



BOOK OF ABSTRACTS

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

November 2025, Bucharest

**National Agricultural Research and Development
Institute Fundulea**

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

BOOK OF ABSTRACTS

**28 November 2025,
Bucharest**

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

Organized by:

National Agricultural Research and Development
Institute Fundulea
in collaboration with
Academy of Agricultural and Forestry Sciences
„Gheorghe Ionescu-Șișești”,
National Institute of Economic Research
„Costin C. Kirițescu”,
Center for AgroForestry Biodiversity Studies and
Research „Acad. David Davidescu”

Editorial Board

General Editor: Elena PETCU

**Members: Elena Partal, Cristina Mihaela Marinciu,
Maria Joița-Păcureanu, Emil Georgescu, Matilda Ciucă,
Victor Petcu, Elisabeta Barbu, Cătălin Savin, Dan Oprea**

Publisher:

National Agricultural Research and Development Institute Fundulea

Adress: N. Titulescu Str., No 1, Fundulea, Călărași, Romania

Phone/Fax: 021-3110722/0242-642875

E-mail: elisabeta.barbu@ricic.ro, catalin.savin@ricic.ro

Webpage: www.incda-fundulea.ro

ISSN 3044 - 8468

ISSN-L 3044 - 8468

Genetic and Phenotyping Variation of Grain Protein Concentration, Dough Strength and Test Weight in Wheat (*Triticum aestivum*)

*Cristina Mihaela Marinciu, Gabriela Șerban, Vasile Manda, Indira Galit,
Vasile Silviu Vasilescu, Nicolae N. Săulescu*

National Agricultural Research and Development Institute Fundulea

Keywords: wheat, protein concentration, dough strength, test weight, nitrogen fertilization, cultivar variation, bread-making quality.

Abstract: Most of the wheat produced in Romania is used for bread making. Therefore bread-making quality parameters, and especially grain protein concentration and dough strength (W), are very important for producing suitable bread, without using excessive additives. Test weight (Volumetric weight) is used in grading wheat, as it influences milling quality. In this study, we analyzed these parameters in samples from 21 cultivars, grown with and without nitrogen (N) fertilization over three years at NARDI Fundulea in South Romania. Nitrogen fertilization was the main source of variation for protein concentration, explaining 60% of the total variation and increasing the average protein % from 12,5 to 16,4%. Cultivars explained only 4,7% of total sum of squares, causing an average variation from 14,9 to 17,5% with N fertilizer and from 11,9 to 13,8% without fertilization. A similar pattern was observed for dough strength, where N fertilization explained 59,4% and cultivars 7,9% of the total variation. In contrast, test weight variation was primarily determined by cultivars (34,3%), while fertilization accounted for only 6,8% of the total variation.

These results highlight the importance of N fertilization in enhancing protein content and dough strength, while genetic differences among cultivars are more influential for test weight, which has implications for both breeding and agronomic management.

**Genome-Wide Association Studies of Romanian Wheat Cultivars
from the Vegetal Genetic Resources Bank Suceava**

Iulian Gabur¹, Tiberiu Emilian Sârbu¹, Danela Murariu², Dănuț-Petru Simioniuc¹

¹“Ion Ionescu de la Brad” University of Life Sciences, Iași

²“Mihai Cristea” Vegetal Genetic Resources Bank, Suceava

Keywords: GWAS, wheat, SNPs, *Triticum monococcum*.

Abstract: Wheat (*Triticum aestivum* L.) is one of the world’s most important crop species, largely because its grain contains high levels of carbohydrates and proteins in a ratio well suited to human nutritional needs. It is also among the earliest domesticated crops of agronomic significance, having been cultivated by humans as early as 10,000-12,000 years B.C. In Romania, wheat has been grown for more than 2,500 years, based on archaeological findings along the shores of the Black Sea, underscoring the crop’s long-standing cultural and economic importance. This study includes 350 wheat genotypes - comprising local populations, commercial varieties, and breeding materials - provided by the “Mihai Cristea” Vegetal Genetic Resources Bank in Suceava. The objective of this study is to perform genomic analyses of wheat (*Triticum aestivum* L.) and einkorn (*Triticum monococcum*) cultivars, using the SNP chip array, and identify genetic patterns linked with important agronomic traits and adaptation to local environments.

Yield and Quality of Soybean Crop under the Influence of Tillage Systems

Camelia Urdă, Alina Şimon, Felicia Cheţan, Alin Popa, Adrian Ceclan

Agricultural Research and Development Station Turda

Keywords: plowing, quality, chisel, yield, soybean.

Abstract: Soybean is a crop with high requirements for soil tillage and efficient weed management. Therefore, the identification of appropriate methods of soil preparation and weed control are technological links in ensuring high and good - quality yields. A polifactorial experiment was conducted at the Agricultural Research and Development Station (ARDS) Turda over two consecutive growing seasons (2024 and 2025), based on the split-plot design. The biological material studied was the soybean variety Felix, sown at 50 cm between rows and 55 g.s./m². The study aimed to assess the stability of yield, thousand kernel weight, and seed quality (oil content, protein content, and fatty acids) under two soil tillage systems (plowing and chisel) and different weed control methods (a control variant without treatment, pre- and post-emergent herbicides for monocots and dicots, as well as combinations with mechanical or manual hoeing). The results obtained in both experimental years indicated a high level of weeding, especially in the non-herbicidal variant, both in the conservative system (chisel) and in the classic ploughing system. Among the dominant annual monocot species, *Setaria glauca* and *Echinochloa crus-galli* stand out and in perennial dicotyledonous species such as *Cirsium arvense* are observed. Average yields were higher in the plowing system, while the chisel system provided greater stability in yield capacity. The best results were obtained in variants combining chemical weed control with hoeing, confirming the effectiveness of integrated weed management. The maximum yield (2034 kg/ha) was achieved under plowing with chemical weed control, whereas in the untreated control, yields were 785 kg/ha for plowing and 500 kg/ha for chisel. Thousand kernel weight was similar in both systems (130-145 g), slightly higher and more stable in the chisel system. Seed chemical composition was relatively consistent: the chisel system promoted higher oil content (21.06%) and oleic acid (26.44%), whereas plowing slightly increased protein content (33.93%) and linolenic acid (5.24%). Low coefficients of variation confirmed the high stability of seed quality. In conclusion, the conservative chisel tillage system provided stable yield and quality, while plowing offered a higher productive potential, especially under favorable environmental conditions.

Acknowledgements: This research was supported by the Ministry of Agriculture and Rural Development, through the ADER 1.4.1. project: “Improving the methods of weed control in soybean crops, in order to increase economic efficiency by reducing the number of treatments and the negative impact on the environment”.

Recent Advances in Winter Triticale Breeding: New High-Performing Varieties

Maria Voica¹, Mariana Bălțatu¹, Alina Mihaela Delcea¹,
Cristina Mihaela Marinciu², Constanța Popescu³

¹Agricultural Research and Development Station Teleorman

²National Agricultural Research and Development Institute Fundulea

³Institute for Testing and Registration of Varieties, Bucharest

Keywords: triticale, breeding, new varieties, yield, adaptability, drought and disease resistance.

Abstract: Are reported the performances of the first registered triticale cultivars *Drăgănești* and *Egreta* (2025), obtained at ARDS Teleorman, following the primery introduction of a triticale breeding program, based on germplasm transfer from NARDI Fundulea (agronomic cycle 2019/2020).

The new triticale genotypes *Drăgănești* (14225T1-02) and *Egreta* (16026T4-1) were experimentally evaluated during 2022-2025 under the National triticale culture (NTC), carried out annually in 39 different experimental conditions, compared to the cultivars registered in the period 2018-2024 (*Zori*, *Zvelt*, *Utrifun*, *Zaraza*, *FDL Ascendent*, *FDL Caltrit*) and SITRV network, 2022-2024. The control cultivars *Haiduc* and *Utrifun*. The results evidentiated in the both new triticale cultivars, *Drăgănești* and *Egreta*, high values of the most desirable agronomic traits as: resistance to drought, heat, diseases and to the sprouting of grains in the ear, as well as precocity and other agronomic traits associated with a high yield and hectoliter weight. Their level of adaptability to the different environmental conditions across the country, expressed by the higher production potential recorded, compared to the control cultivars (7-13%), recommends them for a successful cultivation, in terms of yield and quality, in all favorable areas for triticale crop of Romania.

Diversifying of triticale germplasm through specific methods remains a major current and perspective objective within the newly triticale breeding program started at ARDS Teleorman.

Use of Genetic Markers in Wheat Breeding for Organic Heterogeneous Material

Anders Borgen, Dennis Kjær Christensen

Agrologica, Mariager, Denmark

Keywords: OHM, MAS, common bunt, marketing.

Abstract: Organic Heterogeneous Material (OHM) is a term defined in the EU Organic regulation (EU 2022), and based on experience gained from several EU projects on organic plant breeding. OHM can be composed by mixing of all offspring from a set of crosses exposed to natural selection (original composite cross populations), but the mixture will in this way be similar or slightly better than the average of the parents (Döring et al., 2011). It is therefore crucial to use only well adapted parents to achieve competitive germplasm. If suboptimal parents are included, an alternative approach such as positive and negative selection by the breeder need to be used to avoid suboptimal components, and the EU regulation allows this. One way to avoid sub optimal genotypes in OHM is to select pre studied pure lines, and compose the OHM only by selected offspring (complex variety mixture).

Organic plant breeding at Agrologica started in Denmark 2006 with the attempt to develop OHM of wheat with good baking quality, weed competition and resistance to plant diseases, including common bunt.

Some traits are difficult but not impossible to improve further after the OHM have been composed. Baking quality can be improved by Single seed NIR sorting (eg. BoMill Insight[®] technology), colour sorting or by gravity sorting. However, with state-of-the-art technology, this can only increase gross grain protein content and seed hardness, but will not improve more complex baking quality parameters such as gluten rheology, incl. gluten index. To compose mixtures with optimal gluten index above the average of the parents, we have developed SNP markers for High Molecular Weight Glutenin subunits (HMWG) to be used for MAS in order to compose mixtures with a diversity of optimal HMWG subunits within the mixture.

Weed competition is best improved by visual assessment and selection for early vigour, and plant height before heading stage with due respect of the risk of lodging. The plant height, lodging resistance and early vigour are governed by a high number of genes, including genes for vernalisation, and genetic markers are developed for some of these genes, but so far, our selection mainly rely on phenotyping, with only limited support from MAS.

