of temperate continental climate with influence of mountain climate, and Visoko - continental climate zone with microlocality with xerothermal habitat. Morphological parameters of leaves and fruits were measured with the level of statistical significance  $P < 0.001$ . A two-way ANOVA was used in the study. Control plots are mixed forests of deciduous tree species in Germany: mixed forest in Margarethenschluht Canyon, Heidelberg; Leimen forest, and Anger (Bayern). In all populations, 30 trees were analyzed, of which from each tree were 10 best-developed leaves for analysis of leaf morphological characteristics ( $P < 0.001$ ), and 20 best-developed fruits for analysis of fruit morphological characteristics ( $P < 0.001$ ). The main results of the study indicate the presence of interpopulation morphological variability of *T. cordata* for the Bosnian populations, while in comparison with the results of the morphological measurements of the Controls, the Bosnian populations show a statistically significant ( $P < 0.001$ ) higher level of diversity. Trees growing on xerothermal habitats show a lower percentage of fruiting than trees growing in continental parts of BOSNIA and HERZEGOVINA. The trees that grow in the river valleys show a higher degree of leaf development, while those growing in the mountainous areas have extremely small fruits but long petioles.

**Key Words:** climate change, temperature zones, *tilia cordata*, morphology, environment

# BIOCHEMICAL STUDIES OF AT.TC RAPESEED (*BRASSICA NAPUS* L.) PLANTS UNDER DROUGHT STRESS

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## ABSTRACT

Drought stress is one of the major limitations to crop productivity reducing growth firstly through the alternation in physiological, biochemical and molecular processes in plants, and secondly by disrupting the balance between the production of reactive oxygen species and the plant's antioxidant defense activities which leads to oxidative stress. One of the plant defense mechanisms is the use of non-enzymatic antioxidants such as vitamin E. This study aims to investigate some biochemical and physiological parameters in some rapeseed genotypes and their transgenic lines. Nima, Hyola4815, RGS003, Dalgan and Zafar genotypes besides transgenic rapeseed plants included Hyola4815 (Line5 and Line6) and RGS003 (Line3), were studied at four levels of 30, 50, 70 and 90% FC using a factorial experiment by Completely Randomized Design (CRD). By decreasing field capacity, several parameters such as relative water content (RWC), chlorophyll b, and total chlorophyll a and b are decreased, while some other parameters such as carotenoid, proline, malondialdehyde, and leaf greenness are increased. Chlorophyll a was ascended in some plants and in some others an ascending-descending trend is observed, while leaf temperature is changed through a descending-ascending trend. Biochemical traits including total protein, catalase enzymes (CAT), guaiacol peroxidase (GPX), ascorbate peroxidase (APX) and Polyphenol oxidase (PPO) showed an increasing trend under stress. In general, rapeseed transgenic lines were able to show more diverse physiological and biochemical responses than control plants, which can be considered as a result of the presence of the *At.TC* gene, which strengthens the antioxidant defense network against stress.

**Key Words:** drought stress, *at.tc* gene, rapeseed, transgenic plants

# EVALUATING THE GENETIC STRUCTURE OF SOME SAINFOIN ACCESSIONS BY SIMPLE SEQUENCE REPEAT (SSR) MARKERS

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## ABSTRACT

*Onobrychis viciifolia* Scop. has been adapted to different ecological regions (arid and semi-arid lands) and cultivated especially in Central and Eastern Anatolia. Sainfoin is a forage plant with important properties such as rich protein content, easy growing in arid and calcareous soils, and also resistant to different abiotic stress conditions. In this study, genetic structure of 83 sainfoin accessions was determined by 10 SSR loci (OVK036, OVK046, OVK094, OVK101, OVK125, OVK161, OVK174, OVM033, OVM061, and OVM125). All SSR loci were found to be polymorphic. A total of 92 alleles were detected for 10 SSR loci. The mean observed number of alleles was calculated as 9.2. Among the genetic diversity parameters, Shannon Index ( $I=0.375$ ), unbiased genetic diversity value ( $uh=0.243$ ) and mean polymorphic information content ( $PIC=0.240$ ) were calculated. Dendrograms were built by UPGMA clustering method using genetic distance values and it was observed that the studied sainfoin lines were divided into two main clusters. The results obtained from our study provide significant information about the genetic structures of the studied sainfoin lines. Genetic data obtained from our study will contribute to sainfoin breeding studies and gain new varieties to agriculture. This study was supported by TUBITAK (Project No: 215O526).

**Key Words:** breeding, genetic diversity, *onobrychis viciifolia*, SSR

# THE IMPORTANCE OF CHOOSING THE APPROPRIATE ISOLATION PROTOCOL FOR THE PURPOSE OF THE BREEDING STUDIES

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## ABSTRACT

The DNA molecule is essential for life, as it has the potential to carry all the information necessary for the viability. The light provided by genetic information on the basis of scientific studies contributes to enlightening the problems in breeding studies, as in many studies. At this point DNA isolation plays a major role in revealing genetic information. For this purpose, DNA isolations are carried out manually, using chemicals such as chemical kit, enzymatic kit and chelex. In this study, DNA isolations were performed and compared with the CTAB method, a commercial chemical isolation kit, a commercial enzymatic kit and the Chelex method. Primarily, the first step is carried out in all protocols by grinding with liquid nitrogen to break down the plant cell wall and reveal the cell contents. In the subsequent treatments, it proceeds in the form of dissolving the DNA-protein complex and obtaining DNA by separating the DNA from other molecules. Depending on the purpose of the study and the expected DNA quality, the time and cost per reaction also play an important role in the selection of the method. In the trials conducted for this purpose; In all methods, the duration of DNA isolation and the cost per reaction were determined, the qualitative and quantitative amounts of the obtained DNAs were determined, and their quality was evaluated on the basis of nanospectrophotometer and agarose gel. The obtained DNAs were studied on the basis of conventional PCR and Real Time PCR using different molecular markers and PCR results were compared.

**Key Words:** CTAB, enzymatic kit, chemical kit, chelex

## IN VITRO PROPAGATION OF A HIGH VALUE MEDICINAL PLANT: *ORIGANUM SIPYLEUM* L.

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### ABSTRACT

*Origanum sipyleum* L. known as “Mor Mercan” is one of the endemic plant species of Turkey, belong to *Lamiaceae* family, and carry high value of medicinal and aromatic properties. Scientific studies have shown that *Origanum* spp. have anticarcinogenic, cytotoxic, antibacterial, antidiabetic, antifungal, antiviral, antiinsecticidal effects. However, there are very few scientific studies on the reproduction of *Origanum sipyleum* L. by using advanced biotechnological methods that provide new means for conserving genetic resources and rapidly multiplication valuable medicinal plants. Therefore, this study was conducted for propagation of plant genetic resources material of *Origanum sipyleum* L. which was collected from Izmir/Bozdag by using *in vitro* techniques which is one of the biotechnological methods. Effects of two types of explants (nodes and shoot type) and four different concentrations of BAP and IAA in Murashige and Skoog (MS) and ½ MS basal medium were investigated. The best proliferation rate (96%) and the highest shoots per explant (5.56) were obtained from nodal explants growing on MS medium containing 1.0 mgL<sup>-1</sup> BAP + 0.1 mgL<sup>-1</sup> IAA. Developed plantlets were successfully transplanted into potting mixture of soil-perlite (2:1).

**Key Words:** *Origanum sipyleum* L., Medicinal plant, *In vitro*

# EFFECT OF AROMATIC AMINO ACID COMPOSITION ON PHENOLIC COMPOUND CONTENT AND THE EXPRESSION LEVEL OF GENES INVOLVED IN THE BIOSYNTHESIS PATHWAY

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## ABSTRACT

Basil used as traditional herbal medicine is rich in antioxidants such as phenolic compounds and are called medicinal and aromatic plant. The synthesis of phytochemical compounds in plants is closely related biochemical pathways and expression of genes encoding enzymes playing roles in the synthesis reactions. The current study attempted to get a comprehensive overview of aromatic amino acid compositions (AAAs) response in *Ocimum basilicum* in respect to the expression of some genes involved in the biosynthesis of secondary metabolites and content of phenolic compounds. The transcript expression levels of PAL, EOMT, CVOMT, HPPR, C4L, EGS, and FLS increased depended on AAAs concentration compared to control plants. The highest mRNA accumulation was obtained in EOMT, FLS, and HPPR in leaves of sweet basil. The expression of TAT gene in leaves significantly decreased in response to all AAAs applications compared to untreated groups and it had the lowest transcript accumulation. Eleven individual phenolic compounds were determined in leaves of basil and the content of caffeic acid, chicoric acid, methyl chavicol and vanillic acid increased depended on administered concentration to control. Rosmarinic acid and rutin were detected as the main phenolic compound in all experimental groups of sweet basil in respect to quantifying. The accumulation of cinnamic acid, eugenol, and quercetin did not significantly change in leaves of AAAs treated plants compared to control. The application of AAAs led to the accumulation of total flavonoid content in all treatments compared to control plants, while there was no significant change in the content of total phenolic compounds. Further research is required to fill some gaps for a detailed understanding of the whole mechanism of phenolic compound regulation to more clarify the pathway.

**Key Words:** aromatic amino acid, *Ocimum basilicum* L., phenolic compounds, transcript expression; EOMT; PAL; TAT

## Acknowledgements

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# ENHANCED PRODUCTION OF SECONDARY METABOLITES BY RHIZOBIUM RHIZOGENE MEDIATED HAIRY ROOT INDUCTION IN MORINGA OLEIFERA

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## ABSTRACT

*Moringa oleifera* known for its nutritional and medicinal properties belongs to family Moringaceae, contain valuable metabolites with multiple functional properties. In this study an in vitro technique was adopted to enhance metabolic properties of this plant. Hairy root culture is a biotechnological tool to increase yield of metabolite contents in transformed roots comparative to intact plant. *Rhizobium rhizogene* a soil borne bacterium caused hairy root formation at the site of infection, these roots have ability to proliferate in artificial media without any phytohormones. Segments of stems were used as explants and dipped into suspension of a 9402 on different infection time duration and co cultivation duration on different days. Results suggested that maximum induction was observed at 30 minutes of infection time while promising co cultivation period were observed on 3rd day. Molecular analysis showed successful integration of oncogenes *rolB* (670bp) and *rolC* (534bp) along with *aux1* (350bp) and (*virD* 438bp) which is confirmed by PCR. These transformed roots were further optimized on MS medium with varying sucrose concentrations for maximum growth. 10 folds increase in growth of transformed root mass was evident in liquid 1/2 MS medium supplemented with 30% sucrose after 42 days. Transformed hairy roots showed greater amounts of phenolic contents (44.87 mg g<sup>-1</sup>) and flavonoid contents (40.98 mg g<sup>-1</sup>) in comparison of non-transformed roots of *Moringa oleifera*. By this genetic manipulation, these transformed roots can be established and grown in liquid MS basal medium for maximum production of secondary metabolites.

**Key Words:** rhizobium rhizogene, secondary metabolites, hairy root induction, moringa oleifera

**DETERMINATION OF PHYTOCHEMICALS AND ANTIOXIDANT CAPACITY OF EDIBLE DANDELION PLANT (*TARAXACUM OFFICINALE*) COLLECTED FROM KIRŞEHİR REGION**

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**ABSTRACT**

In this study, the total phenolic and flavonoid content of the methanol extract of *Taraxacum officinale* (dandelion), which grows spontaneously in April and May in the Kirşehir region and is consumed as a fresh vegetable by the people of the region, was determined. Total phenolic and flavonoid substance amounts were determined as 36, 53 mg GAE/g and 43,31 mg QE/g, respectively. Antioxidant capacity was determined by 1, 1-Diphenyl-2-picrihydrazil (DPPH) Radical scavenging capacity method (DPPH), and IC<sub>50</sub> value was calculated as 482,09 µgmL<sup>-1</sup>. The Fe<sup>3+</sup>-Fe<sup>2+</sup> Reducing antioxidant power was determined and calculated as 42,652 µg AAE/mL ascorbic acid equivalent. As a result, it was determined that *T. officinale* plant, which grows spontaneously in arid and rural areas, has natural antioxidant characteristic as well as pharmaceutical characteristics. It is thought that it can be an important source to meet some of the daily antioxidant needs in the regions where it is grown, and there is a need for new studies to determine its industrial use and its effects on health.

**Key Words:** taraxacum officinale, phenolic and flavonoid substance, antioxidant.

# RAPID DEVELOPMENT OF BREAD WHEAT LINES RESISTANT TO WARRIOR YELLOW RUST RACE (*PUCCINIA STRIIFORMIS F.SP. TRITICI*)

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## ABSTRACT

Yellow rust (*Puccinia striiformis f.sp. tritici*) is one of the leading fungal foliar diseases threatening wheat production in our country. The agent threatens our wheat production and causes very important yield losses, causing epidemics in years when conditions are suitable. Although there are many effective fungicides against the disease, due to their negative effects such as application cost, resistance formation, and effects on human and environmental health, the most appropriate solution to rust disease is the development of resistant varieties. Among the genes associated with resistance to yellow rust disease known so far, the Yr15 resistance gene is known to be still effective against many yellow rust breeds, including the Warrior race. New varieties are tried to be developed all over the world, by transferring this gene to wheat genotypes. KASP (Competitive allele specific PCR) markers, which have been developed very recently, have given a new impetus to breeding studies against this race. Screening with KASP markers at our institute revealed that the Yr15 gene was not present in any of our registered bread wheat varieties. In this study, Ceyhan-99 bread wheat variety, which is widely cultivated in our country and has become susceptible to Warrior race, was addressed in order to gain resistance against this rust race. Within the scope of the study, Ceyhan-99 variety and the donor line (Avocet Yr15) containing the Yr15 resistance gene were crossed in the Field Crops Central Research Institute (TARM) facilities. Plants containing Yr15 were determined by KASP molecular analysis from F1 plants generated after four backcrossings, and doubled haploid pure lines were obtained from these plants by anther culture method. Within this study, lines 97% similar to Ceyhan-99 but containing the Yr15 gene and thus resistant to yellow rust were developed in a short period of 2 years. With this study, the use of classical and biotechnological approaches has been optimized and it is believed that this system will provide great convenience in targeted breeding studies.

**Key Words:** yellow rust, wheat, resistance breeding, molecular marker

This study was financially supported by TUBITAK 118O172 Project

# THE IMPACT OF URBANIZATION ON URBAN AIR QUALITY: A CASE OF PM10 MASS CONCENTRATION IN URBAN AREA OF “LIQENI I THATË”, TIRANA

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## **ABSTRACT**

One of the most concerning consequences arising from intense urbanization is deterioration of air quality. As a developing city, Tirana has had a rapid urbanization with a high population increase and nowadays is the most populated city. This paper presents the data of PM10 concentration measured in a new residential area in Tirana, which during the last ten years has been transformed from a very green area to a highly populated area with increased construction activity. During the period of 12th June to August 8th, 2019, the daily PM10 concentration was measured and the mean concentration resulted to be 35 µg/m<sup>3</sup>. An examination of daily mean concentrations, highlights that in 11.9% of the monitoring days, PM10 concentration was above daily limit value (50µg/m<sup>3</sup>) set by EU Ambient Air Quality Directive for this pollutant. These concentrations are similar with those reported for others urban areas of Tirana city, and prove that this area can no longer be considered as an area with a very good air quality as before, when it was mainly a recreational and green area. The destruction and replacement of green spaces with man-made structures, the drastic increase of population, the enlarged construction activities and the increased traffic due to the nearby crossing of the highway, are some of the main factors that have led to the degradation of air quality in this area, compared to a few years previous.

**Key Words:** air pollution, urbanization, PM10, Tirana

## ECOPHYSIOLOGICAL APPROACHES FOR PROTECTING ENVIRONMENT

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### **ABSTRACT**

In many different research subjects, it is basically aimed to determine the changes of different factors on living things. This research method is widely used in both plants and animals. In this study, instead of specific examples, basic ecophysiological methods, goals and methods are summarized. In this way, it is aimed to provide basic approaches to researchers who conduct similar studies by examining similar factors (eg climate change or toxic substance effect).

**Key Words:** ecophysiology, methods, plant ecophysiology, animal ecophysiology

**A STUDY ON THE DISTRIBUTION OF CHRYSOPERLA CARNEA (STEPHENS)  
(NEUROPTERA: CHRYSOPIDAE) IN NATURAL AREAS OF THE EASTERN  
MEDITERRANEAN REGION**

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**ABSTRACT**

In this study, the distribution of *Chrysoperla carnea* (Stephens) in the natural areas of the Eastern Mediterranean Region was investigated. A cosmopolitan species, *Ch. carnea* is resistant to extreme living conditions and has a high species density in the world. Scope of work; Samples were taken from 20 different locations in Adana, Kahramanmaraş and Osmaniye. The obtained data were compared with the literature information.

**Key Words:** chrysoperla carnea, neuroptera, eastern mediterranean region

**A MAJOR LINKS BETWEEN APHIDS SPECIES (HOMOPTERA: APHIDIDAE)  
AND SOME GREEN LACEWINGS EGG-LAYING LOCATIONS (NEUROPTERA:  
CHRYSOPIDAE) IN THE EASTERN MEDITERRANEAN REGION**

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**ABSTRACT**

In this study, the relationship between egg locations of green lacewings and some aphid species has been investigated. The nearest aphid species has been determined for each lacewing species. The abundance of aphid species has been recorded weekly. Ecological notes have been compared for *Chrysopa formosa*, *Chrysopa hungarica*, *Chrysoperla carnea*, and *Italo-chrysa italica*. Also, larval stages (first, second, third instar) have been investigated to determine the species abundances of aphids. I concluded that the most abundant aphid genus was *Hyalopterus* sp. in the survey area.

**Key Words:** chrysopidae, neuroptera, aphids, egg, eastern mediterranean region.

## EXPANDING THE USE OF WASTE WATER IN AGRICULTURE

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### ABSTRACT

Today, climate change has become a new stakeholder on water resources. As the competition between agriculture, industry and domestic consumption increases, insufficient rainfall brings along the discourses of drought. While it is aimed to increase the irrigated areas especially in the field of agriculture, limited water resources have become the most important issue threatening food security. Countries produce projects according to their climate characteristics, social and economic structure to this problem, which is sought for a solution on a global scale. In this context, reuse possibilities of wastewater are being investigated. Increasing pressure, both in terms of water scarcity and deterioration of water quality, causes reclaimed water to be considered as a new water resource. In addition, irrigation with wastewater is seen as environmental waste management in terms of minimizing the pollution created by direct discharge into surface and underground waters. In many parts of the world, the use of treated and used water for agricultural purposes has a long history. According to the Turkish Statistical Institute (TUIK) 2018 municipal wastewater statistics; 4.8 billion m<sup>3</sup> of wastewater collected from municipalities via sewerage network was discharged. 2.3% of the treated wastewater is used in industry, agricultural irrigation, etc. areas have been reused. As a result, the use of wastewater is not accepted enough in our country. The most important reason for this is that although we are among the countries suffering from water shortages, the sensitivity of the issue cannot be fully perceived. In addition, the evaluation of wastewater as sewage water creates prejudices in its use in agricultural production. In order to expand the use of waste water, it is necessary to categorize the used waters separately and to create an appropriate infrastructure so that they do not mix with each other. It is essential to establish the necessary standardization and to gain the public's trust in this regard.

**Key Words:** drought; climate change; wastewater

# PERFORMANCE EVALUATION OF AUTOMATICALLY EXTRACTED CITRUS TREES FROM LIDAR POINT CLOUD DATA: REVISITING A TRADITIONAL STRATEGY BASED ON LOCAL MAXIMA AND WATERSHED SEGMENTATION

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## ABSTRACT

Information on agricultural areas, such as the type and amount of fruit trees, crown height, and stem locations, is useful for a variety of applications in agricultural studies. Light Detection and Ranging (LiDAR) is a method that provides quicker and more complete data than field-based measuring approaches, while providing high-accuracy outcomes of 3-D point cloud data. The main goal of this study is to assess the performance of automatically extracted citrus trees from point cloud data of a LiDAR sensor (G-LiHT, Goddard's Lidar, Hyperspectral and Thermal airborne imager) using a traditional automatic strategy based on local maxima detection followed with the watershed segmentation. In total 14 parcels of citrus trees were selected from the south of Florida, USA. First, Cloth Simulation Filter was applied to split the point data into two categories, ground and off-ground, to generate canopy height models for each citrus parcel. Treetop positions were determined using a local maxima filter, and the boundaries of trees were delineated by traditional watershed segmentation. Finally, in each parcel, different tree species other than citrus were manually queried and eliminated, and boundaries of citrus trees were finally improved by post-processing. The implementation was carried out using MATLAB and R programming languages along with open-source software (QGIS, CloudCompare, and LAStools). According to the results computed, the parcels with the greatest accuracies ( $\approx 85\%$ ) had more regular and sequential planting characteristics and composed of trees of similar height. The peak positions of certain trees could not be detected in parcels with many non-fruit bearing young trees and with varying tree heights. In such cases, because tree tops of certain trees could not be collected, their boundaries could not be determined either. Besides, it was observed that in parcels with high tree density, more numbers of trees were recognized than the actual number, causing the boundaries to be erroneously delineated.

**Key Words:** lidar, citrus tree detection, canopy height model, local maxima filter, watershed algorithm, automatic detection

## ASSESSMENT OF SOIL POLLUTION AND PROCESS OF DISTRIBUTION OF HEAVY METAL FROM SALIX ALBA PLANT

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### ABSTRACT

Heavy metal pollution has always been a significant problem due to the discharge and distribution of materials and waste in the ecosystem. These heavy metals have the potential to contaminate the water and vegetation that grows in these ecosystems. The great sources of water pollution in Albania in the last decade are urban discharges. The purpose of this study was to assess the accumulation of heavy metals in sediment and willow (*Salix Alba*) in river beds. Also, in general, the study is focused on the current situation, the problems of pollution of the Erzen River. The presence of organic matter in sediments - the willow plant - was also analyzed. The use of plants in the recuperation of contaminated soil is low cost, sustainable, and environmentally sound. River water quality assessment is done using the limit values set out in the European Commission Directive (1989) and FAO. The average temperature value in the period July 2020 and July 2021 goes 26.08 ° C. The pH value resulted within the limits recommended by the EU Directive [1989] <8.5 being ranked in good condition, with small deviations demonstrating an alkaline environment. The results obtained on the concentrations found for heavy metals in plants presented in descending order Pb> Cr> Ni. The data found results that the values of heavy metals in the *Salix Alba* plant are below the values set by FAO. The results of nickel, chromium, and lead clearly show higher concentrations in samples 0-25 cm across the range of extractors. The use of diversified plant material is essential and optimal for the phytoremediation process. These species offer different opportunities through their metallic tolerance and accumulation of underground biomass metals for the permanent removal of these metals from the terrestrial substrate.

**Key Words:** *Salix Alba* plant, phytoremediation, heavy metal, pollution, soil contaminated

## FOOD WASTE MANAGEMENT IN THE TOURIST AREA OF DAJTI, TIRANA

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### ABSTRACT

More than 1.3 billion tons of food are wasted each year which is approximately 1/3 of the food consumed. If managed carefully, food waste can be part of the solution in addressing food insecurity. The city of Tirana and especially the study area of Dajti face great problems related to waste management. The purpose of this study is to address and provide a solution to this huge challenge on the separation of food waste from the site of urban solid waste disposal. Beyond diets and food safety, food waste has a harmful ecological footprint with negative impacts on water, land use, biodiversity, and climate change. Food waste is everyone's problem, where each of us can be conscious of our choices of consumption and food. This research study focuses on a general description of the Sharra landfill as well as the current situation of how it works. From the questionnaires conducted in the area, we managed to extract the perceptions and attitudes of the respondents towards waste generation management (treatment, storage, transport and collection, waste) minimization, and their final disposal. On the impact that the waste management tax would have on the improvement of this service, 60% think positively while 40% thought that there would be no impact. Residents of the area, 90% of them said that they did not separate the waste from their source and that 95% of them would prefer to choose recycling as the most sustainable alternative for waste treatment while 5% preferred incinerators.

**Keywords:** food waste, composting, tourist area, landfill, waste generation

# CONSIDERATION OF BEEF CATTLE BARN PROJECTS WITH MANURE MANAGEMENT PLANNING: ÇANAKKALE/AYVACIK CASE STUDY

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## **ABSTRACT**

Barns are built without taking into account animal welfare, productivity and effective use of labor in cattle breeding operations. These problems can be eliminated by following the design principles. Another important issue taken into consideration in the barn design is the design of the most cost effective barn system possible. However, considering the small family businesses in Turkey, it is seen that there are quite large design errors in the cattle barns. Another issue that is not taken into account in livestock enterprises is the processes related to the collection, transmission, storage and disposal of animal wastes that will arise during production. This makes management difficult, causes some environmental problems, and wastes manure, which is a very valuable plant food source. In this context, the aim of the study is to make an exemplary beef cattle business project in Çanakkale, one of the regions where animal husbandry is most intense in our country. At the same time, a manure operating system was designed depending on the type of barn, number of animals, land condition, existing crop production areas and soil characteristics. Again, considering the same data, manure operation planning was made in order to provide an economic gain by using the manure in vegetable production without harming the environment. With the manure application planning, the amount of land required for the disposal of manure, the application amount based on the parcel and the economic value of the manure were calculated. With this study, a model that deals with both the barn project and the manure management in the regional conditions has been put forward.

**Key Words:** beef housing, barn projects, manure management, nutrient management, environmental quality

# TEMPORAL DISTRIBUTION OF AIRBORNE ALLERGENIC POACEAE POLLEN IN DIFFERENT REGIONS OF TURKEY

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## ABSTRACT

Pollen is one of the important bio-particles frequently encountered in the atmosphere, and pollen grains of Poaceae members have a high allergenic effect on susceptible individuals. The concentration of atmospheric pollen may vary according to geographic, ecological, climatic factors as well as the floristic structure of the region. Poaceae is the most abundant atmospheric pollen in many areas, and its concentrations can affect the living standards of many allergenic individuals. This study aims to determine daily concentrations, Main Pollen Seasons (MPS), and durations for atmospheric Poaceae pollen in four cities from different geographical regions of Turkey; Bingöl, Bolu, Kilis, and Mersin. An aerobiological study was performed for two years using a volumetric Hirst type sampler (Lanzoni VPPS 2000). Slides were examined daily, and pollen amounts were calculated as m<sup>3</sup> air. The MPS and durations were analyzed according to the 95% method. During sampling, 7848 pollen belonging to the Poaceae family were determined in four cities (Bingöl; 2919, Bolu; 1900, Kilis; 1412, Mersin; 1617). The highest concentration of Poaceae pollen was found in the Bingöl atmosphere, while the lowest concentration was seen atmosphere of Kilis. Poaceae pollen was found in the atmosphere for more or less all months in three cities. However, Poaceae pollen was not found in the atmosphere in Bingöl in January and February during the sampling years. In Mersin and Kilis, the MPS and durations of Poaceae pollen were showed similarities in the timeline (March-October max. 217 and 225 days). In comparison, in Bolu and Bingöl, the MPS and durations were found shorter (April-October max. 155 and 172 days). This study was financially supported by TUBİTAK-117Z252 Project.

**Key Words:** pollen monitoring, flowering, main pollen season, Turkey

# **EFFECTS OF METEOROLOGICAL VARIABLES ON STEM DIAMETER VARIATION AND PHENOLOGICAL DEVELOPMENT IN OLIVE TREES (*OLEA EUROPEAE* L.)**

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## **ABSTRACT**

Agricultural production, like many sectors, is affected positively and negatively by climate change. Olive-tree; it is the source of a strategic product for its homeland, the Mediterranean Basin, and Turkey. Turkey is one of the leading olive producers and ranks first in product quality. On the one hand, the studies aim to increase the yield of olives. However, the ongoing physiological cycles of the tree under the influence of instant meteorological variables show us that the olive is adversely affected by climate change. The consequences of this result in reductions in fruit yield and quality. This study emphasizes the 2016-2018 development period information of a climate change-agriculture interaction study that started in 2014 in Kemalpaşa / İzmir and still continues. The reason for considering this period is that the drought experienced in 2016 is compared with other development periods. Body diameter variation was measured continuously at half-hour intervals with micrometer ( $\mu\text{m}$ ) precision instruments called dendrometers. The analyzes show that trunk diameter variation is governed by many meteorological parameters, especially soil moisture and air temperature. This is basically related to photosynthesis and respiration mechanisms. The results of the effects during the developmental season show themselves in the phenological development. The stem diameter variation (daily maximum change  $-7.6\mu\text{m}$ ) and rapid generative development, which showed a low course due to drought in 2016, were completed with extremely slow fruit ripening stages after mid-season. In 2018, stem diameter variation (daily maximum variation  $15\mu\text{m}$ ) during the development period, which can be considered normal, indicates a calmer spring generative period and fruit ripening process compared to the dry period. At the end of the study, it has been shown that olive tree trunk diameter variation and derived indicators can be used as effective bio-indicators to see the effects of climatic parameters.

**Key Words:** olive, climate, meteorology, stem diameter change, phenology, İzmir.

# **A SMALL-SCALE TRANSPORTABLE BIODIGESTER USING ORGANIC HOUSEHOLD WASTES, WASTEWATER AND HUMAN EXCRETA TO BIOGAS RECOVERY**

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## **ABSTRACT**

The deficit in wastes management and valorization causes an important problem to face in health and environmental protection and preservation. Organic municipal wastes represent the big amount in comparison with other categories of wastes. This project is aimed on the concept of studying the feasibility of making a transportable biodigester functioning with co-anaerobic digestion of food, wastewater and human excreta. Furthermore, the nomad population can benefit from bioenergy for cooking and heating and as well from biofertilizer.

**Key Words:** transportable biodigester, organic household wastes, wastewater, human excreta, biogas, ch<sub>4</sub>, energy, anaerobic digestion, nomad

# ESTIMATES ON CLIMATE CHANGES IN ALBANIA, BASED ON FACTUAL DATA ON THE FIELD OF AGRICULTURE IN THE SOUTHEASTERN AREA

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## **ABSTRACT**

Water deficiencies in agricultural soil, prolonged periods without rain and the increasing trend of using marginal lands for agricultural production as a result of climatic changes, has increased the risk of invasive alien species (IAS) in parcels and crops. Climate change and invasive alien species act synergistically, threatening food security in certain regions. The assessment of climatic change for the industry of agriculture in our country sheds light on this synergistic relationship. This global phenomena has increased as a result of global climate change and has also started its influence in this country. Climate is valued as a national asset of our country due to its diversity and the countless opportunities and benefits that it offers us (when it comes to climate we must take into account the geographical position in which our country is located). An analysis of the start, end and duration of the vegetation period, the beginning of the first frosts in autumn and the last in spring, the sum of active and effective temperatures, etc., creates an overview of the current situation and the climate - agriculture relationship. What is most evident in all these changes resulting from climatic conditions, is the fact that with the extension of the vegetation period by 3-4 weeks more than the norm, the amount of active and effective temperatures has increased significantly and at the same time there has been an increase of the long periods without rainfall. Chill Units or as they may be otherwise known as "sleeping units" are experiencing a decrease as a result of the increase in average daily / hourly temperatures during the cold period of the year. July is no longer the month with the highest temperatures, leaving its place to August.

