



PROCEEDINGS OF INTERNATIONAL CONGRESS ON OIL AND PROTEIN CROPS

2-4 NOVEMBER, 2023

ANTALYA, TURKEY

**PROCEEDINGS OF
INTERNATIONAL
CONGRESS ON OIL AND
PROTEIN CROPS**

2-4 NOVEMBER, 2023

ANTALYA, TURKEY

**Organized by
Trakya University
European Association for Research on Plant
Breeding (EUCARPIA)
International Researchers Association**

**ISBN #:
978-605-73041-9-3**

WELCOME NOTES

International Congress Oil and Protein Crops Section Conference of EUCARPIA which is organized by Trakya University and the International Researchers Association in cooperation with the European Association for Research on Plant Breeding (EUCARPIA). The congress is held in Megasaray Westbeach Hotel, Antalya, Turkey, on November 2-4, 2023 with supporting of several national and international partners.

The Congress topics covers Oil and Protein Crops: Plant Breeding and Genetics, Molecular Genetics and Biotechnology, Biology and Physiology, Genetic Resources, Plant Protection, Agronomy, Economy, Animal feeding, Food Science and Nutrients, Fats, lipids, and Protein studies.

Oil crops are rich sources of oils, proteins, minerals, vitamins, and dietary fibers for both human and animal feeding and provide the raw material for the production of biodiesel. Oil crops are soybean, cottonseed, sunflower, canola, rapeseed, peanut, safflower, flax, sesame, coconut, castor, copra, etc.

Almost 50% of the global food protein supply comes from cereal seeds. Soybean, peanut, common bean, pea, lupine, chickpea, faba bean, lentil, grass pea, cowpea, pigeon pea, etc. are currently the most important legumes for human consumption and animal feed. Because of the protein content of their seeds; grain legumes, cereals, and other minor crops such as amaranth, quinoa, hemp, caraway, etc. are protein crops growing for plant protein for food and feed.

The Congress is intended that the subjects to be kept broad in order to provide opportunity to the science and research community to present their works as oral or poster presentations. The Congress languages is in English. Researchers, breeders and others with an interest in the genetics and breeding of oil and protein crops are invited to participate. Among the topics to be discussed are directions of breeding for resistance to abiotic and biotic stresses, improved industrial use, and conventional versus organic production.

As there have been many different scientific meetings around the world, we aimed to bring three different communities together, namely science, research and private investment groups considering practical information sharing that is of value for breeders, seed enterprises, researchers and scientists, in a friendly environment of Antalya, Turkey to share their knowledge and experience and benefit from each other.

There are 38 orals and 63 poster presentation in the congress both joining and presenting normal and online with 141 participants from 20 different countries from the world.

The congress gathered scientists from around the world, and present their recent achievements. The organizers will also invite relevant stakeholders to provide a view on the current situation around the world as well as prospects to overcome the limitation for sustainable crop production to feed the world.

We would like to thank all of you for joining this conference and we would like to give also special thanks to our sponsors and collaborators for giving us a big support to organize this event.

Prof Dr Yalcin KAYA
Head of the Organizing Committee

ORGANIZING COMMITTEE

<u>NAME</u>	<u>INSTITUTION</u>	<u>DUTY</u>
Prof Dr Yalçın KAYA	Trakya University	Head of Committee
Assoc Prof Dr Necmi BEŞER	Trakya University	Vice Chair
Dr Leonardo VELASCO	Institute for Sustainable Agriculture CSIC, Spain	Section Chair
Emrah AKPINAR	Trakya University	Congress Secretary
Prof Dr Bulent UZUN	Akdeniz University	Member
Prof Dr Mehmet Emin CALISKAN	Nigde OmerHalisdemir University,	Member
Dr Maria PACUREANU-JOITA	Romanian Acad, Res. Studies Center for Agroforest Biodiv	Member
Dr Dragana MLADINOVIC	Novisad Agricultural Research Institute	Member
M. İbrahim YILMAZ	Trakya Agricultural Research Institute	Member
Dr Göksel EVCİ	Trakya Birlik	Member
Dr Veli PEKCAN	Trakya Seed Co,	Member
Cengiz KURT	International Researcher Association (IRSA)	Member