Cereal Cyst Nematodes (CCN, *Heterodera avenae*) is in Denmark mainly a problem in spring wheat, and no varieties on the EU Catalogue are documented to be resistant. The market for special varieties with this trait is limited as farmers tend to use non susceptible crops rather than resistant cereal varieties in case of nematode infestation of a field. Therefore, CCN resistance should be included in all spring wheat as a preventive rather than a curative measure. Marker Assisted Selection (MAS) is the best way for selection, as field phenotyping is difficult and

expensive. We have therefore developed SNP markers the Cre1 resistance gene for this selection.

Common bunt (*Tilletia caries*) needs special attention in organic breeding programs, as most varieties are susceptible (Borgen et al., 2023A). Only a few susceptible plants in an OHM are enough to maintain an infection, and close to all plants must therefore have resistance to the virulence in the region. Virulence is present in Europe against most of the known resistance genes (Borgen et al., 2023B), and pyramiding genes are therefore the only safe way for durable resistance to common bunt. We have so far identified 59 resistance genes and developed SNP markers to 20 of them for MAS (Christensen and Borgen, 2025).

Leaf diseases such as mildew and in particular rust diseases (*Puccinia* sp.) can be devastating in organic farming. These diseases can be selected in the field based on leaf symptoms, but the experience indicates that if resistance is based on a single or few vertical resistance genes, the varieties or OHM can turn susceptible within 1-3 years. Therefore, horizontal (adult plant) resistance genes or multiple vertical resistance genes must be included to maintain durability of the resistance. We therefore develop SNP markers for the most important rust resistance genes for MAS.

We conclude that OHM is preferable over pure line varieties as a strategy for organic farming, as both yield and baking quality is more stable than in pure line varieties. Our experience is that OHM based on selection of pure lines in many cases provide an appropriate strategy to develop high quality germplasm for organic farming. There seems to be a synergy of baking quality and taste between the components of a mixture.

Funding organic plant breeding is difficult as the market is too small to cover the cost of the breeding. The OHM developed from our breeding program is therefore distributed via the member organisation Landsorten, based on home saved seed production to reduce cost for the seed production. Two OHMs have been officially registered, 'Mariagertoba' and 'Popkorn', whereas other OHMs are produced in smaller amount without registration. By not selling seed, the activities of Landsorten are legal, and small seed lots can be distributed under the Article 3 exemption or research, trial and breeding purposes (EU 1966) as a base for multiplication of home saved seed. Landsorten supports in this way a production of 1500 ha of organic bred varieties in Denmark, England, Belgium and The Netherlands.

Acknowledgements: The breeding, seed production and research is supported by the CORE Organic Co-fund project 'DIVERCILIENCE' and the Organic RDD project 'BOOST' funded by GUDP, Denmark, both coordinated by ICROFS.

References:

- Christensen D., and Borgen, A., 2025. *Mapping Bt-resistance genes controlling common bunt in wheat*. Abstracts of The XXIII International Workshop on Bunt and Smut Diseases.
- Borgen, A., Müller, K.-J., Vollenweider, C., Löschenberger, F., Henriksson, T., Christensen D.K., Dumalasova, V., 2023A. *Registered varieties and Organic*

- Heterogeneous Material (OHM) with resistance to common bunt in Europe.* Bürstmayr, Hermann (Ed.) Proceedings of the XXII International Workshop on Bunt and Smut Diseases, BOKU, Austria, 28-29.
- Borgen, A., Forster, M., Sedaghatjoo, S., Christensen, D.K., Maier, W., 2023B. *Determination of virulence of European races of common bunt using a differential set of wheat cultivars.* Bürstmayr, Hermann (Ed.) Proceedings of the XXII International Workshop on Bunt and Smut Diseases, BOKU, Austria, 16-18.
- Döring, T.F., Knapp, S., Kovacs, G., Murphy, K., Wolfe, M.S., 2011. *Evolutionary Plant Breeding in Cereals - Into a New Era.* Sustainability, 3(10), 1944-1971, <https://doi.org/10.3390/su3101944>.
- EU, 1966: Council Directive 66/402/EEC on the marketing of cereal seed.
- EU, 2022: Regulation 848/2018, on organic production and labelling of organic products.

Turda 350 and Turda 59: The Latest Creations in Maize Breeding at ARDS Turda

*Andrei Varga, Roxana Elena-Călugăr, Carmen Daniela Vana,
Ancuța Loredana Ceclan, Nicolae Tritean, Andras Fodor*

Agricultural Research and Development Station Turda

Keywords: breeding, hybrid, new maize, high quality, best production.

Abstract: Within the breeding program of the Agricultural Research and Development Station (ARDS) Turda, two new maize creations were obtained, namely the hybrids Turda 350 and Turda 59, registered in 2025, belonging to the FAO 360 group. The two hybrids stood out for their production potential superior to the latest “TURDA” creations, high quality, as well as for the superior ability to capitalize on technological factors.

The two hybrids were tested in the State Institute for Testing and Registration of Varieties (SITRV) network, in nine variety testing centers and under five different ecological conditions in the Academy of Agricultural and Forestry Sciences (AAFS) network (Turda, Târgu Mureș, Secuieni, Livada and Lovrin), in non-irrigated crop system, between 2021 and 2023. Their experimentation was carried out in comparative crops, being tested under the names HST 148 and SUR 18/399, respectively.

The new registered hybrids are distinguished by: tall plant, semi-erect leaves, long cylindrical cobs, dent grains, normal yellow in color, with 18-22 rows of grains, the TKW is between 260-280 g, the shelling percentage between 83-85%. Also, the new creations have a good ecological plasticity, very good resistance to low temperatures in the first part of the vegetation period, resistance to falling, very good tolerance to drought, heat and hardening of the grains. Both genotypes were distinguished by a yield potential of over 13000 kg/ha. The seeds can be produced based on a perfected formula, with no need for castration in hybridization batches.

The hybrids Turda 350 and Turda 59 are recommended for cultivation in the Transylvanian Plain, the neighboring plateaus, the meadows of the Mureș, Someș and Târnave rivers, central and north-eastern Moldova, as well as in the hilly areas in the west of the country, and the best production results were obtained at a density of 70000 plants/ha.

New Sunflower Genotypes Obtained at NARDI Fundulea - Connection to a Sustainable Agriculture

Maria Joița-Păcureanu^{1,2}, Gabriel Popescu², Florin Gabriel Anton¹,
Laurențiu Ciornei², Victor Petcu^{1,2}, Ioana Todirică²,
Simona Simion², Amalia Străteanu²

¹National Agricultural Research and Development Institute Fundulea

²Center for Study and Research for AgroForestry Biodiversity
“Acad. David Davidescu”, Bucharest

Keywords: sunflower, climate change, adaptation, performant genotypes.

Abstract: Sunflower (*Helianthus annuus* L.) crop is grown for its edible oil but also for its achenes (confectionery types), both commonly used in human food.

After being obtained first sunflower hybrids with high oil content, area cultivated with sunflower crop has increased over the world.

Sunflower is an important source of oil and protein necessary for development of healthy humans. By producing sunflower the main gains a possibility to use oil and proteins in different forms.

With ongoing climate change, sunflower, as a spring crop, could be more exposed to the direct effect of heat stress and to different drought scenarios, resulting in severe yield losses, oil content decrease and alteration of fatty acids composition.

The oil concentration in sunflower (whether linoleic or oleic varieties) is valued above the contribution of genotype, of environment but also of the crop management.

By using a very various and valuable germplasm, there have been obtained valuable inbred lines, having very good characteristics.

In the present and future climate context, sunflower cropping offers a wide range of option for attenuating or preventing the negative impacts of climate change. Adaptation through crop management (early sowing), breeding (earliness, stress tolerance etc.) and shifting growing areas could be introduced, assessed and combined at field level.

During early growth stage, sunflower plants can withstand temperatures in the -3.3 to 3.8 degrees of temperatures for short period. As the plants develop through the vegetative stages, they become progressively more sensitive to frost. There have been identified resistance or tolerance of young sunflower plants to overnight freezing temperatures.

It has been obtained an important genetic progress, regarding the productivity, also different agronomic and physiological traits and adaptation to the biotic and abiotic factors.

The performance of new genotypes gathering most of these characteristics are presented.

The Biomass Yield and Biochemical Composition of Some Annual Leguminous Species in Moldova

Victor Țiței

“Alexandru Ciubotaru” National Botanical Garden (Institute)
of the Moldova State University, Chișinău

Keywords: annual leguminous species, biochemical composition, biochemical methane potential, forage quality, fresh mass, hay.

Abstract: Research and utilization of the agrobiological potential of the leguminous species becomes more and more relevant. The annual leguminous species *Cicer arietinum*, *Glycine max*, *Lablab purpureus*, *Pisum arvense*, *Trifolium alexandrinum*, *Trigonella foenum-graecum* maintained in monoculture on experimental land in the National Botanical Garden (Institute), Chișinău, Republic of Moldova, served as objects of study. Results revealed that biomass yield of studied annual leguminous species varied from 2.42 to 5.67 kg/m² fresh mass or 0.71 to 1.28 kg/m² dry matter. The biochemical composition of dry matter of the harvested whole plant was 145-216 g/kg CP, 205-310 g/kg CF, 90-126 g/kg ash, 240-332 g/kg ADF, 376-520 g/kg NDF, 36-61 g/kg ADL, 104-271 g/kg Cel, 136-188 g/kg HC, with nutritive and energy value 63.0-70.2% DDM, RFV=113-171, 10.19-11.25 MJ/kg ME and 6.21-7.26MJ/kg NEI. The forage value of prepared hay: 168-209 g/kg CP, 63.5-66.9% DDM, RFV=118-146, 10.26-10.76 MJ/kg ME and 6.28-6.77 MJ/kg NEI. The biochemical methane potential of studied substrates varied from 318-390 l/kg. The harvested biomass from studied annual leguminous species can be used as fodder for farm animals or as co-substrates in biogas plants for the production of biomethane as renewable energy.

Cotton Bollworm (*Helicoverpa armigera*) a Threat to Maize Crops in Romania

Emil Georgescu¹, Lidia Cană¹, Cristina Radu², Cristina Cionga²,
Paula-Lucelia Pintilie³, Luxița Rîșnoveanu^{4,5}

¹National Agricultural Research and Development Institute Fundulea

²Romanian Professional Farmers and Processors Forum

³Agricultural Research and Development Station Secuieni

⁴Agricultural Research and Development Station Brăila

⁵University Economic Studies of Bucharest

Keywords: cotton bollworm, high population, maize.

