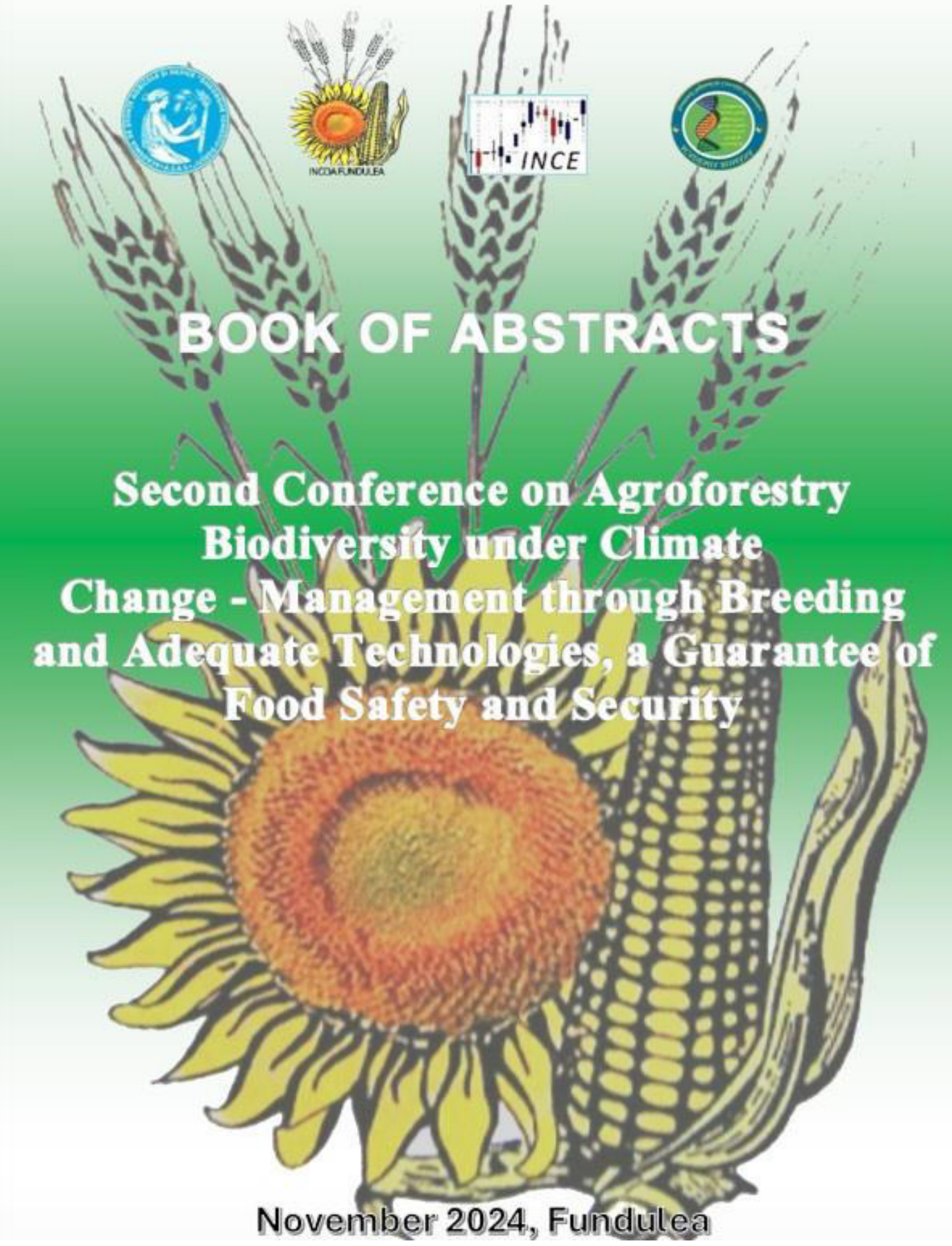

BOOK OF ABSTRACTS

Second Conference on Agroforestry Biodiversity under Climate Change - Management through Breeding and Adequate Technologies, a Guarantee of Food Safety and Security

November 2024, Fundulea

National Agricultural Research and Development Institute Fundulea

Second Conference on Management of Genetic Biodiversity by Plant Breeding and Sustainable Agricultural Technologies

BOOK OF ABSTRACTS

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An estimate of the genetic progress achieved in wheat breeding at National Agricultural Research and Development Institute from Fundulea, Romania

Cristina-Mihaela Marinciu, Gabriela Șerban, Vasile Mandea, Indira Galit, Nicolae Săulescu

NARDI Fundulea

Keywords: genetic progress, wheat, yielding potential, stress, reduced fertilization, *Fusarium*.

Abstract: Genetic progress for grain yield in wheat breeding at NARDI Fundulea, estimated by direct comparison of nine cultivars registered during 2005-2025 in 48 yield trials from Southern and Western Romania and sixteen yield trials from Central and Eastern Romania conducted for four years (2021-2024), was 49 kg/ha/year and 44.8 kg/ha/year, respectively. The yield increase obtained by the highest yielding recent cultivar (*FDL Columna*) over *Glosa* was 703 and 777 kg/ha in the two zones. This yield increase is additional to the 1184 kg/ha, and 1581 kg/ha increase previously recorded by *Glosa* over *Bezostaya 1.* All new cultivars had yield coefficients of variation smaller than *Glosa* in Southern and Western Romania, while in the Central and Eastern part of the country only two cultivars had better yield stability than *Glosa*. Genetic progress for yielding potential, estimated by the maximum yield recorded for each cultivar in any of the trials from the two zones, was 70.5 and 51.1 kg/ha/year, respectively, while for minimum yield we only observed a nonsignificant trend of increase of 12.1 kg/ha/year. Under reduced Nitrogen fertilization we observed a significant genetic progress of 40.7 and 47.1 kg/ha/year, respectively, while in the organic agriculture system we found a nonsignificant trend of increased yields of 27.1 kg/ha/year. Most of the new cultivars had a grain protein concentration higher than *Glosa*, and cultivar *FDL Columna*, which was on average the highest yielding also had the highest grain protein concentration averaged on twenty-three trials. We found significant genetic progress for resistance to *Fusarium* head blight, with cultivar *FDL Consecvent* proving to be the most resistant for four years under artificial inoculation. The superior performance of the most recent cultivars might be related to the fact that they carry introgressions from rye or from *Aegilops ventricosa*.

Genetic progress for production capacity in winter wheat, estimated based on the results from multi-year comparative cultures, at ARDS Turda

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Keywords: winter wheat, genetic progress, yield, comparative cultures.

Abstract: Genetic progress in the creation of wheat varieties is continuous, both worldwide and in breeding programs in our country. Foreign germplasm and modern Romanian germplasm no longer differ in terms of potential, but more in terms of adaptation to the specific conditions in which they were created. Genetic progress for yield capacity has not declined in recent years, but has been counteracted since the 1990s by climate change, which is generally unfavourable to cereal production in temperate climates due to heat stress during grain filling and drought during straw elongation. At Agricultural Research and Development Station Turda (ARDS Turda), a number of 16 winter wheat varieties, adapted to the conditions of the central and northern areas of the country, were created and launched in production since 1971. Since precocity can reduce the effects of heat and drought, one of the objectives of wheat breeding at ARDS Turda was the creation of varieties close in precocity to Arieşan or even earlier than it. The Andrada variety, for example, is a variety close to Arieşan in terms of precocity, but it heading 2-3 days later, and the Codru variety is close to it in terms of the heading period. The genetic progress for wheat production capacity was estimated based on the results of multi-year comparative cultures executed in the period 2015-2024, at a value of 42 kg ha^{-1} an^{-1}, without a capping tendency. These values are comparable to those obtained in other countries where active wheat breeding programs are carried out. The behaviour of the varieties created at ARDS Turda regarding the level and stability of production, demonstrates that the progress made in increasing the production capacity was not accompanied by a decrease in stability performances. On the contrary, especially with the recent varieties, the increase in production was associated with the improvement of the stability of the harvests.

Productivity and stability of some commercial and experimental maize hybrids obtained by National Agricultural Research and Development Institute Fundulea, Romania

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Keywords: hybrid, maize, the yield, stability, adaptability.

Abstract: An important way to the increase the yield and its stability is the adaptation of hybrids to the variations in environmental conditions by the good practices in natural resource management and the reduction of damage caused by abiotic and biotic stress factors.

The main objectives of breeding programs are increasing the yield potential and yield stability.