**Key Words:** climate change, invasive alien species, vegetation period, agriculture relationship.

# CLIMATE CHANGE IN ALBANIA AND SOME CONSIDERATIONS FOR THEIR IMPACT ON THE VARIOUS SECTORS

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## ABSTRACT

Biodiversity is increasingly being threatened as a result of climate change and many global components that are experiencing change, which are bringing and bearing new impacts. Global climate change, clearly noticed by every one of us, is factualized and illustrated in this paper. It primarily highlights the changes that the weather and consequently the climate have undergone. Secondly it shows how the impact of such global change is reflected in our country. A generally mild winter and a hot and dry summer are mixed with frosty days and minimal temperatures, which sometimes exceed the norm. Instances of days with thunderstorms / rainstorms have also increased, causing significant flooding. A summer season that is no longer 3 months but is borrowing from spring and especially autumn and a fragmented winter, are impacting the sectors of agriculture, energy, tourism, health and even transport and telecommunications. The change of climatic conditions is noticeable from the duration of seasons and the changes in their specifics. The month with the highest average maximum temperatures has shifted from July to August as per the temperature indicator the shift, which is also a noticeable change together with the increase of sea temperature and the changes that the flora and fauna are undergoing, which are increasingly shifting towards northern latitudes. The changes affecting the aquatic ecosystems and many others, are happening as a result of human intervention on top of droughts and changing natural conditions. This is due to an increase in water consumption needs that arise from increased energy needs. This is as a result of increasing the degree of refresh days, network losses etc... Currently, as the conflict between humanity and COVID-19 is under the risk zone and is well under control, it is predicted that the climate can be put "against" us as a result of the anthropological damage throughout the globe.

**Key Words:** climate change, Albania, the duration of seasons, average maximum temperatures, Biodiversity Ecosystems Ecosystem services Natural resource management

# **INDUSTRIAL RESEARCH AND EXPERIMENTAL DEVELOPMENT VEHICLES WITH BRUSHESLESS ELECTRIC MOTORS POWERED BY LITHIUM-ION BATTERIES FOR PERSONAL TRANSPORTATION-GENTLE ELECTRIC**

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## **ABSTRACT**

The paper aims to present a Romanian company that currently produces a wide range of electric vehicles: electric scooter, electric transportation vehicle for disabled people, electric bicycle and electric kick scooter. Nextrom predicted that in any field, the future requires innovation and it is necessary to develop projects that respect this trend of offering high-performance products with unique qualities, which not only meet an existing demand, but create the desire to have more. Through the projects implemented by ARIES OLTENIA and PLIMM CALAFAT, the creation of a network for electric bicycles in the entire cross-border area Romania-Bulgaria began in order to achieve an improved individual mobility of sustainable transport. In a globalized economy where life is moving so fast, most consumption habits revolve around public transport, common housing and common work spaces. This research was conducted by the University of Craiova – Faculty of Mechanics, SC PARC INDUSTRIAL CRAIOVA SA and The Ecological Initiative and Sustainable Development Group for the Preliminary study on the industrial research and experimental development vehicles with brushesless electric motors powered by lithium-ion batteries for personal transportation-gentle electric, but also for the construction of the industrial hall and endowment with the necessary equipment for the production of vehicles powered by brushless electric motors powered by lithium-ion batteries for passenger transport-GENTLE ELECTRIC.

**Key Words:** GPS and online tracking, electric kick scooter, ridesharing, docking stands

# EVALUATION OF UNIVERSITY FEMALE STUDENTS IN BREAST CANCER SCREENING WITH CHAMPION'S HEALTH BELIEF MODEL SCALES

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## **ABSTRACT**

Among all cancers, breast cancer has very high cancer-related morbidity and mortality rates worldwide. Our study is an example of Trakya University Health School of the latest version of Champion's Health Belief Model Scales (CHBMS) adapted to Turkish for breast cancer screening. The validity and reliability of the Turkish version of the CHBMS were also found sufficient in the studies. Turkish versions of the scale are used safely to identify and develop beliefs and behaviors related to breast cancer. Young women's beliefs about "breast self-examination" and their behavior was measured in our study. For this reason, three dimensions of the scale related to BSE and common dimensions were used. When the breast cancer screening behaviors and beliefs of women are measured; all dimensions of the scale were used. 233 female university student volunteers were included in the study. The study was conducted with online interviews with the participants. The results obtained from the scale; It was evaluated at the level of 3 basic sub-dimensions. The first sub-dimension; It was a breast self-exam. 2nd sub-dimension; It was based on sensitivity, caring and health motivation. The third sub-dimension was the level of knowledge about breast pathology imaging techniques. It was observed that they did not have sufficient knowledge about mammography and breast ultrasonography. Those who did breast self-examination had higher scores from the 3 sub-dimensions of the scale. Those living in an extended family compared to those living in a nuclear family; their scores on the scale were lower. The scores of those with low socioeconomic status from the scale were lower than those with high socioeconomic status. In our study, with the CHBMS-Turkish scale; the breast cancer awareness levels of young university Turkish women and the factors affecting their breast cancer screening behaviors were evaluated. It has also been shown that CHBMS-Turkish forms can be used in experimental research designs to raise awareness and raise the quality of young women's beliefs and behaviors about breast cancer and screening behaviors. Thus, it can be used in screening studies for early diagnosis of breast cancer in the field of women's health. The data of our study; It will also be useful for healthcare professionals as a pre-test-post-test data collection tool to evaluate the effectiveness of breast cancer screening projects.

**Keywords:** breast cancer, university students, health beliefs, women's health, champion's health belief model scale

# INSIGHTS INTO SUNFLOWER LEAF MORPHOGENESIS: A CELL CYCLE PERSPECTIVE

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## ABSTRACT

Understanding leaf growth and development is an important prerequisite for improving crop productivity and survival under benign and extreme environmental conditions. Variations in leaf morphology can affect physiological performance of the plant. The size and shape of leaves is determined by the coordinated regulation of cell proliferation and cell expansion, which is strictly controlled by different internal and external cues. This study focuses on the activity of cell cycle machinery in three sunflower populations with different leaf size and shapes. Cell cycle progression and cell division are strictly controlled by the activity of cyclin-dependent kinases (CDKs) and their regulatory subunit cyclins. We analysed the expression levels of several cell cycle genes in the leaves of the sunflower populations studied, and identified specific transcript accumulation patterns for the CDKs *HaCycA2;1*, *HaCycK-B2;2* and *HaCycK-F4*, the cyclins *HaG2-CycC13;1*, *HaCycD3;1* and *HaCycK-D3*, and the CDK inhibitor *HaCycK-Inh4*. The results suggest that transcriptional regulation of the key cell cycle regulators could be population-specific, and provide a solid basis for further experimental testing of the control of leaf size and shape in sunflower.

**Key words:** cell cycle regulators, epidermal cells, leaf shape, sunflower accessions

## ACKNOWLEDGEMENT

This work has been carried out in the bilateral project numbered 119O218 based on the framework of the between the Bulgarian Academy of Sciences and TÜBİTAK.

## EVALUATION OF ANTIOXIDANT CAPACITY AND FLAVONOID CONTENT IN ANNUAL AND PERENNIAL WILD *HELIANTHUS* SPECIES

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### ABSTRACT

The genus *Helianthus*, belonging to the *Asteraceae* family, is a very diverse genus that consists of 53 species including 14 annuals and 39 perennials. The large number of wild sunflower accessions constitutes a genetic pool for crop improvement providing breeders with potentially useful agricultural traits, such as increased disease resistance, high oil content, better abiotic stress tolerance, early maturity, enhanced antioxidant potential. These advantageous agronomic characteristics could be introduced into elite parental lines by interspecific crosses. The main goal of the present investigation was to examine the antioxidant capacity of different sunflower accessions grown in the Institute of Plant Physiology and Genetics (Bulgarian Academy of Sciences, Sofia, Bulgaria) and Trakya University (Edirne, Turkey) using Ferric reducing antioxidant power (FRAP) and 2,2-diphenylpicrylhydrazyl (DPPH) assays, and leaf flavonoid content. We analysed the annuals ( $2n=2x=34$ ) *Helianthus petiolaris* ssp. *petiolaris*, *H. praecox* ssp. *runyonii*, *H. praecox* ssp. *praecox*, *H. praecox* ssp. *hirtus*, the diploid perennials ( $2n=2x=34$ ) *H. divaricatus*, *H. salicifolius* (2 populations), *H. pauciflorus*, *H. smithii*, *H. grosseserratus*, and hexaploid ( $2n=6x=102$ ) *H. tuberosus*. Altogether, this work provides experimental evidences for the highly variable antioxidant activity of the studied sunflower accessions, which could be used as a basis for development of novel cultivars with desirable antioxidant properties.

**Key words:** antioxidant capacity, flavonoids, sunflower, wild accessions

### ACKNOWLEDGEMENT

This work has been carried out in the bilateral project numbered 119O218 based on the framework of the between the Bulgarian Academy of Sciences and TÜBİTAK.

# EVALUATION OF MACRO AND MICRO NUTRITIONAL ELEMENT CONTENT AND SOIL PROPERTIES OF *HYPERICUM SCABRUM* AND *HELICHRYSUM PLICATUM* PLANTS

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## ABSTRACT

The interest in herbal treatment in the field of alternative medicine in the world and in our country is increasing day by day. It is known that herbal teas have positive effects on human health. In addition to its positive effects, it is also important to know the nutritional content of the plant in consumed teas. However, there are limited studies on the plant nutrient content of medicinal and aromatic plants consumed in the form of therapeutic tea, and the physical and chemical properties of the environments in which they are grown. In this study, macro and micro plant nutrients (N, P, K, Ca, Mg, Fe, Cu, Zn and Mn) and physical and chemical properties of the growing soils of *Hypericum scabrum* and *Helichrysum plicatum* plants, which are used as medicinal tea, were investigated. According to the analysis results of the plant samples taken from the flower parts; N, K, Ca and Mg values were higher in *Hypericum scabrum* and P value was higher in *Helichrysum plicatum* plant. The Fe, Zn and Mn values of *Helichrysum plicatum* plant, where the highest Fe, Zn and Mn values were determined, were 2200 ppm, 84 ppm and 74 ppm, respectively. The highest Cu value was found as 24.8 ppm in *Hypericum scabrum* plant. According to the analysis results of both plant soils (*H.scabrum* and *H. plicatum*); It was determined that the plant soils were generally slightly acidic, unsalted, clayey loam texture class, medium in organic matter, very low in lime content, medium and sufficient in phosphorus and potassium, respectively.

**Keywords:** *Hypericum scabrum*, Karahasançayı, *Helichrysum plicatum*, Altınotu, Medicinal and Aromatic Plants, Nutrients

## **DROUGHT-INDUCED RESPONSES IN ROOTS AND LEAVES OF WHEAT CULTIVARS WITH DIFFERENTIAL TOLERANCE TO DEHYDRATION**

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### **ABSTRACT**

Drought is one of the environmental factors affecting all aspects of plant growth and development, which include increased formation of reactive oxygen species that cause damages in different cell components. Plant cells counteract excessive ROS accumulation by the cellular antioxidant systems that play a major role in ROS scavenging. In our experiments, the wheat (*Triticum aestivum* L.) genotypes Guinness and Bojana with different dehydration tolerance were exposed to drought stress and subsequent recovery. Plant antioxidant status was monitored in plant roots and shoots by 2,2'-diphenyl-1-picrylhydrazyl (DPPH) Radical Scavenging assay and Ferric Reducing Antioxidant Power (FRAP) assays. The expression of genes encoding key antioxidant proteins was also analysed in both plant organs. The evaluated parameters showed organ- and cultivar-specific alterations upon stress exposure and recovery. In addition, genotoxic effects of dehydration were screened by alkaline comet assay. Larger comet tails in the root samples of the stress vulnerable cultivar Bojana were detected, as compared to the drought-tolerant genotype Guinness, thus demonstrating lower DNA integrity in the stress sensitive cultivar. Our results suggest that wheat drought responses are complex and include organ- and cultivar-specific transcriptional reprogramming of antioxidant defence machinery and genotype-dependent DNA damages.

**Key words:** antioxidant capacity, DNA damage, drought, wheat genotypes

**Acknowledgements:** This work has been carried out in the framework of the project No DN06/12/19.12.2016 funded by the National Science Fund of the Ministry of Education and Science of Bulgaria.

## HONEY PLANTS ECOLOGICAL ASSESSMENT IN TREBESHINA-DHEMBEL-NEMERCKE MOUNTAIN RANGE

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### ABSTRACT

In situ conservation of honey plants species is an effective strategy for the conservation of natural resources especially in under climate change impact. These species have also a great economic value as they are source of honey production, particularly in mountain areas where beekeeping is a promising economical source for locals. The knowledge about the list of honey plant of a certain area, their flowering period and their ecological requirements and optima is crucial for their conservation. This data could also assist local beekeepers to develop effective strategies in managing their farms and bee feeding. A study was conducted in the Trebeshinë-Dhëmbel-Nëmërçkë mountain range aiming the identification of honey plant grown wild in this area, assessing their flowering period and ecological requirements using Ellenberg-Pignatti indicators. A total of 121 honey plant species were identified in the studied area, the majority of them flower in the June –August. Based on the Elleberg-Pignatti ecological indicators the majority of these plant species require high light levels, temperate temperatures, sub oceanic to slightly continentality climate, dry to medium soil moisture and soils with neutral pH and with low to slightly rich nitrogen

**Keywords:** Honey plants, ecologic indicators, Trebeshinë-Dhëmbel-Nëmërçkë mountain range, Albania

# ISOLATION AND IDENTIFICATION OF THE PATHOGENS CAUSING ROOT ROT DISEASE IN ALFALFA AND THE EVALUATION OF ALFALFA RESISTANT VARIETIES TO *FUSARIUM EQUISETI* AND *F. TRICINCTUM*

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## ABSTRACT

**Purpose:** Causative pathogens of the Alfalfa Root Rot (ARR) are rather complicated, to identify the dominant species of the pathogens causing ARR in different ecological environments is very important for controlling the disease. Diseased samples suspected to be ARR were collected from three different locations in Inner Mongolia region. The pathogens were isolated and identified, and the different alfalfa resistant varieties to root rot was evaluated.

**Method:** Isolation of the pathogens was carried out using conventional tissue separation method. The fungal species was confirmed molecularly with PCR using total genomic DNA extracted from the pure culture as template. The internal transcribed spacer region of DNA was amplified using the *Fusarium* specific primer pair EF1/EF2, and the amplicon was sequenced and queried in NCBI (National Center for Biotechnology Information). For the Evaluation of Alfalfa Resistant Varieties to *Fusarium* spp., alfalfa was planted in the greenhouse and inoculated with pathogens. After 25 days, we observed the onset symptoms of the plants and classified them according to the resistance evaluation criteria.

**Results:** The results showed that 6 different *Fusarium* species were identified, including XAMG-6 (*F. equiset*), XAMG-2 (*F. acuminatum*), XAMJ-4 (*F. thapsinum*), CYSG-3 (*F. equiseti*), CYSG-1 (*F. incarnatum*), CYS1-3 (*F. oxysporum*) and MX-1 (*F. tricinctum*). Furthermore, the resistance level of 32 alfalfa varieties against both species MX-1 (*F. tricinctum*) and MX-2 (*F. equiseti*) were evaluated under greenhouse conditions. Among the 32 varieties, 'KangSai' variety showed the highest resistance level against both MX-1 (*F. tricinctum*) and MX-2 (*F. equiseti*), with a disease index of 26.07 and 26.81 respectively. Based on the classification standard of resistance level, 18 of 32 varieties, accounting for 56.25%, showed moderate resistant level to *F. tricinctum*; 14 varieties showed moderate susceptible level, the ratio is 43.75%; no high susceptible variety was identified in this study. For the *F. equiseti*, 9 varieties showed the moderate resistance level, accounting for 28.13%; 14 varieties were moderately susceptibility with a ratio of 43.74% and 9 varieties were identified as highly susceptible, accounting for 28.13%.

**Conclusions:** *F. quiseti* was the dominant species of ARR from three different locations in Inner Mongolia region. None of the tested materials was screened out as either immune or have a high resistant to both *Fusarium* species in this study.

**Keywords:** Alfalfa, Alfalfa Root Rot, Resistance, Pathogen Isolation, *Fusarium* spp.

# THE IDENTIFICATION OF NEW SUNFLOWER VARIETIES RESISTANT TO OROBANCHE CUMANA IN FIELD

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## ABSTRACT

**Purpose:** Orobanche is a kind of parasitic weeds, seriously endangering the development of sunflower industry. In order to effectively identify the resistance of registered sunflower varieties to *Orobanche cumana* and speed up the popularization and application of excellent varieties, 36 domestic representative registered varieties of edible sunflower were selected, and identified the resistance to *O. cumana* in luguanhao village of wulateqianqi and gaoyoufang village of Siziwangqi in the main sunflower producing areas of Inner Mongolia. **Method:** In 2020, we have selected Bayannur City (40°87'10"N, 108°53'92"S) and Wulanchabu City (41°51'10"N, 111°66'59"S) field trials should be conducted on the plots with serious occurrence of sunflowers. We randomly arrange the plots, each plot covers an area of 30 square meters, and the experiment is set for 3 repetitions. With the 'SH363' identified in the field as the control variety for the susceptibility. Investigate the parasitic rate and degree of parasitism in the sunflower blooming period. **Results:** The results showed that race F was the dominant race in luguanhao village of wulateqianqi. Among them, 20 varieties such as 'Tongxin 2' and 'Chengpai C93' showed immune level; 11 varieties such as 'SanRui 3' and 'Tiankui 16' showed high resistance level; the other 5 varieties showed susceptibility or high sensitivity level in the field. The dominant race in gaoyoufang village of Siziwangqi was race G, of which 14 varieties such as 'Tongxin 2' and 'Shengdi 1' were immune; 16 varieties such as 'Chengpai C93' and 'SanRui 3' were highly resistant; 'Longshikui 5' was moderately resistant; the other 5 varieties were susceptible or highly susceptible. **Conclusions:** Among them, 11 varieties showed immunity in both regions, including 'Tongxin 2', 'Shengdi 1', 'Longkui 27', 'Shengdi 777', 'Qiyuan 6', 'JR5511', 'Yimin 931', 'Yimin 303', 'Yimin 966', 'Yimin 969', 'Jingukui 33', 'S2009' and 'Xinnong 101'; 9 varieties showed high resistance to *Orobanche cumana*, including 'SanRui 3', 'Tiankui 16', 'Zhengbodingsheng', 'Shuangxing 6', 'Zhongshikui 90', 'Yimin 968', 'Chengpai K7', 'Chengpai K9' and 'Sanrui 11'. These varieties have good resistance and have good market prospects in the main sunflower producing areas in China.

**Keywords:** Sunflower, Resistant, *Orobanche cumana*, Race

## **DETERMINATION OF COLD STORAGE PERFORMANCE OF 'KLEMANTINE' AND 'ORLANDO TANJELO' HYBRID CO210 MANDARIN GENOTYPE**

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### **ABSTRACT**

The hybrid 'Klemantine' and 'Orlando tanjelo' were stored for 3 months at 4 and 6 °C and 85–90% relative humidity to determine the cold storage period of the CO210 mandarin genotype and to contribute to the increase in the variety in the mid-late period in the market.CO210 mandarin genotype. In the 2nd month of the 1st year storage, the total weight loss at 4 and 6 °C, and spoilage due to fungal and physiological reasons were determined as 10.45% and 11.81%, respectively. Since these values are close to 10%, which is the acceptable limit for storage, the CO210 mandarin genotype could be stored for 2 months at 4 and 6 °C and 85-90% relative humidity. In the 2nd year of the CO210 mandarin genotype, the taste score was determined as 4.33 and 5.00, respectively, in the 3rd month of storage at 4 and 6 °C temperatures. The sum of weight loss, deterioration due to fungi and deterioration due to physiological reasons were determined as 5.84% and 9.62%, respectively. CO210 mandarin genotype was found to be below 5 points, which is the limit of consumer acceptance, although the sum of weight loss, deterioration due to fungal reasons, deterioration due to physiological reasons at the end of the 3rd month of storage at 4 °C was below the accepted limits. Although the total of CO210 mandarin genotype was higher in weight loss at 6 °C, deterioration due to fungal reasons, and deterioration due to physiological reasons, it could be preserved in the cold for 3 months more successfully because its taste value was within the limits of consumer acceptance.

**Keywords:** Mandarin, cold storage, CO210, hybrid

# THE USE OF MEDICAL AND AROMATIC PLANTS IN LANDSCAPE ARCHITECTURE AND AGRICULTURAL LANDSCAPE, THE CASE OF DÜZCE

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## ABSTRACT

Our country, at the intersection of three important floristic regions, with different climates and a wide area, has a rich flora in terms of medicinal and aromatic plants. Medicinal and aromatic plants have an important place in our country due to their wide usage areas, their contribution to the country's economy and their additional income for the people living in the regions where they are grown. One of the important areas of use of medicinal and aromatic plants is the ornamental plants sector. It is possible to see that medicinal aromatic plants are used as ornamental plants in a wide area from traditional home gardens to themed parks and gardens from past to present. Medicinal and aromatic plants, which are used for both ornamental and utility purposes in traditional homes and gardens, are now taking their place in park and themed garden designs (Dönmez et al. 2016) and they find use in landscape designs at different scales. Medicinal and aromatic plants, which are used in many gardens around the world with their pleasant smell and healing properties, have a strong potential as ornamental plants and as an alternative in landscape designs with pleasant flowers and colorful leaves. Also; Medicinal and aromatic plants are used as raw materials in different industries. For this reason, the demand for these plant species, which have a wide usage area and spread over a wide geography in Turkey, is increasing day by day. Turkey is among the most important countries in the world in the trade of medicinal plants. However, despite the high potential of Turkey in the export of medicinal and aromatic plants, the desired level has not been reached yet. Considering that medicinal and aromatic plants are an important source of income for the country's economy, in order to increase the share of Turkey, which has a rich potential in the export of medicinal plants, in the world medicinal plant market (adaptation and breeding studies and organizing trainings for farmers in this field) etc.) should be increased. In an other saying; Medicinal and aromatic plants, which have a wide range of uses from industrial, medical, chemical, cosmetic and perfumery industries to ornamental plants, should be cultivated and preserved and sustainability should be ensured. In this context; Within the scope of the "Medical and Aromatic Plant Production Studies Project" carried out in Düzce; together with volunteer farmers (25 people), İzmir Thyme (*Origanum onites*), Medicinal Sage (*Salvia officinalis*), Anatolian Sage (*Salvia triloba*), Mint, Melissa (*Melissa officinalis*), Calendula (*Calendula officinalis*), Lavender (*Lavandula angustifolia*), Saffron ( Production trials of *Crocus sativus*), Salep (*Orchis morio*), Pomegranate (*Momordica charantia*) and Sugar Grass (*Stevia*) plants were established. The conditions of the farmers (economic, tools-equipment) were also taken into consideration while producing. It is aimed to increase the number of farmers and production areas producing medicinal and aromatic plants in Düzce, to develop the relevant industry branch, and to provide

income to our province and country's economy as a result of these studies. With this research; the usage areas of medicinal and aromatic plants in landscape architecture were examined; Medicinal and aromatic plants deemed appropriate in the landscape design and planning study were suggested and some medicinal and aromatic plants were evaluated in terms of Agricultural Landscape in Düzce Province. He examined both the healing and calming role of medicinal and aromatic plants and the visual richness. The usage purposes of medicinal plants, the points to be considered in their selection and the advantages they provide in landscape design and planning studies have been researched and the usage situation in Turkey has been revealed.

**Keywords:** Medicinal and aromatic plants, Herbal design, Agricultural Landscape, Landscape Architecture, Düzce

# EFFECT OF MYCORRHIZAL FUNGUS ON THIAMETHOXAM UPTAKE AND TRANSLOCATION ON MAIZE AND RESPECTIVE RESIDUES ON GUTTATION

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## ABSTRACT

The aim of this study was to detect and compare the residue levels of the neonicotinoid insecticide thiamethoxam on guttation when the maize is grown by the use of arbuscular mycorrhizal fungi (AMF). A maize inbred line was selected (A) for both experimental systems (field and pot). The neonicotinoid insecticide Actara® (Syngenta Hellas) was used for both systems. The insecticide was applied with the use of an Eppendorf dispenser set at 10ml. In the first application the insecticide was applied in its recommended dose, while during the second application a double dose was used. The plots for the field cultivation were established in randomized complete block design replicated thrice. Each plot was separated in 3 different rows, one for each treatment (E = application with the pesticide, C = control, M = application of the substance plus the use of an arbuscular mycorrhizal fungus). The pots on the pot system were also thrice replicated and the treatments were signed accordingly. Guttation was collected in 6 different samplings, in the first morning hours for both cropping systems. A HPLC-DAD analysis was used for determining the residue levels of thiamethoxam on guttation. The results revealed that the plants of E treatment, that were developed in the pot cultivation, had residue levels ranged from 0,24ppm (1st sampling) to 0,78 (6th sampling), while plants of the same treatment that were field cultivated showed residue levels ranging from 0,56ppm (1st sampling) to 0,19ppm (6th sampling). Results of the pot cultivated plants for M treatment showed residue levels ranging from 0,26ppm (1st sampling) to 1,1ppm (6th sampling), while the field cultivated plants of the same treatment showed results ranging from 1,66ppm (1st sampling) to 0,11ppm (6th sampling). These results suggest that plants that were grown by the combined use of AMF (treatment M), developed a more dense and extensive rhizosphere that was able to absorb larger amounts of the active substance in comparison with that of the plants of the E treatment.

**Keywords:** Mycorrhizal fungus, Thiamethoxam, translocation, maize, residue

# HONEYCOMB EXPERIMENTAL DESIGN FACILITATES THE DIFFERENTIATION OF INDIGENOUS AMF SPORES IN ZEA MAYS PLANT RHIZOSPHERE

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## ABSTRACT

Terrestrial plants establish symbiotic relationships with Arbuscular Mycorrhizal Fungi (AMF) of the phylum *Glomeromycota*. AMF symbiosis facilitates water and nutrient uptake resulting in increased yields in agricultural plants. There is mounting evidence that plants display distinct interactions with different AM fungi, so that plant growth and/or supply with soil nutrients depend on the compatibility between the two partners. The objective of this study was to analyze the AMF spores isolated from *Zea mays* plant rhizosphere in field conditions. Two HS4 open-pollinated lines, originating from a commercial hybrid through intense single plant selection at nil-competition regime, were tested according to the honeycomb design to maximize phenotypic expression and differentiation among maize plants. Soil samples were collected before sowing (control samples) and also ten days after anthesis from the rhizosphere of twelve plants of each line. The results revealed significant differences in the total number and phenotype of the spores both among the control and maize rhizosphere samples but also between the samples from the two maize lines.

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**Keywords:** honeycomb breeding, maize, Arbuscular Mycorrhizal Fungi

## MULTIFUNCTIONAL APPLICATIONS OF WILD HALOPHYTES SPECIES

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### ABSTRACT

The decline of the arable lands and the increasing in the population number make it certain to utilize long-neglected natural resources and re-assess it in preparation for potential applications. Halophytes that can grow under high salinity water in arid and semi-arid area has gain more concerns to be used as alternative applications. Therefore, there is a serious need to utilize the halophytes plants to face the shortage of arable lands and the crops productivity. Due to their salt-tolerance capacity, even at high salinity concentration, halophytes species have been demonstrated for multipurpose applications, which include soil cleaning through phytoremediation, salt recovery, livestock fodder and heating purposes. Furthermore, several species can be utilized for more than one application. The existing outright challenge for utilizing the halophytes for multiple applications is to create a novel platform in order to judge and classify each species based for its potential application. The main idea of this study is to discuss the multifunction application of wild halophytic species harvested from salt-affected area in Aral Sea in Uzbekistan and to evaluate the species for its potential application based on its specifications and physic-chemical constituents. Analyzing the halophytes species for chemical compositions and nutrients content can be used to determine the quality of the species if it is adequate to meet the criteria for a specific requirement and to be categorized for proper potential application and use. The potential multifunction applications were ranged from phytoremediation and soil cleaning to salt recovery, and from livestock fodder to heating purposes. Novel mapping platform was created to evaluate any halophytes species based on several criteria as ash fraction, biomass yield, tolerance mechanism, the concentration of anti-nutritional parameters, and the life span. However, the main question is to what extent the each criteria will be accepted to be classified for a specific potential application. For instant, species that evaluated to be utilized as fodder livestock, it should firstly meet the criteria of nutritive fraction and the anti-nutritional factors concentration beside the biomass growth yield. Twenty various halophytes species from saline environments in Aral Sea area were explored and its physic-chemical composition were analyzed and evaluated for its potential application based on the created mapping platform. Each species was analyzed for 17 elements like crude fiber, ash fraction in order to classify it for potential application. The results showed that the species of *Alhagi pseudoalhagi* can be used mainly as fodder for livestock whereas *Climacoptera lanata* and *Atriplex nitens* are recommended to utilize for phytoremediation and soil cleaning. The created mapping platform can also be used for judging any halophytes species that its ecological information and physic-chemical constituents were specified and determined.

**Keywords:** Halophytes; Phytoremediation, Soil cleaning, livestock fodder, Plant Constituents

## ANTIBACTERIAL ACTIVITY OF THE ESSENTIAL OILS OF *R. ANGUSTIFOLIA* AGAINST MULTIRESISTANT BACTERIAL STRAINS

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### ABSTRACT

The worldwide increase of multidrug resistance in both community and healthcare associated bacterial infections has impaired the current antimicrobial therapy, warranting the search for other alternatives. We aimed to find the *in vitro* antibacterial activity of the essential oil of *Ruta angustifolia* plant against 6 reference bacterial species: *Enterococcus Faecium*, *Staphylococcus aureus*, *Listeria monocytogenes*, *Escherichia coli*, *Salmonella Typhi* and *Pseudomonas aeruginosa*. The yield of EOs, based on dry weight of sample, was 2%. The antibacterial activity was assessed by means of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) using the microdilution method. The most sensitive bacteria was the Gram-positive, bacillus *Listeria monocytogenes*, with 60 µl/mL minimum inhibitory concentration (MIC). The essential oils of *Ruta angustifolia* show also a strong antifungal activity against *Aspergillus ochraceus*, *Fusarium moniliforme* and *Botrytis cinerea*.