Abstract: This paper presents a five-year study concerning monitoring the cotton bollworm (*Helicoverpa armigera*) flight dynamics using pheromone traps and a study relating to the behaviour of nine maize hybrids from two maturity groups to this pest attack in 2024. The monitoring and field assessments were made in south-east Romania, Călărași County, at the NARDI Fundulea. During the monitoring period, from 2020 to 2024, air temperature was higher than average in the summer months while rainfall was below average, except in June 2021. Total captured moths in the traps were 246 in 2020, 406 in 2021, 5064 in 2022, 1024 in 2023, and 4145 in 2024. In the middle of July 2022, the average captured moths per trap were 483.3; in the middle of September, it was 589.0 catches. In 2024, in the last 10 days of July, the average captured moths per trap were 311.7, in the last 10 days of August, it was 358.0, while in the middle of September, it was 362.3. In 2024, at the beginning of August, the attack incidence of corn earworm on maize hybrids ranged from 43.75 to 53.75 %, and on 13 September, it was 100% at all hybrids. In September 2024, at all maize hybrids from this study, the pest attack incidence on cobs was 100%. We analyse the maize hybrids' yield for total aflatoxins (B1 + B2 + G1 + G2) level. Because of high pest attacks in 2024, the aflatoxin was higher than maximum limits (Reg. EC 1881/2006) at all hybrids from this study. This is the first report from southeast Romania that mentioned a higher population of cotton bollworm in the late summer and beginning of autumn, and the first report that mentioned high pest attacks on maize cobs in September.

Engineering Agroforestry Systems, Convergence of Fruit Trees with Arable Crops under Temperate Conditions of Southern Romania

Damian Dragomir, Maria-Marinela Dragnea, Alexandra Maria Bardoş Marţiş

Research and Development Station for Fruit Tree Growing Băneasa

Keywords: agroforestry, fruit trees, arable crops, sustainable agricultural technologies.

Abstract: Agroforestry represents a sustainable land management strategy integrating woody perennials with annual crops to enhance productivity, biodiversity, and ecological resilience. This study explores the engineering design and functional assessment of fruit tree-arable crop agroforestry systems under the temperate conditions of Southern Romania, focusing on the experimental framework developed at the Research and Development Station for Fruit Tree Growing (SCDP) Băneasa, within the Experimental Base of Moara Domnească. The initiative aims to establish a new research direction in horticultural agroforestry adapted to local pedoclimatic conditions. The convergence between fruit trees and arable crops generates mutual benefits: tree canopies moderate temperature extremes, reduce evapotranspiration, and improve soil moisture retention for annual crops, while herbaceous layers contribute to nitrogen fixation, soil aeration, and erosion control, improving the physiological and nutritional status of the fruit trees. Precision technologies (remote sensing, microclimatic and soil sensors) are integrated to evaluate energy, water, and nutrient fluxes and to identify optimal spatial configurations. The expected results will demonstrate how genetic diversity within fruit tree species and compatible arable crops can be harnessed to create multifunctional, climate-resilient systems. This approach lays the foundation for a biodiversity-based innovation model at SCDP Băneasa, supporting sustainable agricultural technologies in temperate agroecosystems.

Evolution of Soil Tillage Practices: Current Status and Strategic Perspectives in Romania

Elena Partal

National Agricultural Research and Development Institute Fundulea

Keywords: soil tillages, evolution, perspectives.

Abstract: Soil is the most important resource in agriculture. The way we work the soil influences everything from water retention and fertility, to crop productivity and farm resilience in times of drought. Intensive use without conservation measures can lead to irreversible degradation of the physical, chemical and biological properties of the soil, transforming a vital and apparently sustainable resource into a vulnerable and limited one. Intensive practices, such as repeated mechanical tillages, can accelerate degradation and reduce the microbial biodiversity essential for soil functioning. Without protective interventions, the fertile layer can be lost in just a few years, while its natural recovery takes centuries. The evolution of soil tillages in Romania indicates a clear shift towards conservation systems, due to economic pressure, the need for efficiency and climate change. In the context of climate change and soil degradation, traditional approaches need to be analyzed and, sometimes, reconsidered.

Effects of Pyramiding Genes for Partial Resistance to Leaf Rust (*Puccinia recondita*) in Wheat (*Triticum aestivum*)

Indira Galit, Daniel Cristina, Alina-Gabriela Turcu, Matilda Ciucă,
Cristina Mihaela Marinciu, Gabriela Șerban, Nicolae N. Săulescu

National Agricultural Research and Development Institute Fundulea

Keywords: wheat, leaf rust, *Puccinia recondita*, partial resistance, *Lr* genes, gene pyramiding, marker-assisted selection.

Abstract: Wheat, one of the most widely grown crop globally and in Romania, is affected by numerous diseases, among which leaf rust, caused by the pathogen *Puccinia recondita*, is one of the most frequent and can lead to yield losses of up to 40%.

Genetic resistance is the most convenient way, both economically and ecologically, to reduce the impact of this disease, and many strong resistance genes, offering complete protection against leaf rust, are available. However, experience has shown that the pathogen can rapidly develop new races virulent to such resistance genes, if they are deployed on large areas, making this genetic protection against leaf rust short lived. Partial resistance genes, usually manifested only at adult stage, proved to offer a more durable but incomplete protection. Pyramiding such genes in one wheat genotype, was suggested and has been used in several breeding programs, to ensure adequate and long-term resistance.

In this study molecular markers associated with genes *Lr34*, *Lr37*, *Lr46* and *Lr68* were used to identify genotypes carrying one to four of these resistance genes. The genotypes were tested at NARDI Fundulea, under artificial inoculation with a mixture of races prevalent in the area, during 2023 to 2025. Percentage of leaf area affected by rust was visually estimated. Averaged over three years and several genotypes carrying the same number of *Lr* genes, entries carrying one gene reduced the attack from 66.7% in susceptible genotypes to 20.0%, while entries cumulating two *Lr* genes showed 7.1% attack. In entries cumulating 3 or 4 *Lr* genes no leaf rust attack was observed. Presence of the *Lr46* gene alone reduced the attack from 66.7% to 26.7%. Adding to it the genes *Lr68* or *Lr37* further reduced the attack to 7.8% and 4.4%, respectively, while adding both *Lr37* and *Lr34* provided complete protection against leaf rust.

These results, consistent with international studies and adapted support as we routinely use marker assisted selection to increase the frequency of partial resistance genes in the breeding program and to attempt pyramiding these genes for more complete and durable genetic protection.

**Research on Selection of Several Maize Hybrids Developed
by the NARDI Fundulea for Productivity, Water and Nutrient
Use Efficiency, in Different Environments**

*Daniela Horhocea¹, Horia Lucian Jordan¹, Cătălin Lazăr¹, Alina Laura Agapie²,
Gergely-Andrei Smit³, Monica Tanc⁴, Alin Ionel Ghiorghe⁵*

¹National Agricultural Research and Development Institute Fundulea

²Agricultural Research and Development Station Lovrin

³Agricultural Research and Development Station Livada

⁴Agricultural Research and Development Station Valu lui Traian

⁵Agricultural Research and Development Station Brăila

Keywords: maize, hybrid, productivity, stability, water use efficiency, nutrient use efficiency.

Abstract: Water and nutrient use efficiency in maize refers to the plant's ability to convert available resources into biomass and, ultimately, into grain yield. These efficiencies vary depending on genetic (hybrid), agronomic (water availability, planting density, cultivation practices), and environmental factors.

Maize has high water requirements, particularly during certain phenological stages such as anthesis, grain formation, and grain filling. Nutrient use efficiency especially nitrogen use efficiency is essential for maximizing productivity and reducing environmental impact. It is influenced by genetic factors, soil fertility, the type and timing of fertilizer application, and crop management practices.

This study aimed to evaluate a set of maize hybrids under different ecological and technological conditions during the 2024-2025 period, focusing on yield level and stability. to select maize hybrids with superior adaptability and high efficiency in water and nutrient use.

The biological material consisted of 20 maize hybrids, 19 of which were developed at INCDA Fundulea, while one served as a competitive control. The hybrids were tested under nitrogen fertilization, both in non-irrigated and irrigated conditions across five locations with different pedoclimatic conditions: at NARDI Fundulea, ARDS Brăila, and ARDS Valu lui Traian (under both non-irrigated and irrigated conditions), and at ARDS Lovrin and ARDS Livada (under non-irrigated conditions).

Under non-irrigated conditions, the average yields of the experimental hybrids ranged from 5,578 kg/ha (HSF11936-19) to 8,430 kg/ha (HSF1142-17), with an experimental mean of 7,450 kg/ha. Under irrigated conditions, average yields ranged from 9,428 kg/ha (HSF2141-22) to 11,875 kg/ha (HSF1089-17), with an experimental mean of 10,840 kg/ha.

The superior performance of the hybrids HSF11467-19, HSF10935-19, HSF2213-22, HSF1142-17, and HSF2016-22 was confirmed by their stability selection indices, which ranged from 13.61 to 13.02.

The Adaptive Response of Maize Crops to the Interaction of Biotic and Abiotic Factors under Climatic Conditions of 2025

Horia Lucian Iordan, Daniela Horhocea, Emil Georgescu,
Lidia Cană, Cătălin Lazăr

National Agricultural Research and Development Institute Fundulea

Keywords: maize yield, adaptability, abiotic stress, biotic stress, *Fusarium spp.*, maize ear rot, *Ostrinia nubilalis*, pathogen-pest interaction, agricultural sustainability, climate change, tolerant hybrids.

Abstract: The variability of climatic conditions observed in recent years has exerted a significant influence on the adaptability of maize crops, leading to alterations in physiological processes, productivity, and tolerance to both biotic and abiotic stress factors. Abiotic elements such as temperature, humidity, and the spatial-temporal distribution of precipitation directly affect plant growth processes and its ability to respond to pressures imposed by pathogens and pests. Within this context, the interaction between maize ear rot, caused by species belonging to the *Fusarium spp.* complex, and the European corn borer (*Ostrinia nubilalis*) represents a major threat to yield stability and grain quality. The galleries formed by larvae within the ears and stalks serve as entry points for fungal pathogens, thereby facilitating colonization and the systemic spread of infection throughout plant tissues. The study was carried out at the experimental fields of the National Agricultural Research and Development Institute (NARDI) Fundulea, located in Călărași County, Fundulea locality (approximate geographic coordinates: 44°27' N, 26°31' E). The project aims to strengthen the role of agricultural research in ensuring food security and in improving crop adaptability to climate change through modern genetic and technological approaches. In this regard, during the 2025 growing season, nine domestic and promising maize hybrids, together with one foreign control hybrid, were evaluated under local pedoclimatic conditions in order to comparatively assess their agronomic performance. To test tolerance to biotic stress, the plants were subjected to controlled artificial infestation with *Fusarium spp.* inoculum and *Ostrinia nubilalis* larvae. This approach enabled the evaluation of hybrid responses under conditions of elevated pathogen and entomological pressure, reflecting the complex interaction between genotype, environment, and biotic stressors. The results provide valuable insights into the adaptive mechanisms of maize hybrids exposed to multiple stress factors and contribute to the development of integrated breeding and crop protection strategies aimed at enhancing maize resilience and ensuring sustainable production under changing climatic conditions.