The yield is a complex attribute, thus for its fulfillment the entire genetic system of the plant acts in relationship with the environmental conditions, during the entire growth period.

Yield stability is achieved by genetic dynamic equilibrium and tolerance to biotic factors (different diseases and characteristics pests) and abiotic factors (heat, drought, low temperatures).

This study aimed to evaluate a set of maize hybrids under different ecological and technological conditions during the 2021–2023 period, focusing on yield level and stability, to select maize hybrids with superior adaptability. The biological material consisted of 15 maize hybrids, which were developed at NARDI Fundulea.

The hybrids were tested across six locations with different pedoclimatic conditions: at NARDI Fundulea, ARDS Brăila, ARDS Simnic, ARDS Valu lui Traian, ARDS Lovrin and ARDS Livada.

The stability of maize hybrids was determined used four methods. One of them is based on the drought tolerance index-DRIND after Mandache, (2013) and index of drought suscebtibility after Ficher and Maurer (1986) the second on the regression parameters proposed by Brukner şi Frohberg, (1987), the third on the coefficients of variation , and the fourth on the parameter Ecovalence, obtained by the method of Wricke (1965).

The maize hybrids:Felix, FDL Ovidiu, HSF1033-17, HSF1034-17, Miraj, Magnus and F423 showed good production stability.

Stability of yield capacity and quality parameters in maize hybrids sown in different seasons

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Keywords: quality, yield capacity, sowing date, maize, stability.

Abstract: In the context of current climate change characterized by an increase in air temperature, corroborated with episodes of drought throughout the maize growing season, the identification of hybrids that manage to maximize unfavorable environmental conditions by obtaining stable yields in time and space becomes imperative. In this regard, at the Agricultural Research and Development Station (ARDS) Turda, a field experiment was conducted in 5 different years in terms of climatic conditions (2020-2024). The biological material consisted of 7 hybrids, from different FAO groups, created at ARDS Turda (Turda 248, Turda 165, Turda 201, Turda Star, Turda 332, Turda 344, Turda 335). The hybrids were sown at 3 different sowing dates (6°C, 8°C and 10°C), depending on the soil temperature measured in the morning at 8 o'clock. The results obtained highlight a pronounced stability of the yield capacity obtained by the Turda 332 hybrid. As expected, the response of cultivars to sowing at different dates varied depending on the genetic factor, however, the importance of maize sowing at the optimal time is obvious. Regarding quality, it varied in particular depending on the genotype.

Genetic biodiversity contribution to increase the oil quality and protein content in sunflower

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Keywords: biodiversity; sunflower; genetic variability; oil quality; genetic progress.

Abstract: Biodiversity is the diversity of life on earth, including plants, animals, fungi, and microorganisms.

At the genetic level, biodiversity includes the diversity found between varieties and landraces of the same crop, but also extends to diversity present in crop wild relatives.

There are efforts of scientists exploring agrobiodiversity, to develop genetic tools critical for improving crop performance to support both resilience to climate stresses, and local adaptation to low-input agriculture.

Oilseed sunflower accounts for up to 12% of the worldwide production of vegetable oils, ranking fourth after palm, soybean and canola oil .

Compared to the other main temperate crops, cultivated sunflower is a recent crop. It experienced a domestication bottleneck that narrowed its genetic base but the large number of sunflower CWR makes it possible to mine a vast genetic pool for crop improvement.

The use of CWR in the sunflower breeding is a long tradition in the breeding programs.

A significant number of inbred lines have been created by interspecific crosses.

These lines, together with the wild populations, represent a valuable resource of useful alleles that are abundantly used in the breeding program for increasing genetic variability.

By using a very various and valuable germplasm, in different breeding programs there have been obtained valuable inbred lines, having very good quality, by increasing the high oleic acid content, content in tocoferols, also protein content.

It has been obtained an important genetic progress, regarding the productivity, also different types of oil (high linoleic or high oleic) and adaptation to the biotic and abiotic factors.

There have been studied some new sunflower hybrids – contribution of genetic diversity for increasing of productivity and quality.

Fall armyworm (*Spodoptera frugiperda* Smith) a new quarantine pest in Romania

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Keywords: fall armyworm, first detection, Romania.

Abstract: Fall armyworm (*Spodoptera frugiperda* Smith) is a major agricultural pest in tropical and subtropical areas, originating from the American continent. In the last years this pest has spread in the African continent, India, and many countries from East Asia. In Europe, *Spodoptera frugiperda* is regulated as a quarantine pest for the European Union according to Commission implementing regulation (EU) 2019/2072 and is nominated as a priority pest in the Commission delegated regulation (EU) 2019/1702. In 2021 this pest was reported for the first time, in the Canary Islands (Spain). More recent reports confirm the presence of the pest in some countries from southern Europe, such as Portugal (Madeira), Greece, Cyprus, and Turkey. This pest has a high migration capacity, spreading in new territories in a short period. However, it seems fall armyworms can't overwinter in temperate climates, but can migrate during the summer from the southern regions. In 2023, during a survey carried out in Fundulea, Călărași County by the National Agricultural Research and Development Institute, for different pests of corn, including *Spodoptera frugiperda* in a trap were detected suspicious adults of fall armyworm. For the survey, it was used pheromone traps, VRAL+ type, from the Csalomon® (Hungary) which was deployed in a maize field from the Southeast of the country. The observations started at the end of May and finished at the end of November. The morphological analyses of the adults were done at the National Phytosanitary Laboratory in Romania and the confirmation of the results was performed by the European Union Reference Laboratory, through ANSES (France) from the morphological point of view and AGES (Austria) for molecular analyses. Both types of analyses confirmed the presence of the fall armyworm for the first time in Romania. The larvae or eggs weren't detected during the observation of the maize field in the summer or the beginning of autumn.

A possible explanation for the late trapping of the pest in the middle of autumn is the migration of adults from southern European countries where *Spodoptera frugiperda* was previously detected. Further studies are necessary to clarify the pathways of introduction.

The biochemical composition of green mass and silage from *Amaranthus hypochondriacus* and its potential application in the Republic of Moldova

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Keywords: *Amaranthus hypochondriacus,* biochemical composition, biochemical methane potential, forage quality of green mass and silage, phytomass productivity, reddish genotype, yellowish genotype.

Abstract: *Amaranths* have high potential and can be considered as alternative multipurpose crops in most parts of the world. The goal of this study was to evaluate the quality indices of the green mass and silage from the yellowish genotype and the reddish genotype of prince's-feather amaranth, *Amaranthus hypochondriacus*, and the prospects of using them as feed for farm animals and as feedstock for the production of biomethane as renewable energy. The studied *Amaranthus hypochondriacus* genotypes in early flowering stage reached 167-175 cm, the phytomass productivity reached 86.29-93.30 t/ha or green mass or 11.84-12.86 t/ha dry matter with 15.7-16.7% CP, 9.0-10.1% ash, 32.9-34.9% CF, 34.8-36.2% ADF, 52.9-53.4% NDF, 5.4-5.8% ADL, 29.4-30.4% Cel, 17.2-18.1% HC, 608-617 g/kg DDM, RFV=106-109, 9.85-10.20 MJ/kg ME and 5.87-6.03 MJ/kg NEl. The biochemical composition and nutritive value of the silages prepared from the studied yellowish and reddish genotypes of *Amaranthus hypochondriacus* were: pH=3.95-4.03, 29.6-33.3 g/kg lactic acid, 6.6-6.9 g/kg acetic acid, 14.8-16.1% CP, 8.5-9.4% ash, 29.1-32.9% CF, 30.8-34.5% ADF, 48.9-51.5% NDF, 4.0-4.5% ADL, 26.8-30.0% Cel, 17.0-19.0% HC, 567-619 g/kg DDM, RFV=112-121, 12.23-12.75 MJ/kg DE, 10.04-10.47 MJ/kg ME and 6.06-6.49 MJ/kg NEl. The green mass and silage from the studied amaranth genotypes can be used as substrates in biogas plants, possessing a biochemical methane potential of 320-351 l/kg organic matter. The obtained results indicate the possibility of using the studied yellowish and reddish genotypes of *Amaranthus hypochondriacus* as initial material for breeding and implementing new local amaranth cultivars for agricultural production.