INVITED SPEAKERS

Dr. Vladimir MIKLIC	Novisad Research Inst. Vice Director, SERBIA «Hybrid Sunflower Production»
Dr Cengiz TOKER	Vice-Rector, Akdeniz University, TURKEY «Legume Breeding & Production»
Dr. Etienne PILORGE	Terres Inovia, FRANCE «Oil & Protein Crops Sector in Europe»

EDITOR OF THE PROCEEDINGS ABSTRACT BOOK

Prof Dr Yalcin KAYA, Assoc Prof Dr Necmi BESER

SCIENTIFIC COMMITTEE

<u>NAME</u>	<u>INSTITUTION</u>
Prof. Dr. David BALTENSBERGER	Texas A&M University, UNITED STATES
Prof Dr Emre İLKER	Ege University, TURKEY
Prof. Dr. Maria DUCA	USAM, Republic of MOLDOVA
Prof. Dr. A. Tanju GÖKSOY	Uludağ University, TURKEY
Prof. Dr. Sevgi CALISKAN	Nigde OmerHalisdemir University, TURKEY
Prof Dr Aziz TEKIN	Ankara University, TURKEY
Prof Dr Cengiz TOKER	Akdeniz University, TURKEY
Dr. Begona PEREZ VICH	CSIC, Cordoba, SPAIN
Prof Dr Fatih SEYIS	Rize Recep Tayip Erdoğan University, TURKEY
Dr. Siniša JOCIĆ	IFVC Novi Sad, SERBIA
Dr. Etienne PILORGE	Terres Inovia, FRANCE
Prof Dr Hasan BAYDAR	Ispart Technical University, TURKEY
Dr. Ana MARJANOVIC JEROMELA	IFVC, Novi Sad, SERBIA
Prof Dr Johann VOLLMANN	Univ. of Natural Resources & Applied Life Sci., AUSTRIA
Prof Dr Viliana VASSILEVA	Maize Research Institute, BULGARIA
Dr Abdulkadir AYDOĞAN	Central Field Crops Research Institute, TURKEY