Performance and Variability of Some Agronomical Traits of Hulless Winter Barley Genotypes under NARDI Fundulea Growing Conditions

*Liliana Vasilescu¹, Eugen-Iulian Petcu¹, Lidia Cană¹, Alexandrina Sîrbu²,
Lenuța Iuliana Epure³, Andreea D. Ona⁴, Vasile Silviu Vasilescu¹*

¹National Agricultural Research and Development Institute Fundulea

²“Constantin Brâncoveanu” University of Pitești

³University of Agronomic Sciences and Veterinary Medicine of Bucharest

⁴University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca

Keywords: barley two-row genotype, hulless and hulled grain, yield, TKW, protein and starch content.

Abstract: Barley can help regulate or decrease blood glucose levels, thereby lowering the risk of diabetes. According to the European Food Safety Authority, three health claims related to the beta-glucan content in barley have been approved: maintaining normal blood LDL-cholesterol levels (at least 1 g per meal), reducing postprandial glycaemic response (dose >4 g per 30 g of available carbohydrate), and lowering blood cholesterol (daily intake of 3 g).

This paper presents the results of a five-year study examining the performance and variability of certain quantitative and qualitative parameters in a set of 20 hulless winter two-row barley genotypes under different climatic growing conditions. Four agronomical traits of the hulless barley genotypes were considered: yield, grain weight, protein content, and starch content. Analysis of variance revealed a significant impact of year, genotype, and the interaction between year and genotype on these parameters ($p < 0.01$).

Due to their potential, the hulless winter barley two-row lines included in this study could be used to develop new varieties specifically tailored for foods with high nutritional value. The lines studied possess genotypic potential for creating better barley breeding materials intended for nutritious foods such as flakes, pasta, flatbreads, and muffins.

Regenerative Agriculture: A Unique Opportunity for the Luxury Sector

Laurențiu Ciornei¹, Ioana Claudia Todirică¹, Victor Petcu^{1,2}

¹Center for Study and Research for AgroForestry Biodiversity
“Acad. David Davidescu”, Bucharest

²National Agricultural Research and Development Institute Fundulea

Keywords: regenerative agriculture, luxury industry, biodiversity, soil health.

Abstract: Regenerative agriculture includes a set of practices aimed at restoring soil health, enhancing biodiversity, and sequestering carbon. This approach goes beyond traditional sustainability efforts, which typically focus only on minimizing negative impacts. The luxury sector, known for its high profit margins, reliance on quality agricultural raw materials, and significant influence on consumer preferences, is uniquely positioned to promote the adoption of regenerative agriculture.

Drawing on Capgemini’s report *Regenerative Agriculture: A Unique Opportunity for the Luxury Industry (2025)*, together with recent peer-reviewed studies and sector literature on regenerative agriculture and luxury supply chains, this article investigates pathways by which luxury brands can actively support the transformation of agricultural systems. It evaluates the ecological, social and economic benefits associated with a shift toward regenerative practices, outlines the practical and structural constraints that may limit adoption across luxury value chains, and identifies evidence gaps and priority areas for future research and industry action.

The Impact of Different Soil Tillage Systems on the Physical Characteristics of Soils in the Context of Current Climate Change

Amelia Victoria Anghel, Lavinia Burtan, Monica Dumitrașcu, Irina Calciu

National Research and Development Institute for Soil Science,
Agrochemistry and Environment - ICPA Bucharest

Keywords: bulk density, total porosity, water permeability, penetration resistance, climate change.

Abstract: The purpose of this work was to experiment with different technologies of soil tillage in areas subject to aridity phenomena in Tulcea (Nalbant) and Constanța (Cogealac and Râmnicu de Jos) counties. The comparative analysis of the two technologies applied in the experimental fields was carried out, with sampling in spring 2024 and 2025, in order to observe how the conservative technologies influence the physical characteristics of the soils within the studied administrative territorial units. Soil samples were collected at depths of 5-10, 25-30 and 45-50 cm, and their physical properties were determined in the laboratory according to standardized methodology.

In the classical tillage field (2024) at U.A.T. Cogealac, the bulk density values were higher, at the second depth 25-30 cm, (1.31 g/cm^3), indicating a more pronounced compaction (specific to intensive mechanical works), compared to the minimum soil tillage technology, where the soil has a higher density. In contrast, the minimum tillage (no-till) technology produced a soil with lower density, which may limit both water infiltration and root growth under water stress conditions. In the field with conservative works, at U.A.T. Nalbant, at the spring 2024 sampling, the results indicate that the soil is loose, however by spring 2025 sharp compaction was observed. In the classical version, the situation is more balanced, but compaction occurs at a depth of 25-30 cm. High water permeability values indicate rapid infiltration, favorable for avoiding puddles, but can lead to loss of water and nutrients by leaching.

Total PTwi porosity (% v/v), in the two experimental fields ranged from 43.7 (% v/v) to 58.9 (% v/v), indicating medium to very high values. We can say that there are no significant differences between the two soil tillage technologies.

At the territorial administrative unit Râmnicu de Jos, the application of the two technologies of soil tillage (classic/no-till), the soil presents a favorable structure for the growth and development of plant roots. The penetration resistance RP (Kg/cm^2), in no-till, shows us that in the spring of 2025, the soil presents a large surface compaction (partial limitation of root development), while classical tillage showed more balanced resistance values.

The rate of water infiltration in no-till increases with depth. In classical technology and then the situation changes: if at the first sampling (2024) there are good values of permeability for water, at the second sampling (2025), the values decrease almost by half (but still with a good permeability for water).

Regarding total PTwi porosity (% v/v), all values for both technologies applied, were good (>48%), indicating a generally good capacity of the soil to retain water.

In the technology with no-till tillage, the total porosity values have a decreasing tendency on the first two depths, compared to the technology with classical works where the trend is similar to the conservative one but with higher values (the soil is loose).

**Evolution of Soil Chemical Characteristics
under the Impact of Various Agricultural Technologies
and Economic Scenarios in Southern Romania**

*Lavinia Burtan¹, Monica Dumitraşcu¹, Amelia Victoria Anghel¹,
Marius Bogdan Petre⁴, Victor Petcu^{2,3}, Laurențiu Ciornei³*

¹National Research and Development Institute for Soil Science,
Agrochemistry and Environment - ICPA Bucharest

²Centre of Study and Research for Agroforestry Biodiversity
“Acad. David Davidescu”, Bucharest

³National Agricultural Research and Development Institute Fundulea

⁴University Economic Studies of Bucharest

Keywords: agricultural technologies, minimum tillage, no-tillage, chemical properties.

Abstract: Two soil tillage systems were tested, the conventional system (classical) and the conservative system (minimal tillage), in the following locations: Mavrodin, Teleorman County; Sohatu, Călărași County and Afumați, Dolj County.

The soil classes identified in the studied areas are Chernisoles, with the types cambic Chernozem and typical Faeozom and Luvisoles with the type reddish Preluvosoil (WRB-SR 2014).

Soil samples were collected at depths of 5-10; 25-30 and 45-50 cm depths and their physical and chemical properties were determined in the laboratory according to standardized methodology.

At U.A.T. Afumați, the minimum tillage system offers clear advantages over the classical one, by maintaining an optimal pH (weakly acid-neutral), a more stable humus content and a more balanced distribution of nutrients (nitrogen, phosphorus and potassium). In contrast, classical tillage favors the alkalization of the soil, the loss of organic matter in depth and a reduced mobility of nutrients. Conservative technology contributes to the preservation of soil fertility and ensures long-term sustainable agriculture. Comparing the two systems of soil tillage in the Mavrodin area, the minimum tillage technology is distinguished by a more stable pH, a better accumulation of organic matter on the surface, as well as an increased concentration of nitrogen and potassium in the upper layers, favorable aspects for soil fertility. In contrast, classical tillage leads to deep soil acidification, a more uniform but weaker distribution of humus and nutrients, and potential leaching losses. Overall, the conservative system better supports long-term soil health and balance. The no-till (conservative) technology applied at Sohatu, favors a gradual improvement of the soil reaction (pH), especially in the deep layers, as well as a better accumulation of organic matter at the surface. Although the total nitrogen content is lower than the classical system, its distribution is more stable over depths. Mobile phosphorus is more concentrated in the superficial layer, and mobile potassium shows high values in 2024, with a slight decrease in 2025. The classical system maintains higher values of nitrogen and phosphorus in 2024, but this decrease significantly in 2025,

indicating a potential long-term in of balance. Overall, the conservative system provides a better nutrient balance and improved soil sustainability.

Weed Infestation Patterns and Problem Species in Sunflower Crops: A Case Study from NARDI Fundulea

Mihaela Cergan, Gheorghe Măturaru, Elena Partal, Florin Gabriel Anton

National Agricultural Research and Development Institute Fundulea

Keywords: sunflower, weed density, degree of infestation, weed species, yields.

Abstract: In Romania, sunflowers crop belonging to the order Compositales (Asterales), family Compositae (Asteraceae), are heavily level of infestation with annual and perennial weed species. This high weed diversity intensifies competition for the development of the crop plant, negatively affecting plant growth, grain yield, and overall crop quality when appropriate control measures are not applied.

Given the distinct biological characteristics of these weeds compared to the crop plant, their behavior under the climatic conditions of Fundulea requires detailed study.

In the experimental field at NARDI Fundulea, the sunflower crop showed a high degree of infestation (65-85%) with characteristic species, depending on the location area, the applied technological links and the preceding crop. The cause of the appearance of different weed species is correlated with climatic factors, with the seed reserve in the soil and the limited competitive ability of sunflower plants.

The research focused on determining the weeds, identifying and predominance of the existing weed species in the untreated variants located on the cambic chernozem soil type (3.2% OM; 37 clay, Ph 6.5) of the experimental field.

The main objective of the work was to study the weed species and identify the “problem weeds” (*Setaria viridis*, *Echinochloa crus - galli*, *Sorghum halepense*, *Xanthium strumarium*, *Ambrosia sp.*, *Cirsium arvense*) that cause significant annual production losses and increased management costs. The presence of annual and perennial weeds in sunflower crops throughout the vegetation period is a reality that causes various quantitative (by reducing the level of production) and qualitative (by decreasing the quality of crops) problems.