Technological sequences for optimization and effective utilization of the nutrition space for maize and soy crops

Elena Partal, Gheorghe Măturaru, Mihaela Cergan

NARDI Fundulea

Keywords: maize, soybean, nutrient-use efficiency, sowing density, fertilization regime, soil structure, crop performance, sustainable agriculture, technological sequences.

Abstract: The study presents a series of technological sequences designed to optimize and effectively utilize the nutrition space in maize and soybean crops. The research was carried out at INCDA Fundulea during the agricultural years 2022–2024 and analyzed the relationship between sowing density, fertilization regime, and soil structure, examining how these factors influence nutrient uptake and crop performance. Over this period, the average maize yield was roughly 4.5 t/ha in 2022 due to strong hydric stress, with a projected recovery to 5.0 t/ha by 2024. Meanwhile, soybean yields in comparative trials during 2023 varied broadly—between 450 kg/ha and 1,5 kg/ha, under dry conditions. The application of the proposed technologies resulted in a significant improvement in nutrient-use efficiency, increased plant vigor, and higher yields. The findings suggest that integrating these technological sequences can contribute to the development of sustainable and high-performing cropping systems for both maize and soybean.

Cereals breeding challenges to reduce anti-nutritional factors from feed

Matilda Ciucă[1], Cristina-Mihaela Marinciu[1], Liliana Vasilescu[1], Eugen Petcu[1], Daniel Cristina[1], Iulia Vărzaru[2]

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Keywords: cereal breeding, anti-nutritional factors, biotechnology.

Abstract: Cereal grains, such as wheat, maize, barley, sorghum and oats are foundational components of animal feed globally, providing essential nutrients such as carbohydrates, proteins, lipids, vitamins, and minerals. In addition, cereal grains have high amounts of dietary fiber and antioxidants which have beneficial effects on human health linked with the utilization of whole grain products. The germ has high content of vitamins B and E, unsaturated fats, high quality protein, carbohydrates, and minerals while the bran mostly consist insoluble carbohydrates such as cellulose, antioxidants, protein, traces of vitamin B and minerals, and also anti-nutritional components like phytic acid. In cereal grain endosperm is the major component consisting mainly of starch and protein, and small amount of minerals and vitamins.

Despite their nutritional benefits, cereals often contain various anti-nutritional factors (ANFs) that can impair animal growth, nutrient absorption, and overall health. These ANFs include phytic acid, tannins, non-starch polysaccharides (NSPs), protease inhibitors, and lectins, among others. Overcoming the challenge of ANFs in animal feed is increasingly relevant as the demand for efficient and sustainable animal production rises. Cereal breeding, particularly through advanced biotechnological methods, has emerged as a promising strategy to reduce ANFs while maintaining or enhancing the nutritional quality of feed. However, numerous challenges hinder progress in breeding cereals with reduced ANF levels. This paper explores these challenges and the future directions for cereal breeding to improve animal feed quality.

Exploring Synthetic Hexaploid Wheat as a source of genetic diversity for rust resistance in wheat

Daniel Cristina, Alexandru-Leonard Dumitru, Matilda Ciucă

NARDI Fundulea

Keywords: synthetic Hexaploid Wheat, rust resistance, genetic resource.

Abstract: Common wheat (*Triticum aestivum* L.), one of the staple crops today, originates from a natural hybridization and chromosome doubling event between *Triticum turgidum* ssp. durum Desf. MacKey, a cultivated allotetraploid (2n = 4x = 28, AABB), and *Aegilops tauschii* Coss., a diploid goat grass (2n = 2x = 14, DD). In the evolution of hexaploid wheat, due to the involvement of only a few accessions of both species, the genetic diversity of common wheat was largely decreased in comparison with its donor species.

Wild relatives of wheat have long been recognized as a source of useful genes for cultivated wheat improvement. One of the wheat breeding programs strategies in exploiting the wild relatives of wheat has been through synthetic hexaploid wheat (SHW).

SHWs have the potential to improve yield potential, tolerance/resistance to biotic stresses such as rusts, tolerance/resistance to major abiotic stresses including drought, high temperature (heat), salinity/sodicity, waterlogging, acidity, cold, and soil macro and micronutrient deficiencies or toxicities.

In this study 13 F2 plants, resulted from the cross of SHW-E1 and double haploid line B2-98, were analyzed regarding the transfer of some rust disease resistance/tolerance genes. The results highlighted recombinant SHWs lines that cumulated resistance genes, from both parental forms, in different combinations, underlining the importance of SHWs in wheat breeding programs from NARDI Fundulea.

Molecular analysis for detecting genetic variability at the NAM-A1 locus in a collection of wheat varieties, old populations, lines and wild species

Elena-Laura Conțescu, Daniel Cristina,
Matilda Ciucă, Elena Partal, Gabriel Anton, Alina Turcu

NARDI Fundulea

Keywords: genetic variability, NAM loci, grain quality, molecular markers.

Abstract: The key determinant of novel wheat varieties market potential and economic worth is wheat grain quality, a characteristic that influences both the nutritional content and the quality of food processing. The NAC transcription factor, which is encoded by the "No Apical Meristem" (NAM) gene, contributes to senescence acceleration by boosting the remobilization of nutrients from leaf tissues to growing grains. Two homeologs (on chromosomes 6A and 6D) and three paralogs (on chromosomes 2A, 2B, and 2D) make up hexaploid wheat's five NAM genes. Of these, NAM-A1 (6A) functions is similarly to NAM-B1 (Gpc-B1), which has positive effects on baking qualities and nutritional value of cereals. This study aimed to detect allelic variants at the level of the NAM-A1 locus, by using the KASP technique, respectively two molecular markers related to SNPs 1 and 2. Analyzes of the 102 varieties, lines, old populations of wheat and 44 genotypes of wild species highlighted the predominant presence of the T allele for SNP-1 and A allele for SNP-2, resulting in the haplotypes NAM-A1a, NAM-A1c and NAM-A1d but also some heterozygotes haplotypes. The analysis of the 44 wild species revealed the presence of the C allele for SNP-1 and the A allele for SNP-2, resulting in the haplotypes NAM-A1a and NAM-A1c but also heterozygous haplotypes. To identify the role of the NAM-A1, NAM-B1 and NAM-D1 genes in wheat and also the most favourable allelic combinations unique to each growing environment, more research is required to better understand the function these and their interactions with the environment.

Wild Triticeae relatives as a genetic resource for anthocyanin content in wheat grains

Alexandru Dumitru

NARDI Fundulea

Keywords: synthetic amphiploids, anthocyanins, colored wheat.

Abstract: Wheat wild relatives can be successfully exploited in breeding programs not only for improving resistance to biotic and abiotic stress factors, but also for genes involved in the synthesis of anthocyanins. Due to their antioxidant activity, anthocyanins are contributing to the prevention of diseases associated with oxidative stress.

Purple wheat contains anthocyanins in the pericarp. The purple pericarp character is controlled by three dominant alleles: *Pp-B1* (on chromosome 7B of *Tr. durum* Desf., 7S of *Ae. speltoides* Tausch.), *Pp-D1* (7D, *Tr. aestivum* L.) and *Pp3* (2A, *Tr. aestivum* L.). Blue wheat contains anthocyanins in the aleurone layer. This trait has been observed in species belonging to Aegilops, Triticum, Thinopyrum and Secale genera. The blue aleurone trait is controlled by genes from different wild relatives: *Ba1* (a dominant gene from *Thinopyrum ponticum* (Podp.) Barkworth & D.R. Dewey), *Ba2* (a semi-dominant gene from *Tr. monococcum* L./*Tr. boeoticum* Boiss.) and *BaThb* (a dominant gene from *Th. bessarabicum* (Săvul. & Rayss) Á.Löve).

At NARDI Fundulea, two synthetic amphiploids characterized by blue and purple grains were developed. The blue-grained synthetic amphiploid was obtained by crossing durum wheat variety Condur with *Triticum monococcum ssp. boeoticum* Boiss., while the synthetic amphiploid with purple grains was obtained by crossing durum wheat variety Agedur with *Triticum urartu* L.. Following the hybridization, caryopses with different degrees of pigmentation were identified and individual selection and seed multiplication stages were performed for the lines of interest.

In conclusion, the biochemical composition of wheat can be improved through the use of wild species and the introgression of genes involved in the anthocyanin synthesis. Thus, in a constantly developing world, obtaining varieties of colored wheat with functional health benefits is a new desideratum in breeding.