**Keywords:** EOs, MIC, MBC, *R. angustifolia*, antibacterial activity

## IN VITRO ANTIOXIDANT ACTIVITY OF THE ESSENTIAL OILS OF *R. ANGUSTIFOLIA*

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### ABSTRACT

The use of EOs as natural antioxidants is a field of growing interest because some synthetic antioxidants such as BHA and BHT are now suspected to be potentially harmful to human health. This study aims to evaluate the antioxidant activity of the essential oils of *Ruta angustifolia* aerial parts (leaves, stem, and flowers). The total phenol content of essential oils was measured by the Folin-Ciocalteu method and the analysis of their major compounds was performed by gas chromatography and mass spectrometry. The antioxidant properties were evaluated by two tests: the test of the radical trap diphenyl picryl hydrazyl (DPPH) and the reducing power (FRAP). These oils showed 50% of inhibition at a concentration of 42mg/mL.

**Keywords:** EOs, *R. angustifolia*, antioxidant activity, polyphenols.

## THE IMPACT OF COMPOST SPREADING ON THE QUALITY OF THE LENTIL PLANT (LENS CULINARY) ON A CONVENTIONAL SYSTEM

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### ABSTRACT

Composting is a natural and ecologically sustainable biological process which thanks to the action of endogenous microorganisms that colonize organic feedstocks allows transforming highly biodegradable organic compounds into stabilized organic matter (Ugo De Corato.,2020). This is the reason why organic amendments are increasingly used for their potential to restore biological, physical, and chemical soil properties (Jemai et al, 2011). This work describes the effects of compost application on lentil growth in a conventional system. The compost used was waste from the olive and poultry industry (olive droppings and pomace). The study was conducted to highlight the effect of different compost concentrations on lentil growth and soil fertility by analyzing some chemical parameters of the soil, such as nitrogen, nitrates, phosphorus, and pH, which directly influence nitrogen fixation by the legumes. This trial was limited by unfavorable weather conditions (lack of rainfall), which influenced the results, which vary from one treatment to another, the results obtained illustrate the beneficial effects of moderate concentrations (5t/ha and 10t/ha) of compost on lentil cultivation, both on morphology. The best results for fertilization were recorded for the high dose of compost (15t/ha), which proved to provide the nutrients necessary for the development of the plant and act as an organic amendment by improving most of the fertilizing characteristics of the soil.

**Keywords:** Composts, conventional system, soil quality, lentil growth

# INOCULATION EFFECTS OF PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) ON THE GROWTH OF THE PEANUT KT-22 VARIETY IN MOROCCO

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## ABSTRACT

In order to improve peanut yields in the northwestern region of Morocco, plant growth promoting rhizobacteria (PGPR) have been emerged as a potential biotechnological tool for achieving this goal. To select a suitable bio-inoculant for peanut growth, 40 out of 300 strains isolated from the rhizosphere of three varieties of peanut (KT-22, KP-29 and Beldi), were found to be able to solubilize tricalcium phosphate (TCP) on Pikovskaya (PVK) agar medium with a solubilization diameters  $\geq 4$ cm. Furthermore, the rhizospheric isolates were evaluated for the production of indole acetic acid (IAA), siderophores, hydrogen cyanide (HCN) and lytic enzymes; such as amylase, cellulase, lipase and urease. The phenotypic results have been converted into a dendrogram, 13 groups are appeared with 50% of similarity, one strain from each group was taken to quantify the P-solubilization on PVK liquid medium, the highest concentration was obtained by JR39  $190 \pm 0.67$  mg /L. Only 7 PSB were found positive for the production of ACC deaminase. In addition, the antagonistic test has been conducted *in vitro*. The results showed the ability of three bacteria (BP46, JR30 and JR49) to inhibit the growth of phytopathogenic fungus *Fusarium oxysporum*. Based on their plant growth promoting (PGP) traits activities, three PSB (BP49, JR30 and JR39) were selected to evaluate their effects on peanut growth seeds of variety KT-22 under culture chamber conditions. The highest values in terms of length, fresh and dry weight of the aerial and root parts, number of nodules were recorded in the plants inoculated with the two bacterial strains BP49 and JR39. The results indicate that inoculation with BP49 and JR39 has a favorable effect on peanut growth. These bacteria can be suggested to farmers in order to reduce the amount of fertilizer used to improve peanut yields in Morocco.

**Keywords:** *Fusarium oxysporum*, Inoculation, KT-22, Peanut, PGP

**ASSESSMENT OF ACTIVITIES PROMOTING PLANT GROWTH AND  
TOLERANCE TO ABIOTIC STRESS OF RHIZOBACTERIA ISOLATED FROM  
THE RHIZOSPHERE OF THREE VARIETIES OF PEANUT (*ARACHIS  
HYPOGAEA L.*) IN MOROCCO**

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**ABSTRACT**

Salinity is a major environmental stress that limits crop production worldwide. In this study, we characterized plant growth-promoting rhizobacteria (PGPR) and examined their effect on abiotic stress tolerance, 40 out of 300 strains isolated from the rhizosphere of three varieties of peanut (KT-22, KP-29 and Beldi), were found to be able to solubilize tricalcium phosphate (TCP) on Pikovskaya (PVK) agar medium with a solubilization diameters  $\geq 4$ cm. Furthermore, the rhizospheric isolates were evaluated for the production of indole acetic acid (IAA), siderophores, hydrogen cyanide (HCN) and lytic enzymes; such as amylase, cellulase, lipase and urease. The phenotypic results have been converted into a dendrogram, 13 groups are appeared with 50% of similarity, one strain from each group was taken to quantify the P-solubilization on PVK liquid medium, the highest concentration was obtained by JR39  $190 \pm 0.67$  mg /L. We also investigated their tolerance to salt stress (from 0 to 12% NaCl), heat stress (30, 32, 37, 42 and 45°C) and pH (4 to 10), three PSB, JR39, JP17 and VR27 tolerate 10% NaCl, the effect of high temperatures manifested as a decrease in the percentage growth of the microbial population studied compared to the control (28 °C). in regards to pH, generally, a great diversity in the sensitivity of the strains is observed at pH 4 and 10, for all the isolates tested, alkaline pH are more tolerated than acidic pH. Since the bacterial enzyme ACC-deaminase plays a significant role in sustaining plant growth under abiotic stress conditions, 7 isolates were capable to use ACC as the sole nitrogen source. This study reveals the potential of some test rhizobacteria to be used as efficient bio-inoculants.

**Keywords:** ACC deaminase, *Arachis hypogaea L.*, PGP, PSB, stress abiotic

# STUDY OF NEW DRUG CANDIDATES DERIVED FROM PLECONARILE INHIBITING COXSACKIEVIRUS B3 (CVB3) BY MOLECULAR DOCKING, ADMET, AND RETROSYNTHESIS

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## ABSTRACT

In light of their serious diseases, there is an urgent and inescapable need to hunt for antiviral medications for Coxsackievirus B3 (CVB3). The current study looked at four drug candidates (P1-P4) derived from pleconaril, which has antiviral activity against CVB3. According to Lipinski's guidelines, two candidates P3 and P4 can be medications based on the results obtained after evaluating physicochemical and ADMET properties. The high antiviral activity of these two candidates ( $pIC_{50}=11.063$  for P3 and  $pIC_{50}=9.580$  for P4), when compared to a reference compound (MA:  $pIC_{50}=8.523$ ), was explained by the different parameters generated after optimizing their geometries employing Gaussian09 program suit with the hybrid density functional B3LYP and 6-31G(d,p) basis sets, and the molecular docking analysis ( $\Delta G$  (Gibbs energy), FF(Full fitness) and bonding modes) using the SwissDock server. The principle of retrosynthesis allowed us to draw a path for the synthesis of drug candidates. This study may add more valuable and useful information to optimize further new Pleconaril derivatives.

**Keywords:** Molecular Docking, ADMET, Retrosynthesis, Isoxazole, Coxakievirus B3, Pleconaril, Antiviral

# DISCRIMINATING ABILITY OF ISSR MARKERS IN THE REVEALING OF THE GENETIC POLYMORPHISM IN TURKISH BROOMRAPE POPULATIONS

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## ABSTRACT

In the present study, the analysis of the informativity level and discriminatory capacity for 14 ISSR-markers to identify polymorphism of seven *Orobanche cumana* populations from different geographical regions of Turkey was performed. ISSR markers utility was assessed by calculating of different parameters such as the polymorphism information content (PIC), observed and effective number of alleles ( $N_a$  and  $N_e$ ), Nei's and Shannon diversity indexes ( $H$  and  $I$ ), number and percentage of polymorphic loci, resolving power ( $R_p$ ), Simpson's coefficient ( $H_j$ ). Out of 207 amplicons generated by microsatellites primers, 195 were found polymorphic (94.29%) and 12 were monomorphic with size range from 341 to 5353 bp. The average number of amplified bands was 14.79 fragments per primer. The PIC values for 14 primers ranged from 0.18 ((GATA)<sub>4</sub>) to 0.41 ((AG)<sub>8</sub>YA) with the mean value 0.34. Eight primers ((AG)<sub>8</sub>YA, (CT)<sub>8</sub>TC, BC807, BC841, (CA)<sub>6</sub>AC, (CTC)<sub>4</sub>RC, (CAG)<sub>5</sub>, BC835) were considered the most effective. The mean  $I$  value was 0.52 and ranged from 0.32 ((GATA)<sub>4</sub>) to 0.6 ((AG)<sub>8</sub>YA). The (AG)<sub>8</sub>YA, (CT)<sub>8</sub>TC, BC807, BC841, (CTC)<sub>4</sub>RC, (CA)<sub>6</sub>AC and (CAG)<sub>5</sub> primers had the highest  $I$  values. The  $R_p$  ranged from 5.9 for primer (CA)<sub>6</sub>RG to 22.59 for primer (AG)<sub>8</sub>YA. Nine of the ISSR primers ((AG)<sub>8</sub>YA, (CTC)<sub>4</sub>RC, BC810, BC807, BC841, BC835, (CAG)<sub>5</sub>, BC857 and (CT)<sub>8</sub>TC) possessed high  $R_p$  values (22.59, 19.12, 16.83, 16.54, 16.49, 14.59, 13.32, 12.88 and 11.37, respectively) and were able to distinguish all 41 genotypes. The higher discrimination potential calculating by the Simpson's coefficient had primer BC810 (0.33) and the lower (CA)<sub>6</sub>RG (0.01), the mean value for all primers was 0.18. According to ISSR data analysis, the high proportion of the genetic variability (94.29%) was due to interpopulation variation and 45.82% of the diversity by cause of intrapopulation variations. In conclusion, in this comparative study of the discrimination capacity of 14 ISSR markers using to broomrape population genetic analysis, the tri- ((CTC)<sub>4</sub>RC, (CAG)<sub>5</sub>) and dinucleotide ((AG)<sub>8</sub>YA, BC807, BC841, (CT)<sub>8</sub>TC) primers proved more informative than tetranucleotide repeats. Moreover, these primers revealed the highest values for all analyzed polymorphism information indexes of genetic diversity (number of amplicons per primer from 15 to 28, level of polymorphism more than 88.89%,  $PIC \geq 0.36$ ,  $I \geq 0.53$ ,  $H_j \geq 0.11$  and  $R_p \geq 11.37$ ) for Turkish broomrape populations. The analysis of ISSR-markers showed that this type of marker is applicable for the assessment of intra- and interpopulation genetic polymorphism for species *O. cumana*.

**Keywords:** broomrape, population, *Orobanche cumana*, genetic polymorphism, ISSR markers

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## DEVELOPMENT OF QUALITY OIL SUNFLOWER (*HELIANTHUS ANNUUS* L.) HYBRIDS

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### ABSTRACT

The development of a hybrid with high oleic acid is an important breeding goal for sunflower. Hence, inbred lines differing for oleic acid were selected and hybrids having one or both parents with high oleic acid were developed and evaluated at various sites at Pakistan in spring and autumn seasons. DNA profiling of hybrids differing for oleic acid contents was characterized using N1-3F/N2-1R, which successfully confirmed the presence of high oleic acid gene in hybrids. Oleic acid and seed yield components were higher in spring than in autumn due to the high degree days availability during the former. Among these hybrids, H5 had stable high oleic acid content during the spring season with high seed yield and kernel to seed percentage than the cultivar check. Combining ability analysis revealed a high relationship with mean oleic acid contents at two sites, thus showing the effectiveness of selection for developing high oleic acid inbred lines. Newly developed inbred C.112.P was a positive combiner for oleic acid across sites except Sargodha, while restorer populations such as RH.344, RH.345 and RH.347 were positive male combiners.

**Keywords:** Combining ability, degree days, kernel to seed%, seed yield

# ENHANCEMENT OF SOYBEAN (GLYCINE MAX L.) ADAPTABILITY AND PRODUCTIVITY THROUGH MOLECULAR METHODS

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## **ABSTRACT**

Soybean is an important protein and oilseed crop of the masses, which is highly sensitive to the environmental factors such as photoperiod, and altitude making it to adaptable to specific regions of the world. Poor adaptability of soybean cultivars caused significant decreased in seed yield due to disrupting of flowering time or maturity time. Moreover, global climate changes triggering factors such as high temperature and water stress condition are further challenging its sustainable production in various parts of the world. Therefore, there is need to understand the genetic response induced by the factors. Review of the current literature showed that flowering is affected by several QTLs and show Photo-thermal responses. Review also highlighted cyto-genetical stock such as chromosome segment substitution lines and their role in introgression of novel genes from wild soybean and was also discussed. All genes showing responses to various environmental factors and adaptability were reviewed in the study and their putative function was discussed. There was also need to enhance the tolerance against global climate change induced factors such as high temperature and water stress. Genes related with enhancement of temperature and heat stress were also discussed which may help to develop stress tolerant soybean cultivars.

**Keywords:** Altitude, tolerance, global climate change, CSSLs

# SESAME AN UNDERUTILIZED OIL SEED CROPS: BREEDING ACHIEVEMENTS AND FUTURE CHALLENGES

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## **ABSTRACT**

High oil concentration (50%) and balanced fatty acids, adaptability to water stress conditions are the ingredient which may help sesame for global expansion in its area and production. However, low yield, poor response to farm inputs and agro-climatic conditions, and high post-harvest losses due to dehiscence capsule hinder its production worldwide. CRISPR/Cas9 has great potential to downregulate the alleles having undesirable effects on plant phenotypes including modifications in fatty acid profile. Crop has entered the genomics era which may help to formulate the effective molecular breeding programs for its improvement. and may help to find genes related with important traits.

**Keywords:** CRISPR/Cas9, Capsules, Genomics, SNPs, Yield, abiotic stres

# ABUNDANCE AND DYNAMICS OF APHIDS COLLECTED FROM POTATO CROP

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## ABSTRACT

Aphids or greenfly (*Hemiptera*) are the most widespread groups of insects harmful to agricultural systems. Potato seed crops are directly affected (nutrient sap collection) and indirectly (virus transmission) by the abundance, diversity and activity of the aphid population. The main damage to the aphid crop of seed potatoes is due to the spread of phytopathogenic viruses. Production losses due to infections with potato leaf roll virus (PLRV) can vary between 53-81% and for potato virus Y (PVY) between 33-89%, depending on the abundance and structure of aphid populations, potato variety, infection rate, vegetation stage and year-specific climatic conditions. The paper presents data on the abundance, dynamics and diversity of aphid species collected in Braşov (2020) with three yellow pan traps and the suction trap on potatoes crops. A total of 4102 specimens of 113 different species were collected and identified. Yellow pan traps - 922 aphids (22.47% of total catches) in 65 species; suction trap - 3180 aphids (77.52% of the total) of 108 species. The large number of specimens and species collected with suction trap compared to the yellow pan traps is noticeable. The activity of the main virus vector species *Myzus persicae*, *Aphis fabae*, *Brachycaudus helichrysi* was dominant and abundant during the first part of the growing season of the potato crop (May-June), after which there was a dramatic decrease in their presence and flight dynamics.

**Keywords:** Aphids, virus vector, yellow pan trap, suction trap, abundance, dynamics, *M. persicae*.

# DETERMINATION OF FORAGE QUALITY OF DIFFERENT COOL SEASON TURF GRASS SPECIES AND VARIETIES

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## ABSTRACT

This research was planned to determine the forage quality of the varieties of different grass species used to create green areas. The research was carried out in Erzurum in 2018 and 2019 according to the randomized completely blocks experimental design with 3 replications. The hay taken from the green fields of 14 varieties of *Lolium perenne*, *Festuca arundinacea*, *Poa pratensis*, *Festuca rubra rubra*, *Festuca rubra trichophylla*, *Festuca rubra commutata* and *Agrostis tenuis* were dried and the dry matter ratio, crude protein ratio, ADF (Acid detergent fiber) and NDF (Neutral detergent fiber) and RFV (Relative Feed Value) values were determined. The obtained data were subjected to variance analysis with the help of SPSS package program, and the differences between the averages were revealed by Duncan multiple comparison test. According to the results obtained, it was determined that there were great differences in the forage quality parameters of the hay according to the varieties. The highest crude protein (19.17%) Miracle, the lowest ADF (23.17%) Olympus and the lowest NDF ratio (38.89%) were determined in Allstater varieties according to the two-year averages. The relative feed values of the cultivars also varied between 91.8 and 216.6.

**Keywords:** Turf grass, cool season, quality, forage

## USE OF GARDEN RADISH IN JOHNSONGRASS CONTROL IN COTTON

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### ABSTRACT

Cotton, an industrial crop, have many problems in producing stage, which include weeds. Johnsongrass (*Sorghum halepense* (L.) Pers.) is among important weeds in cotton as well as many other crops worldwide. Chemical control of johnsongrass and the other weeds in cotton have been the dominant method in traditional cotton and GM cotton. High reliance to herbicides resulted in problems such as herbicide resistant weeds, side effects on non-target organisms, carryover, pollution in environment so on. Farmers have mostly ignored non-chemical methods although alternative methods had been available before chemical methods were invented. Allelopathy is a phenomenon has got attention more since the second half of the previous century. But use of allelopathy in weed control has not been adapted in practice. Garden radish (*Raphanus sativus* L.) has been proved with its allelopathic effect on many weed species including johnsongrass in vitro or in situ in some instances but not implementation of weed control in crop field conditions. In this study, garden radish was applied as cover crop, intermediate cropping (Half of the radishes harvested) rotational crop, or organic amendments (whole radish or vegetative parts) comparing to herbicide application (Haloxypop, group A/1) in cotton. All applications controlled johnsongrass, but it was less in amendment applications. Cover crop gave the best cotton yield. Effect of rotational radish regarding to herbicide application was comparable. It is concluded that garden radish can be used in johnsongrass control in cotton as cover crop for the best result, rotational crop for better income, or amendment as a part of a control program.

**Keywords:** cover crop, intermediate cropping, rotational crop, organic amendments, herbicide application, Haloxypop, ACCase inhibiting herbicide

# EFFECTS OF GREEN AND COMMERCIAL SYNTHESIS ZNO NANOPARTICLES ON GROWTH PARAMETERS AND WATER STATUS IN PEPPER UNDER DROUGHT STRESS

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## ABSTRACT

There are limited studies on agricultural applications of nanotechnology in plants (agro-nanotechnology) and plant nanoparticle interactions. It is very important for the researchers to determine the effects of nanoparticles on biological systems and their applicability especially in agricultural use. The use of nanoparticles to improve plant stress tolerance has recently become one of the most remarkable areas. In this study, first-time, ZnO nanoparticles were synthesized with green synthesis by using *Pinus brutia* Ten. pollen. The application of nanoparticles with green and commercial form spraying method to pepper plants under control and drought stress (initial, moderate, severe), the role of nanoparticles (3 different concentration and 2 form) on drought were investigated comparatively by growth and water status analyses. Relative water content (RWC), root and shoot growth and biomass measurements were carried out. According to the results; It was determined that the green synthesis ZnO NPs (100 and 500mg/L) RWC increased in severe drought conditions compared to the arid group. It also increased the total biomass and root length at moderate stress. As a result of the study, it is expected that the agricultural use of nanoparticles will contribute to the development of an innovative approach to sustainable agriculture. There are limited studies on agricultural applications of nanotechnology in plants (agro-nanotechnology) and plant nanoparticle interactions. It is very important for the researchers to determine the effects of nanoparticles on biological systems and their applicability especially in agricultural use. The use of nanoparticles to improve plant stress tolerance has recently become one of the most remarkable areas. In this study, first-time, ZnO nanoparticles were synthesized with green synthesis by using *Pinus brutia* Ten. pollen. The application of nanoparticles with green and commercial form spraying method to pepper plants under control and drought stress (initial, moderate, severe), the role of nanoparticles (3 different concentration and 2 form) on drought were investigated comparatively by growth and water status analyses. Relative water content (RWC), root and shoot growth and biomass measurements were carried out. According to the results; It was determined that the green synthesis ZnO NPs (100 and 500mg/L) RWC increased in severe drought conditions compared to the arid group. It also increased the total biomass and root length at moderate stress. As a result of the study, it is expected that the agricultural use of nanoparticles will contribute to the development of an innovative approach to sustainable agriculture.

**Keywords:** Green synthesis, ZnONpS, Drought stress, *Capsicum annum*, plant development

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# POSSIBLE EFFECTS OF GLOBAL WARMING ON INSECT POPULATION

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## ABSTRACT

Insects are among the groups of organisms most likely to be affected by climate change because climate has a strong direct influence on their development, reproduction, and survival. All insects are responsive to temperature, so it should expect frequent impacts of global warming on insect populations and the ecosystems they inhabit. Climatic warming tends to influence insect species population dynamics directly through effects on survival, generation time, fecundity and dispersal. Increase in temperature may cause an acceleration of insect metabolism and an increase in local insect population density. Rising temperatures increase the egg laying rate of insects, the number of eggs and accelerate the development of their biological stages. Because insect species in general have short life cycles, high reproductive capacity and high degree of mobility, the physiological responses to warming can make large and rapid effects on species population dynamics. Warming can also create indirect effects on a given insect species via effects on the physiology of vegetation or natural enemies. Climatic warming is expected to force insects to shift their distributions by expanding into the new climatic areas and by disappearing from areas that have become climatically unsuitable. Some insect species can shift their ranges northward and to high elevations as a result of warming. Insects can respond to climate change by moving to areas where climate is favourable, by evolving to cope with the challenges posed by new environmental conditions. Due to global warming, insect will be able to have additional life cycles with rapid growth rate. Changes in temperatures that directly influence insects, as well as reduced host plant resistance caused by changes in precipitation can contribute to insect population increase. Insect populations are also influenced by temperature and other environmental conditions, and so future changes in climate can be expected to affect insect outbreaks. As a result of changes in the population dynamics including distribution and migration increased insect outbreak can affect agricultural production. Research on basic biology of insect, population dynamics and behavior features should be focused to understand the effect of global warming on insect behavior.

**Keywords:** Insect, population dynamics, global warming

# DETERMINATION OF THE GROWTH PHYSIOLOGY OF CORIANDER (*Coriandrum sativum* L.) IN DIFFERENT GROWING ENVIRONMENTS

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## ABSTRACT

This research was carried out to determine the germination physiology of coriander, an annual herbaceous plant that is widely used as a medicinal and aromatic plant in Turkey, especially in the Eastern Anatolia Region. In the study, the germination rate (%), germination speed (days), average daily germination (days), peak and germination values of coriander (*Coriandrum sativum* L.) in different growing media were investigated under controlled conditions. 100% peat, 75% peat + 25% soil, 50% peat + 50% soil, 25% peat + 75% soil and 100% soil cultivation environments. In the study in which the germination physiology of coriander (*Coriandrum sativum* L.) was determined in five different growing media, it was determined that the media were significant at the 1% level in the parameters examined as statistically. Germination rate (84%), germination speed (10 days), average daily germination (6.43 days), peak (2.2) and germination values (14.1) were found the highest parametres in 100% peat medium. While the lowest parametres values were obtained from 100% soil medium has been done. It has been determined that 100% peat medium provided the best germination for coriander seeds (*Coriandrum sativum* L.).

**Keywords:** Peat, Soil, Emergence, Seed, Medicinal and Aromatic Plants

# GENETIC CHARACTERIZATION OF SOME LOCAL AND FOREIGN BREAD WHEAT GENOTYPES WITH MOLECULAR MARKERS

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## ABSTRACT

Wheat is a strategic crop due to having a high ratio in the total agricultural area both in Turkey and the world, and also being raw material for the most basic nutrients. Due to the limited number of arable land in the world, it will be possible to meet the nutritional needs of the population which is predicted to increase in time only with the increase in the yield per unit area. The best way to increase yield is the breeding of new plant varieties. In recent years, breeders have turned to genetic characterization studies in order to overcome the problems encountered in classical plant breeding. In this thesis, the genetic characterization of 96 wheat genotypes was performed by 8 SSR loci and 4 ISSR loci. Five SSR loci (Barc53, Barc84, Barc319, Xgwm136, and Xgwm295) were monomorphic and three (Xgwm160, Xgwm161, and Xgwm312) were polymorphic (37.5%). A total of 18 alleles were identified for 8 SSR loci. In the study, 40 bands were determined in ISSR analysis and 33 bands were found to be polymorphic (82.5%). The mean Shannon Index was calculated as  $I=0.112$  (SSR) and  $I=0.346$  (ISSR). The mean heterozygosity value for SSR and ISSR was calculated as 0.153 and 0.246, respectively. Dendrogram was formed by UPGMA clustering method with genetic similarity values and it was observed that wheat varieties were divided into two main clusters. The information obtained as a result of this study will contribute to other studies on genetic diversity, genetic structure, breeding and cultivation development in wheat in order to facilitate the selection of some wheat varieties for breeding studies and to form the basis of breeding studies.

**Keywords:** Wheat, SSR, ISSR, Genetic Diversity, Molecular Markers

## BIOACCUMULATION OF HEAVY METALS BY SELECTED SOME PLANTS CULTIVATED IN CENTRAL AND EASTERN BLACK SEA REGION

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### ABSTRACT

The excessive accumulation of heavy metals in the soil, have significant effects not only on soil fertility and ecosystem functions, but also on animal and human health through the food chain. It is also known that heavy metal concentration in soil has certain effects on heavy metal concentration in plants. The aims of the current study are to i-) determine the amount of heavy metal in the leaves of vine, tea and hazelnut plants, ii-) to examine heavy metal transmission in soil systems where the selected plant grows and iii-) to determine the bioaccumulation factor (BAF) used in the evaluation of heavy metal accumulation in plants. For this purpose, leaves and soil samples of hazelnut, vine and tea plants were collected in from Samsun, Tokat and Rize provinces, respectively. Analysis of Cu, Cd, Cr, Pb, Co, Ni and Zn were performed in 7 soil and plant samples from hazelnut fields, 8 from Vine fields and 8 from tea fields also BAF were determined. According to the study results, it was determined that Cd values vary between 0.001-0.038 ppm, Co values 0.023-0.146 ppm, Cr values 0.018-0.026 ppm, Cu values 9.663-73.756 ppm, Ni values 0.001-1.610 ppm, Pb values 0.347-0.684 ppm and Zn values 13.015-50.264 ppm in Vine leaves. In addition, it was found that Cd values vary between 0.022-0.081 ppm, Co values 0.092-0.533 ppm, Cr values 0.025-0.039 ppm, Cu values 2.067-8.017 ppm, Ni values 0.663-2.803 ppm, and Zn values 13.103-26.953 ppm in tea leaves. Moreover, it was detected that Cd values vary between 0.001-0.06 ppm, Co values 0.082-0.652 ppm, Cr values 0.025-0.060 ppm, Cu values 1.603-8.419 ppm, Ni values 0.406-9.473 ppm, Pb values 0.001-0.191 ppm and Zn values 10.227-19.834 ppm in hazelnut leaves. Also, BAF values were changed between 0.00002-2.56 and were sorted as Zn>Cu>Pb>Cd>Co>Ni>Fr over average values in vine leaves. BAF values of tea leaves varied between 0.00003-0.64 and were sorted as Zn>Ni>Cu>Cd>Co>Cr>Pb on average values while BAF values of hazelnut leaves changed between 0.00003-0.64 and were sorted as Zn>Ni>Cu>Cd>Co>Cr>Pb on average values.

**Keywords:** Heavy metal, bio-accumulation factor, tea plant, hazelnut, vine plant

# OPTIMIZATION OF ULTRASOUND ASSISTED EXTRACTION REGARDING TOTAL PHENOLIC CONTENT AND ANTIOXIDANT CAPACITY OF OLIVE LEAVES

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## ABSTRACT

By-products rich in phenolic compounds occur in olive tree cultivation and olive processing industry. Olive leaf, which is one of these by-products; comes out during the pruning of olive trees, the collection of olive fruits and the cleaning-blending process in olive oil production. It has been stated that the olive leaf has positive effects on health which has been associated with the phenolic compounds in the leaves. It is very important to use an appropriate extraction method in order to obtain bioactive compounds without structural degradation and in high yield. Ultrasound-assisted extraction has been proposed as an alternative to conventional solvent extraction in providing better recovery of targeted compounds with lower solvent consumption and/or faster analysis and bioactivity properties. The aim of this study was to optimize ultrasound assisted extraction of olive leaves according to the total phenolic content and antioxidant capacity of olive leaves. The antimicrobial activity of olive leaves was also evaluated in the study. Dependent variables in the optimization were determined as solvent (ethanol/water) concentration (30-70% v/v), extraction time (5-15 min) and amplitude (30-50%). The phenolic content ranged between 666 and 922 mg GAE/100 g and antioxidant capacity was found between 18.11 and 43.79  $\mu\text{mol Trolox/g}$  olive leaf. The leaves extracted at 30% amplitude, 70% ethanol for 10 min showed higher antimicrobial activity against *Staphylococcus aureus* and *E. coli*. Ultrasound assisted extraction method was found effective to maximize total phenolic content with response surface Box Behnken design under optimal conditions with 55.50 % ethanol concentration at 48.40% amplitude, and 14.74 min extraction time.