CONTENTS

WELCOME NOTES.....	3
ORGANIZING COMMITTEE.....	4
SCIENTIFIC COMMITTEE.....	5
THE DROUGHT EFFECT ON LEAF SPAD VALUE OF SESAME (SESAMUM INDICUM L.) ACCESSIONS	12
ENHANCING SESAME PRODUCTIVITY FOR LIVELIHOOD AND ECONOMIC IMPROVEMENT IN SUDAN	13
POLYMORPHISM OF GRAIN STORAGE PROTEINS IN TRITICALE LINES OF CIMMYT ORIGIN.....	14
TOWARD DEVELOPMENT OF CLIMATE RESILIENT VARIETIES: GENOME WIDE ASSOCIATION ANALYSIS FOR HEAT TOLERANCE IN CHICKPEAS.....	15
BREEDING FOR POD-SHATTERING RESISTANCE IN VEGETABLE-TYPE SOYBEAN. 16	
NOVEL AND SIMPLE CROSSING TECHNIQUE IN OIL SEED CROP SESAME (SESAMUM INDICUM L.).....	17
VARIABILITY OF AMARANTHUS CRUENTUS L. CV. PRIBINA PBA AND CDDP PROFILES UNDER THE TREATMENT OF HEAVY METALS.....	18
TESTS FOR THE CULTIVATION OF SUNFLOWER IN THE AGRO-CLIMATIC CONDITIONS OF LATVIA	19
DEVELOPMENT OF SOUTH AFRICAN SOYBEAN LINES WITH RESISTANCE TO SUDDEN DEATH SYNDROME	20
CHARACTERISATION OF THE SCLEROTINIA SCLEROTIORUM POPULATION ON SOYBEAN AND SUNFLOWER IN SOUTH AFRICA TO IMPROVE RESISTANCE BREEDING STRATEGIES	21
OVERVIEW ON THE ROMANIAN SOYBEAN QUALITY	22
GENETIC STRUCTURE AND VARIABILITY PARAMETERS OF LATHYRUS SATIVUS L. EUROPEAN COLLECTION	23
THE STUDY ON THE VARIABILITY OF PRODUCTIVE AND QUALITATIVE COMPONENTS OF SOME MUSTARD GENOTYPES	24
USING OF HETEROSIS SELECTION IN PEANUTS (ARACHIS HYPOGAEA L.).....	25
USING OF HETEROSIS SELECTION IN SESAME (SESAMUM INDICUM L.).....	26
EVALUATION OF HYBRID FORMS, ORIGINATED FROM WILD HELIANTHUS SPECIES ON SOME BIOCHEMICAL CHARACTERISTICS.....	27
SAFFLOWER: A SOURCE OF BENEFICIAL FLORAL TEA.....	28
YIELD ENHANCEMENT OF WATER STRESS CHICKPEA GENOTYPES BY INOCULATION WITH RHIZOBIUM STRAINS	29
GENOME-WIDE ASSOCIATION STUDIES OF SALINITY TOLERANCE IN MUNGBEAN AT THE VEGETATIVE AND REPRODUCTIVE STAGE	30
EXPANDING GENETIC VARIABILITY AND TRAIT IMPROVEMENT OF STAPLE CROPS: INSIGHTS FROM IFVCNS SUNFLOWER, WHEAT AND BRASSICAS PROGRAMS	31
CYTOGENETIC STUDY OF SOME SPECIES OF MEDICAGO GENUS.....	33

BREEDING AND AGRONOMIC COMPARISON BETWEEN SPRING AND WINTER VARIETIES OF CAMELINA SATIVA IN ITALY	34
IMPROVEMENT OF BEAN PLANT TRAITS BY INDUCED MUTAGENESIS	35
EXPLORATION, EVALUATION AND EXPLOITATION OF WILD SPECIES OF COOL SEASON FOOD LEGUMES	36
DEVELOPMENT OF CHLORSULFURON RESISTANCE SOYBEANS BY EMS MUTAGENESIS	38
THE CHALLENGE OF BREEDING FOR REDUCED OFF-FLAVOUR IN FABA BEAN INGREDIENTS.....	39
POLIMORPHISM OF GRAIN STORAGE PROTEINS IN TRITICALE LINES OF CIMMYT ORIGIN.....	40
MODIFIED METHOD OF MICROSPORE ISOLATION FOR DH TECHNOLOGY FOR THE BRASSICACEAE FAMILY	41
IMPROVEMENT OF BEAN PLANT TRAITS BY INDUCED MUTAGENESIS	42
PREPARATION OF CUO-TiO₂ BINARY NANOCOMPOSITES FOR THE SUPERIOR PHOTOCATALYTIC DEGRADATION OF RHODAMINE B: MORPHOLOGICAL AND STRUCTURAL PROPERTIES.....	43
PHYTOPATHOLOGY AND MOLECULAR INVESTIGATION OF RESISTANCES TO BACTERIAL AND FUNGAL PATOGENS IN COMMON BEAN MUTANT AND BREEDING LINES.....	44
DROUGHT STRESS TOLERANCE IN COMMON BEAN MUTANT AND BREEDING LINES: PHYSIOLOGY AND PROTEOMICS RESPONSE	45
PROTEOME EFFECT OF DROUGHT STRESS IN PEPPER MUTANT LINES	46
YIELD ENHANCEMENT OF WATER STRESSED CHICKPEA GENOTYPES BY INOCULATION WITH RHIZOBIA	47
EFFECT OF CLIMATE VARIABLES ON SUNFLOWER YIELD IN THE REPUBLIC OF MOLDOVA.....	48
DETERMINING THE CONTRIBUTION OF THE ENVIRONMENTAL FACTORS IN THE VARIATION OF SUNFLOWER SEED YIELD BY MULTIVARIATE ANALYSIS.....	49
PHYTOCHEMICAL AND PHARMACOLOGICAL PROFILE OF PHENOLIC EXTRACTS OF POMEGRANATE PEEL (PUNICA GRANATUM).....	51
CHROMATOGRAPHIC ANALYSIS AND HYPOGLYCEMIC ACTIVITY OF TWO MEDICINAL PLANTS	52
ANTI-INFLAMMATORY AND ANALGESIC ACTIVITY OF AQUEOUS EXTRACT OF INULA VISCOSA LEAVES	53
IN VITRO, MOLECULAR DOCKING AND TOXICITY PREDICTION OF PINE RESIN EXTRACT	54
THE ACCUMULATION OF PROLINE AND SOLUBLE SUGARS UNDER THE LOW TEMPERATURES IN SOME GRASS AND LEGUME MEADOW IN TEH SEMI ARID REGION SETIF , ALGERIA SPECIES.....	55
STEREOLOGICAL ANALYSIS OF THE SUNFLOWER ROOT SEEDLING.....	56
URTICA DIOICA L., ALGERIAN WILD PLANT WITH HYPOGLYCEMIC EFFECT	57