Results regarding drought and heat tolerance of some Romanian winter wheat genotypes obtained at NARDI Fundulea

Gabriela Şerban, Cristina-Mihaela Marinciu, Cătălin Lazăr, Matilda Ciucă, Daniel Cristina

NARDI Fundulea

Keywords: wheat, drought, heat, tolerance, allele.

Abstract: Heat and drought episodes are becoming more frequent during the grain filling period, which is one of the most important stages in wheat development for high yield and baking quality. "The rate of reduction in grain weight" it's often used as an indicator of how well a plant is coping with stress, a smaller reduction in seed weight generally indicates better tolerance to the stressor.

81 contrasting winter wheat genotypes were sown in two repetitions (control and treated), with two rows from each genotype for drought test, and another set of 57 wheat genotypes was exposed to high temperatures under controlled conditions in laboratory, at seedling stage to assess their potential for tolerance to high temperatures.

Among the genotypes tested for drought tolerance FDL FAGUR, 17054G1-07, ABUND-1A, 19148G0-2, 16131G1-1, FDL EVIDENT, VOINIC, FDL ABUND, 20099GP1, 17217G1-08, IZVOR, 17051G1-05, KUKRI, Simnic 1412, 19290G0-2, ABUND-1R, 19284G0-2 and FDL EMISAR show above-average tolerance.

More than 15 winter wheat genotypes stood out after performing the heat stress tolerance test out of the 56 analyzed. KASP (Kompetitive Allele Specific PCR) technique show that Drysdale, FDL FAGUR, FDL EVIDENT, and 17217G1-08 confirm the presence of genes associated with resistance to drought and heat.

Impact of climatic conditions on rheological parameters in several Romanian winter wheat varieties

Cristina-Mihaela Marinciu[1],Cătălin Lazăr[1], Gabriela Şerban[1], Mihai Tilihoi[2], Gabriela Păunescu[3], Cecilia Bănăţeanu[4], Beniamin-Emanuel Andraş[4], Cristina Melucă[5], Iustina Lobonţiu[6], Zsuzsa Domokoş[6], Simona Florina Isticioaia[7], Andreea Sabina Pintilie[7], Andreea Enea[7], Emanuela Marcu[8], Cornelia Tican[9]

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Keywords: winter wheat, rheological parameters, climatic conditions.

Abstract: Nine winter wheat cultivars, released at NARDI Fundulea, were evaluated under conventional conditions in 9 research centers, during three seasons: 2021, 2022, 2023. The rheological parameters of the dough during mixing were analyzed using the reomixer device. In our study we analyzed three parameters: initial slope ("initslope") describing the water absorption phase; peak height ("peakheight") reflecting dough strength or elasticity and one calculated parameter, the estimated bread volume (BV). We also analyzed protein % by Infratec grain analyzer FOSS 1241. The agrometeorological data were analyzed for each location and year: the amount of precipitation, minimum and maximum temperatures, the number of days with temperatures below 14ºC and the number of days with temperatures above 24ºC during the grain formation period (May and June). The quality parameters analyzed were more or less influenced by the climatic conditions. The analyzed climatic conditions influenced the quality parameters differently, depending on each wheat variety. The average values of quality parameters showed significant differences between the testing centers.

Winter and spring barley assortment evaluation for yield and quality parameters under different pedoclimatic conditions in 2023-2024 year

Eugen Petcu[1], Liliana Vasilescu[1], Ioana Crișan[2], Beniamin-Emanuel Andraș[3], Simona Pochi[4], Mihai Tilihoi[5], Cristina Melucă[6], Emanuela Lungu[7], Gabriela Păunescu[8]

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Keywords: winter barley, spring barley, yield, protein content, starch content, thousands grain weight, beta-glucans content, adaptability.

Abstract: The adaptability of barley (*Hordeum vulgare* L.) to the pedoclimatic conditions in Romania makes it one of the most important cereal crops in the country. Romania benefits from a variety of climatic conditions and soil types, which allows the cultivation of barley in different regions, from plains to hilly and mountainous areas.

During 2023-2024 year, an assortment of 25 winter barley genotypes was experimented in 8 different pedo-climatic regions of Romania and 25 spring barley genotypes in 2 pedo-climatic regions of Romania. The analysed parameters were yield potential (kg/ha), thousands grain weight (g), protein and starch content (%) both for winter and spring genotypes. Beta-glucans content was assessed only for spring varieties in 2 experimental sites (NARDI Fundulea and ARDS Turda). In addition to field testing, at NARDI Fundulea the winter barley assortment was tested for drought resistance by inducing drought artificially in seedling stage, and the root and shoot length were assessed to evaluate the drought resistance of each genotype.

The obtained results are revealed as the mean, minimum, and maximum values, for all parameters. Expert FD variety registered the highest value (9662 kg/ha) of winter barley assortment at NARDI Fundulea, meanwhile the lowest yield value has been registered for the Ileana variety (4172 kg/ha), at ARDS Turda. Protein content (%) had the best response for Cardinal FD, Azur, and Smarald with a protein content of less than 11%, being suitable for malting industry. Ileana variety was the single genotype that succeeded in over 65% of starch content at ARDS Valul lui Traian. The lowest value of TGW (g) was constant for the Agil variety in almost all regions except ARDS Valul lui Traian, meanwhile the highest value was obtained at University of Craiova, 58.9 g (DH 403-12 perspective line). During research activities of project, ADER 1.1.4, the obtained results between studied traits are very different from one region of another for yield potential and quality parameters, for both growing seasons of barley (winter and spring). The best varieties for yield

and quality traits will be promoted as adaptable varieties in specific pedo-climatic growing region.

Historical data of some descriptors in a barley collection during the 1957-2022 period

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Keywords: historical data, collection, traits, winter and spring barley.

Abstract: The historical data records for winter and spring barley collections from the National Agricultural Research and Development Institute Fundulea, including various geographic regions, covering the period from 1957 to 2022 (with the winter barley record period from 1957-2021 and the spring barley record period from 1958-2022), were documented across multiple regeneration cycles and experimental barley breeding fields.

Data from notebooks spanning 1957-2022, alongside the digital curation of several agronomical descriptors—such as yield, specific weight, lodging resistance, and protein and starch content from different seasonal cycles were utilised (83 experiments for spring barley and 92 experiments for winter barley).

The phenotyping process under varying climatic conditions, followed by digitalisation of passport data of winter and spring barley genetic resources, enabled breeders to select suitable accessions for barley crop improvement.

Phenotypic and genetic variability of local maize germplasm from Transylvania

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Keywords: variability, germplasm, local populations.

Abstract: The continuous and significant loss of genetic variability in most crops, observed in recent years, has stimulated a growing interest in biodiversity conservation. Local germplasm represents valuable source of genetic variability in grain quality.

In this paper, aspects regarding the collection, study and conservation of local maize germplasm were followed. The germplasm was characterized in terms of phenotypic variability and potential for use in hybrid crosses. Subsequently, a series of crosses were made with inbred lines on various types of male-sterile cytoplasms, in order to observe their reaction.

The Agricultural Research and Development Station Turda had an impressive collection of local populations (over 1200 origins) but after selection only 591 remained, the rest being eliminated due to phenotypic similarity. Some of them were included in 20 synthetic populations created out of the desire to concentrate more valuable genes from local populations.

The distribution of the local populations in Transylvania, based on the origin county is as follows: Cluj (117), Bistrița (61), Alba (72), Mureș (56), Sibiu (19), Harghita (15), Brașov (15), Sălaj (11), Covasna (1).

Following the study of the general and specific combining ability for several agronomic traits, some local populations were noted as valuable. The inbred lines obtained through selection from local populations were crossed with 4 elite lines, from different heterotic groups. The T291 inbred line, obtained from a local population from Mures County, was the highest yielding.

Local germplasm (local population or derived inbred lines) generally exhibit good specific combining capacity for grain production in interaction with elite inbred lines.

Seed yield of sunflower hybrids, in year 2024, in Romania

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Keywords: words:, sunflower, hybrids, seed yield.

Abstract: Sunflower is the most important oil crop in Romania, and is cultivated on approximately one million hectares in every year. In this paper we present data \regarding behavior of two sunflower hybrids in Clearield Plus system, HS9233CLP and HS2312CLP, two sunflower hybrids in Express Sun system FD15E27 and HS2309E, two sunflower hybrids in conventional system HS1122 and HS2372, created at NARDI Fundulea. These six sunflower hybrids were cultivated in year 2024 in ten locations in the test network a State Institute for Variety Testing and Registration. The lowest seed yield was registered by sunflower hybrid HS9233CLP with 1082 kg/ha, in the south of Romania, in location Rosiorii de Vede, county Teleorman. The higher seed yield was registered by sunflower hybrid HS2372 with 3703 kg/ha, in the south-east of Romania, in location Mircea Voda, county Braila.