**Keywords:** Olive leaves, Ultrasound-assisted extraction, Optimization, Antioxidant, Total phenolic content, Antimicrobial

# THE EFFECTS OF MONOCHROMATIC LIGHTING ON HATCH WINDOW AND HATCHING PERFORMANCE IN BROILER BREEDER EGGS

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## ABSTRACT

In this study, the effects of monochromatic lighting on hatch window and hatching performance were investigated. The number of eggs used in the experiment was a total of 780 (Ross-308 genotype). Eggs were randomly assigned to 3 groups. 1) Control group: Eggs were incubated in dark, 2) Green light group: 560 nm (wavelength from 535 to 585 nm), 3) Red light group: 670 nm (wavelength from 640 to 690 nm). During the first 18 days of the incubation period, continuous illumination of 0.1-0.2 lx intensity was provided with LEDs placed on both sides of trays. The light transmission was prevented by blank trays coated with greenhouse covering material which has 75% shading feature placed among experiment groups. In this way, light transmission to other trays and any possible hitches of air circulation was prevented. There was no difference between examined egg weights of the treatment groups in the experiment, but it's found that significant difference in egg weight loss for both colours of light. Red light and control groups (15.00% and 11.92%) show a similar embryonic death rate, while the green light group has a lower embryonic mortality rate (5.00%) than these groups. The effects of monochromatic lighting on the hatching time were significant (Chi-square<0.05). Although there was no difference between hatching performance parameters of the treatment groups in the experiment, the green light group had better hatching efficiency than other groups. The findings of this research were carried out with two different light wavelengths are remarkable for showing that the significant effects of the monochromatic illumination on hatching results.

**Keywords:** Hatchery, monochromatic lighting, hatching performance, hatch window

# THE EFFECTS OF IN OVO INJECTION OF PROPOLIS EXTRACT TO BREEDER EGGS ON HATCHABILITY AND EARLY PERFORMANCE IN BROILERS

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## ABSTRACT

This research was conducted to determine the effects of in ovo injection of propolis extract to breeder eggs on hatchability and early performance in broilers. For this purpose total of 250 units Ross 308 broiler hatching eggs were obtained from a commercial hatchery. Eggs were divided into four groups randomly, isotonic serum sodium (0.9%) was injected at the level of 0.2 ml into the first group and there were used as positive control (PK) group, whereas there was no treatment on negative control (NK) group. Where the amount of 0.2 ml prepared mixture which is included %3 propolis extract were injected into low propolis (LP) group, 0.2 ml prepared mixture which is included %6 propolis extract were given into the high propolis group (HP). In ovo propolis extract injection resulted in a shorter hatching time compared with the control groups. The hatchability, hatching weight and survival of newly hatched chicks were not affected by in ovo injection of propolis extract according to our results. The results indicated that except the PK group chicks' weights were similar at hatching day, but the later stage weights of chicks were started to significantly differ from each other and propolis groups have shown higher live weights than the controls at 5th and 10th day ( $P<0.05$ ). All treatment groups exhibited greater weight gain from hatch to 10 d compared to the control groups. The results indicate that in ovo feeding of broiler embryos with propolis extract may have beneficial effects on broiler hatch weights and early growth rate.

**Keywords:** Broiler, hatching, in ovo injection, performance, propolis

# CHANGES IN SOME BIOCHEMICAL PARAMETERS OF SWEET RED PEPPERS AT DIFFERENT STORAGE TEMPERATURE

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## **ABSTRACT**

Nowadays, a healthy life and nutrition are among the most important problems of humanity. Therefore, the demands of consumers to products with high quality and nutritional value are becoming the focus of recent studies. In line with the demands of the consumers, issues of reducing the biochemical compositions changes of crops are increasingly important. For this reason, sweet red peppers (copia type) stored at different storage temperature (4 °C, 8 °C and 20 °C) for 21 days. Peppers were analyzed for ascorbic acid content, total phenolic content, total anthocyanin content, antioxidant activity, total carotenoid content, electrolyte leakage, physiological disorders, chilling injury and weight loss at the harvest time and 7 days intervals. The total phenolic and ascorbic acid content decreased regularly throughout storage, regardless of storage temperature. However, the decrease of these compounds was delayed in peppers stored at 8 °C. The storage time and temperatures significantly affected the weight loss of peppers. Weight loss increased with increasing time and temperature as expected; but these increases was limited at 4 °C. The chilling injury was not recorded peppers stored at 8 °C and 20 °C. Chilling injury was recorded on 21th days of storage at 4 °C.

**Keywords:** Antioxidant activity, Ascorbic acid, Carotenoid, FRAP, Red pepper

## REDUCING THE TOXIC EFFECT OF KATHON CG USING LIQUID VERMICOMPOST IN PISUM SATIVUM VAR. ARVENCE

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### ABSTRACT

Kathon CG is a biocide consisting of a 3:1 mixture of Methylchloroisothiazolinone and Methylisothiazolinone compounds. Nowadays, Kathon CG can be mixed into soil and sea due to its use as a preservative in many different areas. Liquid vermicompost is the worm humus containing humic acid, phytohormone, and many micronutrients for plant development and growth. In this study firstly, 1.5 mL/L (EC<sub>50</sub>/2), 3 mL/L (EC<sub>50</sub>), 6 mL/L (EC<sub>50</sub>x2) Kathon CG concentrations were applied to *Pisum sativum* var *arvence* and 48 hours after mitotic index, chromosome abnormalities, and DNA damage rate were determined. Then, 48 hours after applying Kathon CG concentrations and 10% liquid vermicompost (SV), mitotic index, chromosomal abnormalities, and DNA damage rate were determined. After the Kathon CG concentrations were applied, it was determined that the mitotic index rates decreased according to the control group, while the abnormality rates increased especially in the prophase, metaphase, and anaphase stages. High rates of nuclear chromatin granulation, pycnotic nuclei, and ghost cells were observed with Kathon CG exposure. In comet analysis, detected DNA damage in stem cells after Kathon CG exposure. An improvement was observed in the mitotic index rates with Kathon CG and 10% SV applying while abnormalities were found to increase especially in the prophase and metaphase stages. In root tip cells, chromatin granulation in the nucleus was not observed, while the ratios of pycnotic nuclei and ghost cells were found to be decreased. As a result of applications with Kathon CG+SV, DNA damage was detected in the comet analysis. As a result of SV applications, we think that vermicompost reduces the toxic effect caused by Kathon CG and supports plant growth.

**Keywords:** Comet assay, Kathon CG, Mitotic index, *Pisum sativum*

## NUTRITIONAL ENRICHMENT OF SESAME SEED BY *Aspergillus niger* SOLID-STATE FERMENTATION

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### ABSTRACT

The aim of the study was to investigate the effect of solid-state fermentation on the nutritional composition of sesame seed. *Aspergillus niger* strains (ATCC 200344, ATCC 200345, ATCC 201572, and ATCC 52172) were used as the microbial inoculants in this study. Sesame seed was fermented by the mixture of *A. niger* strains at 30 °C for seven days. The crude protein (CP), ether extract (EE), ash, neutral detergent fiber (NDF), acid detergent fiber (ADF), and acid detergent lignin (ADL) of unfermented and fermented sesame seed were determined. Solid-state fermentation increased the CP (P<0.001) and ash (P<0.01) content while decreased the EE (P<0.05), nitrogen-free extract + crude fiber (P<0.001), NDF (P<0.001), ADF (P<0.01), and ADL (P<0.05) content of sesame seed. The results showed that the nutritional value of sesame seed can be improved by *A. niger* solid-state fermentation.

**Keywords:** sesame seed, nutritional composition, solid-state fermentation, *Aspergillus niger*, fermented feed

## **SOLID-STATE FERMENTATION USING *Aspergillus niger* IMPROVES THE NUTRITIONAL QUALITY OF OLIVE PULP**

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### **ABSTRACT**

The effect of solid-state fermentation on the nutritional composition of olive cake was investigated in this study. Olive cake was fermented with *A. niger* (ATCC 9142) at 30 °C for seven days. The crude protein (CP), ether extract (EE), ash, crude fiber (CF), neutral detergent fiber (NDF), acid detergent fiber (ADF), and acid detergent lignin (ADL) of unfermented and fermented olive cake were determined. Fermented olive cake had lower CF ( $P<0.01$ ), ADF ( $P<0.01$ ), and ADL ( $P<0.001$ ) content than unfermented olive cake. Fermentation decreased ( $P<0.01$ ) the nitrogen-free extract but did not change the CP, EE, ash, and NDF content of the olive cake. Obtained results showed that the nutritional quality of olive cake can be improved by *A. niger* solid-state fermentation.

**Keywords:** olive pulp, nutritional quality, solid-state fermentation, *Aspergillus niger*, fermented feed

# EFFECTS OF DIFFERENT SOWING TIMES ON YIELD AND QUALITY TRAITS OF SAFFLOWER UNDER THE TEKİRDAĞ CONDITIONS

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## **ABSTRACT**

The aim of this research was to determine the effects of different sowing times on some agronomical and technological traits of safflower (*Carthamus tinctorius* L.) cultivars. The study was conducted at applying research field, Faculty of Agriculture, Namık Kemal University, Tekirdağ in spring of 2017 and 2018. The experiment was carried out as a split plot design based on randomized complete block design with three replications, in which cultivars constituted the main plot with two cultivars (Dinçer and Balcı), and sowing times constituted the sub-plot with four dates (20 February, 5 March, 20 March and 5 April). Results showed that variation in sowing times had a significant effect on seed yield, oil content and oil yield of safflower. The highest oil content was obtained from the Balcı cultivar (35.71 %), while the highest seed yield and oil yield were obtained from the Dinçer cultivar (149.55 and 44.48 kg/da respectively). According to the results, seed yield significantly decreased as sowing time was delayed. The highest seed yield was obtained from sowing on February 20 (162.47 kg/da). As a result, because of sowing time is an important factor for seed yield of safflower, sowing should be done as early as possible in the spring.

**Keywords:** Safflower, sowing time, seed yield, oil content

**RHIZOBIA INOCULATION AND DMPP NITRIFICATION INHIBITOR HAD  
EFFECT PHENOLOGICAL AND MORPHOLOGICAL CHARACTERS OF BEAN  
(PHASEOLUS VULGARIS L.)**

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**ABSTRACT**

The field experiment was conducted during the 2017 and 2018 at the experimental area of the Faculty of Agriculture, Eskisehir Osmangazi University, Eskisehir, Turkey. The experiment was designed as factorial arrangement in the complete randomized block design with four replications. In this study, rhizobia and non-rhizobia were investigated at different nitrogen fertilizer types and doses (control, 25 kg ha<sup>-1</sup> AS, 25 kg ha<sup>-1</sup> DMPP, 50 kg ha<sup>-1</sup> AS and 50 kg ha<sup>-1</sup> DMPP). The effects of year were significantly for all of the investigated characters except for emergence time. Bacteria inoculation was increased all of the morphological characters and grain yield and decreased phenological characters. 50 kg ha<sup>-1</sup> DMPP nitrogen fertilization types and doses were provided highest values for investigated characters and grain yield. The use of nitrogen inhibitors may be an important practice to improve the bean crops. With the use of DMPP, the amount of nitrogen fertilizer and the number of applications of nitrogen fertilizers can be reduced.

**Keywords:** Bean, DMPP, phenological properties, morphological properties, yield

# THE EFFECTS OF BEE FLIGHT AND POLLINATING DISTANCE ON SEED PRODUCTION AND QUALITY IN SEED SUNFLOWER PRODUCTION

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## ABSTRACT

Chasmogamy plays a significant role in the sunflower seed production. The amount of natural pollinators has dramatically decreased as a result of intense use of insecticide in farming areas. Therefore, the use of honeybee for pollination has become compulsory. This study has been conducted in the fields that were cultivated sunflower of Akcapinar village of Ezine district of Canakkale in 2020. The sowing of sunflowers has been done as 9 orders of male-sterile, and 2 orders of restorer line. The distances among the orders were adjusted as 70 cm, and the intrarow distances were 25 cm. In the study that has been conducted in producer fields, three repetitive panel samples have been harvested from 1st, 3rd, 5th, 7th and 9th orders that were after restorer line, and the seed attitude and the seed feature were investigated by blending in the labs of the Field Crops Department of Faculty of Agriculture of Canakkale On Sekiz Mart University. Flight distances of honeybees have not been influence on the seed attitude in the study. However, the distance to the restorer line has affected the yield of the seeds significantly. The yield of seeds has increased in male-sterile plants which has been close to the restorer line. It was concluded that decreasing the number of main line orders is beneficial for the production of sunflower seed.

**Keywords:** Pollination, seedbes, flight distance, mother line

## THE EFFECTS OF SUMMER PRUNING APPLICATIONS OF VINE GROWTH AND CLUSTER FEATURES

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### ABSTRACT

Viticulture in our country has an important place both because of ecological conditions and it provides the livelihood of most families. Among the main problems in viticulture in our country, the low amount of product obtained per unit area, the fight against fungal diseases and quality losses have an important place. In order to keep the yield and quality at the highest level, it is important that the cultural practices are carried out in a timely and correct manner. Pruning, which has an important place among these cultural practices, is considered as winter and summer pruning. Winter pruning, also known as yield pruning, aims to keep the yield and quality at a high level by ensuring the continuation of the physiological balance of the vine and the training given to the vine when it is at full dormancy. Summer pruning applications are made throughout the vegetation following the winter pruning. With summer pruning, it is aimed to obtain the color specific to the variety, to increase the quality of the cluster, to strengthen the vine, to prevent disease factors, and to reach the inner parts of the vine better by spraying by providing air flow between the shoots of the vine. In line with these purposes, summer pruning types such as sprout and waterspouts, leaf removal, axillary shoots removal, shoot tip and topping removal, cluster thinning, cluster tipping, and girdling are carried out. The young shoots that do not form clusters and that come out of the old parts should be removed in the early period as it will be difficult to remove as time passes and the damage they cause will increase. Better development of fertile shoots will be achieved by removing the empty shoots. The leaf removal, allows better ventilation of the inner parts of the plant canopy, the penetration of sunlight into the vine, the increase in the color of the berry, the maturation of the clusters and the more effective spraying. Shoot topping is done in order not to experience ventilation and lightening problems in varieties that create more axillary shoots, and to prevent excessive moisture accumulation in the vineyard. With shoot topping, better development of clusters, increase in berry set and at the same time stronger development of weakly developing shoots are provided. With this process, before flowering in varieties showing weak berry set; On the other hand, in cultivars with dense berry setting, it is beneficial to perform the shoot tipping process after flowering. Shoot topping is the practice of making more cuttings from the tip of the shoot in order to use the water and nutrients to be used in shoot elongation for the development of clusters and grains. Cluster thinning is done in order to increase the quality of the remaining clusters by reducing the number of clusters. Cluster tip cutting is the practice of reducing the bunches by cutting them a little. It is applied to increase berry size, coloration of berries and increase quality in table varieties. Shoot girdling is applied with the aim of preventing the passage of the nutrients synthesized in the leaves from the top to the bottom and thus increasing the growth of clusters and shoots in the upper part. Summer pruning applications; It may vary depending the variety to be grown, the rootstock type, the application time, the climate of the region where the cultivation is made, and the type of training given. For this reason, timely and correct summer pruning applications suitable for the variety are among the basic principles of viticulture.

**Keywords:** Vine, Summer Pruning, Development, Yield, Quality

# SEEDS OF ECHINOCHLOA SPP. IN SEEDBANK IN RICE FIELDS IN THE BIGA DISTRICT OF THE ÇANAKKALE PROVINCE, TURKEY

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## ABSTRACT

Rice is used by more than half of the world population as staple crop, which is the third most grown cereal following to maize and wheat. It has been a cash crop for farmers in some districts such as Biga of the Çanakkale Province despite it is not a crop grown largely in Turkey. The Marmara Region produces more than half of the Turkey's rice production. Weeds become the foremost problem in rice fields in Turkey due to herbicide resistance, newly introduced weeds, and hybridization in some species. They cause quantity and quality losses in the crop and make agricultural practices difficult. *Echinochloa* spp. are seen in every single rice field in Turkey. The aim of this presentation is to show the role of soil seedbank in *Echinochloa* problem. Soil samples were taken from four fields in Biga in October 2019. In each field, from three different points, soils were taken from four different depths 0-2,5, 2,5-5, 5-10, and 10-20 cm depth. Approximate average dry weight of each sample was 300 g. Using wet sieving and floating methods, seeds were retrieved then identified using pictures and internet sources. The percentage of *Echinochloa* spp. seeds in retrieved seeds is 74% (62.19 to 79.64), which shows the importance of *Echinochloa* spp. in rice fields. The percentages of *Echinochloa* seeds in vertical distribution were 69.82%, 74.23%, 76.37, and 75.13% for depths 0-2.5, 2.5-5, 5-10, 10-20 cm, respectively. It is also another sign of *Echinochloa* problem because it emerge during growing season due to vertical distribution as well. Three well identified *Echinochloa* species have been recorded in Biga area, namely *E. crus-galli*, *E. oryzicola* and, *E. oryzoides* that we found seeds of all three.

**Keywords:** Barnyardgrass, *Echinochloa* spp., rice, seed, Biga

This presentation is prepared from master thesis.

# INVESTIGATION OF SOME QUALITY PARAMETERS OF HOMEMADE YOGURT WITH NETTLE POWDER

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## ABSTRACT

In this study, it was aimed to determine the effect of powdered nettle addition at the rate of 1% (A1), 2% (A2) and 3% (A3) on some quality parameters in traditional yoghurt made using homemade yoghurt yeast. Physical-chemical [pH, titration acidity, syneresis, viscosity, colour (L\*, a\*, b\*)] and sensory properties were investigated on the 1st, 7th, 14th and 21st days of storage. The titration acidity (% lactic acid), pH values and syneresis values were determined respectively as between 0.71-1.21%, 3.86-4.40 and 2.85-9.50 ml/25 g in yoghurt samples. The average viscosity value of the yogurt samples containing nettle powder was higher than the control yogurt. The highest viscosity value was found in the A3 sample group on the 21st day and the lowest viscosity value was found in the control group on the 14th day. Differences between L\*, a\* and b\* values of yoghurt samples according to yoghurt types and storage times were statistically significant ( $p < 0.01$ ). Panellists, who evaluated the sensory properties of yoghurts such as appearance, taste, colour, odour, consistency, acidic taste and general acceptability, scored the 1% (A1) group as close to the control group. Sensory evaluations have shown that 1% and 2% nettle powder can be used in the production of yoghurt. Colour is an important parameter that determines the acceptability of a product, and the intensity of the green colour reduced panellists' appreciation. It is thought that the development of alternative dairy products with the addition of nettle, a plant with high nutritional and therapeutic properties, will bring an innovative understanding to the functional food market.

**Keywords:** Nettle, Homemade yogurt, Sensory properties, Viscosity, Syneresis

# THE USE OF MAPLE SYRUP AND CHLORELLA VULGARIS IN YOGHURT PRODUCTION

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## ABSTRACT

Today, food science and technology strives to establish a new fundamental field in the light of nutritional guidelines. The enrichment of yogurt, which is an important culture of Turkish cuisine, with additive components in terms of both nutritional and health is one of these applications. At the same time, because of yogurt is loved by most people, it is accepted as a good medium to provide and improve the daily intake of nutrients that can prevent diseases and have positive effects on consumer health. As a result, the studies on enriching the functional and nutritional values of yogurt are increasing day by day. As an example, we can give the development of a new product by combining these two valuable products, since algae contain bioactive compounds or phytochemicals that can benefit health and have valuable nutrients. Microalgae have been an important part of human nutrition for centuries. Especially *Spirulina* and *Chlorella* are produced on a large scale around the world. *Chlorella vulgaris* contains essential amino acids, proteins, ascorbic acid and B complex from vitamins, mineral substances,  $\beta$ -carotene, chlorophyll and other important compounds necessary for health. The consumers have changed their preferences instead of synthetic additives and turned to natural additives has led to an increase in studies on the use of microalgae-based components in foods. However, considering the effects of consumption of sugary products on chronic diseases such as diabetes and obesity, it is extremely important to examine the importance of using natural sweeteners and the production of a new functional and healthy microalgae fermented product in terms of consumer expectations. The purpose of this review was to examine the use of natural sweeteners maple syrup and *Chlorella vulgaris* in yogurt production in the light of scientific data in terms of the sustainability of our health and a protective/preventive diet.

**Keywords:** Microalgae, *Chlorella vulgaris*, Maple syrup, Yogurt

**DETERMINATION OF ADULT LONGEVITY OF COTESIA GLOMERATA L.  
(HYMENOPTERA: BRACONIDAE) ON DIFFERENT DIETS**

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**ABSTRACT**

The purpose of the study was to determine the differences between adult longevities of *Cotesia glomerata* (Hymenoptera: Braconidae), larval parasitoid of *Pieris brassicae* (Lepidoptera: Pieridae), on different diets. With this purpose, *C. glomerata* adults gathered from *P. brassicae* larvae from cabbage fields in 2019 and 2020, were fed with honey water (15%), molasses water (15%), sugar water (15%), mixture diet (15% honey + 15% molasses + 15% sugar + 55% distilled water) and distilled water. In addition, adult longevity was determined with adults without any food as control. Number of days alive was recorded for each adult with daily checks. At the end of the study, data were compared with statistical analysis. According to the results, there was no statistical difference between the longevities from honey water (3,27 days), molasses water (3,32 days), sugar water (2,84 days) and mixture diet (3,53 days), while longevity from distilled water and control were lower than the other diets. At the same year, longevities of males and females were also higher from honey water, molasses water, sugar water and mixture diet than others. When longevities on different diets were compared, female longevities were higher than male longevities in molasses water, sugar water and mixture diet. Longevities on honey water, distilled water and control did not significantly differ between sexes. On the second year of the study, highest longevity was determined from sugar water (2,56 days), while honey water (2,08 days), molasses water (2,00 days) and mixture diet longevities did not differ from each other significantly. Longevities from distilled water (1,36 days) and control (1,33 days) were significantly lower than the other diets. When the effect of diets on longevity was compared based on the sexes, similar to the general longevities, longevity from sugar water were higher on both sexes. On sugar water and mixture diet, female longevity was found to be longer than males, but there was no significant difference from other diets and control. As the result of the study, sugar water can be considered as an alternative to honey and molasses, as there is not any significant difference between longevities from these diets, and sugar is cheaper in general.

**Keywords:** *Cotesia glomerata*, Adult Longevity, Diet, Honey, Molasses, Sugar

# NUTRITIVE VALUE OF SILAGE AND HAY MADE FROM RADISHES (RAPHANUS SATIVUS) BY-PRODUCTS FOR ANIMAL

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## **ABSTRACT**

Agricultural field crop residues or by-products are the materials left after the crop has been harvested which include leaves, stems, flowers and bulbs. The utilization of crop by-products as roughage is a feasible alternative for economy of animal nutrition and waste management.

The objective of this study was to determine the nutritive value of radishes by-products as silage and hay in animal nutrition. Samples of fresh radishes were obtained from local bazaar during the harvesting season in March 2021. Then one part of radishes is chopped 3 cm and ensiled in to glass jar with three replicates for 45 and 60 days. And other part is used for making hay. For this purpose dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), ash, total phenol compounds (TPC), water soluble carbohydrate (WSC), pH, mould, yeast and lactic acid bacteria (LAB) was analyzed. The metabolizable energy (ME), fleigh scores and relative forage value (RFV) were also determined. The pH values changed significantly according to opening time of silos ( $P<0.05$ ). The WSC concentrations were differed between silages and hay samples ( $P<0.05$ ). No differences were determined between silage and hay samples in CP, cell wall components and TPC. Radishes by-product does not have any conservation problem as silage or hay and can be use in animal nutrition. Further studies on aerobic stability and feeding trials will be required.

**Keywords:** Fermentation, preservation, nutritional composition

# AN OVERVIEW OF SUPPORT POLICIES IN WHEAT PRODUCTION

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## ABSTRACT

Wheat is a strategic product because it is the raw material of bread, which is the main food source of humanity, and it meets the basic feed needs in animal production. The total world production is 761 million tons and approximately 3% of this is produced by Turkey. In this study, the price and support policies of the last 10 years in wheat production, which has strategic importance, were evaluated in general. The data used in the evaluation; compiled from databases of the Turkish Statistical Institute (TUIK), Central Bank of the Republic of Turkey, Eurostat, Oecdstat, Ministry of Agriculture and Forestry. For this purpose, product prices and supporting amounts according to the years as well as inflation-free reel prices are given. The current product price, which was 0.605 TL/kg in 2011, increased by 172.73% and became 1.65 TL/kg in 2020. When the product price is realized according to the 2003-based consumer price index (CPI), it is seen that the price in 2011 was 0.32 TL/kg and the price in 2020 was 0.35 TL/kg (an increase of 10.31%). According to the results of the study, a farmer's total herbal product value of 600 kg / da in Tekirdağ province was calculated as 1450 TL/da. The total amount of support of this manufacturer will receive the amount of total support (51 TL / da) and premium-based support (60 TL / DA) was calculated as TL 111. Considering the gross production value of the producers over the years, it is seen that there are big differences. For example, while a return of 77.3 \$/da was provided in 2018, this value is seen to be 109.1 \$/da in 2019. The main reason for this income difference is the average yield of wheat in the region and the base price of wheat. The support policies implemented by the state for sustainable wheat farming by minimizing this difference and capturing a certain profit margin of the producer reveal the importance.

**Keywords:** Agriculture, Wheat, Agricultural Supports

# THE STRUCTURAL EVALUATION REGARDING TO AGRICULTURAL TOURISM OF VITICULTURE FARMS IN TEKİRDAĞ PROVINCE

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## ABSTRACT

Agricultural tourism enables consumers to see a production pattern on the spot and have information by including them in agricultural activities in rural areas, either for a day or with accommodation. In addition, agricultural tourism is the purchase of the products harvested by the producers or sold locally by the visitors, thus providing an economic contribution to the producer, promoting the social and cultural characteristics of the region and raising awareness on the consumer. In other words, it is the farmers' marketing of their agricultural activities and rural cultures without breaking away from the existing agricultural production pattern. In this context, activities that can provide additional income to the producer; outdoor recreations, educational experiences, harvest festivals, accommodation services, direct sales from the farm. In this way, while the producers will ensure their sustainability in agricultural terms, it will also contribute to the development of individuals living outside the rural areas in terms of agricultural culture. In this study, its commentate the perspectives on agricultural tourism activities that can provide additional income to the farmer alongside their current agricultural production of viticulture farms in Tekirdağ province. In addition, were investigated in terms of their potential to apply of these activities and the structural adaptation to agricultural tourism of viticulture farms. For this purpose, were tried to be revealed agricultural tourism potentials of 104 viticulture farms in 27 neighborhoods of Süleymanpaşa and Şarköy districts in Tekirdağ province. Considering some of the parameters required for tourism, Tekirdag province has features such as having the sea-sand-sun, at the same time, natural attractiveness (forest ecosystem, etc.), hosting historical wineries and museums, revealing the strong side of the region. It seems that the willingness of the producers to give agricultural tourism activities is in a positive direction when the findings obtained as a result of the study conducted in Şarköy and Süleymanpaşa districts The biggest negativities for the viticulture businesses in the study area are; When the demographic characteristics of the rural neighborhoods, such as low income levels of the producers, high average age (about 55 years), the young population is almost non-existent, and the annual birth rate is below 1, the producers are shy about taking risks and being open to innovations.

**Keywords:** Agricultural Tourism, Tekirdağ, Viticulture

## SALINITY AND DROUGHT STRESS IN WALNUT

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### **ABSTRACT**

Walnut (*Juglans regia*.L.) is one of the most important nut with high economical value. Plant stressors such as salinity and drought has major impact on plant development and productivity thus causing serious agricultural yield losses. Walnut needs large amount of water to reach its optimal yield and quality and many current commercial walnut cultivars are very sensitive to drought and salt stress factors. Due to the soil salinization and drought many agricultural lands becomes arid or semi-arid. Thus finding new cultivars and rootstock that shows relatively high level of tolerance to salinity and drought stress factors in different growing stage can prevent severe yield loss in walnut. Also allow us to plant walnut in semi-arid or even arid regions. In this article we will focus on the salinity and drought stress studies conducted on walnut.

**Keywords:** walnut, salt stress, drought stress

## **SALT STRESS AND ITS MECHANISM IN ALMOND**

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### **ABSTRACT**

Almond (*Prunus dulcis* Mill) is one of the most widely cultivated nut in the World. Almond is very important in cosmetic, industrial and medicine industries. Like other stone fruit tress almond is also very susceptible to salt stress and suffer dramatic yield lost under salt stress conditions. Salt stress is one of the most important abiotic stress that we are facing in almond cultivation. And it can affect almond's pomological, physiological and morphological characteristics. In this study, we will focus on the salt stress studies and its mechanism in almond.

**Keywords:** Almond, Salt stress, mechanisim

# CHANGES IN SHRUB QUALITY AND GOAT PREFERENCES IN THE CAFETERIA FEEDING SYSTEM

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## **ABSTRACT**

Goats grazing in the shrub pastures supplemented their daily diets by consuming different shrub species. The animal preferences varied according to the season and the taste of the shrub species. This study was carried out in a farmer's farm at the 15th kilometer of Balıkesir-Edremit Highway between November 2014 and April 2015. In the research, 5 seanen goats were used as animal material. Five shrub species (kermes oak, maple cut, mullein, labdanum and thyme) were used to determine goats' grazing preferences.

Akçakesme and Kermes oak were mostly preferred by the goats in all observation periods. Akçakesme was consumed over 1 kilogram per day in the spring months of April and May. The least preferred species in all periods was thyme. Results indicated that goats preferred the shrub species with low ADF, NDF and crude fiber content.

**Keywords:** Shrub quality, goat preferences, cafeteria feeding system

# INVESTIGATION OF GOATS' DAILY BEHAVIOR UNDER CAFETERIA FEEDING SYSTEM

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## **ABSTRACT**

This study was conducted in private farm with Turkish Saanen goats and five shrubs species in five different months in Balıkesir during the years 2014-2015. Shrubs species were *Phillyrea latifolia* L., *Quercus coccifera* L., *Spartium junceum*, *Cistus creticus* and *Thymus capitatus*. The cafeteria feeding system was applied to investigate the consuming preferences of the goats. Goats' behaviors were monitored in April, May, July, and November. Daily observations were made from 9:00 until 16:00 hours.

Results showed that goats started to graze quickly when they reach the grazing material within the observation hours (09:00-16:00). In the next stage, selectivity came to the fore, and it was observed that the consumption rate in the morning began to decrease towards noon. After the feeding behavior, the goats mainly performed rumination and mostly lying. It has been observed that there were changes in the shrub species preferred by the goats in different months. In all months, goats did not engage in feeding activity between 12 and 13 hours. Other behaviors varied according to the months.