DIVERSE METHODS TO EVALUATE THE ANTIOXYDANT EFFECT OF PLANT EXTRACT	58
EVALUATION OF BIOLOGICAL ACTIVITY OF CRUDE EXTRACTS FROM PLANT USED IN TRADITIONAL MEDICINE.....	59
AN INVASIVE WEED OF CROPS: OXALIS PES-CAPRAE.....	60
PHYSICAL CHEMISTRY ANALYSIS, ANATOMICAL STUDY AND ANTIOXYDANT ACTIVITY OF ROSMARINUS OFFICINALIS.....	61
PHYTOCHEMISTRY AND ANTIOXYDANT ACTIVITY OF CERATONIA SILIQUA L. PULP EXTRACTS	62
PHYTOCHEMISTRY AND ANTIOXYDANT ACTIVITY OF CERATONIA SILIQUA L. SEEDS EXTRACTS.....	63
EXPANDING THE GENETIC BASE OF FLAX FOR IMPROVEMENT OF BIOTIC AND ABIOTIC STRESS TOLERANCE.....	64
FATTY ACID COMPOSITION AND YIELD COMPONENTS OF HEMP (CANNABIS SATIVA L.) GENOTYPES OF DIFFERENT ORIGINS CULTIVATED IN LATVIA	65
COMPARATIVE ASSESSEMENT OF THE PHYSIOLOGICAL AND MORPHOLOGICAL EFFECTS OF AN ORGANIC FERTILIZERS VERSUS A CHEMICAL FERTILIZER ON GREEN BEANS (PHASEOLUS VULGARIS L.).....	66
ROLE OF POST-HARVEST RESIDUE TREATMENT ON THE WHEAT PRODUCTIVITY, FLOUR PROPERTIES AND BREAD-MAKING QUALITIES	67
EVALUATION OF PHYTOSANITARY PRESSURE IN CEREAL GROWING IN AN ARID REGION.....	68
DIAGNOSIS OF AGRICULTURAL PRACTICES OF QUINOA CULTURE IN ALGERIAN ARID REGIONS	69
SEEDYIELD AND PROTEIN CONTENT IN SOME BULGARIAN SUNFLOWER HYBRIDS	71
CONTENT ESSENTIAL MACRONUTRIENTS IN THE ORGANS OF SUNFLOWER (HELIANTUS ANNUS) - HYBRID DEVEDA DEPENDING ON THE MAIN TILLAGE SYSTEM	72
CONTROL OF POLLEN BEETLE (MELIGETHES AENEUS F.) IN OILSEED RAPE USING INSECTICIDE LAMBDA-CYHALOTHRIN.....	73
THE NUTRITIONAL VALUE OF TWO FODDER PLANTS (MEDICAGO SATIVA L. AND CYPERUS ROTUNDUS L).....	74
CHANGES IN THE NITROGEN CONCENTRATION IN THE ORGANS OF WINTER WHEAT VARIETIES DEPENDING ON THE AGRICULTURAL PRODUCTION SYSTEM	75
USES OF POST-HARVEST RESIDUES AND THEIR INFLUENCE ON GRAIN PRODUCTIVITY AND GRAIN PHYSICAL PROPERTIES OF WINTER WHEAT	77
IN RURAL AREAS INTERNET CONNECTION PROBLEMS AND SOLUTION RECOMMENDATIONS EXPERIENCED IN THE PROCESS OF USING SMART AGRICULTURE METHODS IN OLIVE FARMING.....	78
EFFECTS OF DIFFERENT POLYETHYLENE GLYCOL (PEG) CONCENTRATIONS ON GERMINATION AND ROOT LENGTH OF SOYBEAN [GLYCINE MAX (L.) MERR.]	79
RECENT ADVANCES IN THE USE AGRICULTURAL-BASED MATERIALS FOR WASTEWATER TREATMENT.....	80