Study on the behavior of some sunflower hybrids cultivated at Fundulea Agricultural Research Company in 2024

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Agricultural Research Company Fundulea

Keywords: sunflower hybrids, yield components, achene production, genetic performance, crop adaptability.

Abstract: This study evaluates the agronomic performance of nine sunflower hybrids cultivated in 2024 at the Agricultural Research Company Fundulea, Southern Romania, with a focus on the candidate hybrid HS-FSP-1023. The experiment assessed key yield components—number of achenes per head, achene weight per head, and seed yield—under the specific climatic conditions of the year. Despite reduced plant height caused mainly by shortened internodes, leaf number remained unaffected; however, Thousand Kernel Weight decreased, significantly influencing seed formation. Among the hybrids, AROMATIC recorded the highest achene number (1389/head), followed closely by HS-FSP-1023 (1367/head), while P64LE99 had the lowest. For achene weight, HS-FSP-1023 ranked first (51.97 g/head), whereas SURIA showed the lowest value. Yield results indicated an experimental average of 1727.8 kg/ha, with HS-FSP-1023 achieving the highest productivity (2338.65 kg/ha, +35% above average) and SURIA the lowest (1188.9 kg/ha). Overall, the findings highlight a strong adaptation of tested hybrids to Fundulea's pedoclimatic conditions and confirm HS-FSP-1023 as a highly promising hybrid for achieving superior yield stability and productivity.

The behavior of sunflower hybrids set, in different soil and climatic conditions in Romania

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Keywords: sunflower, environment, oil content, oil quality.

Abstract: Sunflowers hold a high position at number four, on the list of the most important oil crops, over the world.

Improved genetic progress in sunflower is the production priority to enchance competitivenes with other crops and stability of yield and quality.

Sunflower seeds may help lower blood pressure, cholesterol and blood sugar, as they contain vitamin E, magnesium, protein, linoleic and oleic falty acids and other compounds.

The new type of sunflower oil can have: high oleic acid (>85%), high palmitic (>25%), high stearic acid (>25%), good content in tocopherols. All of them determine a good stability of oil as well as more healthy oil.

There have been studied different sunflower genotypes, in different climatic conditions, in three locations, in two years.

We found that the oil quality is less affected by the environment than oil content. It was high influenced by soil and climate, the seed yield.

The sunflower genotypes have good ecostability for linoleic acid content. All corelations between oil and linoleic acid content are significant for most of genotypes.

The protein content in sunflower genotypes is high influenced by environment.

The behavior of new varieties of alfalfa under the conditions of 2024

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Keywords: alfalfa, biotic and abiotic stress, low temperatures, drought, molecular markers.

Abstract: Alfalfa is the most important forage crop in Romania. The main objectives in alfalfa breeding are: improving quality, dry matter yield, as well as biotic and abiotic stress tolerance. Abiotic stress conditions cause extensive losses to agricultural production worldwide, especially in perennial crops, like alfalfa. Climatic changes will lead to severe drought conditions and aridization of some important regions in Romania, especially in the south part of the country, as it happened in 2024. Under these conditions, 9 new varieties of alfalfa were studied in term of production, quality and tolerance to low temperatures and drought. In order to shorten the breeding process, this year also started works that include the selection assisted by molecular markers. The exeperiments were in the first year of vegetation, they were installed in the spring of 2024 and will be studied and in the next 2 years.

Objectives and modern techniques in pea breeding at NARDI Fundulea

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Keywords: pea breeding, genetic improvement, NARDI Fundulea, yield stability, breeding techniques, crop adaptability.

Abstract: This study presents the objectives and modern techniques applied in pea breeding at NARDI Fundulea. The research focuses on the development of high-performing pea cultivars with improved yield stability, disease resistance, and adaptability to local pedoclimatic conditions. Breeding approaches—including hybridization, direct and indirect selection - are integrated to accelerate genetic gains and optimize agronomic traits. The implementation of these strategies aims to meet both national and regional demands for high-quality pea cultivars, enhancing productivity and sustainability in pulse crop systems. The findings underline the importance of combining classical and modern breeding tools to achieve efficient cultivar development and address challenges posed by climate variability.

Yield and seed quality performance of the new soybean varieties developed at ARDS Turda

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Keywords: soybean, yield, quality, progress, breeding.

Abstract: To improve the Romanian soybean supply, continuous research is required to create varieties suitable for processing industry as raw material and to meet the market demands. Identifying genotypes adapted to the environmental conditions in our country by obtaining high, stable, and high-quality production is a priority objective of agricultural research. Soybean, is in the first 5 most widely grown crop throughout and has become more and more interesting to researchers being studied in many worldwide breeding programs such as the one from Agricultural Research and Development Station Turda (ARDS Turda), initiated in 1969. In the context of current climate change, the paper aims to present the progress made in conventional soybean breeding in Turda, in the last decade. Turda genetics offers farmers 24 varieties of different maturity, from the very early group to the semi-early maturity group. With 16 genotypes registered (64% of the total) the recent decade is the most prolific period for Turda soybean breeding program. Efforts have been underway to develop early maturing varieties. The newer high yielding varieties with pronounced stability of yield capacity and high fat and protein content, can be successfully recommended for food and feed. Also, Turda varieties are characterized have an ideal profile of fatty acids content.

Phenotypic study of bean seeds harvested from L 47BBA and L 79BB

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VRDS Buzău

Keywords: *Phaseolus vulgaris* L., gemplasm collection, qualitative characteristics, quantitative characteristics.

Abstract: In Romania, normally, the bean (*Phaseolus vulgaris* L.) is considered a self-pollinated plant. Vegetable Research and Development Station (VRDS.) Buzău possess a bean gerplasm collection presenting over 450 accessions. In 2020, a high percentage of allogamy was found in cultivated accessions. This paper presents the study of two climbing bean accessions seeds sown. For each accession sown, there were taken into study nine new biotypes harvested. The seeds sown represented the control variant for the analysis of the harvested biotypes. The seeds were evaluated in what it concerns quantitative (100 seed weight, length, thickness and width) and qualitative characteristics (seed color and shape). The mean weight of 100 seeds at V1 was 39.41g (higher value than the control variant – 36.38g) and at V2 the mean weight (43.81g) was smaller than control variant (46.95g). The variability coefficient for this parameter had a medium value (V1 11.42% and V2 16.72%), the other analyzed parameters had a small variability. The main colors of the control seeds were brown (V1 – medium and V2 –dark). At V1 there were white seeds (1.5.), and at V2 khaki (2.9.).

New technological links with increased efficiency in weed control at the rape crop

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Keywords: weeds, herbicides, time of application, selectivity and efficacy.

Abstract: Rapeseed is one of the most popular cultivated plants, it belongs to the *Brassicaceae* (*Crucifera)* family, the *Brassica genus*, which includes 34 species, of which only five are cultivated for the oil used for human consumption, the production of biodiesel fuel and fodder. Weed control is the main care work for rapeseed crops, being necessary to eliminate the competition of weed species present from the early stages of their appearance and development.The presence of weeds in rapeseed crops is a reality, their predominance being influenced by the crop area, technological links, the preceding plant and local pedoclimatic conditions.

In the rape experience carried out in the experimental field at the NARDI - Fundulea, the crop showed a high infestation degree of weeds -74%, extremely diversified annual dicotyledons: *Anthemis arvense, Capsella bursa pastoris, Chenopodium album, Galium aparine, Papaver rhoase Veronica hederifolia* and monocotyledon: *Volunteer cereals.*

Post-emergence (BBCH 12-13) herbicide treatments (Gajus 2,25 l/ha + Targa Max 0,5 l/ha; Gajus 3.0 l/ha + Targa Max 0,5 l/ha and Gajus 3.0 l/ha) and one variant with 1 mechanical weeding in the growth and development stage of BBCH 16-18 rapeseed crops were used to control weeds in rapeseed crops. The research focused on technological sequences, physiological aspects (plant height, number of branches, number of siliques, development of the root system), crop selectivity and combating weed species by applying herbicide treatments without negative impact on the environment.