**Keywords:** Goat behavior, cafeteria system,

## GENOME ANNOTATION IN PLANTS USING ENSEMBL

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### **ABSTRACT**

Genome annotation is description detected genes or variants on the genome and indexing their genomic coordinates. In other words, DNA annotation or genome annotation is the process of determining the positions of genes and all coding regions in a genome and determining what these genes do. It involves gene annotation provided by Ensembl, ie the identification of transcripts across the genome. The development of markers associated with agronomic traits in plant breeding and their position, expression or function on the genome play an important role in breeding programs. Because each variant has different meanings on the exon or on the intron region. In this article, the genome annotation of the variants and the definitions according to their position will be defined.

**Keywords:** Genome, ensembl, annotation

## ALTERNATIVE BOOM DESIGN FOR FIELD SPRAYERS

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### ABSTRACT

Sprayers commonly used to apply pesticides on the field crops. Since the main crops grown in Thrace Region are grains and oil crops, field sprayers are the most common equipment for crop protection. A survey is carried out by interviewing 132 farmers with 22 questions in order to determine the field sprayer properties and the problems faced while operating them. The commonly used field sprayers have 800-1000 l tank capacity, 12 meters of boom width, and a manual boom folding mechanism. 57.6 % of the attendants have stated that the sprayer booms have been fractured by hitting the ground or an obstacle. 78.8 % of the sprayers have had nozzle clogging issues and 20.5 % of the farmers stated that they have seen cracks on the liquid tanks in time. According to this research, it is concluded that sprayer boom is a crucial component of the field sprayers. In order to eliminate the failures of the sprayer booms, the design of those components is crucial. For that reason, a telescopic sprayer boom consists of 5 parts that holds 24 flat fan nozzles was designed. Materials used in the boom design are St-37 welded square and St-52 sheet metal. The telescopic motion of the boom parts is provided by wheels that are beared with radial ball bearings. The propulsion is created with the rack-pinion mechanism and a DC motor. In order to examine the strength of the design, static structural analysis are carried out in Solidworks-Simulation module by using Finite Elements Method (FEM). All boom parts, wheels and boom-chassis support points are investigated individually. All forces affected on the boom parts both on X-Y and Y-Z planes are calculated with the help of the free-body diagrams. Support points, gravity and external forces are applied before the analysis carried out. After the mesh creation, the analysis are carried out and Von-Mises stress and displacement graphs are created. According the graphical results, critical zones on the boom parts are identified and design improvement are performed when necessary. Finally, bolt shear stresses and bearing fatigue are calculated.

**Keywords:** Boom, field sprayer, design, finite element analysis

## USE OF SSR MARKERS IN STRAWBERRY CULTIVARS

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### ABSTRACT

*Fragaria × ananassa* Duch. ( $2n = 2x = 56$ ) is an economically important fruit species grown in temperate regions of the world, due to its nutritional properties and health-promoting effects. Being a member of the Rosaceae family, strawberry is one of the most consumed fruits. Strawberry is also a popular fruit among producers because of its great taste and economic importance. It would be advantageous to have a robust and reliable identification system that does not rely on phenotypic characteristics to help preserve the genetic makeup of the cultivated strawberry varieties and protect the rights of plant breeders. Previous studies have used a number of different molecular marker systems for fingerprinting of strawberry varieties, including AFLP (Amplified Fragment Length Polymorphism), RAPD (Random Amplified Polymorphic DNA), SRAP (Sequence-Related Amplified Polymorphism) and ISSR (Inter-Simple Sequences Reaped). In recent years, there has been increased interest in developing molecular markers for *Fragaria* such as microsatellites, also known as simple sequence repeats (SSRs). In recent years, there has been increased interest in developing molecular markers for *Fragaria* such as microsatellites, also known as simple sequence repeats (SSRs). Many of these SSR markers have been developed from genomic DNA libraries. Microsatellites are short DNA sequences that are repeated sequentially in the genome as mono, di, tri or tetra nucleotides and show polymorphic properties. Microsatellites can be used effectively for require less DNA, being codominant and stable markers, being abundant and dispersed in the genome, being reproducible and suitable for automation, showing high polymorphism and being an informative marker system, it is used in phylogenetic analysis, variety identification, population genetics, genetic mapping and marker-based selection studies.

**Keywords:** Strawberry, microsatellite

## GENIC SIMPLE SEQUENCE REPEATS IN WILD PISTACIA SPECIES

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### ABSTRACT

Pistacia genus belongs to the Anacardiceae family, includes more than 11 species and Wild trees of Pistacia species such as *P. atlantica* Desf., *P. eurycarpa*, Yalt., *P. lentiscus* L. and *P. terebinthus* L. *P. mutica* F. & M., *P. palaestina* Boiss have spread almost all over the world. Other known Pistacia species in the world are *P. integerrima* Stewart and *P. chinensis* Bunge. Wild Pistacia species are used as rootstock seed source for grown *P. vera* and sometimes as fruit consumption, oil extraction, soap production and forest trees. Simple sequence repeat (SSR) markers are very important marker type due to their abundancy in the genome and codominant nature. EST-SSR markers are more valuable because they are directly linked to the genes. EST-SSR markers are very informative and their development becomes more cost effectively due to the advances in sequencing technologies. EST-SSR markers are very useful in population and germplasm studies due to its direct link to the genic regions in the genome. To date very little EST-SSR studies have been made in wild Pistacia species. Many studies have been conducted on *P. vera* grown from wild Pistacia species but some of these studies examined the transfer of these primers to wild species. EST-SSR markers are also valued for their high level of transferability among the different species in the same genus. EST-SSR markers not widely used in Pistacia species. However, some studies conducted using EST-SSR markers in Pistacia species and Pistacia population showed that EST-SSR markers are more useful than genomic SSR markers in phylogenetic, genetic mapping studies.

**Keywords:** Pistacia, EST-SSR, genic

# EFFECT OF DIFFERENT GERMINATION ENVIRONMENT ON SOYBEAN GERMINATION

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## **ABSTRACT**

This study was conducted in order to determine the germination rates of seeds of different soybean (*Glycine max* L. Merr.) varieties (Gapsoy-16, Traksoy and İlksoy) in soils with different properties (sandy loam, clayey, sandy-clay loam-I, sandy loam and sandy-clay loam-II) in a climate laboratory with two different temperature and humidity values (Growing Environment) in 2018 with 4 replications. In the first growing environment (max. 24 °C, min. 13 °C, humidity 52%), the germination rates of soybean varieties on the 8th, 12th, 16th and 20th days after planting, soil structure and variety x soil structure interaction that was determined to be significant at level 1% were statistically significant. On the basis of cultivars, the highest germination rate of 35.25% (7.05/20) was recorded in İlksoy variety, and the highest germination rate in terms of soil textures was recorded in Sandy Clay Loam-II with 45.85% (9.17/20). The difference between the germination values of soybean varieties was not significantly affected by the soil texture change, and the highest germination value of 60% (12/20) was obtained in the Sandy Clay Loam-II texture of the İlksoy variety. In the second application (max. 33.8 °C, min. 20.6 °C, humidity 32%), germination rates on the 4th, 8th, 12th and 16th days after planting, the effect of soil texture on germination and soil structure x variety interaction. On the other hand, it was found to be statistically significant at the 1% level only in the first observation (4th day). The highest germination values were reached on the 16th day, and the highest germination among soybean varieties was recorded in Traksoy with 71.00% (14.20/20). Among the soil textures, the highest germination value was 75.40% (15.08/20) in Sandy Clay Loam-II soil and the highest germination in soil structure x variety interaction was in Traksoy x Sandy Clay Loam-II interaction with 85% (17/20) has taken place. The effect of temperature values on soybean seed germination was significant at the 1% level. Average emergence of variety values of the first and second period plantings were determined as 5.73/20 (28.65%) and 13.22/20 (66.10%) respectively. As a result, the effect of sowing time temperature and soil texture on the germination of soybean seeds and the difference between the germination rates of seeds of different soybean cultivars were found to be significant. It is important for soybean producers to consider the temperature values when planting, and to prefer light textured sandy clay lands instead of heavy textured soils that negatively affect the germination of soybean seeds.

**Keywords:** Soybean, Soil Texture, Germination, Temperature Values

# VARIATION OF PM10 AND SO2 CONCENTRATIONS IN HEATING DEGREE DAYS AND COOLING DEGREE DAYS IN KIRKLARELI, TURKEY

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## **ABSTRACT**

Today, with the rapid increase of the world population, air pollution due to heating is increasing in cities. In this study, heating degree days and cooling degree days were determined in a one-year period in Kirklareli city centre. The variation and cumulative distribution of daily PM10 and SO2 concentrations in heating degree days and cooling degree days have been compared. It has been determined whether the daily PM10 and SO2 concentration values in the heating degree days and cooling degree days exceed the limit values set by The European Parliament and of The Council. The wind rose diagrams have been plotted in heating degree days and cooling degree days. In addition, polar plot has been produced for PM10 and SO2 concentrations. The directions of transport of PM10 and SO2 on heating degree days and cooling degree days were determined.

**Keywords:** PM10, SO2, heating degree days, cooling degree days, polar plot

**ASSESSMENT OF ENVIRONMENT EFFECT ON AGRONOMIC AND QUALITY  
PARAMETERS OF BARLEY (*Hordeum vulgare* L) GENOTYPES UNDER RAINFED  
CONDITION**

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**ABSTRACT**

This research was carried out to assess the yield and quality parameters of barley genotypes under rainfed conditions. The experiments were set up with 25 barley genotypes in a completely randomized blocks design with four replications during the four consecutive cycles from 2014-2015 to 2017-2018 growing cycle in Edirne location, Turkey. Data on grain yield, plant height, days of heading, 1000-kernel weight, test weight, protein ratio, and grain uniformity was investigated. The results of the study showed that there were significant differences among environment and genotypes based on characters investigated. There was variation in all parameters over the years due to the effect of the environment. It was found various correlations between grain yield and parameters investigated. TKW was positively correlated with test weight, protein ratio and grain uniformity across four environments. In the 2014-2015 cycles, grain yield negatively correlated with plant height and protein ratio. There was a significant positive relation between grain uniformity and TKW, TW and protein ratio. In 2015-2016, grain yield was significantly negatively correlated with plant height and positively correlated with 1000-kernel weight and grain uniformity. Grain uniformity positively significantly correlated with TKW, and negatively correlated with days of heading. In 2016-2017, grain yield was slightly negatively correlated with plant height. A positive correlation was observed between TKW with test weight and grain uniformity. In 2017-2018, grain yield was slightly positively correlated with all parameters investigated in the study. Grain uniformity positively significantly correlated with plant height, TKW, test weight and protein ratio. A positive correlation was found between TKW with test weight, protein ratio and grain uniformity. Protein ratio was significantly correlated with plant height, 1000-kernel weight and test weight. Environment factors had various effects on grain yield, 1000-kernel weight, test weight, protein ratio grain uniformity, earliness and plant height. Various environmental conditions caused different correlations between parameters. Therefore, it is very important in breeding studies to determine stable genotypes

**Keywords:** Barley, genotypes, yield component, quality parameters, environment effect

**ASSOCIATION OF YIELD AND YIELD COMPONENT IN DURUM WHEAT  
(*Triticum durum* Desf.) GENOTYPES UNDER RAINFED CONDITIONS**

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**ABSTRACT**

This study aimed at investigating genotypic differences in the leaf area duration of durum wheat genotypes and their relation to grain yield under rainfed conditions. The research was carried out at Trakya Region, Turkey, in 2016-2017 growing years with 30 genotypes in randomized completely blocks design with 4 replications. Data on grain yield, flag leaf area, days of heading, plant height, peduncle length, spike length, spikelet per spike, number of kernel per spike, and relationships among these characters were investigated. The analysis of variance revealed highly significant differences ( $p < 0.01$ ) among the genotypes for all parameters investigated. The mean grain yield of the genotypes was 6496 kg ha<sup>-1</sup>. The highest yields were obtained in the G25 line with 7466 kg ha<sup>-1</sup> and followed by genotypes C1252, G6, and G13 had the highest grain yield. The mean values of the genotypes were varied between 74.8 to 92.8 cm for plant height, 26.1 to 35.3 cm for peduncle length, 7.0 to 9.5 cm for spike length, 16.6 to 23.4 for spikelet number per spike, 30.2 to 69.5 for kernel number per spike and 16.4 to 28.2 cm<sup>2</sup> for flag leaf area. Correlation coefficients based on the investigated parameters were determined by Pearson's correlation analysis. Flag leaf area positively correlated with grain yield and kernel number per spike. Days of heading were positively significantly correlated with spike length ( $r = 0.562^{**}$ ) and spikelet number per spike ( $r = 0.749^{**}$ ). A significant positive correlation was determined between plant height with peduncle length ( $r = 0.412^*$ ), and spike length ( $r = 0.498^{**}$ ). A negative correlation was observed between the flag leaf area with plant height ( $r = -0.442^*$ ). Spikelet number per spike was negatively correlated with peduncle length ( $r = -0.488^{**}$ ) and positively correlated with spike length ( $r = 0.477^{**}$ ). The correlations among agronomic parameters revealed that flag leaf can be used as selection criteria to improve grain yield in durum wheat.

**Keywords:** Durum wheat, Genotypes, Yield, Yield component

# GENOTYPES × ENVIRONMENT INTERACTION AND STABILITY OF BREAD WHEAT (*Triticum aestivum* L.) CULTIVAR UNDER RAINFED CONDITIONS

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## **ABSTRACT**

The significant genotype (G) and environment (E) interaction and genetic diversity in the breeding programs are essential issues for the breeder to develop new cultivars. The experiment was conducted in the experimental area of Trakya Agriculture Research Institute Edirne, Turkey at eight environments from 2006-2007 to 2013-2014 growing cycles. In the study, nine released cultivars were used in randomized complete block design with four replications. Grain yield data were subjected to analysis of variance (ANOVA), the additive main effect, and multiplicative interaction (AMMI) and genotype and genotype-by-environment (GGE) biplot analyses. Stable genotypes were identified with GGE biplot and AMMI models. ANOVA and AMMI analysis revealed highly significant ( $p < 0.01$ ) differences among test environments (E), genotypes (G), and their interaction (G×E). The graphical result from PCI showed that the first principal component PC1 explained 49.43% of the interaction sum of the square while the second principal component, PC2 explained 29.08% of some of the square interaction. The result of PCA revealed that the 2 principal components (PC1, PC2) contributed 78.51% of the total variability. The environmental effect was responsible for the greatest part of the variation, followed by genotype and genotype by location interaction effects. Genotypes, when tested across eight environmental conditions, showed significant variation in grain yield. The highest grain yield was performed by cultivar Bereket (G8) and followed by Selimiye (G7) and Gelibolu (G4). Environment E4 and E1 was found near the ideal test environment of the average environment coordination. It was determined that cultivars G7 (Selimiye) and G8 (Bereket) were well adaptable to all environmental conditions. Cultivar G4 (Gelibolu) was well adaptable to well fertile environmental conditions.

**Keywords:** Bread wheat, Environment, GGE Biplot, GE interaction, Yield stability

**IDENTIFICATION OF RESIDENTIAL DEVELOPMENT IMPACTS ON  
AGRICULTURAL LANDS USING LANDSAT IMAGERIES: CASE STUDY OF  
BURSA, NILUFER (1990-2020)**

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**ABSTRACT**

Bursa province of Turkey have been exposed to controlled and uncontrolled urbanization process especially in last three decades due to industrial initiatives, particularly. Nilufer district, which is one of the central residential sites, was foreseen to be significantly effected against increasing artificial surface construction processes. Therefore the main objective of the study was to analyze the land cover land use (LCLU) changes within ten-year periods between 1990 and 2020, and agricultural land status in response to increased urbanization were highlighted. Images from Landsat series were utilized and the study area was classified through two different classification techniques of segmentation and random forest considering six main LCLU classes namely, forest (F), agriculture (A), residential (R), bare soil (B), water surface (B) and other (O). According to segmentation results, A class were decreased by 9.40%, 11.03%, 10.41% within 1st, 2nd and 3rd periods, respectively whereas R areas were increased by 58.97%, 75.62% and 29.37% with the same periodical order. On the other hand, according to the random forest classification, the decrease in A areas were calculated as 12.77%, 19.34% in 1st and 2nd period while there was a small increase of 1.10% in 3rd period. Meanwhile, the increases in R areas were found to be 49.96%, 92.19%, and 97.77%, respectively. Results of accuracy assessment revealed that segmentation gave slightly more accurate classifications in the selected area of interest. However, the LCLU maps obtained from both classification techniques showed that the increase in R areas is highly complex and and the gains of R areas were not restricted with only A areas. Especially conversions from F and O classes concluded to be investigated via high resolution imageries for more precise results.

**Keywords:** Agricultural Land, Bursa, Landsat, Nilufer, Residential Development

# INVESTIGATION OF SAME AGRICULTURAL CHARACTERS OF SECOND CROP HYBRID CORN VARIETIES

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## **ABSTRACT**

Since the corn plant is used in many ways and so that it is an open pollinated plant, it is widely cultivated in every each region. Therefore, the research of yield characters of 17 hybrid corn varieties (Tavascan, Motri, Calgary, Sancia, P.573, P.32T83, Hydro, Performer, Capuzi, 72MAY80, Simon, Macha, PL712, Torro, Bolsan, KB5562 and KB3961) were aimed to the in the second crop growing season in Kahramanmaraş conditions. In the study, the tassel emergence period, plant height, stem diameter, 3rd leaf angle, number of leaves in the plant and grain yield values were investigated. The research was conducted in random blocks in the trial design in 3 replications in 2016. It was recorded that the tasselling period, plant height, stem diameter, 3. leaf angle, number of leaves in plant, grain yield are among 49-55 days, 164.1-233.1 cm, 24.6-28.3 mm, 21.5-38.1°, 12.2-15.4 number, 410.3-1069.9 kg da-1 respectively.

**Keywords:** Corn, varieties, second crop, grain yield

## APRICOTS SAPLING PRODUCTION IN TURKEY

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### ABSTRACT

The aim of this study is to evaluate the developments in apricot seedling cultivation in Turkey according to the records of the Ministry of Agriculture and Forestry. Turkey has been the leader in world apricot production for years. In recent years, there has been a significant increase in the number and size of closed apricot orchards, as in other fruit species. This increase in the number of orchards has also triggered the production of apricot saplings. Although the production amount of apricot saplings in Turkey has increased and decreased over the years, it has increased at certain rates every year after 2010. Turkey's Apricot sapling production was 944,000 in 1976, 740,007 in 2010, 1,499,457 in 2015 and 3,127,139 in 2020. Certified plant material production records of 10 apricot cultivars were found in Turkey, on demand. It was determined that among these cultivars, the most certified plant material belonging to Kabaası (29%), Şekerpare (16.53%), Hacıhalilođlu (13.90%) and Roxana (6.11%) apricot cultivars were produced, respectively. It has been determined that a large proportion (75%) of domestic apricot varieties are produced in Turkey. Malatya province ranks first with 810,170 (80%) in total apricot sapling production in Turkey, while İzmir ranks second with 363,810 (25%) and Isparta province ranks third with 70,950 (4.81%). While the majority of apricot saplings are produced by the private sector, a certain amount of seedlings are produced in some public institutions. With the implementation of the regulation published by the Ministry of Agriculture and Forestry in 2009, it has been determined that there has been a significant increase in the production of certified apricot saplings. In general, the increase in the production of certified saplings in the last 10 years has led to the elimination of the sapling problem, which is true to its name, in closed garden facilities. In Turkey, there are still problems with seedlings originating from unregistered production, although it is proportionally very low. In order to increase the production rate of healthy saplings, especially true to its name, and to prevent unregistered production, the certification system should be implemented strongly

**Keywords:** Apricot, sapling, production Turkey

# **SURVEY OF TOMATO BACTERIAL DISEASES GROWN UNDER GREENHOUSES IN MERSIN AND NEW EMERGING BACTERIAL DISEASE AGENTS**

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## **ABSTRACT**

Mersin is one of the important cities that grows tomatoes in Turkey. In this study, tomato bacterial disease surveys were conducted in 130 individual greenhouses located in Silifke, a county of Mersin, and prevalence of the bacterial diseases were evaluated. Among surveyed greenhouses, 31 were infected with bacterial disease symptoms like chlorosis and necrosis on leaves, wilt, stem rot and pith necrosis. A total of 317 putative bacterial strains were isolated from diseased plants. Amongst them, 109 plant pathogenic bacterial strains were identified using physiological and biochemical tests, MALDI-TOF MS, PCR and sequencing tools. The prevalence of bacterial diseases in tomato growing greenhouses in Silifke, Mersin was recorded as 23.8%. The pathogenic bacterium, *Pseudomonas syringae* pv. *tomato*, was widespread by 17.7% in the region followed by a prevalence 4.6% of *Stenotrophomonas* spp. and 1.5% prevalence of *Clavibacter michiganensis* subsp. *michiganensis* and *Pectobacterium carotovorum* subsp. *carotovorum*, respectively. The probable plant opportunistic bacteria from the genera *Stenotrophomonas*, *Paenibacillus*, *Microbacterium* and *Arthrobacter* spp. were rarely isolated for the first time in Turkey. In the future, further tests should be conducted to verify their pathogenicity on tomatoes and other crops. This study was supported by Erciyes University Scientific Research Projects Unit (ID: FYL-2019-9570).

**Keywords:** *Lycopersicum*, *Stenotrophomonas*, phytopathogenic bacteria, survey

# CHERRY LAUREL (*P. LAUROCERASUS* L.) FLOWER CHARACTERISTICS, FERTILIZATION AND FRUIT SET

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## ABSTRACT

Cherry laurel (*Prunus laurocerasus* L.) is an evergreen shrub or small tree that can grow up to 6 m high. It is native to the regions bordering the Black Sea in most part of Europe and also in Southwestern Asia. It is naturally grown in the northern part of Turkey and very common in the Kocaeli. There are many cultivars as sources of germplasm, provide rich parental material for breeding studies. It is consumed as fresh fruit in Turkey. The fruit is traditionally known for its rich medicinal properties against diabetes and kidney stones. It is an integral part of the life of the people of the Black Sea region where it is known as amazing fruit for their life circle. Cherry laurel gardens have been recently planted. In this study flower characteristics was investigated, pollination requirements were discussed. Fruit set was evaluated for cherry laurel cultivars. All observation was made on three replicates. One tree was taken as a replicate and 15 flower stalk per tree. Fruit color, size and quality was changed with pollen source. Fruit set was increased with different pollen resources compare with open pollination. There was not fruit set on self-pollinated flowers. Results of the study gave about pollination biology of cherry laurel that very useful for plantation of modern orchards. We propose that, in future, it can be grown in small-scale conventional farms.

**Keywords:** Cherry laurel, flower, pollination, fruit set, breeding

# EFFECTS OF NITROGEN FERTILIZATION ON LIGNOTUBER DEVELOPMENT AND SPROUTING OF *ARBUTUS UNEDO* L.

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## ABSTRACT

Strawberry tree (*Arbutus unedo* L.) is an important species for nature. It is resistant to fire and drought. It is a species which can survive with increasing temperatures of global climate change. Arbutus fruits very valuable for health that makes it plantable fruit. Lignotubers develop over the years in the underground part of Arbutus trunks. These structures are storage organs that accumulate nutrition. Lignotuber size vary between 41cm to 3068 cm<sup>2</sup> size that they are the source of new meristems. After forest fire ended, plant re-grow from meristem of lignotubers. In this study plant development and lignotuber formation was evaluated in the first 5 years after plantation in plastic tunnel condition in Kocaeli City of Turkey. One year old seed propagated plants were planted in high plastic tunnel. After plantation 40, 80, 120, 160 and 240 ppm N fertilization was applied to the saplings with irrigation water. There are 7 plants in each treatment. The results were evaluated after 2 years for plant development and after 5 years for lignotuber formation. The number of new sprouting was recorded. 120 and 160 ppm N application formed the newest sprouts from lignotubers. Lignotubers diameter and size was increased by doses of N fertilization but decreased after 200 ppm doses. Fruit size also increased by the application of N. All doses increased plant development according to control plant. The results obtained from the studies will be of great benefit in terms of breeding studies and supply knowledge for manage the global climate change in future.

**Keywords:** *Arbutus unedo* L., nitrogen fertilizer, lignotuber, germination

# **SIMULATING FUTURE STATUS OF AGRICULTURAL LANDS IN SOUTH PART OF MARMARA BASIN DEPENDING ON HISTORICAL TRENDS\***

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## **ABSTRACT**

Change in amounts and locations of agricultural lands have become a worldwide phenomenon against forcing effects of global urbanization trends. Such trends seemed strongly related with growing population in various regions of the world particularly in developing countries. In present study it was aimed to visualize future situation of agricultural lands in terms of area (ha, %), position and landscape metrics. Freely available Landsat imageries from Thematic Mapper (TM), Enhanced Thematic Mapper Plus (ETM+), and Operational Land Imager of 1984, 1999 and 2014 production season were used to delineate land cover land use (LCLU) maps. Moreover, census data of closest years were utilized to evaluate the population impacts on LCLU formations as main trigger in the area. Markov chains were used to predict pixel demands of future classes whereby the analysis results were modified in simulation step dependently to population relations. The LCLU maps for 2029 and 2044 were simulated through cellular automata based model coupling artificial neural network algorithm and roulette wheel selection mechanism, and results are presented.

**Keywords:** Agricultural lands, Future Status, Historical Trends, Simulation, South Marmara.

## EFFECT OF ESSENTIAL OIL ON ABIOTIC STRESS TOLERANCE IN WHEAT

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### ABSTRACT

Local populations are of great importance as genetic resources for plant breeding, resistance or tolerance to biotic and abiotic stress factors. Drought is one of the major constraints affecting plant growth, development and yield in wheat production worldwide. In addition to drought, salinity and cold stress also cause yield losses and reduced quality. Plants have evolved a variety of mechanisms at the morphological, cellular, physiological and biochemical levels to respond to stress conditions, survive and tolerate stress factors. However, in some cases, ancillary approaches are needed. The use of secondary metabolites obtained from various plant species is rapidly becoming widespread in many areas. Especially their easy metabolism has paved the way for their use instead of synthetic chemicals in agricultural areas. According to the results; *Rosmarinus officinalis* oil is more important than control in germination, shoot length and root length of seeds under drought, salt and cold stress. In addition, 0.05% and 0.01% doses of Rosemary oil are statistically significant compared to 0.10% and 0.25%. With these results, the optimization of oil solutions has been achieved. According to the results of the study, essential oil application is effective in increasing tolerance in the first germination and seedling period when plants are more sensitive to environmental factors. Using essential oils to avoid stress conditions is an innovative, environmentally friendly and sustainable approach.

**Keywords:** Essential Oils, abiotic stress, wheat

## THE EFFECT OF COWPEA (*VIGNA UNGUICULATA L.*) ON HUMAN HEALTH

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### ABSTRACT

Today, many diseases that threaten human health are emerging due to rapid population growth, aging of the population and malnutrition. A healthy and balanced diet is the basic principle to prevent diseases. Improper nutrition endangers the body and mind, affects health, causes death and diseases such as heart disease, hypertension, diabetes and atherosclerosis. One of the keys to success in a healthy diet is the consumption of fruits and vegetables rich in protein and vitamins. Legumes from herbal food products have a special importance in human health. Cowpea (*Vigna unguiculata L.*) is not only a delicious vegetable, but also an important legume in human and animal nutrition in terms of low fat, high protein and carbohydrate content. *Vigna unguiculata* belongs to fabaceae family and is an important crop in the semiarid regions across Africa and Asia due to its tolerance for sandy soil and low rainfall. In this research, the effects of cowpea on the health of the human body were discussed. cowpeas are rich in vitamin A, which is very important for eyesight and the health of immune system. Cowpeas increase digestion, helps to remedy of sleep disorders, manage diabetes and protect the heart and reduce bad cholesterol. Cowpea also helps maintain the sugar balance by allowing their carbohydrate to pass into the blood slowly. Therefore, it can be easily consumed by diabetics. Besides, cowpea which also be reffered as "poor man's meat" is a very effective food for vegetarians to absorb the amount of protein they need, because cowpea has high levels of protein in its seeds and leaves.

**Keywords:** Cowpea (*Vigna unguiculata L.*), human health, protein.

# POLYPHENOL CONTENT AND ANTIOXIDANT CAPACITY OF MEDICINAL AND AROMATIC PLANTS

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## **ABSTRACT**

In the prehistoric age, humans primarily benefited from plants and animals for their continuation of life and survival. In recent years, medicinal and aromatic plants are used in areas such as nutrition, cosmetics, body care, and especially the pharmaceutical industry for an increasingly healthy and sustainable life, while aromatic plants are an important raw material used to give scent and flavor in different industrial areas. Since medicinal and aromatic plants are complex mixtures containing different components, they also differ in terms of their biological effects. The importance of these plants is increasing in the field of medicine and health due to the fact that they have a versatile effect compared to their synthetically obtained active substances and that they do not have side effects. Today, as a result of increasing concerns about the safety of synthetic antioxidants, it has been determined that the use of these substances has negative effects on human health. Therefore, modern medicine and researchers have a great interest in obtaining natural antioxidants. This situation has led to the increasing use of medicinal and aromatic plants, which have great potential as a natural source of antioxidants. In recent years, consumers have shifted to natural products, and the use of herbs and spices as antioxidants has come to the fore. This study aimed to discuss the polyphenol content and antioxidant capacities of important medicinal and aromatic plants (such as lavender, rosemary, thyme, thyme, sage, chamomile, and fennel), the importance of which is better understood every day.

**Keywords:** Medicinal and Aromatic Plant, Phenol Compounds, Antioxidant Activity

# PHYSIOLOGICAL AND BIOCHEMICAL EFFECTS OF THERMO PRIMING ON WHEAT (*TRITICUM AESTIVUM* L.) UNDER DROUGHT AND HEAT STRESSES

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## ABSTRACT

High temperature and drought are two important environmental factors that limit the growth and productivity of wheat (*Triticum aestivum* L.). Seed priming which is one of the physical methods applied to the seeds increases the tolerance of crops against stressful environmental conditions. The aim of the study was conducted on wheat plants to evaluate the physiological and biochemical responses of wheat to thermo-priming (38°C) under drought stress (D) and heat stress (H). Heat stress was applied by raising the temperature from 22 to 40°C and then kept at 40°C for 3 hours. The combination stress was simultaneously imposed with %15 PEG 6000 treatment and heat stress (HD). The effect of thermo-priming based on total chlorophyll content (SPAD), relative water content (RWC), specific leaf area (SLA), biomass, shoot-root lengths, H<sub>2</sub>O<sub>2</sub> amount and antioxidant capacity. Our results showed that shoot lengths were reduced drastically with D, H, and HD compared to root lengths. Besides, combined stress treatment protected RWC by 6,8% with 60 min thermo-priming compared to other stress treatments. Total chlorophyll content was decreased dramatically with drought and heat stresses, while thermo-priming wasn't limits that decreases. In addition, SLA was decreased with all stress applications, while it healed only with 60 min thermo-priming by 12%. Hydrogen peroxide content was increased with drought stress, while reduced with all heat stress applications. Among them, HDT60 was found to be more effective than others. All stress treatments were increased total protein contents. GR activities were increased with thermo-priming by 14-18%, with drought and heat stress by 5%. Additionally, GR activity was increased with 30 min thermo-priming in HD application by 5,8%, while only with HD by 3,2%. Consequently, 60 min thermo-priming seemed to effectively on biochemical parameters in wheat seedlings against drought and heat stress.