SUNFLOWER HYBRID SEED PRODUCTION - CHALLENGES AND PERSPECTIVES.....	81
NEGLECTED AND UNDERUTILIZED A CROP IN TURKEY: LINSEED (LINUM USITATISSIMUM L.)	83
DEVELOPMENT OF ORGANIC SOYBEAN GROWING IN POLAND.....	84
SOIL FERTILITY, PRODUCTIVITY AND CARBON STOCKS OF DIFFERENT OIL PALM (ELAEIS GUINEENSIS) HYBRIDS IN TUNGABHADRA COMMAND AREA OF KARNATAKA.....	85
LEGUMES IN TERMS OF SUSTAINABLE AGRICULTURAL PRACTICES FOR GLOBAL WARMING AND CLIMATE CHANGE.....	87
EFFECTS OF DIFFERENT SALT DOSES ON SEEDLING GROWTH AND RELATIVE WATER CONTENT OF SUNFLOWER (HELIANTHUS ANNUUS L.)	88
ROLE OF POST-HARVEST RESIDUE TREATMENT ON THE WHEAT PRODUCTIVITY, FLOUR PROPERTIES AND BREAD-MAKING QUALITIES	89
CHANGES IN THE NITROGEN CONCENTRATION IN THE ORGANS OF WINTER WHEAT VARIETIES DEPENDING ON THE AGRICULTURAL PRODUCTION SYSTEMS	90
POST-HARVEST RESIDUE TREATMENT EFFECT ON THE WINTER WHEAT PRODUCTIVITY.....	92
VALORIZATION OF LOCAL NATURAL RESOURCES IN LIVESTOCK FEED IN ARID REGIONS OF ALGERIA	93
VALORIZATION OF OLIVE CAKE, AN OLIVE OIL INDUSTRY BY PRODUCT, IN THE DIET OF GROWING RABBITS.....	94
VALORIZATION OF OLIVE OIL INDUSTRY BYPRODUCT, OLIVE CAKE, IN THE DIET OF JAPANESE QUAIL: IMPACT ON ZOOTECHNICAL PERFORMANCE AND HEALTH STATUS	95
ASSESSING THE NUTRITIONAL VALUE OF FORAGE PLANTS IN ARID REGIONS OF ALGERIA	96
FUNCTIONAL PROPERTIES OF STARCH EXTRACTED FROM LANDRACES OF ALGERIAN PEARL MILLET USING VARIOUS TECHNIQUES, INCLUDING WET MILLING AND ULTRASOUND	97
DIETARY INTERVENTION OF BETALAINS FROM AMARANTHUS VIRIDIS FOR DETOXIFICATION OF ENVIRONMENT-INDUCED OXIDATIVE STRESS	98
INSIGHT INTO RADIATION DEVELOPED AMARANTH SEED - ANALYSIS OF STARCH AND STARCH-RELATED GENES.....	99
CHARACTERIZATION OF SOME CORN GENOTYPES IN TERMS OF PRODUCTION AND PROTEIN CONTENT	100
ANTI-INFLAMMATORY ACTIVITY OF ETHYL ACETATE AND BUTANOLIC EXTRACTS OF ARBUTUS UNEDO L.	101
QUALITY INDICES VARIATION IN SEEDS OF SOME HEMP GENOTYPES.....	102
SUGAR AND PROTEIN CONTENTS, SUPEROXIDE ANION RADICAL SCAVENGING AND ANTIHEMOLYTIC ACTIVITIES OF ETHANOLIC EXTRACT OF APPLES (MALUS DOMESTICA BORKH)	103