The chemical control of the weed species existing in the culture, on the type of cambic chernozem soil from Fundulea, represents an especially important and necessary technological measure. In the field of weed control, the main objective is to reduce the degree of infestation and, last but not least, to identify the most effective combinations of substances, so as to reduce both the impact on the environment and the costs per hectare.

The damage caused by weeds can be diverse and often lead to a decrease in production, an increase in costs, a deterioration in the quality of products, weeds being ideal hosts for pathogens and pests.

Comparison of soybean variety mixtures vs. pure lines for agronomic value in Southern part of Romania

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Keywords: soybean, variety mixtures, pure lines, yield stability, genetic diversity, agronomic performance, sustainable agriculture.

Abstract: Soybean is a crop with specific climatic and soil requirements, capable of adapting to various environmental conditions, yet achieving its best performance in temperate zones with adequate heat and moisture. Studies investigating the potential agronomic advantages of heterogeneous soybean material remain relatively limited. To address this gap, an experiment was conducted using different soybean varieties to evaluate their behavior when cultivated as pure lines or in mixtures.

The experimental site was located at the Center for Ecological Agriculture, INCDA Fundulea, on cambic chernozem soil. The experimental factors included soybean crops cultivated as **mixtures** of two, three, and four varieties, compared to monocultures of single varieties.

The results indicated that using a mixture of four soybean genotypes (*Ovidiu*, *Triumf*, *Fabiana*, and the F 13-908 line*) resulted in higher yield levels and improved quality compared to the average performance of the individual pure lines. These results confirm that **genetic heterogeneity** within soybean crops may provide greater adaptability to environmental variability and more stable production across years.The use of multi-varietal mixtures represents a promising agronomic strategy for sustainable soybean production, especially in organic or low-input systems.

Effect of some mycromicetes on seed germination and seedling growth in sunflower

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Keywords: sunflower, seedling, biomass, fungal strain.

Abstract: Sunflower (*Helianthus annuus* L.) is an important oilseed crop globally, but its productivity is frequently compromised by various fungal pathogens. Among the fungi reported to colonize sunflower seeds, prevalent species include *Alternaria alternata, Aspergillus flavus, A. fumigatus, A. niger, Chaetomium atrobrunneum, Fusarium oxysporum, F. solani, Penicillium brevicompactum, P. expansum,* and *Rhizopus stolonifera*. Seed-borne fungi are known to induce seed rot, damping-off, and other diseases upon germination, resulting in diminished seed viability and compromised seedling establishment. On the other hand, several seed-borne fungi establish symbiotic relationships with plants, enhancing tolerance against both biotic and abiotic stresses.

This study aimed to investigate the influence of some fungal strains - *Alternaria alternata, Aspergillus niger, Fusarium oxysporum,* and *Rhizopus arrhizus* - on the germination and growth of sunflower seedlings at the early developmental stage. Sunflower seeds of the local hybrid Oscar were subjected to treatment with conidial suspensions of each fungal strain, adjusted to a concentration of 10^6 conidia mL^{-1}. Control plants were treated with sterile distillated water. At the end of the experiment the plant height, root length and fresh/dry weight of plants was recorded.

During the study, it was noted that *A. alternata* and *A. niger* significantly reduced seed germination by 55%. In contrast, *F. oxysporum* and *Rh. arrhizus* did not show any discernible effect on the percentage of seed germination. Significant enhancement (ranging from about 22% to 35%) in most growth parameters, except shoot length, were observed in sunflower seedlings co-cultured with *Rhizopus arrhizus*. *Fusarium oxysporum* and *Aspergillus niger* exhibited a less pronounced positive effect (10% to 18%) on root length and fresh biomass accumulation. Conversely, treatment with *Alternaria alternata* resulted in the lowest values across all growth variables. The height of the plants ranged from 8.5 and 10.6 cm, representing a 6% to 24% reduction compared to non-inoculated seedlings.

This study underscores the varying impacts of seed-borne fungal strains on sunflower seedling growth. *Rhizopus arrhizus* notably enhanced several growth parameters, suggesting a potential for promoting sunflower growth under controlled conditions. Further exploration of these fungal interactions is essential for elucidating their potential applications in agriculture, particularly in strategies aimed at enhancing crop resilience and productivity.

Influence of foliar fertilization with boron and zinc for maize grain crop in the hilly area of south-western Romania

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Keywords: foliar fertilization, maize, foliar analysis, yield.

Abstract: For 2 years (2020 and 2021) in the hilly area of south-western Romania a single-factor maize experiment (hybrid Kapitolis FAO 410 from KWS) was established with 4 foliar fertilization variants: V1 = untreated control ; V2 = Treatment 1 at BBCH 14-18 (maize with 4-6 leaves) using Lebosol products 1l/ha Zinc700 + 1,5l/ha Bor ; V3 = Treatment 2 BBCH 24-28 (maize with 8-10 leaves) using the same products ; V4 = Treatment 1 + Treatment 2.

Before the first treatment (T1) leaf and soil samples were collected and after the second treatment (T2) leaf samples from all 4 variants were collected for analysis. The foliar analysis before the first application showed normal values for nitrogen, phosphorus, calcium, magnesium, sulfur, iron, manganese, boron, iron, and molybdenum; low value for potassium; slightly low value for zinc and high value for calcium. After the application of the second treatment, zinc content values were much more improved within the leaves, boron remained constant but molybdenum content decreased a lot. Although at the borderline, the nitrogen content of leaf at T1 and T2 remained at normal value, after application of T1 + T2 it decreased from 4.6% (before application) to 2.96%.

The lowest crop yield was obtained with the untreated control - 5210 kg/ha and the highest yield with the T2 variant - 6050 kg/ha. ANOVA yield analysis showed that the yield increase of 840 kg/ha at T2 is very significant compared to the untreated control and the one at T1 + T2 of 370 kg/ha is distinctly significant compared to the same control. Although the maize yield was high compared to the control after application of T1, it was not statistically assured. Of the yield and quality elements studied, the most stable were: test weight (values ranging from 69.9-71.8 kg/hl), protein content (values ranging from 5.79-6.55%) and fat content (values ranging from 3.13-3.26%). Large ranges of values were observed for the thousand kernels weight (values ranging from 300.3-352.4 g) and starch content (values ranging from 67.76-69.54%).

While boron is essential for pollination and thus for yield development, zinc plays an important role in optimal plant development.

The impact of the sowing time on the European corn borer (*Ostrinia nubilalis* Hubner) attack in some romanian hybrids

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Keywords: maize, hybrids, sowing seasons, *Ostrinia nubilalis* Hubner, incidence of the attack on ear.

Abstract: European corn borer (*Ostrinia nubilalis* Hubner) it is the most representative maize pests, for the conditions in the Transylvanian Plateau and is the most important pest after the emergence of the tassel, attacking all the aerial organs of the maize plant. The damages are made by mature larvae which tunneling in stalks, tassels and ears. The attack on stalks affects plant developmental causing their breakage and, implicitly, the decrease in maize yield. The attack on ears favors the installation of pathogens, which depreciates the quality of the kernels.

The reaction of maize hybrids to European corn borer attack can be influenced by several factors, including the time of sowing. Certain corn hybrids show variable susceptibility to this pest. In these sense, the aims of this study were to (i) evaluate the influence of sowing date (season) of maize on the natural attack incidence of European corn borer larvae on ear; (ii) determine the reaction of hybrids from different FAO maturity groups regarding the natural attack on ear of this pest.

The research was carried out in the experimental fields at ARDS Turda, using 12 maize hybrids as biological material (Turda 248, Turda 165, Turda 201, Turda Star, Turda 332, Turda 344, Turda 335, Turda 2020, Turda 380, HST 148, HST 149, Sur 18/399 HST). Observations and determinations on the natural attack of the European corn borer on ear were carried out in the period 2021-2023.

The timing of sowing influences the susceptibility of maize hybrids to the attack of *Ostrinia nubilalis* larvae. Earlier sowing seasons favor natural European corn borer attack on ear. The hybrids Turda 248, Turda 165, Turda Star, Turda 344 and Sur 18/399 hybrids are the most susceptible to European corn borer attack on ear and the most tolerant Turda 380, Turda 2020, HST 149 and HST 148. The choice of the optimal sowing season, in combination with other agricultural practices and the use of hybrids tolerant to the attack of *Ostrinia nubilalis*, can significantly reduce the damage caused by this pest.