Research on the Flight Dynamics of *Helicoverpa armigera* Hübner in Maize Crops from the Transylvanian Plateau

Adina Tărău¹, Camelia Urdă¹, Ana-Maria Vălean¹, Felicia Mureșanu²,
Laura Șopterean¹, Loredana Suciu¹, Florin Russu¹, Felicia Chețan¹

¹Agricultural Research and Development Station Turda

²Academy of Agricultural and Forestry Sciences

“Gheorghe Ionescu-Șișești”, Bucharest

Keywords: maize, *Helicoverpa armigera* Hübner, pest monitoring, abundance, polynomial regression.

Abstract: *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae) is one of the most important pests of maize crops, with a wide geographical distribution and a high capacity to adapt to different climatic conditions. Through the activity of its larvae, the species causes direct damage to the female and male inflorescences, and indirectly promotes fungal infections, leading to significant economic losses. Under the pedoclimatic conditions specific to the Transylvania Plateau from Romania (approximately 45°15'-47°00' N latitude and 22°00'-25°30' E longitude), information regarding the population dynamics of *Helicoverpa armigera* is limited, indicating the need for local studies to support the integrated pest management strategies.

Monitoring adult flight represents an essential step, as it provides the basic information needed to make accurate decisions regarding the timing and type of interventions, thereby preventing yield losses and reducing control costs. One of the most effective methods is the use of pheromone traps. In this regard, a study was carried out at the Agricultural Research and Development Station (ARDS) Turda during the period 2022-2024, using FUNNEL-type pheromone traps installed in maize crops. The experimental data regarding the abundance and flight dynamics were statistically analyzed using polynomial regression, based on the main climatic variables: minimum temperature, maximum temperature, relative air humidity, and minimum air humidity.

The results of the study revealed a significant influence of climatic conditions on the flight dynamics of *Helicoverpa armigera* adults, with higher abundance recorded in years characterized by high temperatures and dry periods. Minimum temperatures between 13-15°C and maximum temperatures between 23-28°C favored the flight dynamics, whereas extreme temperature and high relative humidity had a negative effect on the catches. These results highlight the importance of climatic conditions in population dynamics, and based on the four analyzed climatic parameters. Based on the four analysed climatic parameters warning bulletins can be developed to support the adoption of the most appropriate management decisions.

Effect of Increasing Nitrogen and Phosphorus Fertilization Rates on the Micro- and Macronutrient Contents in Wheat Grain Grown on Acid Soil

*Veronica Tănase¹, Nicoleta Vrînceanu¹, Mihaela Preda¹,
Mihaela Costea¹, Patrick Ursan²*

¹National Research and Development Institute for Soil Science,
Agrochemistry and Environment - ICPA Bucharest

²Agricultural Research and Development Station Livada

Keywords: wheat, nitrogen, phosphorus, micronutrients, macronutrients.

Abstract: Soil acidity is one of the main factors limiting wheat yield and grain quality, as it significantly impacts nutrient solubility, availability, root development, and nutrient uptake by plants. Understanding how fertilization practices interact with soil acidity is essential for sustainable crop production. This study aimed to investigate the influence of increasing nitrogen (N) and phosphorus (P) fertilization rates on the micro- and macronutrient contents of wheat grain grown on an acidic soil. The experiment was conducted under field conditions using a bifactorial design with five levels of nitrogen (0, 40, 80, 120, 160 kg/ha) and five levels of phosphorus (0, 40, 80, 120, 160 kg/ha). After harvest, the grain samples were processed and analyzed for their macronutrient (N, P, K, Ca, Mg) and micronutrient (Fe, Mn, Zn, Cu) contents. The results revealed that increasing N and P fertilization rates significantly influenced the mineral composition of wheat grain. Higher nitrogen rates (120 and 160 kg/ha) increased grain nitrogen content and enhanced zinc and manganese concentrations, indicating an overall improvement in nutritional quality. An increase in phosphorus supply commonly results in a corresponding decline in copper uptake, reflecting an antagonistic interplay between these elements. Phosphorus fertilization favored the accumulation of P and Mg in the grains, with higher phosphorus application rates leading to statistically significant increases compared to the control. These findings highlight the importance of balanced nitrogen and phosphorus fertilization in optimizing both yield and nutrient composition of wheat grain under acidic soil conditions. Proper nutrient management contributes not only to maintaining long-term soil fertility but also to enhancing the nutritional value and quality of wheat as a staple food crop.

Transcriptional Profile of Sod Genes in Sunflower under Broomrape Stress

Maria Duca, Angela Port, Steliana Clapco, Ana Mutu

Center of Functional Genetics, Moldova State University, Chişinău

Keywords: sunflower, broomrape, *Orobanche cumana*, pre-attachment, superoxide dismutases, genes.

Abstract: Sunflower broomrape (*Orobanche cumana* Wallr.) is an obligate, chlorophyll-lacking root parasite and one of the most destructive pathogens of sunflower in Eastern Europe and the Mediterranean region, including the Republic of Moldova. The continuous emergence of new, more virulent races following the cultivation of monogenic resistant varieties (*Or1-Or7*) has shifted research focus toward understanding non-specific, quantitative polygenic resistance mechanisms.

Reactive oxygen species (ROS) are inevitable byproducts of cellular metabolism that function both as signaling molecules and as mediators of oxidative damage during plant stress responses. Superoxide dismutases (SODs) represent the first enzymatic defense against ROS, catalyzing the dismutation of superoxide radicals into hydrogen peroxide and molecular oxygen. Despite their essential role, the transcriptional regulation of SOD genes during the early stages of broomrape infection remains largely unexplored.

This study aimed to investigate the expression dynamics of SOD-encoding genes in the roots of three sunflower F₁ hybrids - Favorit and P64LE20 (resistant) and Performer (susceptible) - during the pre-attachment phase of *O. cumana* infection. Plants were exposed to germinated broomrape seeds and sampled at 2, 6, 12, and 24 h post-inoculation. Gene expression levels were analyzed using quantitative real-time PCR.

Comparative analysis of SOD gene expression revealed distinct patterns between resistant and susceptible sunflower hybrids. In the absence of biotic stress, transcriptional activity followed the pattern Cu/Zn-SOD II > Cu/Zn-SOD I > Mn-SOD II > Mn-SOD I, with more pronounced variations in the susceptible Performer. Upon infection, the resistant Favorit showed rapid, oscillating up- and down-regulation of Mn-SOD I, Mn-SOD II, and Cu/Zn-SOD II during the first 12 hours, stabilizing by 24 hours, reflecting fine-tuned early redox control. P64LE25 exhibited a gradual and sustained activation, particularly of Mn-SOD I and Cu/Zn-SOD II, indicative of a delayed but stable oxidative homeostasis. In contrast, the susceptible Performer displayed moderate early activation followed by strong repression of Cu/Zn-SOD isoforms, culminating in a marked reduction of Cu/Zn-SOD II at 24 h, signaling transcriptional loss of control and oxidative overload.

The results provide a molecular basis for the use of SOD genes as early markers of resistance to *Orobanche cumana* infestation. Differential expression profiles can be integrated into marker-assisted breeding programs, facilitating the early identification of tolerant genotypes and accelerating the development of resistant sunflower cultivars.

Acknowledgments: This study was supported by the subprogramme 011101 Genetic and biotechnological approaches to the management of agroecosystems in the conditions of climate change, funded by the Ministry of Education and Research.

Climatic Drivers of Cereal Productivity in Romania (1997-2024): a Macro-Level Analysis Integrating Era5 Precipitation Data and National Crop Statistics

Mihaela Pila, Silviu Stanciu

”Dunărea de Jos” University of Galați

Keywords: precipitation, cereal yields, ERA5, climate variability, Romania.

Abstract: A thorough understanding of how climate variability influences crop productivity is essential for the development of sustainable agricultural technologies and the refinement of crop management practices. This study investigates the impact of precipitation patterns on the productivity of Romania’s major cereal crops - wheat (*Triticum aestivum L.*), maize (*Zea mays L.*) and barley (*Hordeum vulgare L.*) - over a 28-year period (1997-2024). The analysis integrates ERA5 reanalysis precipitation data with national statistics on sown area, total output and yield levels. Monthly precipitation values from ERA5 were aggregated to compute annual totals and were further organized into crop-specific seasonal windows: April-June for wheat, June-August for maize and March-May for barley. Results indicate that rainfall remains a key determinant of interannual yield variability, particularly for crops harvested in summer. Maize shows the strongest climatic sensitivity, with a moderate positive correlation between production and June-August rainfall ($r \approx 0.36$), which highlights the crop’s vulnerability to summer drought during pollination and grain-filling. Wheat exhibits moderate correlations between both production and yield and April-June precipitation ($r \approx 0.27-0.29$), confirming the relevance of spring moisture during stem elongation and kernel development. Barley presents weaker correlations ($r \approx 0.13-0.20$), consistent with its earlier phenology and comparatively higher tolerance to early-season moisture fluctuations.

At the national scale, the association between annual precipitation and total cereal output is weak ($r \approx 0.13$), largely due to compensatory effects among crops with different seasonal requirements and the influence of technological progress in breeding, crop management and input efficiency. Nevertheless, seasonal rainfall indicators provide valuable insights into the climatic constraints affecting each crop and underline the need for adaptive strategies, including drought-tolerant germplasm, optimized sowing schedules and precision water management.

Overall, the study offers a macro-level diagnostic framework for assessing how climate drivers of cereal productivity in Romania and supports the development of resilient agricultural technologies under increasing climatic variability.

Early Detection and Quantification of *Tilletia* spp. Infections in Wheat

Oana-Alina Boiu-Sicuiu^{1,2}, Constantin-Alexandru Aldea¹,
Camelia Diguță¹, Indira Galit³, Matilda Ciucă³

¹University of Agronomic Sciences and Veterinary Medicine of Bucharest,
Faculty of Biotechnologies

²Research-Development Institute for Plant Protection, Bucharest

³National Agricultural Research and Development Institute Fundulea

Keywords: wheat, *Tilletia* spp., common bunt, PCR, Real-Time PCR, early detection.

Abstract: Wheat bunt is caused by various *Tilletia* spp. infections. The pathogens are non-cultivable. This particularity restricts their study to *in vivo* experiments, which must be conducted on cereal plants. Since the symptoms defining the infection emerge only in the advanced stages of crop development, near the harvest time, evaluating disease management efficacy becomes difficult, significantly delaying the identification of effective control measurements. Developing and validating rapid molecular methods, focused on early detection of *Tilletia* spp. infections in young wheat plants, would considerably reduce the time required to evaluate the efficacy of preventive strategies.