SUGAR AND PROTEIN CONTENTS, SUPEROXIDE ANION RADICAL SCAVENGING AND ANTIHEMOLYTIC ACTIVITIES OF ETHANOLIC EXTRACT OF WATERMELON (CITRULLUS LANATUS L.)	104
PROTEIN AND SUGAR CONTENTS, ALKALINE DMSO SUPEROXIDE RADICAL SCAVENGING AND ANTIHEMOLYTIC POTENTIALS OF HYDROALCOHOLIC EXTRACT OF WATERMELON	105
PROTEIN AND SUGAR CONTENTS, ALKALINE DMSO SUPEROXIDE RADICAL SCAVENGING AND ANTIHEMOLYTIC POTENTIALS OF HYDROALCOHOLIC EXTRACT OF HAWTHORN FRUITS	106
ANTI-INFLAMMATORY AND ANALGESIC EFFECT OF ETHANOLIC EXTRACT OF CITRUS RETICULATA	107
EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF OLIVE OIL IN PAW AND INTESTINE OF ALBINO FEMALE MICE	108
ANTI-INFLAMMATORY AND ANALGESIC ACTIVITIES OF ETHANOLIC EXTRACT OF CITRUS SINENSIS	109
EVALUATION OF PROTEIN AND SUGAR CONTENTS AND IN VITRO ANTIOXIDANT ACTIVITY OF QUINCE ETHANOLIC EXTRACT	110
EVALUATION OF PROTEIN AND SUGAR CONTENTS AND IN VITRO ANTIOXIDANT ACTIVITY OF MELON ETHANOLIC EXTRACT	111
ANTI-INFLAMMATORY AND ANALGESIC ACTIVITIES OF ETHANOLIC EXTRACT OF CITRUS SINENSIS	112
PROTEIN AND SUGAR CONTENTS, ALKALINE DMSO SUPEROXIDE RADICAL SCAVENGING AND ANTIHEMOLYTIC ACTIVITIES OF HYDROALCOHOLIC EXTRACT OF WATERMELON	113
PRODUCTION METHODS OF VIRGIN COCONUT OIL: THE IMPACT ON NUTRIENTS AND THEIR BIOLOGICAL ACTIVITIES	114
BIOLOGICAL ACTIVITY AND EFFICIENCY IN FOOD PRESERVATION OF THYMUS VULGARIS EXTRACTS	115
CHEMICAL COMPOSITION OF ESSENTIAL OIL FROM MEDICINAL PLANT AND ANTI MICROBIAL ACTIVITY	116
EXCEPTIONAL AMARANTH SEEDS	117
CHARACTERIZATION AND ANTIOXIDANT STUDY OF APRICOT KERNEL VEGETABLE OIL EXTRACTED BY COLD PRESSING	118
PREDICTION OF PRION-LIKE PROTEIN DOMAINS IN IRRADIATED AND CONTROL SAMPLES OF THE PEA SEEDLINGS	119
CHANGE OF PROTEIN AND TRYPTOPHAN AMOUNT IN FRESH, DRY AND CANNED SEEDS OF SOME PEAS GENOTYPES	120
BIOCHEMICAL, TRANSCRIPTIONAL AND FLUORESCENCE SPECTROSCOPY ANALYSIS OF FATTY ACIDS IN SEEDS OF CAMELINA CULTIVARS GROWN IN ORGANIC INTERCROPPING SYSTEM	121
THE EFFECT OF ADDING CANOLA OIL TO DIESEL FUEL ON ENGINE POWER, FUEL CONSUMPTION AND EMISSIONS	122
GLOBAL POLICY TO ELIMINATE TRANS FATS BY 2023 AND THE SITUATION OF PACKAGED FOOD IN TURKEY	123