**Keywords:** Wheat, Thermo priming, Drought stress, Osmotic stress, Heat stress.

**LABORATORY EVALUATION OF ENTOMOPATHOGENIC NEMATODE  
HETERORHABDITIS BACTERIOPHORA (RHABDITIDA:  
HETERORHABDITIDAE) ON THE INDIAN MEAL MOTH, ((*PLODIA  
INTERPUNCTELLA* (HUBNER) (LEPIDOPTERA: PYRALIDAE))**

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**ABSTRACT**

*Plodia interpunctella* (Hubner) (Lepidoptera: Pyralidae) has a wide range of products. It causes direct and indirect losses in the products. The control of stored-product pest depends on the use of heavily pesticides, but more emphasis is now being given to alternative control strategy. The efficacy of Turkish isolates of *Heterorhabditis bacteriophora* (TOK-20) against the last instar larvae of the Indian meal moth, was investigated at three different temperatures under laboratory conditions. Experiments were conducted in petri dishes. Four nematode concentrations (0, 250, 500 and 1000 IJs) were applied onto Whatman filter paper. Indian meal moth was susceptible to different concentrations *H. bacteriophora* (TOK-20) isolate. All doses were more effective than the control (water). It was found that the mortality rate of larvae increased as the temperature increased. While the lowest mortality rate was seen at 10°C, the highest mortality rate was found at 25 °C. In addition, the highest mortality rate was found in the counts 120 hours after from the inoculation. These results provided that *H. bacteriophora* (TOK-20) isolate is very efficient and could be used to against Indian meal moth in control strategies.

**Keywords:** Entomopathogenic nematodes, *Plodia interpunctella*, Biological control, Efficiency, stored pest

# EFFECT OF OPERATIONAL PARAMETERS ON PHOTOCATALYTIC DEGRADATION OF REACTIVE BLUE 19 DYE USING CU<sub>2</sub>O

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## ABSTRACT

The rapid progress of modern industry and agriculture is resulted to an extreme amount of wastewater discharging, thus causing a threat for the human health and environmental pollution. The treatment of organic pollutants containing synthetic dyes coming from textile, printing and various industries is direly important before they penetrate to water and end up in soil. A favorable approach of an advanced oxidation process, namely photocatalysis is an alternative and effective technology for the removal of these colored effluents. In this study, the photocatalytic degradation kinetics of Cu<sub>2</sub>O nanoparticles on Reactive Blue 19 (RB-19) were systematically investigated with the use of artificial light source (UV-A). Experiments to study the effects of operational parameters including initial dye concentration and amount of photocatalyst were performed to find out optimum conditions. The photocatalytic decolorization percentage of RB-19 was studied using UV-vis spectrophotometer. The photocatalytic degradation process was well described by pseudo-first order kinetics. The results indicated that the decolorization of RB-19 was increased with decreasing the initial dye concentration.

**Keywords:** Anthraquinone dye, Cu<sub>2</sub>O, decolorization, photocatalysis, Reactive Blue 19.

# THE EFFECTS OF GLYCINE BETAIN APPLICATIONS ON THE PRODUCTION AND QUALITY OF NARİNCE GRAPE VARIETY

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## ABSTRACT

Narince grape variety is an important wine grape variety accepted in our country and in the world. It is also because of the quality of the leaves with leaf pickyness consumption, especially in Turkey and in Europe are much in demand. In addition to the production of pickled leaves and the grape for white wine, it is a variety that is consumed intensively in the region where it is grown and in the surrounding provinces. It can find buyers at very high prices in the region for table use. Due to its use as a pickled leaf, there is a decrease in yield and quality parameters, as well as intensive sunburn in the bunches of vines, which are exposed to intense leaf breakage. In this study, GB application was carried out on the vines from which 4 different leaf collections (collection of 4-8-12 leaves on the cluster) were made and a total of 4 harvests were made and the vine/grape yield and quality parameters were examined. In the harvested clusters; cluster stiffness (g), cluster width (cm), grain weight (g), grain hardness, grain width (mm), grain color, sqm (%), pH, titration acidity (g/l), maturity index, sunburn rate (%), leaf chlorophyll amount ( $\mu\text{mol m}^{-2}$ ), leaf temperature ( $^{\circ}\text{C}$ ) parameters were examined. And as a result, it is thought that SW applications have a protective effect against high temperature stress, as they come to the fore in cluster parameters.

**Keywords:** Narince, Spad, Sun Burn, Glycine betain

# EXPANSION OF THE GENETIC BASE BY INTERSPECIFIC HYBRIDIZATION IN CAPSICUM ANNUUM AND CAPSICUM CHINENSE

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## ABSTRACT

In our country, there is huge diversity in terms of pepper genotypes varieties. However, in recent years, using standart and hybrid varieties in production caused reduction of genetic diversity over time. While creating breeding programs for different purposes, the existing gene pool is needed to be well known and it should be enriched according to the breeding targets. In the recent years, interspecific hybridization is intensively carried out to increase the existing genetic variation and to extend of genetic bases of cultivar varieties which have biotic and abiotic stresses tolerance in pepper breeding programs. The objective obtained of the study were to broaden the existing genetic base by crossing *C. annuum* (253A and İnan3363) and *C. chinense* (PI 159236) varieties. The study involves evaluation of 54 morphological characters. The first three eigen values explained 56% total variance in the F<sub>2</sub> population derived from 253A x PI 159236 cross (110 offspring), whereas in the F<sub>2</sub> population obtained from İnan3363 x PI 159236 cross (150 offspring), the total variance 87%.

**Keywords:** Capsicum, interspecific hybridization, genetic base, morphological characterization

# DETERMINATION OF THE FACTORS AFFECTING THE PRODUCTION AND QUALITY OF WHEAT GROWING IN SOUTH MARMARA

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## ABSTRACT

Quality is an important factor in bread wheat production. This research was designed to investigate the causes of yield and quality problems in wheat cultivation in the Southern Marmara Region. The quality characteristics of the cultivars are constantly changing according to the years and regions. Differences between years and regions should be investigated in detail. In this study, data on quality characteristics of wheat varieties traded in Balıkesir, Bandırma, Gonen, Karacabey, anakkale and Biga Commodity Exchanges in the Southern Marmara Region between 2005 and 2021 were used as material. The climatic data of the same regions were examined, and the differences between regions and years were revealed by ANOM analysis. As a result of the research, the quality characteristics of bread wheat cultivation in the Southern Marmara Region were significantly affected by the spring precipitation and the temperatures during the grain filling period. It was observed that early cultivars were less affected by stress factors such as drought and high temperature.

**Keywords:** Wheat, Southern Marmara, Yield, Quality

# THE DETERMINATION OF BOTANICAL PROPERTIES OF FORAGE KOCHIA POPULATION GROWN IN KONYA CONDITIONS

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## ABSTRACT

Adverse soil and environmental factors cause a decrease in pasture yield in our country. Shrub species are given importance in breeding studies carried out in order to increase the yield in marginal pastures in the world. Forage kochia (*Kochia prostrata*), which is a naturally growing and semi-shrub in Turkey's flora, shows tolerance to adverse soil and climatic conditions. This research was established in Konya in October 2017 according to the Randomized Complete Block Design with 4 replications. In the research, the morphological and yield values of the forage kochia populations collected from 5 different locations in Konya (i.e., Karapınar Kartal Kayaları, Bahri Dağdaş I.A.R.I, Campus Beltway-Selçuklu, Ardıçlı Rural- Selçuklu, and S.U.F.A. Forage Kochia Demonstration Garden) were examined during 2018-2019. We investigated the blooming time (Scoring), plant height (cm), canopy diameter (cm), number of branch, stem diameter (mm), shape of habitus (Scoring), leaf length (mm), leaf width (mm), color of anther and stigma (Scoring), fodder yield per plant (g) and hay yield per plant (g). In this study, the Campus Beltway- Selçuklu Population (3P) bloomed the earliest in this area between the end of August and early September (Score 5.36). Among the forage kochia populations showing semi-decumbent habitus (Score 7.05-7.63) the Karapınar Kartal Kayaları Population (1P) had the highest yield potential regarding plant height (i.e., 46.63 cm), canopy diameter (i.e., 50.50 cm), fodder yield per plant (i.e., 112 g), and hay yield per plant (i.e., 45.28 g). In line with the findings obtained in the study, while the Karapınar Kartal Kayaları Population (1P) and the Campus Beltway- Selçuklu Population (3P) stand out in terms of yield and yield components. These results show us that each population is a valuable gene resource in plant breeding for pasture improvement.

**Keywords:** *Bassia prostrata* (L.) A.J. Scott (Syn. *Kochia prostrata*), Forage Kochia, Forage Crops, Yield

# EFFECTS OF NITROGEN FERTILIZERS, GENOTYPE AND CUTTING STAGES ON PROTEIN CONTENTS AND FIBER COMPONENTS OF OAT FORAGE

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## **ABSTRACT**

Although oat forage (*Avena sativa* L.) is considered as a prominent roughage source in Marmara region of Turkey, research about the effects of nitrogen fertilizer on its feed quality is limited. In this study, we aim to identify the effects of various nitrogen regimes (0, 5, 10, 15 and 20 kg da<sup>-1</sup>) and two cutting stages (panicle emergence and harvest maturity) on the protein contents and several fiber components of the leaf, straw and panicles of 5 oat varieties. Field experiments were conducted in 2015-2016 and 2017-2018 growing seasons in Çanakkale, Turkey according to the split-plot experimental design with 3 replicates. Protein content, neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL) and fiber content of plant samples were determined via Near Infrared Spectroscopy (NIRS). Analysis of variance results showed that year and genotype effects were significant and decisive for the most parameters. Levels of nitrogen fertilizers influenced the protein contents of all plant samples but did not have a statistically significant effect on the fiber components. Results of Tukey test and Principal Components Analysis (PCA) Biplot suggests that in terms of higher protein and lower fiber contents, cutting oats in panicle emergence stage and choosing the right variety would yield better results. Variety selection for this purpose might also be related to the higher leaf and panicle production rather than straws, which had lesser feed value. Oat variety Kahraman were recommended for the Çanakkale conditions.

**Keywords:** Fiber components, oat, nitrogen fertilizers, protein, Çanakkale

**ASSIGNATION OF RESISTANCE AGAINST SAFFLOWER RUST DISEASE  
(PUCCINIA CARTHAMI) IN SOME OLEIC AND LINOLEIC TYPE SAFFLOWER  
GENOTYPES UNDER FIELD CONDITIONS**

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**ABSTRACT**

Safflower rust disease (*Puccinia carthami* Corda), is one of the most important leaf diseases widely observed in safflower growing areas in Turkey. This pathogen, which is soil or seed-borne, may induce epidemics under favorable environmental conditions and it causes serious yield losses. In this study, the reactions of 38 oleic type and 74 linoleic type of total 112 safflower genotypes were investigated for assignation of resistance against safflower rust disease under field condition. In the production period of 2021, safflower genotypes cultivated in the safflower research areas at the Trakya Agricultural Research Institute were evaluated by using scale of 0-5 for assessment of disease and genotypes were classified based on differences of reactions. Accordingly to this, 28 genotypes resistant, 25 genotypes moderately resistant, 19 genotypes moderately sensitive and 40 genotypes sensitive were designated. In this study, it was found that there are differences among the safflower genotypes in terms of resistance to safflower rust disease. As a result, 22 safflower genotypes were determined promising for resistance breeding studies to be carried out.

**Keywords:** Safflower, safflower rust, resistance, breeding

## NEW TRENDS IN VEGETABLE OIL CONSUMPTION

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### ABSTRACT

Vegetable oils are liquid oils extracted from the seeds or fruits of some plants and they are rich in unsaturated fatty acids. Recently, increasing studies on the beneficial effects of vegetable oils on human health due to the important fatty acids and bioactive components they contain have led to research and development of new processing methods to protect and enhance the nutritional value of vegetable oils. Today, consumers are increasingly interested in cold-pressed vegetable oils that are less processed and can be consumed directly without refining. In cold-pressed oils, since no high heat treatment is applied and no chemical solvents are used during oil extraction from the seed, natural antioxidants such as essential fatty acids, tocopherols, beneficial compounds such as sterols, and the aroma, colour, smell and nutritional values are more effectively is preserved. Cold-pressed oils are one of the most important products of the vegetable oil industry due to the bioactive compounds they contain and due to the increasing interest in this method, there is a parallel increase in the product portfolio of cold-pressed oils. This review aims to provide information about the processing methods and nutritional values of cold-pressed oils and to show that this method can be a new field of study for various oilseeds.

**Keywords:** Vegetable oil, Cold press oil, Nutritional benefits, Bioactive compounds

# OPTIMIZATION OF NANOCELLULOSE ESTERIFICATION WITH DIFFERENT FATTY ACIDS AND ACETIC ANHYDRIDE

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## ABSTRACT

Cellulose derivatives have been widely used in many different food products as thickener, stabilizer, biodegradable packaging material, emulsifier and water retention agent. Cellulose fibers have different sizes depending on the source. These fibers are composed of nano-fibers called "cellulose nano-fiber" which are smaller than 100 nanometers in diameter. With interest in the field of nanoscience and nanotechnology, cellulose nanofibers have offered a highly attractive line of research in recent years. Studies in this area have shown that cellulose nanofibers have high water-binding capacity and they are very effective in forming gels and increasing consistency. Cellulose nanofibers, can be produced by using chemical and mechanical methods and also the physical methods which provide more homogeneous and controlled production. Biodegradable packaging obtained by esterification of cellulosic fatty acids in studies in the literature is noteworthy, as well as the physical structure of the cellulosic material. In this sense, various cellulosic raw materials can be esterified with fatty acids to produce bioplastics. In this study, nano fibers were obtained from vegetable source (corn cob) containing short and thin fibers by using micro-fluidization and then esterified with fatty acids (C6, C12, C18, C18:1) in different degrees of substitution (0.41-2.99). It was determined that the fatty acids of different chain lengths usage were not statistically effective on the degree of substitution. Products with the maximum degree of esterification were obtained after 5 h at 90°C with an average of 2.45 acetyl groups and 0.55 fatty substituents per anhydroglucose unit. In conclusion, the esterification of cellulose with unmodified fatty acids and acetic anhydride in DMAc/LiCl medium allowed the grafting of fatty acyl groups into cellulose, along with a dependent acetylation, thanks to the formation of a mixed anhydride.

**Keywords:** nanocellulose, esterification, fatty acids, acetic anhydride

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## DETERMINATION OF RESISTANCE TO IRON DEFICIENCY OF SOME SUNFLOWER LINES

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### ABSTRACT

The aim of this study is to compare the resistance of some sunflower lines to iron deficiency and to determine the best feature of the line that is resistant to iron deficiency. For this purpose, factorial experiment was carried out in the form of 7×3 (line × iron dose) random plots experimental design in 445 g quartz sand medium. The following non-ferrous nutrient solution adjusted to pH 6.0 was used in the experiment, which was carried out with 3 replications: 0,75 mM K<sub>2</sub>SO<sub>4</sub>; 2,0 mM Ca(NO<sub>3</sub>)<sub>2</sub>.4H<sub>2</sub>O; 1.0 mM MgSO<sub>4</sub>.7H<sub>2</sub>O; 0,25 mM KH<sub>2</sub>PO<sub>4</sub>; 0,1 mM KCl; 1,0 µM MnSO<sub>4</sub>; 1,0 µM ZnSO<sub>4</sub>.7H<sub>2</sub>O; 10 µM H<sub>3</sub>BO<sub>3</sub>; 0,01 µM (NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>; 0,1 µM CuSO<sub>4</sub>.5H<sub>2</sub>O. Fe-EDDHA was added to the applied nutrient solution containing 0, 45 and 100 µM Fe. The iron deficiency tolerance index values of sunflower lines were calculated by proportioning the dry matter amount and other parameters obtained with the iron-free nutrient solution to the dry matter amount obtained with the 45 and 100 µM iron-containing nutrient solution and other parameters. In iron deficiency conditions, the lines formed 2 groups according to their iron nutritional properties. While it was determined that line 18 formed the first group; Lines 12, 28, 34, 37, 25 and 21 formed the second group. In these conditions, lines 34 and 37 were found to be the closest lines to each other, while lines 12 and 18 were found to be the farthest lines from each other. It was determined that line 12 showed higher values than line 18 in terms of ferric reductase activity, chlorophyll-a, total chlorophyll and active iron contents in the leaf. In addition, it was determined that the best iron nutrition properties of line 12 were proportional chlorophyll-a, proportional chlorophyll-b, proportional total chlorophyll.

**Keywords:** Sunflower lines; Iron nutritional indices; Chlorophyll; active iron; Ferric reductase activity

# THE EFFECT OF ACTIVATED BENTONITE ON TOXIC IRON (Fe<sup>+2</sup>) UPTAKE IN RICE PLANT GROWN IN SAND CULTURE

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## ABSTRACT

In this study, the effect of activated bentonite on the removal of iron toxicity in rice plant grown in sand culture and the uptake of some micro elements (Fe, Mn, Zn and Cu) in the plant were investigated. For this purpose, increasing doses of bentonite (0, 1, 2.5, 5, 7.5, 10 and 15%) activated with Na<sub>2</sub>CO<sub>3</sub> with a dose of 250 ppm Fe (in the form of FeSO<sub>4</sub>.7H<sub>2</sub>O) were applied to the pure quartz sand medium, and rice plant (*Oryza sativa* L. cv. Kızılrırmak) were grown in this medium in greenhouse. The trial was carried out according to the complete random block trial design with 3 replications for 70 days. According to the analysis of variance results, activated bentonite (AB) applied at increasing doses significantly increased the dry weight and Cu uptake of rice ( $p < 0.01$ ), and significantly increased the Zn uptake ( $p < 0.05$ ). However, it significantly ( $p < 0.01$ ) decreased Fe and Mn uptake. While the highest rice dry weight (1.70 g/pot) and Zn (0.070 mg/pot) and Cu (0.051 mg/pot) uptakes were obtained at the AB10 dose, the highest Fe (7.06 mg/pot) and Mn (1.33 mg/pot) uptakes were obtained at the control dose. At the end of the study, it was found that the application of activated bentonite to the toxic Fe level in the sand culture significantly decreased the Fe and Mn uptake of the rice plant at the AB7.5 dose, and increased the rice dry weight at the AB5 dose. It was found that zinc uptake increased statistically significantly at AB2.5 and Cu uptake at AB5 dose. As a result, AB5 dose was suggested to increase dry weight by removing Fe<sup>+2</sup> toxicity in water-saturated reducing soil conditions of rice plant.

**Keywords:** Rice, activated bentonite, iron, manganese, zinc, copper

# TEMPORAL VARIATIONS IN THE LEVELS AND QUALITY OF GROUNDWATER IN THE AGRICULTURAL AREAS IN MENEMEN LEFT BANK IRRIGATION SYSTEM

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## ABSTRACT

In this study, the temporal variation of the ground water level and quality of the agricultural lands in the Menemen Left Bank irrigation system located in the Aegean Region in the west of Turkey was determined. Vineyard, vegetable and fruit cultivation is common in this irrigation area, which is located in the south of the Gediz river on the plain, and it is also used as ground water and irrigation water. For this reason, in order to determine the suitability of ground water for irrigation, 65 groundwater observation wells were drilled at a distance of 1 km in general to the research area. Ground water levels were measured and water samples were taken from these wells in the rainy season (January and April), before the irrigation period (June), and during the irrigation period (August). In the research year, monthly average ground water levels were 140-165 cm, EC values were 4.2-5.3 dSm<sup>-1</sup>, pH values were 7.6-8.0, total dissolved matter content (TÇM) was 2673-3121 mg l<sup>-1</sup>, Cl values were 26.1-29.3 me l<sup>-1</sup>, SAR values ranged from 12-13, RSC values 2.54-4.06 me l<sup>-1</sup>, B values between 1.2-2.2 mg l<sup>-1</sup>, NO<sub>3</sub>-N 9.4-11.7 mg l<sup>-1</sup>, total P 0.2-0.5 mg l<sup>-1</sup>. According to the results obtained; II in terms of EC, TÇM, B, throughout the research area. class, I and II in terms of NO<sub>3</sub>-N. Class, for RSC, 60% of the field is first class and about 35% is 3rd class. In terms of Cl, 45% of the ground water is 3rd class and in terms of total P content, more than 50% of it is 3rd class in June, while in other months there is more than 50% first class ground water. In order to solve the agricultural problems caused by ground water, checking the existing in-field drainage systems in the research area, making maintenance and repairs of the systems that do not work, and installing new systems in the areas that do not can be presented as a suggestion.

**Keywords:** Groundwater level, Groundwater quality, Temporal variation, Menemen Plain

# PRODUCTIVITY STATUS OF AGRICULTURAL LANDS IN LEFT BANK IRRIGATION OF MENEMEN PLAIN

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## ABSTRACT

In terms of sustainability, it is necessary to determine the physical, chemical and productivity characteristics of agricultural soils. In this research, it was carried out to determine some physical and chemical properties of the soils in the agricultural areas of the Menemen Left Bank irrigation system located in the Aegean Region in the west of Turkey. For this purpose; 1x1 km grids were created in the East-West and North-South directions in the parts of the plain far from the sea and close to the sea. 23 points were determined in the vicinity of Menemen, which is far from the sea, and 23 points in the south of the Gediz River, and 25 points were determined around the villages of Süzbeyli and Tuzcullu, which are located near the sea in the Menemen plain. Apart from these grids, composition, pH, available phosphorus, available potassium, organic matter analyzes and total nitrogen calculations were made in the samples taken from the 0-20 and 20-40 cm layers of a total of 64 points, 16 points representing the Left Bank soils. At the end of these analyzes and calculations, the average of 0-20 cm and 20-40 cm soil layers, respectively; body loam (L), pH 7.9-8.0 (slightly alkaline), available phosphorus 12.0 – 9.0 kg/day (good), available potassium 121 – 98 kg-1 (excess), organic matter 1%, 5 – 1.2 (less) and total nitrogen 0.076 - 0.059 (less).

**Keywords:** soil, Menemen Plain, pH, Phosphate, Potassium, Organic matter

**A HIGHLY PATHOGENIC BACILLUS THURINGIENSIS ISOLATE FROM TUTA ABSOLUTA AND ITS INSECTICIDAL EFFECT ON T. ABSOLUTA (MEYRICK) (LEPIDOPTERA: GELECHIIDAE)**

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**ABSTRACT**

Tomato (*Lycopersicon esculentum* Mill.) has a very important place in human nutrition. However, it has many harmful pests of the economic importance causing major losses in tomato production in Turkey. *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae) is one of the major tomato pests and chemical pesticides are used extensively for control. Using chemical insecticides also limits the use of its predators used in biological control strategies. Moreover, they are harmful to non-target arthropods which could result in secondary pest outbreaks due to the changing ecosystem. Microbial control using bacteria is a good alternative to chemicals and they show high compatibility with the use of natural enemies. *Bacillus thuringiensis*, an entomopathogen bacterium, has been used for decades to control destructive pests in agriculture, particularly many species of Lepidoptera. In this study, bacteria were isolated from larvae of *T. absoluta* collected from nature. Larvae of the tomato leaf miner were collected from infested greenhouse in Antalya, Turkey. *Bacillus* sp. were isolated from larvae of *T. absoluta* according to the method described by the World Health Organization. Spore crystal staining was performed to confirm that the isolates were *Bacillus thuringiensis*. The infested fruits and leaves were carefully dissected, and larvae were removed. Pure cultures of bacterial isolates were stocked in 20% glycerol at -80°C. Different concentrations of *Bt-Ta1* (from 10<sup>10</sup> to 10<sup>5</sup> cfu/ml) were prepared. Also, 16s rRNA gene sequencing was performed for molecular characterization. After that the insecticidal effect of the isolate on *T. absoluta* was determined by leaf dipping method. At least 30 larvae were used for each different bacterial isolation. Bioassays were performed in Petri dishes and they were incubated at 25±2°C, 60-70% relative humidity and, under a photoperiod of about 16 h light/8 h dark for 3 days. Mortality rate was recorded daily. Screening test were repeated three times. According to the results obtained, it was revealed that almost all of the *Bacillus thuringiensis* strain Ta1 (*Bt-Ta1*) determined as the most effective (mortality 100%) isolate in the screening test was used in concentration response trials. It is suggested that more research should be done on the use of these extracts as biopesticide to control *T. absoluta*.

**Keywords:** *Bacillus thuringiensis*, *Tuta absoluta*, insecticidal effect

# THE TOXICITY EVALUATION OF PREPARED LANTANA CAMARA EXTRACT FORMULATION AGAINST TUTA ABSOLUTA (LEPIDOPTERA: GELECHIIDAE)

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## ABSTRACT

*Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae) is one of the major tomato pests. Chemical pesticides are used extensively to control *T. absoluta*. Because of the negative effects of chemical pesticides, scientists have focused more on biopesticides. Most of the work has been conducted on plants. In this study, firstly the crude extract of *Lantana camara* L. (Verbenaceae) was prepared. After that the formulation of this extract was prepared. To prepare extract was used Soxhlet method. For the formulation of the extract spray-drying method was used. Leaf dipping method was used to determine insecticidal effect of both the crude extract and the formulation. In experiments, second stage larvae were used to determine the insecticidal effects. Three cm diameter discs were punched out from fresh untreated tomato leaf and dipped into the test solutions prepared of extracts (Crude extract 1, 2.5, 5 and 10%, formulated extract 2, 3, 4, 5 %) for one minute. All solutions were prepared with distilled water and 0.01% Triton X-100 was added. The control disc was dipped in distilled water with distilled water and 0.01% Triton X-100. After drying for 30 minutes, treated and control leaf discs were placed into separate petri dishes lined with moistened filter paper. At least 30 larvae were used for each different concentration. Bioassays were performed in Petri dishes and they were incubated at 25±2°C, 60-70% relative humidity and, under a photoperiod of about 16 h light/8 h dark for 3 days. Mortality rate was recorded daily. Screening test were repeated three times. According to the results obtained, the toxicity test of *L. camara* crude extract was compared with formulated extract concentration of control, 2, 3,4,5%. This comparison was intended to determine the effectiveness of *L. camara* formulated extract compared to crude extract against second instar *T. absoluta* larvae mortality. *L. camara* formulate extract was proved to be more effective in controlling *T. absoluta*. The highest mortality (89.23%) was at the highest concentration of the crude extract. The mortality rate in the formulated extract was determined as 86.00% at the highest concentration. Mortality rate at other formulated concentrations was 74.00, 63.50, 48.67% respectively. Mortality in concentrations of crude extract is 75.27, 68.50, 53.83, respectively. As a result, both the crude extract and the formulated extract of *L. camara* were determined to be effective. Much more detailed studies are needed to turn the extract into a product.

**Keywords:** Lantana camara, Tomato leaf miner, Toxicity, extract, formulation

# PLANT SECONDARY METABOLITES AS ANTIBIOTIC RESISTANCE MODIFYING AGENTS IN FOOD CHAIN

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## **ABSTRACT**

Antibiotic resistance is the ability of bacteria to grow against the bacteriostatic or bactericidal effects of antibiotics that act on bacteria and sensitize them. In the last decade there is a dramatic increase in the number of bacterial pathogens presenting multidrug resistance to antibacterial agents. This has become an important problem not only in medicine, but also in farm animals. The widespread use of antimicrobial agents in animals of the food chain constitutes an important source of antimicrobial resistance. Bacterial infections are the focus of public health, mainly due to increase in bacterial resistance, making it increasingly necessary to develop new drugs and effective techniques for treatment. Antibiotic activity modifiers that affect the mechanisms of drug resistance of bacteria are substances that reduce or reverse the resistance of bacteria to antibiotics. There are different approaches to control the infection caused by the multidrug-resistant strains of bacteria, one of which is by isolation of active phytochemicals that can help to prevent the spread of infection. Another is to combine an antibiotic with phytochemicals that have antimicrobial properties. Plant-derived metabolites can decrease the minimum inhibitory concentration of antibiotics and increase the susceptibility of resistant bacteria to antibiotics. The antimicrobial properties in plants are attributed to the presence of active compounds such as quinones, phenols, alkaloids, flavonoids, terpenoids, essential oil, tannins, lignans, glucosinolates, and some secondary metabolites. The microbial cell can be affected by secondary metabolites in several different ways. These include; disruption of cell membrane functions and structure, interruption in DNA/RNA synthesis, function and cell communication, inhibition of respiratory metabolism and reducing ATP synthesis. The aim of this review is to present the importance of antibiotic resistance modifier agents from plant extracts and combination of plant-derived metabolites with antibiotics to develop more effective and less toxic drugs.

**Keywords:** Antibiotic resistance, Phytochemicals, Modifying agent

# TRANSFER OF CYTOPLASMIC MALE STERILITY TO MAIZE BY THE PATERNAL HAPLOID METHOD

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## ABSTRACT

Cytoplasmic male sterility is a widely used technique in hybrid maize seed production. In hybrid maize seed production with the main parent without cytoplasmic male sterility (CMS), the male flower (tassel) of the line should be cut before pollination begins. Although there are machines that cut the top tassel, it is also possible to get the tassels from the workforce. In order to purchase tassels, it is necessary to enter the same field at least three times on different days with a worker or a machine. This increases the cost of seed production. At the same time, the upper leaves and the plant are damaged when the tassel is plucked by the workers or cut with the machine, which causes low yield. The CMS feature has been used extensively in the seed industry for years. There are different genes conducive to CMS and stabilized lines carry these genes. In order to convert a dormant line into a cytoplasmic male sterile form, it should be backcrossed with a line that has this characteristic and backcrossing should be continued until the male sterile form of the line is obtained. At the same time, both the transfer of the gene and the verification of the line are provided by using molecular techniques. This process takes at least 7 years if two generations can not be obtained in one year. With a technique known as protoplast fusion, gene transfer is performed from a different species of maize plant carrying the male sterile gene. Since the production and cultivation of genetically modified plant varieties is prohibited in our country, it is not possible to use this method in classical plant breeding. The paternal haploid technique, which is one of the in vivo haploid techniques, comes to the fore in order to transfer the CMS feature in a short time and effectively. With this technique, CMS features can be transferred in a short period of 1-2 years without the need for backcrossing. The "indeterminate gametophyte" mutant caused by the *ig* recessive gene of the reducing maize line used in the paternal haploid method transfers the CMS trait to the settled maize lines. There are reducing lines that carry different sterility genes. Paternal haploids also carry the *R1-nj* anthocyanin gene to facilitate selection of haploid seeds. Molecular and morphological markers are used to confirm the obtained CMS maize lines. With the in vivo paternal haploid technique, it is possible to create CMS forms of maize lines in a short period of 1-2 years, shorten the breeding period, increase efficiency, reduce the cost of seed production and increase productivity.