Dynamics of useful arthropods in two cereal agroecosystems from the Transylvania Plain

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Keywords: wheat, agroforestry curtains, pests, useful arthropods.

Abstract: Wheat is a basic crop that plays a crucial role in global food security, being one of the most cultivated grain crops in the world. However, the impact of high temperatures and drought, which are becoming more frequent, pose significant challenges for wheat production. Agroforestry protective curtains included in agricultural systems are seen as a solution to mitigate the negative effects of climate change on wheat production. In addition to the multiple benefits that agroforestry curtains, there is also favorable habitats that offer for useful arthropods, which can have a direct impact on the wheat crop. Useful arthropods, such as predatory insects and spiders, play an important role in controlling wheat pest populations, thus reducing the use of pesticides. The objective of this research is to present the useful species identified in two cereal agroecosystems, in a field with agroforestry curtains and in an open field, in the Transylvanian Plateau. For the collection and identification of the species, 100 double sweep-net were made every decade with the help of the entomological net. In the three years (2022, 2023, 2024) in which the research was carried out, the most important useful arthropods species captured belong to the orders Araneae, Coleoptera, Hemiptera, Neuroptera, Diptera, the highest abundance being obtained in the order Aranea.

The dynamics of foliar diseases of wheat in the climate of Transylvania Plain

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Keywords: wheat, foliar diseases, pathogens, rust, dynamics.

Abstract: Wheat, the oldest and most valuable worldwide crop, is susceptible to various foliar diseases that can significantly impact its yield and quality. This paper aims to present the dynamics of the main foliar diseases affecting wheat, caused by pathogens present in the Agricultural Research and Development Station (ARDS) Turda region. During the 2022-2023 and 2023-2024 growing seasons, an assortment of six winter wheat genotypes were subjected to weekly monitoring for foliar diseases. The cultivation practices employed were the standard methods for this location, but without the application of fungicides. The experimental field observations revealed that these two agricultural years were conducive for the emergence and progression of wheat foliar diseases. The pathogens *Blumeria graminis* f. sp. *tritici* and *Zymoseptoria tritici* caused a high attack degree. Additionally, during the vegetation period, the wheat crop's foliage was also affected by *Puccinia striiformis* and *Puccinia recondita*, pathogens that appear with increasing frequency and intensity.

Cultivar and environment on the impact of yellow rust (*Puccinia striiformis*) in Triticale

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Keywords: stripe rust, triticale, resistance, grain yield, tolerance.

Abstract: Yellow (stripe) rust caused by *Puccinia striiformis* f. sp. *tritici* (Pst) is a major destructive fungal disease of triticale, of increasing importance in recent years, in Romania and worldwide.

We tested twenty-three released triticale cultivars and breeding lines originated from the breeding program of NARDI Fundulea and twenty-five new lines selected at ARDS Teleorman in locations with higher stripe rust attack in 2023 and 2024, and observed significantly different disease scores, ranging from resistant to very susceptible. In five yield trials performed in 2023 and 2024, stripe rust had significant impact on grain yield explaining between 15 and 92% of the yield variation. In one trial, at Târgu Mureș the disease occurred unusually early and intense on young plants, and susceptible cultivars did not produce any yield. On average over six trials (three locations x two years) the correlation between rust scores and grain yield was r = - 0.84***. Best resistance to *Puccinia striiformis* was observed in cultivar ZARAZA and in five of the new lines. Based on genealogy, we could trace the resistance sources, to the Polish semidwarf cultivar MAGNAT and to introgressions from *Triticum aestivum* cultivars which were used as parents in crosses with triticale. The deployment of disease-resistant host cultivars proved to be an efficient, economically, and environmentally sound approach to control yellow rust.

We observed large yield differences between cultivars scored similarly for rust attack, suggesting differences in partial resistance and/or tolerance to the disease. Their exploitation can be, along with exploiting available sources of strong resistance genes, an additional breeding objective for reducing rust induced yield losses.

The impact of stripe rust on yield was associated with lower temperatures and higher rainfall in April, which explained more than one third of the variation in coefficients of correlation between stripe rust and yield.

Soil main physical and chemical characteristics modification as influenced by conventional and conservative soil works technologies in areas subject to aridification

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Keywords: aridization, reduced till and inversion tillage, soil physical properties, soil chemical properties.

Abstract: In this paper the influence of soil tillage on physical and chemical and characteristics of soil from different pedoclimatic areas from Romania was studied. Two soil tillage systems were experimented in Olt County, mostly in Iminog Plain, part of the Boian Plain: conventional (classical) and conservative (minimum tillage) at: Brebeni, Olt County; Adunații Copăceni, Giurgiu County; Constantin Brâncoveanu, Călărași County; and Roșiori, Brăila County. The identified soil classes in the area are Luvisols and Chernozems, with the types Haplic Luvisol and Haplic Chernozem (WRB-SR 2014). Soil samples were collected by 5-10; 25-30; and 45-50 cm depths and their physical and chemical properties were determined in the laboratory according to standardized methodology. Soil texture varied from coarse (silt loam) to fine (medium clay), no matter the soil tillage system. Other soil physical characteristics, such as resistance to penetration and total porosity showed slightly more favorable values in the conservative system. Soil chemical properties also varied. Soil reaction (pH) ranged from moderately acid to slightly alkaline and proved to be a bit more favorable for plants growth in the conservative system. Organic matter contents were very low - average, slightly better accumulating in the conservative system. Soil supply with nutritional chemical elements (nitrogen, phosphorus, and potassium) was very low - average for nitrogen and very low - high for phosphorus and potassium. Except for the potassium, which had better values in the conservative system, no significant differences were noticed between the two soil tillage systems. Soil cation exchange properties framed the samples in the oligomesobasic - eubasic classes. Samples of the conservative system generally had a better base saturation degree. Although soil physical and chemical characteristic in the investigated plots differ relatively little between the working systems slight improvements are noticed from these points of view when minimum tillage technology is applied. It is to be predicted that constant and consistent application of conservative technologies will bring about better soil fertility properties preservation and even their improvement.

The agrochemical effect of a protein hydrolyzated biostimulant applied in vegetable crops

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Keywords: biostimulants, protein hydrolysate, foliar application, nutrients, photosynthesis.

Abstract: Currently, agriculture is facing increasing challenges related to climate change and legislative shifts regarding the inputs used. The urgent need to enhance sustainable agricultural production has driven the sector towards methods based on natural products, such as biostimulants. The application of biostimulants derived from protein hydrolysates obtained from plant biomass in horticulture brings a series of benefits that result in higher and improved yields. These fertilizing products are compliant with the relevant fertilizing product regulations. A biostimulant product containing soy-based protein hydrolysate was tested under controlled conditions on crops such as tomatoes (*Precos variety*), eggplants (*Belona variety*), bell peppers (*Bianca variety*), and cucumbers (*Cornistar variety*). The testing involved three foliar applications at a 0.5% concentration during the vegetative phase. The application of the fertilizing product with protein hydrolysate led to yield increases ranging from 28.1% (in eggplants, Belona variety) to 41.6% (in cucumbers, *Cornistar variety*). The three foliar treatments with the biostimulant product also enhanced the photosynthetic assimilation process by 33.6% to 50.6%. Additionally, the nutrient content (N, P, K) in the plants (leaves) showed a significant increase. Products like protein hydrolysate-based biostimulants are seen as a new, efficient generation of agricultural inputs for sustainable farming, replacing some of the traditional fertilizers used in the fertilization process and effectively correcting nutrient deficiency disorders.

Soil health assessment in Filipoiu farm on the Great Island of Brăila

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Keywords: soil health, alluvial soil, conservative agriculture, fertilization.

Abstract: The aim of this paper was to assess soil health in accordance with the requirements of the European Commission through its "Soil and Food Health" (2021) program, in a farm (from the south of Romania) that practices a conservative farming system. A minimum system of soil tillage was applied for the maize crop, in an irrigated system. The fertilizer dose was established as optimal economic (177 kh/ha N, 50 kg/ha P and 22.5 kg/ha K). Soil samples were collected from three profiles, every 10 cm, up to a depth of 50 cm. Soil structural hydrostability (HA) was very high in the first 10 cm (43%) and high up to a depth of 50 cm; the dispersion (D) represented by the microformations with a diameter of <0.01 mm had extremely high values and leaded to very high values of the structural instability index (SI). In all three soil profiles, the texture was dusty-clay, and the carbonate content at a depth of 50 cm had average values (2-8%). The level of nutrient supply is normal and has not been negatively influenced by the production technologies applied. Analyzing the physical and chemical state of the soil, it is possible to appreciate its very good quality, in accordance with the local pedoclimatic conditions and it is capable of providing good quality productions and biomass. The technologies applied through the conservative system have led to a continuous improvement in soil fertility, expressed through the high yields obtained.