EXTRACTION AND CHARACTERISATION OF MILK THISTLE SEED PROTEIN: AN OPTIMIZATION STUDY.....	124
THE IMPACT OF PERENNIAL FLOWER STRIP ON THE COLONIZATION OF WINTER RAPE PLANT BY SELECTED PEST AND BENEFICIAL SPECIES.....	125
CENSUS OF THE ENTOMOFAUNA AND THE ADVENTICE FLORA SUBSERVIENT TO THE CULTURE OF QUINOA	126
PARTICIPANT LIST	127
AGBIOL 2023 CONFERENCE STUDENT ORGANIZING TEAM.....	130
OUR SPONSORS	131

STEREOLOGICAL ANALYSIS OF THE SUNFLOWER ROOT SEEDLING

Jadranka Luković^{1,*}, Aleksandra Rada², Sandra Cvejić³, Anna Galinski⁴, Jelena Jocković⁵,
Kerstin Nagel⁶, Dunja Karanović⁷, Dragana Miladinović² & Lana Zorić¹

¹ Department of Biology and Ecology Faculty of Sciences

² Laboratory For Biotechnology Institute of Field and Vegetable Crops

³ Department of Breeding and Genetics Institute of Field and Vegetable Crops, National
Institute of The Republic of Serbia

⁴ Pflanzenwissenschaften Institut Für Bio- Und Geowissenschaften

⁵ National Institute of The Republic of Serbia Institute of Field and Vegetable Crops

⁶ Plant Sciences Institute of Bio- and Geosciences

⁷ Department of Biology and Ecology University of Novi Sad, Faculty of Sciences

*email: jadranka.lukovic@dbe.uns.ac.rs

ABSTRACT

The aim of this research was to determine the histological basis of the genotypic differences for drought tolerance, calculate tissue volume densities (V_v), examine the variability, and assess tissue proportions along the root maturity gradient. For the stereological analyses of root tissues four sunflower genotypes, 14 days old seedlings which were grown in rhizotrons, have been carried out on the primary (axial) root. The total length of the axial roots varied among genotypes, but not significantly. Root cross-sections were cut along the root maturity in five segments according to the principle of systematic uniform random sampling method. Cross-sections were made applying cryo-technique procedure and proportion of tissues was estimated by point-counting method. The vessel network characteristics (number and diameter of vessels) vary along maturity gradient and individual roots. Consequently, branching vessels pattern and axial conductance may limit water flow through root systems. Characteristics, such as (i) arrangement, number and size of vessels, (ii) volume density of xylem, and (iii) volume density of cortex parenchyma are promising criteria that can help in the selection of more drought tolerant genotypes. Therefore, the root anatomical features have to be included in future breeding strategies to improve the sunflower cultivars for climate changes.

Acknowledgment: This work is supported by the Science Fund of the Republic of Serbia, through IDEAS project “Creating climate smart sunflower for future challenges” (SMARTSUN) grant number 7732457

Key words: root anatomy, sunflower, stereology