The aim of this study was to develop and validate a laboratory testing system for early identification and quantification of *Tilletia* spp. in young wheat plants. A bunt-susceptible wheat variety, Capo, was used for experimental inoculation with *Tilletia* spp. spores and grown under two controlled laboratory cultivation systems. After seven weeks, surface disinfected young plants were subjected to fungal DNA extraction. The samples were quantified and used in conventional PCR reactions with genus-specific primers for *Tilletia* spp., as well as species-specific primers targeting *T. caries* and *T. laevis*. Real-Time PCR was also applied for early detection and quantification of *T. caries* bunt infections in wheat.

Among the two tested laboratory cultivation methods, only one enabled a successful bunt infection of wheat. To achieve this, the cultures were incubated for 4 weeks at 6°C, followed by 3 weeks of growth under diurnal conditions, at 20°C during daylight and 15°C at night, favoring the infection, in laboratory conditions. Molecular biology analysis confirmed the infection. Using the genus-specific primers for *Tilletia* spp., an expected 361 bp amplification product was obtained, whereas with the species-specific primers, an expected 276 bp product was obtained for *T. caries* and a 660 bp product for *T. laevis*. Thus, conventional PCR was validated for early detection of wheat bunt, at BBCH 12 growth stage. The protocol was further validated for *T. caries* using Real-Time PCR with SYBR Green, for semi-quantitative detection.

The study concludes that wheat bunt infections are temperature dependent. A successful experimental bunt contamination, under laboratory conditions, involves culture exposure at 6°C for one month, prior to diurnal plant growth at 20°C/15°C (day/night). Using specific molecular markers for targeting the pathogen, allowed early detection of infected plants, using either conventional or semi-quantitative

PCR techniques. The proposed testing and analysis protocol significantly reduces the time required to validate plant protection strategies.

Acknowledgement: This research is conducted under the frame of the Romanian sectorial project ADER 3.1.1./2023 “Research on the use of molecular markers for the creation and promotion of wheat varieties with genetic resistance to cryptogamic diseases” financed by Ministry of Agriculture and Rural Development.

Moldova's Food Chain Problems: Waste and Losses after Harvest

Laureana Odajiu, Nicolae Mocanu, Silviu Stanciu

”Dunărea de Jos” University of Galați

Keywords: food waste, post-harvest losses, Republic of Moldova, food security, agri-food supply chain.

Abstract: This study analyzes food waste in the Republic of Moldova, focusing particularly on losses that occur on farms after crop harvest. The post-harvest stages are a critical point where a significant amount of food is lost. In 2022, a severe drought caused the loss of approximately 95,000 tons of field crops after harvest, including cereals (wheat, corn) and oilseeds (sunflower, soybeans), representing about 5% of total production. For fruits and vegetables, farms lacking proper sorting and storage facilities can lose 10-15% of their harvest, while modern cold storage could reduce these losses to 3-5%.

Agriculture is of major importance to Moldova’s economy, contributing over 18% of GDP (including the food industry) and accounting for approximately 45% of the country’s exports. The main causes of post-harvest losses are climate challenges, inadequate storage infrastructure, and strict export market requirements.

The study concludes that reducing food waste and strengthening Moldova’s agri-food sector requires technological modernization, digitalization, and alignment with international standards.

Long-Term Effects of Crop Rotation and Fertilization on Chemical and Biochemical Soil Properties

Horia Domnariu¹, Elena Partal², Anca-Rovena Lăcătușu¹

¹National Research and Development Institute for Soil Science,
Agrochemistry and Environment - ICPA Bucharest

²National Agricultural Research and Development Institute Fundulea

Keywords: crop rotation, fertilization, chernozem, soil carbon, nitrogen, CLPP, microorganisms.

Abstract: Long-term effects of crop rotation and fertilization were investigated in a bivariate experiment established in 1967 on a Cambic Chernozem soil. Samples were collected in May 2025 from experimental plots in the maize phase. In addition to basic soil chemical properties, community-level physiological profiles (CLPP) of soil microbial communities were assessed using inoculation and incubation of EcoPlates (Biolog™). While mineral and organic moderate fertilization had no significant effects, more diverse crop rotations (three- and four- crop systems) led to increases in soil organic carbon and total nitrogen compared to two-crop and monocrop rotations. Effects on physiological profiles were less pronounced with no significant changes in metabolic richness, Shannon or Evenness indices. However, some differences were observed in the utilization of specific substrate or substrate category. Thus, fertilization with farmyard manure increased the capacity of putrescine degradation, while the usage of carbohydrates group tended to be higher in the case of simple rotations.

The Biodiversity of Sheep Breeds in Romania and Bioeconomic Impact on Agriculture

Lavinia Udrea¹, Amalia-Gianina Străteanu², Elena Partal³

¹Valahia University of Târgoviște

²Center for Study and Research for AgroForestry Biodiversity
“Acad. David Davidescu”, Bucharest

³National Agricultural Research and Development Institute Fundulea

Keywords: sheep, biodiversity, breed, bioeconomy.

Abstract: Sheep breeding still makes an essential contribution today, by supporting thousands of producers, by providing livestock products necessary for human consumption (milk, cheese, meat), as well as derived products, thus having an essential socio-economic contribution in rural areas. This paper analyses the components of sheep biodiversity in Romania, the role of local breeds, the economic and ecological impact, and also offers recommendations for valorisation and conservation. Currently, sheep breeding and exploitation is experiencing an upward development due to biological and economic particularities, which is why this species has spread throughout the globe. Sheep, due to their number, superior productive potential and relatively low investment, maintenance and marketing costs of products, represent an economic opportunity.

The biodiversity of sheep breeds in Romania constitutes a strategic resource for sustainable rural development. Sheep farming plays a key role for the environment, including the maintenance of less fertile areas and the conservation of the landscape and sensitive ecosystems. Also, given their feeding behaviour, in which grazing plays an important role, they maintain flora biodiversity, protect wildlife and clean natural spaces by removing dry organic matter. Native breeds contribute to the resilience of farms, the maintenance of natural pastures and the agro-cultural identity of the country, as well as to the protection of the national zootechnical genetic heritage by organizing and supporting farms with elite animals.

The integration of bioeconomy principles - resource reuse, product diversification, digitalization and genetic conservation - offers high potential for increasing the competitiveness of the sector.

The Smart Tractor as a Driver of Financial Performance in Modern Agriculture

*Cristina Gabriela Vasciuc (Săndulescu)¹, Lavinia Udrea¹,
Dumitru Săndulescu², Partal Elena³*

¹Valahia University of Târgoviște

²Technological College Viaceslav Harnaj, Bucharest

³National Agricultural Research and Development Institute Fundulea

Keywords: tractor, digital technologies, innovation.

Abstract: The greater complexity of production systems that characterize the agroecological transition requires the use of multiple skills, with training needs for advisors that are not always met. The aim is to support risk-taking, especially for the most mature companies, and risk-sharing between investors and innovative actors.

Leading consortia bring together public and private stakeholders, innovative companies and actors in the agricultural sector. Some benefit from public funding for their coordination. Access to experimentation for innovative companies to test innovations in real conditions is insufficient, with an overcrowded and poorly coordinated infrastructure.

Farmers have already adopted technologies such as the internet, geographic information systems, wireless sensor networks, radio frequency identification, Bluetooth, near field communication, long-term evolution, robotics, automation, programming and recently introduced smart technologies. Farmers who invest in digital technologies seem to improve the economic, environmental and social performance of their farms. In this study, we analyzed digital technologies in agriculture in developed countries. This type of innovation is now generally found more in the agri-food industry sector. Then, the second type of innovation concerns organization. In the agricultural sector, innovation in the organization of the sector was gradually created with the development of upstream and downstream sectors, structuring a division of tasks within the sector. Finally, the third and last type of innovation is that of processes.

This study was conducted to design, calibrate, integrate and validate a compact general-purpose system for the precise measurement of tractor performance parameters by using a new interface technology, HMI.

Assessment of Winter Barley Genotypes for Yield Performance and Quality Traits across Eight Experimental Sites during 2024-2025 Year

Eugen-Iulian Petcu¹, Liliana Vasilescu¹, Vasile Silviu Vasilescu¹, Ioana Crişan², Benjamin-Emanuel Andraş³, Simona Isticioaia⁴, Monica-Claudia Tanc⁵, Cristina Melucă⁶, Ramona-Aida Păunescu⁷, Emanuela Lungu⁸

¹National Agricultural Research and Development Institute Fundulea

²Agricultural Research and Development Station Turda

³Agricultural Research and Development Station Livada

⁴Agricultural Research and Development Station Secuieni

⁵Agricultural Research and Development Station Valu lui Traian

⁶Agricultural Research and Development Station Teleorman

⁷Agricultural Research and Development Station Caracal

⁸Agricultural Research and Development Station Brăila

Keywords: six-row and two-row barley genotypes, environment and genotype interaction, yield stability, quality traits, climate adaptation, multi-location trials.

Abstract: Romania's barley cultivation encompasses 516220 hectares (Eurostat, 2025) producing 1.5-2.0 million tonnes annually and establishing the country as a significant European barley producer. This study evaluated the performance of 27 winter barley (*Hordeum vulgare* L.) genotypes across eight locations in Romania to assess yield stability and quality traits. The total rainfall across the experimental locations during the 2024-2025 barley growing season (October-June) varied from 258 mm (Turda) to 454 mm (Teleorman), representing 196 mm difference between the driest and wettest experimental site.

Grain yield ranged from 3325 kg/ha (Ileana at Turda) to 12252 kg/ha (Cadril at Caracal) with an overall average of 7445 kg/ha, highlighting significant genotype and environment interactions. Thousand kernel weight (g) (TKW) varied from 29.6 (Agil at Fundulea) to 66.2 g (Check at Secuieni), protein content from 9.10% (Check at Valul lui Traian) to 20.4% (Ileana at Livada), and starch content from 56.8% (Ileana at Livada) to 65.2% (Gabriela at Valu lui Traian), indicating significant variation in barley quality parameters.