Dehesa: A systematic literature review to assess its potential in Romania

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Keywords: dehesa, biodiversity, literature review, agroforestry.

Abstract: This study systematically reviews the potential of the dehesa agroforestry system for adaptation to Romania's climate and agricultural landscape, addressing both environmental and social sustainability. The dehesa, widely implemented across Spain and Portugal, integrates holm and cork oak trees with grazing and traditional farming practices, promoting biodiversity and offering a low-impact, high-diversity model adaptable to climate variability. Given the environmental pressures from Romania's industrial agriculture and habitat loss, this study synthesizes findings from 151 articles on dehesa systems, narrowing them to 11 key studies. The review categorizes findings into two primary themes: environmental benefits, such as enhanced microclimate stability, soil carbon sequestration, and reduced greenhouse gas emissions, and the perceptions of diverse stakeholders—including farmers, consumers, and policymakers—toward sustainable agroforestry. Environmental findings underscore dehesa's role in lowering temperatures and increasing soil water retention, which could mitigate Romania's summer droughts. Socially, stakeholder engagement highlights a robust interest in sustainable land-use practices. These insights provide a framework for integrating traditional agroforestry with contemporary agricultural policies, fostering sustainable agricultural practices in Romania.

Opportunities in the development of zoocultural biodiversity in Romania to avoid biodiversity loss to ensure food security

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Keywords: opportunities, zooculture, biodiversity, losses, food security.

Abstract: Agricultural and zoocultural biodiversity is indispensable for food security, sustainable development and the provision of many vital ecosystem services. Zoocultural biodiversity refers to the diversity of domestic animal species that are of economic importance to a particular community. Romania has a rich zoocultural biodiversity. Livestock herds in Romania have declined in recent years. The main reasons for the decline in livestock numbers in Romania have been: migration of the rural population to urban areas, limited access to finance for farmers, high feed costs and fluctuations in the prices of animal products, the impact of climate change and extreme weather events (droughts or floods), animal health and disease prevention and control problems. The development of zoocultural biodiversity in Romania can contribute to avoiding biodiversity loss through the following opportunities: increasing the efficiency of livestock farming, conserving the biodiversity of farm animals, reconsidering the importance of essential services, reconsidering cooperative activities, and setting up institutional structures to ensure the conservation and development of zoocultural biodiversity. A good manager or farmer needs to monitor cows for body condition, appetite and interval from calving to first estrus. An analysis of the dynamics of A.I. in bulls over the period 2013-2023 suggests that the bull industry is actively adapting to technological, economic and environmental changes. The absence of "in vitro" embryotransfers (E.T.) in beef cows over the period 2018-2022 highlights a notable difference in assisted breeding practices between dairy and beef cows. Services satisfy unitary or collective (local, area or national) interests. In the market economy cooperatives play an important role as they promote the principles of the social and solidarity economy and offer an alternative to the traditional business model. The development of zoocultiral biodiversity can be achieved by setting up structures to ensure this.

The quality indices of fodders from some common millet cultivars (*Panicum miliaceum*) under the conditions of the Republic of Moldova

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Keywords: biochemical composition, forage value, green mass, hay, *Panicum miliaceum*, *Pennisetum alopecuroides*, *Pennisetum glaucum*, silage.

Abstract: We investigated the quality of the fodder from proso millet *(Panicum miliaceum), Chinese fountain grass (Pennisetum alopecuroides)* and pearl millet *(Pennisetum* glaucum), which grow in the experimental plot of the "Alexandru Ciubotaru" National Botanical Garden (Institute), Chisinau, Republic of Moldova. The results revealed that the dry matter of whole plants of the studied millet species contained: 11.6-13.5% CP, 7.5-9.3% minerals, 37.0- 40.6% CF, 36.0-40.6% ADF, 60.6-65.1% NDF, 3.3-4.2 % ADL, 9.9-16.6% TSS, 33.7-36.4% Cel, 23.725.0% HC with forage value 573-600 g/kg DDM, RFV= 82-92, 11.39-11.88 MJ/kg DE, 9.359.76 MJ/kg ME and 5.37-5.78 MJ/kg NEl. The biochemical composition and forage value of hay dry matter were: 12.8-13.0% CP, 9.2-10.0% minerals, 35.4-41.7% CF, 36.8-44.1% ADF, 60.170.4% NDF, 3.1-4.2 % ADL, 9.0% TSS, 33.2-39.9% Cel, 23.3-26.3% HC, 545-602 g/kg DDM, RFV= 71-93, 10.88-11.92 MJ/kg DE, 8.94-9.78 MJ/kg ME and 4.98-5.80 MJ/kg NEl. The ensiled dry mass contained 12.0-13.3% CP, 9.3-11.5% minerals, 37.0-41.2% CF, 37.1-43.9% ADF, 63.0-68.8% NDF, 2.0-3.1% ADL, 6.7-9.8% TSS, 35.1-40.3% Cel, 23.3-27.7% HC with forage value 547-600 g/kg DDM, RFV= 74-92, 10.93-11.87 MJ/kg DE, 8.96-9.75 MJ/kg ME and 4.99-5.76 MJ/kg NEl.

Productivity and nutritional value of some Festuca species in Moldova

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Keywords: biochemical composition, *Festuca arundinacea*, *Festuca pratensis*, *Festuca rubra*, *Festuca valesiaca*, green mass, hay, local ecotype, nutritional value, productivity, silage.

Abstract: The grass species of genus *Festuca* are quite common in the floristic composition of permanent and temporary grasslands, have an essential role in water conservation, protecting the soil from erosion, and producing pytomass have been used as forages, biofuels, raw materials for the circular economy. The goal of this study was to evaluate the productivity and nutritional value of the green mass, prepared hay and silage from the local ecotype of *Festuca arundinacea*, *Festuca pratensis*, *Festuca rubra* and *Festuca valesiaca*. We found that the forage dry matter productivity at the first cut of the studied *Festuca* species varied from 5.7 t/ha (*Festuca valesiaca*) to 10.4 t/ha (*Festuca pratensis*). The biochemical composition and nutritional value of green fodder were 8.6-12.4% crude protein (CP), 7.5-8.9% ash, 31.5-42.4% crude fibre (CF), 3.0-5.5% acid detergent lignin (ADL), 30.9-39.1% cellulose (Cel), 23.5-29.2% hemicellulose (HC), 4.0-12.2% total soluble sugars (TSS), 492-651 g/kg digestible dry matter (DDM), 443-601 g/kg digestible organic matter (DOM), 527-646 g/kg total digestible nutrients (TDN), relative forage quality RFQ=70-110, 8.90-10.01 MJ/kg metabolizable energy (ME), 4.91-6.13 MJ/kg net energy for lactation (NEl). The quality indices of fescue hays were 7.5-12.2% CP, 8.0- 10.5% ash, 35.0-43.0% CF, 3.4-5.8% ADL, 35.1-38.6% Cel, 23.6-31.0% HC, 2.0-10.2%TSS, 462-590 g/kg DDM, 423-541 g/kg DOM, 528-595 g/kg TDN, RFQ=68-93, 10.85-11.68 MJ/kg DE, 8.91-9.59 MJ/kg ME, 4.93- 5.61 MJ/kg NEl. The prepared silage from *Festuca arundinacea* and *Festuca pratensis* had pH=4.05-4.11, 28.7- 29.6 g/kg lactic acid, 6.7-10.0 g/kg acetic acid, 0-1.3 g/kg butyric acid, 10.6-13.0% CP, 9.1-10.5% ash, 32.0- 38.0% CF, 1.9-2.4% ADL, 31.5-38.1% Cel, 22.3-29.0% HC, 650-680 g/kg DDM, 610-614 g/kg DOM, 578-646 g/kg TDN, RFQ=82-112, 11.46-12.32 MJ/kg DE, 9.41-10.12 MJ/kg ME, 5.43-6.13 MJ/kg NEl. The local *Festuca ecotypes* may serve as material for selecting, breeding and implementing new local grass cultivars for forages production.