**Keywords:** in vivo paternal haploid, maize, inducer line, cytoplasmic male sterility

# CHANGE IN WATER ACTIVITY OF SOME TURKISH HAZELNUT CULTIVARS AT DIFFERENT MOISTURES AND TEMPERATURES

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## **ABSTRACT**

Water activity ( $a_w$ ) of Tombul, Palaz, Çakıldak and Kalinkara hazelnuts were determined at different moisture levels (ML) (2, 4, 6, 8, 9 and 12%) and different temperatures (20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30°C). Regression equations were generated to estimate  $a_w$  values of hazelnuts with a known moisture at different ambient temperatures. Considering the entire temperatures, it was observed that a unit (1%) increase in moisture yielded 0.055 - 0.062 unit increases in Çakıldak hazelnut cultivar, 0.052 - 0.055 unit increases in Palaz cultivar, 0.047 - 0.050 unit increases in Tombul cultivar and 0.047 - 0.048 unit increases in Kalinkara cultivar. Different  $a_w$  values were observed at the same ML of the cultivars. The  $a_w$  values generally increased with increasing temperatures.

**Keywords:** Hazelnut, moisture, temperature, water activity

## **ACKNOWLEDGEMENT:**

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# CHANGES IN CHLOROPHYLL CONTENT AND FRUIT QUALITY IN ALPHONSE LAVALLÉE GRAPE VARIETIES FROM VERAISON TO RIPE

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## ABSTRACT

In the study, Alphonse Lavallée, one of the colorful table grape varieties that has an important place in the world and in our country, was used. The periods of change in the quality of the grains from veraison ripening (with samples taken at four different times) was determined by physical, chemical and phytochemical analyzes. At the same time, the change in the amount of chlorophyll in the leaves was investigated in this periods. In terms of physical properties, differences in cluster width, berry weight, berry width, berry size and berry hardness were found to be statistically significant. Considering the chemical changes, the differences were found to be statistically significant in terms of all properties (Şçkm, pH, Titration Acidity, Maturity Index). Considering the phytochemical changes, the differences in the values of shell anthocyanin and pulp anthocyanin were found to be statistically significant. Considering the changes in spad values in the Alphonse Lavallée grape variety from veraison to ripening, the values obtained did not make a statistical difference.

**Keywords:** total phenolic, berry hardness, berry weight, total anthocyanin,

# SPECIES RICHNESS IN VINEYARDS DEPENDING ON AGRICULTURAL SYSTEMS

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## ABSTRACT

Grapevine is a species with over million years history and grown economically worldwide. Viticulture has importance from the view of either history, culture, and trade or agriculture, production, and food industry in Turkey. Not only common growing (traditional) systems but also good agricultural practices (GAP) and organically growing systems have been used in viticulture in the Çanakkale Province. Weeds interfere with crops and may affect quality or yield, become hosts for diseases and insect pests, or makes difficult agricultural implementations. No study has been seen related to weed flora of vineyards in the Eceabat district where viticulture is widely applied. The study was carried out in total nine vineyards, three for each growing systems, i.e. common, GAP and organic growing systems, in Eceabat on March, April, June, and August/July in 2019 and 2021. The total number of species for each system was 47 and 58 in traditional vineyards, 43 and 55 in GAP vineyards, and 35 and 49 in organic vineyards in 2019 and 2021, respectively. Change in the number of species between years were attributed to climatic conditions while among systems due to locations or agricultural applications might cause the number of species. The number of species in rows and between rows in 2019, respectively in three vineyards, 27 and 22, 28 and 31, 23 and 28 in organically grown, 29 and 22, 23 and 18, 27 and 22 in GAP, 25 and 19, 15 and 14, 15 and 14 traditionally grown vineyards. In the second year, in organic vineyards 25 and 27, 31 and 27, 37 and 33 species, in GAP vineyards 33 and 6, 21 and 17, 32 and 8 species, in traditional vineyards 20 and 18, 19 and 24, 21 and 23.

**Keywords:** Organic viticulture, GAP viticulture, Traditional viticulture, weed, in row, between row.

This presentation is prepared from masters thesis.

## PROFILE OF OLIVE GROWERS IN THE FOCUS ON WEEDS IN THE KÖPRÜBAŞI DISTRICT (MANISA, TURKEY)

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### ABSTRACT

Olive is an important health food source with its oil and fruit, and it is widely cultivated under suitable climates in the World. Turkey where is the native land of olives is one of the main growers. The Manisa province ranks second with 21 million fruit-producing olive trees and ranks first in table olive production. The Köprübaşı district where over 10% of its land surface is covered with olive trees, is among the important olive growing areas of Manisa. A survey was carried out to find out profile of olive farmers, their relations with olive growing; but, mainly focused on weeds which can affect olive yield, retard tree grow, and be host some other pests. Vast number of farmers were aged 40 to 69 and men that are 60 out of 69 surveyed. Most of the farmers were primary school graduates (35) followed by university degrees holders (11). Emigration from rural areas were very clear because many growers maintained their activities only with their spouses (43) and family members (14) in families mostly two, three or four members (55). Farming was main work for 55 growers and among 69 farmers, 21 dealt with only olive growing, the remaining had other crops and/or animal husbandry as well. Olive farming experience was less than 30 years. Age of olive grows were less than 20 years. The most common and problematic weeds according to farmers were *Cynodon dactylon* L., 54, *Tribulus terrestris* (23), *Sorghum halepense* (22) followed by other problematic weeds such as *Chenopodium* spp., *Xanthium strumarium*, *Convolvulus* spp.. Mechanical control and chemical control are common weed control methods. Glyphosate and ACCase inhibiting herbicides were used. The loss of efficiency for herbicides was mentioned more than half of the growers but it seems that they are not aware of the problem.

**Keywords:** Farming experience, herbicide, were *Cynodon dactylon*, *Tribulus terrestris*, *Sorghum halepense*, mechanic control

## HYDROPRIMING AFFECTS SEED GERMINATION AND SEEDLING PERFORMANCE IN SWEET CORN CULTIVARS

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### ABSTRACT

Seed priming methods have been used to increase seed germination and seedling emergence in several crops. Five different hybrid sweet corn cultivars were hydroprimed (16 hours at 25 °C, dried 24 hours) and various seed quality parameters were measured. Mean germination time was calculated by counting every 2 hours between 24 and 192 h. Root length and shoot length measurements were made at the end of the 8-day period. Seedling emergence test was conducted at 20 °C in climatic room. Root length and shoot length measurements were made at the end of the 20th day. The results showed that hydro-priming increased total germination % 1-17 and normal germination percentages about 6-85%, root 17-42% and shoot length 21-63 %, seedling emergence 2-36%, seedling root 29-40% and shoot length 16-22%, respectively. Mean germination time was reduced from 1.94 to 1.53 days and mean seedling emergence time were reduced from 13.65 to 11.65 days in control compared to treated seeds. The positive effect of the treatment was varied according to the cultivars. It can be concluded that hydropriming can be a simple and effective method to improve seed quality in sweet corn.

**Keywords:** Priming, seedling quality, seedling establishment, seed treatments

## DETERMINATION OF REACTIONS OF SOME BEAN GENOTYPES TO BEAN CHARCOAL ROT (*MACROPHOMINA PHASEOLINA*) DISEASE

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### ABSTRACT

Within the scope of the national dry bean breeding project, survey studies were carried out in 2018 and 2019 to determine the fungal pathogens that cause charcoal rot in beans in 9 different provinces, including Eskişehir, Balıkesir, Kütahya, Bursa, Niğde, Nevşehir, Burdur, Karaman and Konya. A total of 35 *Macrophomina phaseoli* isolates were obtained from plants showing disease symptoms in the surveys. Pre-pathogenicity tests of these isolates were first carried out in petri dishes and then pathogenicity tests were carried out in pots, and classical and molecular diagnoses of these isolates were made by identifying isolates with high virulence. The reactions of 1 isolate selected from the isolates with the highest virulence and 24 bean genotypes belonging to the Black Sea Agricultural Research Institute against coal rot disease were determined. As a result of the reaction determination studies, the KMF-11-30 and ARSLAN genotypes were found to be tolerant, while the 20-BBarBVD-10 genotype was found to be resistant. Within the scope of the national dry bean breeding project, survey studies were carried out in 2018 and 2019 to determine the fungal pathogens that cause charcoal rot in beans in 9 different provinces, including Eskişehir, Balıkesir, Kütahya, Bursa, Niğde, Nevşehir, Burdur, Karaman and Konya. A total of 35 *Macrophomina phaseoli* isolates were obtained from plants showing disease symptoms in the surveys. Pre-pathogenicity tests of these isolates were first carried out in petri dishes and then pathogenicity tests were carried out in pots, and classical and molecular diagnoses of these isolates were made by identifying isolates with high virulence. The reactions of 1 isolate selected from the isolates with the highest virulence and 24 bean genotypes belonging to the Black Sea Agricultural Research Institute against coal rot disease were determined. As a result of the reaction determination studies, the KMF-11-30 and ARSLAN genotypes were found to be tolerant, while the 20-BBarBVD-10 genotype was found to be resistant.

**Keywords:** Bean, Genotypes, Reaction, Charcoal rot

# SELECTION OF ZINC DEFICIENCY RESISTANT RICE (ORYZA SATIVA L.) VARIETIES IN SAND CULTURE ENVIRONMENT

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## ABSTRACT

Rice (*Oryza sativa* L.) is a herbaceous plant species that is most cultivated after corn and wheat. Zinc (Zn) deficiency in rice is one of the most important nutrient deficiencies. The most effective and economical method against the increasing Zn deficiency in our country and in the world is the determination of resistant varieties. The aim of the study was PCA analysis of the effects of zinc applied to sand culture medium on the stem dry weight (sapKA and relative value), stem Zn content (sapZn and relative value), removed Zn (sapKZn and relative value), leaf chlorophyll SPAD and relative values, and NPK of rice varieties. to determine the paddy varieties resistant to Zn deficiency. The experiment was carried out in three replications according to the factorial experimental design in randomized plots by applying 2 Zn doses (0 and 5 ppm) to 6 rice cultivars (Terme İncisi, Rekor, Efe, Kızılırmak, Karadeniz, Romeo) grown in pure sand culture medium nutrient solution under greenhouse conditions. In the study, it was determined that cultivar no 5 was good cultivars in terms of biological indices (sapKA, sapZn, sapNZn and sapKZn) under Zn deficiency conditions, while cultivar no 3 was determined to be good cultivars in terms of sapNKA and sapNKZn. Similarly, it was determined that cultivar 1 in terms of SPAD value and cultivars 2, 4 and 6 in terms of NSPAD value were good cultivars. It was determined that cultivars 5 and 2 were better in terms of P and K, and cultivars no. 6 in terms of N. On the other hand, it has been determined that varieties 3, 4 and 6 are more sensitive to K deficiency. It was determined that cultivar no 5 was the best cultivar in terms of sapKA, SapZn, sapKZn leaf chlorophyll SPAD value under zinc sufficient environmental conditions; It was determined that cultivars 1 and 2 were better in terms of stem P content, and cultivar no. 4 was good cultivar in terms of stem N content. As a result, it was determined that Romeo paddy cultivar 5 was the most resistant to Zn deficiency, followed by 1 and 2, while the most sensitive cultivars were 3, 4 and 6 cultivars outside the group.

**Key Words:** Paddy, variety, zinc, deficiency, tolerance, dry weight, Zn content

**ANTS (HYMENOPTERA: FORMICIDAE) ASSOCIATED WITH APHIDS  
(HEMIPTERA: APHIDIDAE) FROM ÇARDAK LAGOON IN THE ÇANAKKALE  
PROVINCE OF TURKEY**

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**ABSTRACT**

Mutualism is usually defined as the beneficial interaction between two different organisms. The best example of a successful mutualism among organisms offerable the interactions between ants (Hymenoptera: Formicidae) and honeydew producing insects such as aphids from family Aphididae of order Hemiptera. In this mutualistic interactions, honeydew secreted by some myrmecophilous aphids consume by some ant species. This food is important for the carbohydrates requirements needed by ants and used as energy resource for their vital activities. In return for providing food, aphids are protected by the ants from their natural enemies such as predators and parasitoids. In this study conducted to determine the ants associated with aphids and their interactions in Çardak Lagoon in the Çanakkale Province of Turkey between 2020 and 2021, 10 ant species belonging to nine genera in family Formicidae (Hymenoptera) associated with 9 aphid species belonging to five genera in family Aphididae (Hemiptera) were revealed on 12 different host plant species. In total, 17 ant-aphid interactions were revealed in the study area. Of these, the ant-aphid interactions of *Crematogaster scutellaris* (Oliver) - *Chaitophorus lapponum* Ossiannilsson, *Aphis ruborum* (Börner) and *Myzocallis komareki* (Pašek); *Dolichoderus quadripunctatus* (Linnaeus) - *Chaitophorus lapponum* Ossiannilsson; *Formica cunicularia* Latreille - *Aphis gossypii* Glover; *Lasius alienus* (Foerster) - *Pemphigus immunitis* Buckton and *Myzocallis komareki* (Pašek); *Plagiolepis vindobonensis* Lomnicki - *Aphis fabae* Scopoli were observed for the first time in Turkey. The results of this study show that the interactions of ants-aphids have a very rich variety in the Çardak lagoon, which is a quite small area and these relationships need to be investigated locally in many areas of our country.

**Keywords:** Mutualism, Ant, Aphid, Çardak lagoon, Çanakkale, Turkey

# SCREENING AND DETECTION OF GENETICALLY MODIFIED ORGANISMS IN FOOD PRODUCTS

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## ABSTRACT

The history of genetically modified organisms (GMOs) can be traced to the year 1971. New features, including herbicide tolerance, abiotic stress tolerance, disease resistance, resistance to virus, antibiotic, nutritional improvement, and insect resistance are given to food products with gene technology. The food products are especially cotton, tomato, soybean, maize/corn, potato, canola, sugar beet, papaya, squash, bread, potato, beans, rice, dairy products, egg products, chocolates, and meat. It has become important for the development of confidential and rapid methods of GMO detection and quantification GMO analyses. In order to determine the presence or absence of GMOs in food products, methods based on either the detection of added foreign DNA or the detection of novel protein are used in the transgenic plants. The methods are Polymerase Chain Reaction (PCR), biosensors, Western blot, enzyme-linked immunosorbent assays. PCR is the most commonly accepted method owing to its being the most sensitive and reliable both in qualitative and quantitative analyses. Today, food control laboratories performing GMO analyses are equipped with Real-Time PCR (qPCR) instruments because the enforcement of the labeling threshold of 0.9% for food products containing GMOs requires quantification of the GMO content by methods designed for this technique. There are commonly three particular sequences inserted into most transgenic plants. The target sequences are a promoter of the 35S subunit of rRNA of the Cauliflower Mosaic Virus (CaMV p35S), the terminator of the nopaline synthase gene (tNOS) from *Agrobacterium tumefaciens*, and the 34S promoter from Figwort Mosaic Virus (pFMV) for GMOs screening analyses. PCR-based GMO tests can be grouped into four categories corresponding to their level of specificity, including screening targets, gene-specific targets, construct-specific targets, event-specific targets. If samples are positive in the screening test, the next step will be the identification of GMO by an event-specific method. The enforcement of GMO regulations requires validated analytical methods and Certified Reference Materials (CRMs). Validation of GMO detection and quantitation methods is not easy, because of problems connected to availability, type and quality of reference materials, principles of quantitation, expression of the Limit of Detection (LOD) and Limit of Quantification (LOQ), and applicability of LOD and LOQ on different types of samples. In conclusion, appropriate and reliable GMO analyses are require for the measurement of GMO content in food products.

**Keywords:** Genetically Modified Organisms, Food, Real-Time PCR

**A SAMPLE OBSERVATION FOR GASTRONOMIC APPLICATIONS:  
INTERACTION OF LEMON OR APPLE VINEGAR ADDED OLIVE OIL WITH SEA  
BASS FILLET AND BEEFSTEAK**

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**ABSTRACT**

Sensory parameters for the consumers come to the fore to estimate the shelf life of the meat products. Microbial growth may lead to the sensory deterioration which affects the consumers liking and may also create some defects in terms of gastronomic point of view. Therefore, role of 5% apple vinegar and 5% lemon juice added olive oil marination liquid on raw beefsteak (BV and BL) and seabass (SV and SL) samples presented in this study. pH values of apple vinegar-olive oil and lemon juice-olive oil marination liquids were measured as 3.13 and 3.01, respectively. Sensory evaluation of these products is examined by odor, color, texture scores from the initial day, at refrigeration temperature in every 24 hours, until they reached unacceptable score of <5. According to overall acceptability scores, beefsteak samples were defined as unacceptable at 144th hour (BV:4.34, BL:3.86) which are supported by visual photographs. Seabass samples had shorter shelf life depending on marination liquid contents. Significant differences observed in terms of overall scores between SL and SV group on 72nd, 96th, and 120th hours ( $p<0.05$ ). The higher sensory evaluation scores were determined in beefsteak and seabass samples marinated with olive oil-apple vinegar in final stages of storage period. Marination by vinegar resulted in significant differences compared to lemon juice group regarding overall scores at 120th hour for beefsteak samples, and 72nd, 96th, 120th hour for seabass samples. Results of this study showed that marination of samples by olive oil-lemon juice or apple vinegar contributes to the product quality and may extend the shelf life during refrigerated storage. These additives in marination liquids may have positive effect on sensory quality of meat products and can be used at different ratios for gastronomic applications.

**Keywords:** sensory analysis, marination, sous vide, lemon juice, apple vinegar

## AUTHENTICATION OF EXTRA VIRGIN OLIVE OIL

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### **ABSTRACT**

Authentication” refers to the control of different kinds of fraudulent practices, including adulteration, mislabeling, misleading origin etc. Extra virgin olive oil (EVOO) has recently gained in popularity because of its quality, its potential health benefits, and its strict quality and purity control. The high price of EVOO and its reputation as a healthy and delectable oil makes it a preferred target for fraudsters. Fraud often takes place by the addition of lower quality olive oils and less expensive seed oils, especially refined oils, to EVOO for the purpose of financial gain. Moreover, since the chemical and physical properties of olive oil are affected by complex multivariate interactions, including cultivars, ripeness level, geographical origin, processing methods and storage condition, it is challenging to distinguish high quality olive oil from low quality olive oil. In order to sustain consumer confidence, provide them with correctly informed choices and protect legitimate businesses, there is an urgent need to elucidate the characteristics of different grades of olive oil and to develop approaches to identify EVOO adulteration depending on the special/unique properties of olive oils. The worldwide proliferation of EVOO quality and authenticity standards regulations, driven predominantly by the trade globalization of this product and the emergence of new producing and consuming countries outside the Mediterranean region, has stimulated new discussion and debate that trade regulations, which should take into account the natural variation of olive oil composition due to environmental conditions and agro-technological practices. In order to assess the (E)VOO quality, authenticity, and origin (geographical and/or varietal) traceability of this product. The new approaches based on the use of advanced analytical techniques and subsequent data mining and analysis by applying chemometrics, open up very interesting perspectives for authentication of extra virgin and virgin olive oils.

**Keywords:** Authentication, adulteration, origin, traceability, extra virgin olive oil

## COMMONLY USED SYNTHETIC ANTIOXIDANTS IN OILS AND FATS

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### **ABSTRACT**

Oils and fats and fat-rich products containing more than one unsaturated bond are very susceptible to oxidation. Double bonds in unsaturated fatty acids are broken down and easily oxidized by the action of various external factors (such as temperature, light, water, enzymes, oxygen and trace elements). Therefore, one of the biggest problems that occur during the preservation and storage of foods is lipid peroxidation. Lipid peroxidation causes bitterness in oils and fats, and deterioration in colour, taste, aroma, texture and consistency in other foods containing fat, as well as a decrease in quality. The use of antioxidants is one of the most effective methods to delay the oxidation of oils and fats and fatty foods and to protect polyunsaturated lipids from oxidative degradation. Antioxidants are compounds that can inhibit oxygen-dependent lipid oxidation, usually by neutralizing free radicals. The chain-breaking process can occur during the initiation or propagation phase of lipid oxidation. Some free radical scavengers and chain-breaking antioxidants form molecular complexes with free radicals, losing their reactivity and preventing oxidation. Antioxidants are also used as supplements to neutralize the side effects of oxidative stress. To control lipid peroxidation, synthetic antioxidants such as butyl hydroxytoluene (BHT), butyl hydroxyanisole (BHA), tertiary butyl hydroxyquinone (TBHQ) and propyl gallates have been used successfully for many years since they are very effective, have high level of stability and have strong antioxidant activity.

**Keywords:** Lipid Oxidation, Antioxidants, Oils, Fats, Synthetic antioxidants

# EFFECTS OF ENCAPSULATION ON BIOAVAILABILITY OF FEED ADDITIVES

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## **ABSTRACT**

Encapsulation is a technology based on keeping an active substance in capsules by being coated with one or more coating materials. Encapsulation is a system used to increase the stability and bioavailability of bioactive components, to preserve their structure and to release them in a controlled way to target tissues. Although it is used in areas such as food, medicine, pharmacy, veterinary medicine, industry, encapsulation is also possible in feed additives. Vitamins, minerals, enzymes, proteins, organic acids, probiotics, prebiotics, essential oils, sweeteners, preservatives, colours, flavors, fatty acids ( $\omega$ -3, konjugated linoleic acid), carotenoids ( $\beta$ -carotene and lycopene) and antioxidants (tocopherol, flavonoids and polyphenols) are the active ingredients mostly used in the encapsulation process. In recent years, it has been suggested that the encapsulation method can provide significant advantages for more effective use of feed additives used in the nutrition of farm animals. In this review, the advantages of encapsulation technology applied to additives in order to reduce the negative effects of environmental factors on the quantity and quality of active substances or to increase their stability, and the effects of these products on farm animals are discussed.

**Keywords:** Broiler chicken, encapsulation, feed additives, bioavailability, performance.

# EFFECT OF BORON ON THE BERRIES SETTING AND QUALITY CHARACTER OF GRAPE

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## ABSTRACT

Many studies find that the correct use of macro and micronutrients for plant nutrition are essential to improve quality and quantity of fruits. Role of boron are well known for the development and maintenance of structural properties. Grapes require an sufficient and ongoing sourcing of available boron, during important stages especially flowering and berry set. It is known to be critical in the elongation of pollen tube, translocation of sugars and nutrients from leaves to fruit, pollination, cell wall strength, cell division and seed development. Boron is also fundamental in the ion fluxes across the membranes, phenol metabolism and transport. On the other hand, boron accessibility for the plant is limited due to high solubility and leaching by irrigation or rainwater in shallow or coarse textured soils. The management of optimum boron concentrations in plants is necessary to attain quality yield. Low concentrations or absence of boron is one of the most common deficiencies in the grapevine and causes significant loss of grape quality. The most common boron deficiency signs are poor berry set and the presence of small-sized berries. Boron is one of the most important, which has fundamental functions in plant growth mechanisms, participates in photosynthesis, nitrogen fixation, as well as in respiration metabolism. The other main topic is that how we can application of nutrient to the plant? Some research show to us if we applied of boron directly to the soil it can be phytotoxicity because of that there is a small limit between boron deficiency and toxicity for many plants.

**Keywords:** boron, berries setting, quality, grape

## OBSERVATIONS ON THE FORAGING BEHAVIOURS OF BEES IN TWO DIFFERENT ZUCCHINI FARMING SYSTEMS

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### ABSTRACT

The Farming with Alternative Pollinators (FAP) approach aims to support wild pollinators, while increasing the income of the farmers in parallel with the increase in the quality and quantity of the products obtained from the unit area. It provides this with the principle of including 75% of the cultivation area for the main product and 25% for other marketable habitat enhancement plants. This study includes the results of the observations made in a FAP and a Control trial area, apart from the studies within the scope of the project named “Conservation of Pollinator Diversity for Enhanced Climate Change Resilience” which was supported by Federal Ministry for the Environment, Nature Protection and Nuclear Safety and carried out under the coordination of the organisation International Center for Agricultural Research in the Dry Areas (ICARDA). The aim of this study was to compare zucchini production areas that have adopted two different farming systems (FAP and conventional) in terms of total bee diversity and abundance visiting flowers. The study was carried out in two Cucurbita pepo (zucchini) fields (Zucchini-FAP and Zucchini-Control) of the same size in Ayaş district (Ankara-TURKEY). The results were obtained by periodic observations and counts in July-August 2020. A total of 24 transects were recorded at three different times (7:30, 9:30, 11:00) for 4 days, synchronously in both trial areas. It was determined that the maximum number of flowers, both male and female, was reached between 7:30 and 9:30 in both areas, and these flowers closed dramatically after this time interval. According to the counting results, there is a clear synchronization between the total number of bees observed in the fields and the number of open flowers. Maximum bee numbers and diversity were recorded in the second transect series. After this time, significant decrease was determined. According to the transect results, more bees were detected in the control area (total 904) than in the FAP area (758). However, in the control area, 99.23% of these bees were honeybees, while in the FAP area, 67.15% were honey bees and 32.85% were solitary bees. It was determined that the flight activity of honey bees started earlier, but at the 3rd count (11:00), when the increase in temperature became evident, solitary bees continued their activities in higher numbers. In other words, it was observed that there is a kind of niche sharing among bee species. Considering the correlation between bee visits and flower sex, it was determined that female flowers were visited by more bees in both FAP and control areas. This preference was valid for both solitary and honey bees. The most important result obtained from the study was the determination that the FAP approach attracts wild bees to the area by providing alternative food sources. Particularly in small scale farming areas, a positive reflection of habitat enriching small planting pattern changes on pollinators has been recorded.

**Keywords:** Zucchini pollination, honey bee, solitary bee, visiting rate, flight activity

# EFFECTS OF LIVING AND NON-LIVING MULCH APPLICATIONS ON FRUIT YIELD AND QUALITY IN ORGANIC KIWIFRUIT PRODUCTION

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## ABSTRACT

Kiwifruit cultivation, whose production has increased rapidly in recent years, started in the Black Sea region in the 1990s and according to 2020 TUIK statistics, 63,798 tons of kiwifruit is produced in an area of 21,325 da. Organic production constitutes 841 tons of this production. With the technological developments at the global level, increasing population and industrialization, environmental pollution is increasing proportionally and the balance of nature is deteriorating. This situation led to the need to protect the natural balance and new concepts such as good agriculture, organic agriculture and sustainable agriculture revealed. Organic agriculture forbids the use of synthetic chemicals as pesticides, which are foreign to nature, intrusive and put the life of living things at risk by creating residues. This study was carried out in the farmer's garden in Aydınlr Village of Giresun province between 2016-2019 to determine the effects of living and non-living mulch materials on fruit yield and quality in organic kiwifruit production. As living mulch materials, soil surface covering plants, hazelnut husk + straw and weeds were cut and left on the soil. Geotextile cover was used as inanimate mulch material. The study was established according to the randomized complete blocks experimental design, in 20 plots with 5 applications x 4 replications and 4 kiwi vines in each plot. In the study; yield, fruit weight, fruit width, fruit length, fruit flesh color, vitamin C content, total phenol, TSS, pH, TETA and fruit hardness parameters were examined. In our study, in which a sustainable agricultural technique and nature-friendly methods were discussed, no statistical differences were found apart from yield and TETA data. However, it is hopeful to transfer the results obtained one-to-one into practice. In terms of fruit weight (100.1 grams), fruit width (51.91 mm) and vitamin C content (100 mg/100 gr), hazelnut husk + straw application gave the highest results. On the other hand, geotextile in terms of fruit size (66 mm) and pH, and surface covering plant applications (9.32) in TSS values came to the fore. When the yield per decares was evaluated according to the years, it was determined that there were statistical differences. According to the results obtained, the control application was in the same group as the surface covering plant application (1157 kg/da) with a fruit yield of 1281 kg per decares, while the hazelnut husk + straw application was in the last group with 827 kg/da.

**Keywords:** kiwifruit, weed mat, hazelnut husk, mulch, yield

# MODELLING AND OPTIMIZATION OF COAGULATION -FLOCCULATION PROCESS OF WASTE WATER BY RESPONSE SURFACE METHODOLOGY

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## **ABSTRACT**

The reuse of wastewater treated by treatment plants is a hot topic today, the implementation of such a project requires that managers of different organizations such as ONID and agricultural services must have the key elements to educate and motivate farmers to use treated wastewater to irrigate their agricultural land. In our current research, a natural coagulant: *Moringa oleifera* has been applied to improve the physico-chemical qualities of the water treated by the El-karma treatment plant - Oran-. The tests were carried out on a pilot at laboratory level. The coagulation conditions were optimized by the response surface methodology (RSM) on the basis of the central composite design (CCD) using the pH of the initial solution, the concentration of the product, the mixing speed as input variables. The cubic regression models, which have been tested by analysis of variance (ANOVA), were constructed to relate the output response (turbidity) with the above-mentioned input variables, respectively. The cubic regression model describes the process of eliminating turbidity well. The effects of these variables on turbidity treatment performance for the elimination of colloids have been studied, and coagulation mechanisms; including the interactive effects between various influencing factors, have also been discussed.

**Keywords:** Optimization, Coagulation/flocculation, Design of experiment, Response surface methodology

# OPTIMISATION OF THE COAGULATION-FLOCCULATION PROCESS BY BENTONITE AND ALUMINUM SULPHATE

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## ABSTRACT

Aluminum sulphate (AS) was applied in the coagulation process and bentonite in the flocculation process to remove the turbidity of the wastewater. The objective of this study is to follow of parameters and the optimization of the process in the wastewater treatment plant of KARMA (ORAN) town, Five independent factors have been studied; pH, dose of aluminum sulphate, agitation rate and coagulation time and flocculation rate that affect turbidity removal efficiency [5,6]. An experimental design was used to study the effect of independent factors and interaction factors on the elimination of turbidity (%). The results obtained by the experimental design method show that all the factors have a significant effect on the elimination of turbidity (%). In addition the order of significance of the main effects is: temperature > Agitation speed of flocculation > coagulant dose > pH > Agitation speed of coagulation.. As well as among the most important factors had the strongest effect on the elimination of turbidity (%), are the pH \* dose of the coagulant.