Six-row genotypes achieved superior average grain yield (7530 kg/ha) compared to two-row genotypes (7339 kg/ha) with a small difference of 191 kg/ha. However, two-row barley genotypes highlighted higher thousand-grain weight (TGW), 50.6 g compared with 44.1 g. Plant height (cm) ranged from 64 cm to 140 cm with a negative correlation to yield performance ($r = -0.367$), suggesting lodging susceptibility in taller genotypes. The highest yield values (as locations average) were obtained by genotypes included F8-38-24 (9050 kg/ha, two-row genotype) and Cadril (8885 kg/ha, six-row genotype). Experimental sites significantly influenced yield potential, with southern regions (Caracal, Teleorman, Fundulea, Brăila) achieving superior yields (with a mean of 8602 kg/ha across 4 locations) compared to central and northern locations (Turda and Livada - 5590 kg/ha). This findings facilitate precision genotype deployment that enhances barley performance for

targeted industrial end-use while securing yield stability under Romania's variable environmental conditions.

**Biodiversity within the Species [*Mentha piperita* L.
and *Mentha spicata* var. *crispa* (Schrod.) Briq.] at NARDI Fundulea**

Niculina Ionescu

National Agricultural Research and Development Institute Fundulea

Keywords: variety, peppermint, volatile oil, menthol, crisp mint, herb production, carvone.

Abstract: Peppermint occupies an important place among medicinal and aromatic plants due to its aerial organs, which contain volatile oil rich in menthol. Menthol provides peppermint tea with a specific aroma and a pleasant, refreshing taste, giving it and the volatile oil valuable therapeutic properties.

Peppermint tea, used as a food and medicinal product, has a calming, stomachic, anticolic, antiasthmatic, antiseptic, cholagogue, choleric and antidiarrheal action.

The volatile oil, namely menthol, is used in the food industry to flavor liqueurs, candies, chewing gum and in the chemical-pharmaceutical industry, to prepare some medicines.

Crisp mint (*Mentha spicata* var. *crispa*), a species with volatile oil rich in carvone, is cultivated for the aerial organs of the plant, used in the form of tea or for the extraction of the volatile oil.

Tea, used for food or medicinal purposes, has a carminative, intestinal spasmolytic, cholagogue, choleric, stomachic and antiparasitic effect.

Within the peppermint species, the following varieties were tested: Columna (1972), Cordial (1989), Cristal (2000) and Coral (2009) and within the species crisp mint, two varieties were studied: Mencris (1975) and Record (1992).

The volatile oil is used in perfumery and to flavor some toothpastes and chewing gums.

By creating peppermint and crisp mint varieties, significant genetic progress was made both in terms of green herb production, ranging from 65 q/ha in older varieties to 190 q/ha in current varieties, and in terms of its quality due to the volatile oil content ranging from 2.7 to 10.9%.

The average production of dried leaves and inflorescences is between 8 q/ha in older varieties and 32 q/ha in more current varieties.

The menthol content of peppermint varieties was improved from 46% to 66.6%, while the carvone content was adjusted from 50.4% to 55.6%.

Research on the Occurrence and Development of Pathogen and Pest Attacks in Wheat Crops under Different Technological Conditions

Mirela Paraschivu¹, Elena Parial², Călin Sălceanu¹

¹University of Craiova, Faculty of Agronomy

²National Agricultural Research and Development Institute Fundulea

Keywords: wheat, pathogens, tillage, fertilization, *Blumeria graminis*, *Zymoseptoria tritici*.

Abstract: In the 2024 growing season, climatic conditions in southern Romania were characterized by pronounced thermal deviations from the multiannual average, except in September (-1.6°C). Positive temperature anomalies ranged from +0.6°C in May to +8.6°C in February, combined with a severe soil moisture deficit and low relative air humidity, reaching 51% in August. These factors affected the development cycles of wheat pathogens and pests. The main pathogens recorded in the experimental field were *Blumeria graminis* f. sp. *tritici* (Bgt), causing Powdery Mildew, and *Zymoseptoria tritici*, causing Septoria Leaf Blotch, both detected as early as February 2024. Compared with the control (no-tillage, N₉₀P₇₅), significantly lower disease incidence of *B. graminis* f. sp. *tritici* was observed in plowed, unfertilized plots (GA = 2.4%) and in disked, unfertilized variants (GA = 3.55%), due to partial burial of infected residues. For *Z. tritici*, the lowest infection level (GA = 0.9%) occurred in plowed, unfertilized plots, while no-till conditions favored pathogen persistence. Pest incidence was low, with *Eurygaster integriceps* and aphid species (*Schizaphis graminum*, *Macrosiphum avenae*, *Rhopalosiphum maidis*) showing attack degrees between 0.48% and 2.16%. Soil tillage had little effect on pest pressure, indicating minor sensitivity of insect populations to cultivation systems.

**Studies on the Adaptation and Establishment of *Bromus inermis* (Leyss.)
and *Onobrychis viciifolia* (Scop.) on Sandy Soils
on the Left Side of the Jiu River**

Călin Sălceanu¹, Mirela Paraschivu¹, Elena Partal²

¹University of Craiova, Faculty of Agronomy

²National Agricultural Research and Development Institute Fundulea

Keywords: *Bromus inermis*, *Onobrychis viciifolia*, sandy soils, soil stabilization, vegetation cover, arid conditions, sustainable land management.

Abstract: In Romania, sandy soils cover approximately 650,000 hectares, accounting for over 3% of the country's total area. Among the regions characterized by the presence of such soils, the Oltenia Plain holds the largest share, encompassing about 168,000 hectares. The species *Bromus inermis* (Leyss.) and *Onobrychis viciifolia* (Scop.) display a high degree of adaptation to arid climatic conditions and show good tolerance to nutrient-poor soils, being successfully cultivated on eroded lands within the forest-steppe zone. The expansion of vegetation cover on sandy soils and the creation of stable plant communities can be achieved with these species, owing to their ability to stabilize and protect the soil against wind erosion. Research conducted during the 2024-2025 agricultural year at the Experimental Teaching Station - Tamburești Experimental Center of the University of Craiova aimed to identify the most efficient technological approach for stabilizing sandy soils using *Bromus inermis* Leyss., *Onobrychis viciifolia* Scop., and their mixtures. The results demonstrated that both species, whether grown in pure stands or mixtures, can be successfully established on sandy soils. However, maintaining them over the long term proves challenging and requires appropriate management practices and adaptation to the specific pedoclimatic conditions.

Determination of the Content of Bioactive Compounds and Antioxidant Activity in a Synthetic Blue-Grained Wheat Amphiploid

Leonard-Alexandru Dumitru¹, Daniel Cristina¹, Alina-Gabriela Turcu¹,
Elena-Laura Conțescu¹, Aglaia Popa², Matilda Ciucă¹

¹National Agricultural Research and Development Institute Fundulea

²University of Agronomic Sciences and Veterinary Medicine of Bucharest

Keywords: synthetic amphiploids, anthocyanins, blue aleurone, colored wheat.

Abstract: Wheat is an important crop, providing more than 20% of the total calories in the human diet, and is considered a source of carbohydrates, proteins, minerals, vitamins and fiber. The biochemical composition of wheat can be improved by exploiting wild species and by introgression of genes involved in anthocyanin synthesis at the level of caryopses. Due to their antioxidant activity, anthocyanins are compounds of interest, contributing to the prevention of diseases associated with oxidative stress.

The synthetic amphiploid E-31 A developed at NARDI Fundulea by crossing durum wheat variety Condur with *Triticum monococcum subsp. boeoticum* is characterized by blue grains, a trait determined by the distribution of anthocyanins in the aleurone layer.

This study aimed to evaluate the antioxidant activity and determine the content of bioactive compounds (polyphenols, flavonoids and anthocyanins) in blue wheat grains, compared with two modern wheat cultivars - Pitar and Columna.

The results indicated that the synthetic amphiploid had a higher total content of phenolic compounds and flavonoids in the grains than the control cultivars, Pitar and Columna. Furthermore, the blue wheat grains showed a higher total anthocyanin content (0.194 mg Cyd-3-glu/g DW) than Pitar (0.034) and Columna (0.036). Antioxidant activity, measured as DPPH IC₅₀ (mg/mL), was greatest in the blue aleurone genotype (14.011), followed by Columna (22.473) and Pitar (26.783).

In conclusion, the synthetic amphiploid E-31 A exhibits significantly higher levels of bioactive compounds, highlighting the potential of blue wheat as a functional food. These studies provide a strong basis for the pre-breeding program aimed at developing wheat lines with increased bioactive compound content and enhanced health benefits.

Acknowledgments: This work was funded by the MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT - Romania (projects ADER321/2019-2022 and ADER311/2023-2026).

Influence of Maturity Group and Climatic Conditions on Protein Content in Soybean Varieties

Raluca Rezi¹, Adrian Negrea¹, Camelia Urdă¹, Edward Muntean^{1,2}

¹Agricultural Research and Development Station Turda

²University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca

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

Abstract: Soybean protein, being qualitatively very similar to animal-derived protein, plays an essential role both in human nutrition and in animal feeding. Increasing protein content is a priority objective in soybean breeding. The objective of this study is to evaluate the variation in soybean seed protein content depending on maturity group, hilum color, pubescence color, and climatic conditions during the seed-filling period. The biological material consisted of 22 soybean varieties developed at ARDS Turda, from three maturity groups. The results revealed significant differences among varieties and maturity groups regarding protein content. It was observed that early-maturing varieties, in general, have higher protein content, while drought conditions during the seed-filling period led to an increase in protein percentage. Certain morphological traits, such as hilum and pubescence color, are associated with reduced variations in protein content. This study contributes to a better understanding of the genetic variability of soybean varieties developed at ARDS Turda and provides valuable information for future breeding programs aimed at improving genotypes with specific purposes (food industry and animal feed), adapted to the pedoclimatic conditions of the Transylvania region.

Agro-Economic Dynamics of Wheat Production in Prahova County (2003-2023)

*Petruța-Simona Simion (Grosu)^{1,2}, Gabriel Popescu¹, Ioana Claudia Todirică¹,
Victor Petcu^{1,3}, Maria Joița-Păcureanu^{1,3}*

¹Center for Study and Research for AgroForestry Biodiversity
“Acad. David Davidescu”, Bucharest

²University Economic Studies of Bucharest

³National Agricultural Research and Development Institute Fundulea

Keywords: wheat, agricultural productivity, Prahova, statistical analysis, sustainable agriculture.

Abstract: This study analyzes the evolution of wheat production in Prahova County during the period 2003-2023, emphasizing the relationship between agricultural and economic factors. Based on data provided by the National Institute of Statistic, the research examines trends in cultivated area, total production, and yield per hectare. The results highlight the gradual adaptation of local producers to climatic variability, agricultural policies, and cereal market dynamics. Overall, the analysis reveals an increase in productivity driven by technological modernization and the strengthening of the economic sustainability of the cereal sector. The study provides valuable insights for future rural development strategies.