**Keywords:** Coagulation-flocculation; Used water ; aluminum sulphate; experimental design.

# INTRAPERITONEAL ACUTE TOXICITY OF THE ETHANOLIC EXTRACT OF LEAVES PLANT OF OLEA EUROPEA VAR. OLEASTRE

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## ABSTRACT

*Olea europea* var. *oleaster* has a wide use in traditional medicine. It used in folk medicine as a remedy for treatment of inflammation, gastrointestinal problems and internal infections. The acute toxicity test of the ethanolic extract of *O.europea* was evaluated using the mice experimental models. The leaves in powder form were macerated in aqueous ethanol with proportions of 80% (v/v) with an extraction yield of 31.25%. Quantitative phytochemical examination showed that the ethanolic extract of *O.europea* leaves has high contents of total polyphenols, flavonoids and condensed tannins, with the respective values of  $942.36 \pm 0.15 \mu\text{g EAG/mg}$ ,  $523.68 \pm 0.23 \mu\text{g EQ/mg}$  and  $211.28 \pm 0.85 \mu\text{g ER/mg}$  of extract. The acute toxicity test was performed over a 14 days period, with 10 groups of 10 mice, by administering increasing doses of crude extract ranging from 200 mg/kg to 5000 mg/kg body weight to mice intraperitoneally. Administration of the extract at different doses (1000 mg/kg to 5000 mg/kg) causes a regular increase in signs of intoxication and mortality during the 14 days of observation in relation to the administered dose. The results made it possible to obtain the lethal dose for 50% or LD<sub>50</sub> which is included between 500 mg/kg and 5000 mg/kg, the value of the lowest lethal concentration (LCL) is  $958.24 \pm 16.58 \text{ mg/kg}$  and the highest lethal concentration (UCL) is  $5343 \pm 34.27 \text{ mg/kg}$ . Thus, intraperitoneal administration of 2000 to 5000 mg/kg of the ethanolic extract of *O.europea* showed effects on body weight and food consumption and caused a change in behavior. In conclusion, the ethanolic extract can be used safely at doses less than 500 mg/kg.

**Keywords:** *Oleastre*, ethanolic extract, polyphenol, intraperitoneal acute toxicity test, LD<sub>50</sub>

## SELECTION OF MULBERRY (MORUS ALBA) IN SAMSUN

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### ABSTRACT

This research was carried out in Samsun province Terme, Çarşamba, Tekkeköy, Canik, Atakum, Bafra, Alaçam and Yakakent on 21 white mulberry types in 2016-2017 years. In the scope of productivity observations, yield, fruit weight, total soluble solid, dry ratio, dry fruit color, number of seeds in the fruits, fruit juice yield and fruit juice color parameters were added suitable for fruit juice industry. Among the selected types, average fruit weight (g) 1.05-5.65, total soluble solid (%) 10.73-19.07, fruit juice ratio (%) 51.90-76.53, dry fruit ratio (%) 11.51-19.77 and number of seeds in the fruits 6.96-25.74 respectively. These types are intended for fresh consumption, pekmez, for drying and processing in jam.

**Keywords:** M.alba, TSS, Fresh, Pekmez, Drying

# INCREASING NUMBER OF PARTIAL RESISTANCE TRAITS TO ZUCCHINI YELLOW MOSAIC VIRUS IN ONE PRODUCTIVE HYBRID OF SQUASH INCREASE RESISTANCE AND STIMULATE THEIR EFFECTIVENESS

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## ABSTRACT

Zucchini Yellow Mosaic Virus (ZYMV) is a very important cucurbits virus that causes high losses of yield in Iraq and the world. The high biological variability of ZYMV provided opportunities for heterogeneity could observe with multiple aspects of direct partial genetic resistance. Four different direct partial resistance aspects were isolated and bred to pure line genotypes were previously introduced in a program of self-pollination and selection. Collection of these four partial resistance traits of ZYMV genotypes was achieved in a program of combining of resistance genes controlling these traits to increase resistance genes intensity in one genotype of squash. In preliminary production of two individual hybrids was performed. The first one was produced by pollination between the pure line SQ2023 (distinguished with mild auto recovery of ZYMV infection) and the pure line SQ2018 (distinguished with slow mosaic of ZYMV infection), and the second by hybridization between the pure line SQ2026 (characterized by the minor or unclear infection symptoms of fruits, not get chromatic heterogeneity or obvious deformities), with the pure line SQ2017 (characterized by the nonappearance of infection symptoms on the fruits) was conducted. To produce quadrilateral resistant hybrid hybridization between the two dual hybrids was achieved. Evaluation of resistance efficiency explained that there was a positive reaction among the non-allelic genes controlled these partial resistance traits may raise the effectiveness of their resistance gradually with the number of partial traits (genes) include in the hybrid, as it rises from 38.3 in pure lines to 73.4% in the dual hybrids and more to 98.4% in the quadrilateral hybrid. The resistance traits in these inbred lines are different, or independent from their others, or the genes that controlled them are non-allelic, but there is a reaction among them lead to the supremacy of resistance or to the max expressing of the gene(s) responsible of these traits in an unprecedented manner. That indicates the combination of partial non-allelic resistance traits increase their effectiveness.

**Keywords:** squash breeding, virus resistance, cucurbits viruses, squash diseases, genetic resistance, ZYMV

# BIOMATERIALS POTENTIAL AS COAGULANTS IN WASTEWATER TREATMENT

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## ABSTRACT

In order to valorize the available natural substances and to minimize the toxic effect of the conventional chemicals (aluminium sulphate, iron alum, ferric chloride, synthetic polymers) used in the coagulation-flocculation processes, several works have been carried out on substitute products called "biomaterials", of vegetable origin such as (powder or mucilage of the Cactus *Opuntia ficus -indica* (OFI), seeds of *Moringa oleifera*, starch, alginate... ). The Cactus *Opuntia ficus -indica* is a plant widely spread in northern Algeria. For this purpose we are interested in the use of mature cladodes of *Opuntia ficus -indica* as a natural coagulant to reduce turbidity and removal of micropollutants from secondary wastewater of the wastewater treatment plant of El Karma (town of ORAN). The experiments were carried out in the jar test at ambient temperature (20°C to 21°C) with variation of the different parameters (the dose of biomaterial (*Opuntia ficus- indica* cladodes powder), pH, stirring time). The results obtained showed that the highest turbidity reduction efficiency was found with 0.4 g of OFI powder (98%) in comparison with iron alum or 96% with the same dosage. From this study, it can be deduced that OFI has great potential to be used as a low cost bio-coagulant for wastewater treatment.

**Keywords:** *Opuntia ficus-ndica* , biomaterials, wastewater treatment, coagulation-flocculation, turbidity, jar test

# THE ALGERIAN GREEN ALGA *ULVA LACTUCA* AND ITS HYDROETHANOLIC EXTRACT PROTECT AGAINST SERUM AND ERYTHROCYTE OXIDATIVE STRESS INDUCED BY TYPE 2 DIABETES IN RATS

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## ABSTRACT

The present research aimed to evaluate the antioxidant activity of the green alga *Ulva lactuca* and its hydroethanolic extract, in type 2 diabetic rats (T2D). T2DM was induced in male Wistar rats by a high fat diet (HFD, 30% fat) for 5 weeks. At the end of this period, an intraperitoneal injection of a low dose of streptozotocin was administered to the rats. Diabetic rats were divided into 3 groups (n=6) and consumed for one month HFD combined or not with 1% algae (HFD-Alg) or 1% of its extract (HFD-Ext). A control group (n=6) consumed a standard diet. The HFD *vs* standard diet induced hyperglycemia, increased HbA1C, insulin resistance and hyperlipidemia. These parameters decreased with HFD-Alg and HFD-Ext *vs* HFD with a decrease in insulin resistance. Furthermore, in HFD group compared to the control group, an increase in serum and erythrocyte TBARS, hydroperoxides and carbonyls was observed. In addition, erythrocyte antioxidant enzyme (SOD, GSH-Px, CAT and GSSH-Red) activities were reduced. In HFD-Alg or HFD-Ext groups *vs* HFD group, serum and erythrocyte TBARS and serum carbonylated substances were significantly decreased. On the other hand, antioxidant enzyme (SOD, CAT and GSH-Px) activities increased in HFD-Alg or HFD-Ext groups compared to the HFD group. In conclusion, the ingestion of green algae or its extract attenuated oxidative stress by decreasing serum and erythrocyte lipid and protein peroxidation and improving antioxidant enzyme activity.

**Keywords:** *Ulva lactuca*; Antioxidant; Erythrocytes; type 2 diabetes

# DEXAMETHASONE AS AN EFFICIENT DRUG FOR COVID-19: META-ANALYSIS

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## ABSTRACT

SARS-CoV-2, The virus that originated in bats and transmitted to humans, has spread across the continents causing a worldwide pandemic ever since Wuhan's outbreak. Nucleic acid tests were the reliable ways for this virus detection since the culture cycle is too long. Coronavirus disease 2019 is able to affect the respiratory system and lead for pneumonia and acute respiratory distress syndrome (ARDS). A variety of antiviral medicines, immunotherapies, and vaccines are being researched and produced as possible treatments for the prevention or treatment of COVID-19. Dexamethasone is a corticosteroid with anti-inflammatory and immunosuppressive properties that are used in a variety of illnesses. Dexamethasone could be a life-saving medication. Dexamethasone appears to be beneficial only in people who are already in a serious condition. Dexamethasone shows to be clinically beneficial for long-term health consequences in Covid-19 healed individuals.

**Keywords:** Covid-19, Sars-CoV-2, Pandemic, Dexamethasone, Antiviral, Treatment.

## ANTIMICROBIAL ACTIVITY OF ESSENTIAL OIL OF THYMUS NUMIDICUS POIRET

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### ABSTRACT

Plant extracts have strong antimicrobial activities and can be a successful substitute for antibiotics. For centuries, drugs of synthetic origin have shown their ineffectiveness against resistant microorganisms, it is in order to promote treatments of plant origin we have studied the antimicrobial power of the oil. essential of *Thymus numidicus* Poiret. Through this work, we extracted the essential oil by the method of water vapor entrainment; this oil is found to be very rich in terpenes. The antimicrobial activity of this oil was tested by the antibiogram technique on several microbial strains, Gram + bacteria such as: *Bacillus subtilis* and *Staphylococcus aureus*, and Gram- bacteria namely: *Echerichia coli*, *Pseudomonas aeruginosa* and *Pseudomonas fluorescense* The results of the antimicrobial activity show a very good action of the essential oil against Gram + bacteria, they turn out to be very sensitive and exhibit significant zones of inhibition which oscillate between 35.33 and 22.33 mm. While Gram-bacteria show an average sensitivity between 17.66 and 15.66 mm to the extract tested. *Thymus numidicus* Poiret essential oil has shown good antimicrobial activity with low MICs and CMBs ranging from 0.125 to 0.5%. **Keywords:** antimicrobial activity, Minimum inhibitory concentration "MIC", minimum bactericidal concentration "C

**Keywords:** Antimicrobial activity; essential oil, *Thymus numidicus*, minimum bactericidal concentration "MBC", minimum inhibitory concentration "IMC"

## IMPACT OF ALCOHOLIC EXTRACTS OF THYMUS NUMIDICUS OF THE LARVAL DEVELOPMENT OF TUTA ABSOLUTA

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### ABSTRACT

The main objective of this work is the evaluation of the insecticidal potentialities of alcoholic plant extracts obtained from *T. numidicus*, on the mortality of *Tuta absoluta* larvae tested in vitro. The estimation of the insecticidal activity "larval development" of these extracts on the larvae of *T. absoluta* made it possible to record a very good activity of 100% of the alcoholic extracts at a dose of 10 mg / ml after 24 and 48 h of exposure only for the four larval stages, with low LD50 and LT50, However, these bio-tests remain more effective than the two chemical insecticides (Coragen® and Voliam Targo®.) Tested. After exposing the larvae of *T. absoluta* at different stages of development to alcoholic extracts at increasing doses, it was found that the dose of the extract tested as well as the exposure time were directly related to the mortality rate. The more you increase the dose, the more effective the extract is. Thus, the longer the time is spread, the more effective the treatment.

**Keywords:** insecticidal activity, larval development, alcoholic extracts, *Thymus numidicus*, *Tuta absoluta*

# EFFECT OF PLANTING GEOMETRY AND VARIETIES ON THE YIELD OF LENTIL IN NORTHERN TRANSITION ZONE OF KARNATAKA, INDIA

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## ABSTRACT

The experiment was conducted at Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad during the winter season of 2015 under rainfed condition. The geographical co-ordinates of Dharwad are 15°26' N latitude and 75°7' E longitude and an altitude of 678 m above mean sea level. It is located in the Northern Transition Zone of Karnataka which has semi arid climate. The soil of the experimental site was clayey in nature and having available N, P and K of 213, 21.5 and 325.8 kg/ha, respectively. Organic carbon (%) and pH of the soil were, respectively, 0.52% and 7.2. The treatments comprised of 7 genotypes *viz.*, Belgaum local, Kittur local, IPL-316, WBL-58, WBL-77, HULL-57, KLS-218 and two planting geometry *viz.*, 20 cm x 10 cm and 30cm x 10 cm. All the genotypes were sown on 16-10-2015 and provided with 25:50:0 kg of N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O/ha. Among the planting geometries, narrow spacing of 20 x 10 cm recorded significantly higher yield (563 kg/ha) than 30 x 10 cm (502 kg/ha). The per cent increase in yield was 12.15%. Which was attributed to lower plant population in 30x10 cm (333333 plants/ha) compared to 20x10 cm (500000 plants/ha). Among the genotypes local genotypes like Belgaum local (694 kg/ha) and Kittur local (697 kg/ha) proved significantly superior over other genotypes (347 to 596 kg/ha). The higher yield in these genotypes was due to higher number of pods per plant (68.35 and 72.25 respectively) over other genotypes (39.9-53.2). These local genotypes achieved better yield compared to other improved genotypes as they were adopted to the climatic condition of this region and achieved higher biomass under existing conditions. Interaction was not significant

**Keywords:** Lentil, planting geometry, varieties

# MITIGATION OF DROUGHT STRESS EFFECTS BY CHITOSAN-COATED IRON OXIDE NANOPARTICLES AND NATURAL GROWTH STIMULANTS IN PEPPERMINT

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## ABSTRACT

To evaluate the effect of Kitoplus® growth stimulant and Chitosan-Coated Iron Oxide Nanoparticles (CCIONP[JŚ1]) under drought stress on peppermint growth and chlorophyll fluorescence, a factorial experiment conducted in a split-plot randomized complete block design with three replications. Treatments consisted of three levels of moisture stress (irrigation at soil moisture drain at values of 30, 60, and 90% of field capacity), three concentrations of Kitoplus® treatments (control without Kitoplus®, 0.5 and 1 %), and three concentrations of CCIONP (control without CCIONP, 5 and 10 μM respectively). During the experiment, foliar applications of Kitoplus® and CCIONP performed at three stages with 15 days' intervals, and one week after the last foliar treatment stomatal resistance, proline chlorophyll index and chlorophyll fluorescence evaluated for each sample. The results showed that the dual and triple effects of drought stress and growth stimulation treatment of Kitoplus® and CCIONP had a significant effect on the physiological traits studied in the study. The results showed that with increasing drought stress, chlorophyll content and stomatal conductance in plants significantly reduced in control conditions. Kitoplus® treatment at 1 % concentration under irrigation of 60% of field capacity increased chlorophyll index. Also, the maximum fluorescence (Fm) and variable fluorescence (Fv) in comparison to the initial fluorescence were associated[JŚ2] with an increase in drought stress, which[JŚ3] was increased in peppermint plants treated with Kitoplus® supplemented with CCIONP was significantly different from control plants[JŚ4]. [M5] The highest maximum fluorescence and variable fluorescence observed in peppermint plants treated with Kitoplus® at 1 % with CCIONP at 10 μM under drought stress at 30% soil moisture.

**Keywords:** growth stimulant, Kitoplus®, maximum fluorescence, peppermint, quantum performance potential, drought stress

# IMPACT OF STORAGE CONDITIONS ON ACHENE LONGEVITY AND ITS YIELD IN SUNFLOWER (*HELIANTHUS ANNUUS* L.)

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## ABSTRACT

Being an oilseed crops sunflower is sensitive to storage conditions which significantly affect the seed quality and radically impact on crop yield. Seed longevity is very important for long term safe storage of sunflower germplasm. Temperature and relative humidity are the major factors regulating the seed longevity which also directly impacts on quantitative as well as qualitative traits of sunflower. To evaluate the effect of storage conditions on the longevity of achenes and its production, the seeds of 10 sunflower accessions stored at 3 types of storage conditions i.e., room condition as a control (T0), 12°C/50% RH (T1) and 20°C/60% RH (T2) for 8 months at the Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad, Pakistan. After storage, seeds were sowed in Randomized Complete Block Design (RCBD) with two factorial arrangement and 3 replications in field. Results showed that overall seed stored at 12°C/50% RH gave maximum seed germination (84%), highest plant height (155 cm), 100 achene weight (5.35 gm) and achene yield per plant (48 g). Among accessions G-9 and G-56 showed maximum potential in field stored under 12°C/50% RH. In contrast to T1 (12°C/50% RH), control and T2 (20°C/60% RH) showed less potential in field emergence (43% and 35%) and even in yield parameters (23g and 20g), respectively. High humidity with high temperature boost up all the metabolic activities in storage which ultimate lead towards seed ageing. Physiological dysfunction and biochemical changes at the time of storage reduced the sunflower germination in field and thus decreased the achene total yield. In conclusion, sunflower achene showed maximum yield when stored at 12°C temperature with 50% relative humidity.

**Keywords:** Storage, Sunflower, Temperature, Relative humidity, Seed longevity

# GENOME EDITING AS AN ATTRACTIVE TOOL TO ENGINEER RESISTANCE AGAINST PLANT VIRUSES

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## **ABSTRACT**

Plant viruses are serious threat to the crop production worldwide. Annually a huge amount of loss is due to the diseases caused by viruses. Chemical control of vector, good agronomic practices, sanitization of cropping area and virus-resistance varieties are the main focus to cope the plant viruses. These efforts are not sufficient to provide a durable solution against viruses. Recently, development in the genome editing techniques and the emergence of CRISPR/Cas as a powerful genome editing tool has provided a possible solution for development of virus-resistant plants. Clustered regularly interspaced short palindromic repeats (CRISPR) and CRISPR-associated (Cas) proteins are associated with the natural adaptive immune system of prokaryotes against bacteriophages. This CRISPR/Cas based resistance technique can be effectively used to develop resistance against plant viruses. Genome editing by mutating host factors essential for virus infection and/or modification of virus genome using CRISPR/Cas system has proved to be effective against both DNA and RNA viruses. Stable resistance in *Arabidopsis thaliana* plants against Turnip mosaic virus, in rice plants resistant to Rice tungro spherical virus, in cucumber against Cucumber vein yellowing virus, Zucchini yellow mosaic virus and Papaya ringspot mosaic virus has been produced by genome editing of host factor eIF4G genes. Targeting the virus genome, both coding and non-coding region has been proved successful in controlling caulimoviruses, geminiviruses and other RNA virus infections. The studies have shown that CRISPR/Cas technique is more effective and rapid to produce virus resistance as compared to conventional crop breeding methods.

**Keywords:** genome editing, resistance, CRISPR/Cas, Plant viruses

# MILK YIELD COMPOSITION AND MODELING OF LACTATION CURVES OF ARABIAN DONKEYS

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## **ABSTRACT**

The present work was undertaken to evaluate milk yield composition and modeling of the lactation curve of Arabian donkeys. Three experiments were carried out in 4 Tunisian regions characterized by a large asin herd. In a total of 164 milk samples collected during three seasons. The chemical composition of donkey milk was carried out for dry matter, fat, crude protein and lactose. The chemical proprieties of milk were analyzed using ANOVA linear models to determine the influence of the lactation stage and the season on the milk yield. For four mathematical models of lactation, several criteria were established to choose the most reliable and representative lactation curve model. The results showed that the donkey milk composition was: dry matter 9.49%, fat 1.19%, lactose 5.89% and protein 1.48%. Besides, the results revealed that the season significantly affected the dry matter, the milk fat and protein contents. The wood model appears to be the most appropriate among the tested models and can be used to estimate the dairy potential of donkeys. Further research on milk production, milk functionality, and valorization, market development, and genetic selection will help to better preserve and use of donkeys.

**Keywords:** Milk, Composition, quality, lactation curve, donkeys

## DELAYING SOWING DATE TO REDUCE THE MECHANISM OF SUNFLOWER VERTICILLIUM WILT

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### ABSTRACT

Sunflower Verticillium Wilt is caused by the soil-borne fungus, *Verticillium dahliae* Kleb. The fungus produces microsclerotia (MS), which serve as a long term survival structure. In a previously reported, control of Verticillium wilt in sunflower requires an integrated approach, which includes resistant varieties were planted, chemical control, biological control and so on. However, agricultural control is most directly effective control methods. Therefore, we conducted a field experiment on the control of Verticillium Wilt via delaying sowing dates from 2017 to 2021 in XiXiaoZhao, Inner Mongolia and Huinong, Ningxia region. The objective of this research was to determine the effectiveness and mechanism of delaying sowing date in managing Verticillium wilt of sunflower. The selected experimental fields are all disease nursery in the main sunflower producing areas, and the MS can be detected in the soil. For the delaying sowing date experiment, we have set up 5 different sowing date (May1st、 May10th、 May20th、 May30th、 Jun10th ) in BaiYanHua and XiXiaoZhao filed, Inner Mongolia region. Finally, Statistics of the occurrence of sunflower Verticillium wilt in different sowing times, and samples of sunflower roots and rhizosphere soil at different growth periods of sunflowers(V2, V6, R1 and R5) were collected in the experimental field to detect the amount of *V. dahliae* via Q-PCR . We have collected mixed soil samples before planting each year, and these soil samples are used to detect the changes in the number of micro sclerotia in the soil. Finally, we investigated the occurrence of sunflower diseases during the blooming period. The results of delaying sowing date showed that the disease index of Verticillium Wilt decreased with the delaying sowing date. Meanwhile, during seedling period, the *V. dahliae* in the soil showed decreased tendency. During the bud and full bloom of sunflower, there is no obvious change of the pathogens in soil. The colonization amount of pathogens inside vascular tissues of sunflower decreased with the sowing date delayed. The above results indicated that the decreased amount of pathogens was the main reason to explain the decreased severity of sunflower verticillium wilt with delaying the sowing date. In conclusion, delaying sowing date dramatically decreased disease severity of Sunflower Verticillium Wilt, the changing of MS amount in soil produced by *V. dahliae* is the main reason for the reduction of severity of Verticillium wilt under agricultural practices. The mechanism under such kinds of phenomena is still need to explore in detail.

**Keywords:** Delayed sowing date; Sunflower Verticillium wilt; Mechanism

# THE A-1,6-MANNOSYLTRANSFERASE VDOCH1 PLAYS A MAJOR ROLE IN MICROSCLEROTIUM FORMATION AND VIRULENCE IN THE SOIL-BORNE PATHOGEN VERTICILLIUM DAHLIAE

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## ABSTRACT

Sunflower yellow wilt is a widespread and destructive disease caused by the soil-borne pathogen *Verticillium dahliae* (*V. dahliae*). To better understand the pathogenesis mechanism of *V. dahliae* in sunflower, T-DNA insertion library was generated via *Agrobacterium tumefaciens* mediated transformation system (ATMT). Eight hundred positive transformants were obtained. Transformants varied in colony morphology, growth rate, conidia production and pathogenicity in sunflower compared to the wild type strain. A mutant, named VdGn3-L2, was chosen for further analysis based on its deprivation on microsclerotia formation. The flanking sequence of T-DNA insertion site of VdGn3-L2 was identified via hiTAIL PCR, and the interrupted gene encoded an initiation-specific  $\alpha$ -1, 6-mannosyltransferase, named as *VdOCH1*. The deletion mutant  $\Delta$ *VdOCH1* was impaired in certain characteristics such as fungal growth, conidia production, and microsclerotia formation. Also,  $\Delta$ *VdOCH1* mutants were more sensitive to the cell wall perturbing reagents, such as SDS and Congo red, lost their penetration ability through cellophane membrane, and exhibited dramatically decreased pathogenicity to sunflower. The impaired phenotypes could be restored to the wild type level by complementation of the deletion mutant with full-length *VdOCH1* gene. In conclusion, *VdOCH1*, encoded a-1,6-mannosyltransferase, manipulating the biological characteristics, microsclerotia formation and pathogenic ability of *V. dahliae* in sunflower.

**Keywords:** Sunflower, Verticillium wilt, *Verticillium dahliae*, Virulence

# EVALUATION OF THE CONTENT OF PHENOLIC COMPOUNDS AND ANTIOXIDANT POTENTIAL OF WHITE MULBERRY FRUITS AND PEKMEZ

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## ABSTRACT

Mulberry fruits and pekmez are known for their protective, or therapeutic effect to human health. Pekmez is considered as energy source food containing concentrated nutrients, also in Albania is known as for many years it has been produced by traditional method. The study was conducted to evaluate the content of phenolic compounds and antioxidant potential of white mulberry fruits collected in Tirana region, and its product pekmez. Pekmez control sample was prepared without clarifier agents and no sugar, which was compared with other pekmez samples prepared with the aid of various clarifier agents (2% w/w): bentonite, gelatin, calcium carbonate, and samples with sugar added. The total phenolic content, flavonoids and antioxidant potential were evaluated for whole fresh fruit, juice, pomace and pekmez, and the study of influence of various clarifier agents on them. Based on results mulberry fruit had the total polyphenolic content 285.41 mg gallic acid equivalent/100 g of sample in fresh weight (f.w.), and was found 46.97% lower content in juice, whereas in pomace and pekmez was found a greater content (55.32 % and 41.23 %) compared to fresh fruit. Pekmez samples prepared with the aid of clarifier agents resulted to have a greater amount of phenolic content (0.27-30.00 %) compared to control samples. Total flavonoids content resulted 20.67 mg catechin equivalents/ 100 g f.w., juice had 69.55 % lower content, whereas pomace and pekmez had 44.06 % and 56.49 % greater content, also pekmez samples prepared with the aid of clarifier agents resulted to have a greater amount of flavonoids (10.18-87.19%) compared to control samples. Antioxidant activity evaluated with ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) assay resulted from 158.06 to 170.66 mg ascorbic acid equivalent/ 100 g f.w. in pekmez samples, whereas the DPPH (2,2-diphenyl-1-picrylhydrazyl) assay resulted from 29.30 to 43.31 % of inhibition in pekmez samples. Based on study findings may be concluded that clarifier agents contributed positively, as a higher content of phenolic compounds and antioxidant potential resulted, and was in the order: control < sugared < bentonite < gelatin < calcium carbonate, where among clarifier agents calcium carbonate had a higher influence, which may be recommended to be utilized as beneficial for the pekmez production, and for its commercial importance.

**Keywords:** white mulberry, pekmez, clarifier agents, phenolic compounds, antioxidant potential

## DEPENDENCY ANALYSIS OF QUANTITATIVE TRAITS AND GRAIN PRODUCTIVITY IN GARDEN PEA (*PISUM SATIVUM* L.)

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### ABSTRACT

Trial with 10 samples of garden peas was performed on the experimental fields of the Maritsa Vegetable Crops Research Institute, Plovdiv, Bulgaria during three years period. Three of samples had afila leaf type (Echo-af., Kazino-af. and line 22/16- af.), while the other seven (Marsy-n., Plovdiv-n., line 22/16-n., Shugar dwarf-n., Vecherniza-n., line B4/34-n. and line 1/17-n.) – normal leaf type. In the stage of technological maturity of 10 plants from each sample the next indicators were evaluated: plant height (cm), height to first fertile node (cm), internode length (cm), tillers number, branches number, ineffective nodes number, total number of nodes, total number of pods per plant, 1 pod per fruiting handle, 2 pods per fruiting handle, pod length (cm), pod width (cm), pod weight per plant (g), green grains weigh per plant (g), % filled grains, % unfilled grains, average number of grains per pod. Regression analysis was applied and based on the values of the regression coefficient (R) it was found the most significant role in the formation of grain productivity was attributed to total number of nodes (R = 1.190), pods weight (R = 0.610) and height to first fertile node (R = 0.162). The analysis allows determining through which structural elements of the yield it is possible to more effectively increase the productivity of green grains from plants. Based on the regression dependencies, the effectiveness of the selection performance in the sampled garden pea can be successfully predicted.

**Key words:** garden pea, regression analysis, dependencies, grain productivity

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# EFFECT OF HUMIC ACID APPLICATIONS ON TUBER QUALITY IN POTATO (*Solanum tuberosum* L.)

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## ABSTRACT

There is some factors affect tuber yield and quality such as cultivars, environmental conditions and cultural practices. One of the most important cultural practice is fertilizer application which has positive effect on yield and quality parameters. Recently, organic fertilizers are preferred instead of chemical fertilizer. Humic acid is one of the organic fertilizer which is mostly used by farmers due to source of nutrition element for plant growth and improve quality of some soil types. Soils comprise of high pH and low organic matter in Central Anatolia where potato production is carried out intensively. It provides sustainability of soil and promote growth and development of plants. This study was conducted to investigate the effect of different humic acid doses and application methods on tuber quality parameters of potato at Konaklı small town, Niğde in 2019. The field experiments were laid out in the randomized complete block design with tree replication, five different doses of humic acid (HA0: 0 kg HA/da, HA1: 2 kg HA/da, HA2: 4 kg HA/da, HA3: 6 kg HA/da, HA4: 8 kg HA/da) soil + foliar application (half of each doses applied to soil before planting and half of each doses applied to foliar). Starch content, internal blackening, chips and french-fried quality were determined in this study. Results indicated that different doses of humic acid and application methods had various effects on quality parameters. Soil + foliar application of 4-6 kg HA/da-1 (1/2 soil+1/2 foliar) and 4-6 kg HA/da-1 foliar application was determined as an optimum dose for investigated quality parameters.

**Keywords:** *Solanum tuberosum*, Fertilization, Humic acid, Chips, French fry

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