Technological Sequences for Weed Control in Grain Sorghum Crops

Gheorghe Măturaru, Mihaela Cergan, Elena Partal, Marius Bordei

National Agricultural Research and Development Institute Fundulea

Keywords: technological sequences, weed control, herbicide treatments.

Abstract: Sorghum (*Sorghum*) is a genus of plants in the Poaceae family. In Romania, average grain sorghum yields ranged between 1.5-5.6 t/ha, being successfully cultivated in the West and Northwest, in the South and Southeast, in southern Moldova and in some areas of Transylvania. Sorghum has high temperature requirements, with the minimum germination temperature being 10-12 degrees celsius, and temperatures favorable for growth being above 20 degrees celsius. As precursor plants, weeding crops are preferred, which leave the land clean, and after sorghum, it is recommended to establish crops only in the spring of the following year.

In the pedoclimatic conditions specific to the area at NARDI Fundulea, the sorghum crop presents a high infestation (88%), a spectrum of characteristic weeds and a dominance specific to the area. The presence of weeds in the crop is a reality, their predominance being influenced by the crop area, technological links, the preceding plant and local pedoclimatic conditions.

The research focused on technological sequences (classical technology, imazamox-resistant technology and nicosulfuron-resistant technology), crop selectivity and combating weed species by applying herbicide treatments without negative impact on the environment.

Results on the Efficiency of Herbicides in Weed Control in Maize Crop

Mihaela Cergan¹, Gheorghe Măturaru¹, Elena Partal¹, Marius Bordei¹,
Florin Gabriel Anton¹, Sorin Iordache²

¹National Agricultural Research and Development Institute Fundulea

²University Politehnica of Bucharest

Keywords: maize, weed control, herbicide, selectivity.

Abstract: Romania is one of the largest producers of maize (*Zea mays*) in the European Union, a plant that can prove very profitable if certain requirements related to the cultivation and care of the crop are met. It has a production capacity approximately 50% higher than other cereals control. Integrated weed management is a system of integrated measures to maintain the level of weed infestation of crops below the damage threshold. A study was conducted at NARDI Fundulea to evaluate the efficiency of herbicides in controlling both monocotyledonous and dicotyledonous weeds.

In the pedoclimatic conditions specific to the area at NARDI Fundulea, the maize crop presents a high infestation (65-75%), a spectrum of characteristic weeds and a dominance specific to the area. In the maize crop, the characteristic and most representative weed species were: monocotyledons - *Setaria viridis*, *Echinochloa crus-galli*, *Sorghum halepense*; annual and perennial dicotyledons - *Amaranthus retroflexus*, *Solanum nigrum*, *Chenopodium album* and *Cirsium arvenses*. Results showed that selective herbicides effectively controlled the dominant weeds without damaging the maize crop. The research focused on weed identification, crop selectivity, and controlling the weed species present by applying herbicide treatments without negative impact on the environment. Herbicide treatments must be correlated with the degree of weed infestation, the spectrum and dominance of the weeds, the timing of application, the technical potential for effectiveness and the local climatic conditions at Fundulea.

The Impact of APIA Measures on the Sustainability of Agricultural Holdings: Farmers' Perception in Buzău County

Beatrice-Simona Manolache, Constantin Manolache, Silvius Stanciu

”Dunărea de Jos” University of Galați

Keywords: agricultural policies, sustainability, farmers, financial support, rural development.

JEL Classification: Q11, Q02.

Abstract: The paper aims to evaluate how agricultural policies implemented through the Agency for Payments and Intervention in Agriculture (APIA) contribute to strengthening the economic, social, and environmental sustainability of agricultural holdings. The research was based on an online questionnaire applied to 101 active farmers from Buzău County, selected to reflect the structural diversity of farms in the region. The collected data were analysed comparatively in order to identify the main trends and perceptions regarding the effectiveness of support instruments and the difficulties encountered in relation to the financing institution.

The results indicate that direct payments represent the main form of support accessed, perceived as essential for maintaining agricultural activity and ensuring income stability. Financial assistance is regarded as having positive effects on productivity, investment capacity, and the economic resilience of farms. The funds are primarily directed toward expanding cultivated areas, covering operational costs, and modernizing the technical base. At the same time, several major constraints were identified, including procedural complexity, inadequate access to information, and limited advisory support - aspects that may undermine the effectiveness of public interventions. From a social perspective, the support provided helps maintain agricultural activities and reduces the risk of farm abandonment. However, sustainable practices and agri-environmental measures are applied unevenly, influenced by administrative complexity and the low attractiveness of existing incentives.

The conclusions highlight the need to simplify administrative procedures, strengthen the agricultural advisory system, and adapt support schemes to the specific needs of small and medium-sized farms. The results provide empirical evidence to inform regional-level agricultural policies aimed at enhancing efficiency, equity, and sustainability.

Circular Mechanisms, Green Outcomes: An Indicator Framework for Genotype × Environment × Management (G×E×M) in Fruit Crops

Ailin Moloșag, Mihaela Olaru, Alexandra Maria Bardoș Marțiș, Mihaela-Cecilia Dogaru, Maria-Marinela Dragnea, Vlăduț Loređan Holt

Research and Development Station for Fruit Tree Growing Băneasa

Keywords: nutrient circularity, resource efficiency, meta-analysis, cross-crop scalability, decision support.

Abstract: This review advances an indicator framework for assessing Genotype × Environment × Management (G×E×M) interactions in fruit crops under residue valorisation, nutrient and water recirculation, and bio-based inputs, with the aim of delivering sustainability outcomes. Evidence synthesized from contrasting environments and management regimes shows cultivar-dependent responses that influence yield, fruit quality, and resource use efficiencies. Practices are linked to outcomes through a minimal, comparable set of metrics: fertilizer substitution rate, partial nitrogen and phosphorus balances, and indices of nutrient circularity to reflect closing nutrient cycles, together with water-use efficiency, nitrogen-use efficiency, and, where applicable, energy intensity to describe system performance. Statistical guidance emphasizes factorial designs and mixed models with explicit G×E×M terms, complemented by standardized reporting to enable meta-analysis across cultivars, seasons, and sites. The framework is scalable across crop types, including major field crops, vegetables, and industrial species, enabling application beyond fruit systems and supporting optimization of cultivar, input, and environment combinations under climate variability.

Soil Revitalization through Prebiotic Solutions - A Microbiological Approach to Sustainable Fertility in Clay Soils under the Temperate Conditions of Southern Romania

Mihaela-Cecilia Dogaru, Ailin Moloşag, Alexandra Maria Bardoş Marţiş, Cristian-Marian Căliniţă, Nicoleta-Claudia Sandu, Vlăduţ Loredan Holt

Research and Development Station for Fruit Tree Growing Băneasa

Keywords: prebiotic soil, biological fertility, humification, decomposition, carbon farming, sustainability.

Abstract: Soil health and biological fertility are now widely recognized as key determinants of agricultural sustainability. Prebiotic soil solutions represent a new generation of biotechnologies designed to stimulate the native microbial communities, enhancing enzymatic activity and accelerating the natural cycles of mineralization and humification. Unlike microbial inoculants, these formulations do not introduce external microorganisms but provide specific organic substrates that selectively activate the indigenous microbiota, improving nutrient cycling and soil structure across a wide range of crops.

The present study investigates the influence of a prebiotic soil activator (K1) on the decomposition rate of crop residues and on the physical-biological indicators of soil quality. The experiment was carried out at the Moara Domnească Experimental Base (RDSFG Băneasa), comprising three treatments (control, K1 at 100%, and K1 at 200%) using standardized cellulose and cotton strips as decomposition indicators. Alongside biological degradation rates, the study also assessed soil compaction and drainage as correlated parameters of microbial activity.

The central hypothesis assumes that the intensity of decomposition processes is proportional to the applied concentration of K1, and that enhanced microbial activity will correspond to improved soil porosity and a higher degree of organic matter stabilization.

Expected results indicate that K1 application accelerates the biochemical transformation of organic matter, promotes the formation of stable clay-humus complexes, and maintains an optimal humus level, thus enhancing soil fertility. Due to its mode of action (stimulating endogenous microbial populations rather than targeting specific plant species) this technology is applicable to any crop system, contributing to sustainable nutrient management, carbon sequestration, and overall soil resilience.

This research supports the integration of prebiotic technologies into carbon farming strategies and modern sustainable agricultural practices, providing a biological foundation for maintaining productive and resilient agroecosystems.

Influence of Companion Crops on the Microclimate of Young Raspberry (*Rubus idaeus* L.) Plantations

Vlăduț Loredan Holt, Mihaela Olaru, Alexandra Maria Bardoș Marțiș, Maria-Marinela Dragnea, Ailin Moloșag, Mihaela-Cecilia Dogaru

Research and Development Station for Fruit Tree Growing Băneasa

Keywords: *Rubus idaeus*, microclimate, companion crop, shelterbelt, agroecology.

Abstract: The research aims to evaluate the influence of companion crops on microclimate stabilization and protection in young raspberry (*Rubus idaeus* L.) plantations under current climate change conditions. During the early stages of vegetation, raspberry plants are sensitive to temperature fluctuations, dry winds, and intense solar radiation factors that can affect plant establishment and the uniform shoot development.

International studies on alley cropping systems have demonstrated that introducing annual crops between the rows of perennial crops can significantly improve the local microclimate conditions and enhance overall land-use efficiency.

The research will be carried out at the Moara Domnească Experimental Base of the Research and Development Station for Fruit Tree Growing Băneasa (RSFG Băneasa), where companion crops acting as temporary vegetative barriers such as maize (*Zea mays* L.) and cowpea (*Vigna unguiculata* L.) will be tested.

These crops will be established near the raspberry rows, aiming to create a more balanced microclimate characterized by moderated temperatures, higher relative humidity, and reduced wind speed. Such microclimatic adjustments have beneficial effects on the plant's physiological processes, stimulating photosynthesis, reducing water stress, and supporting vigorous vegetative growth.

The implementation of these biological protection systems represents a sustainable alternative to conventional mechanical methods, offering additional advantages such as improved soil structure, increased biodiversity, and enhanced plantation resilience.

The ultimate goal of the research is to identify sustainable agroecological solutions that contribute to microclimate stabilization, reduction of climatic risks, and increased adaptability of berry plantations to changing environmental conditions.

The Effect of Rapeseed Crop Proximity on the Incidence of the Pest *Epicometis Hirta* in Apple Orchards

Mihaela Olaru, Ailin Moloşag, Alexandra Maria Bardoş Marţiş,
Mihaela-Cecilia Dogaru, Maria-Marinela Dragnea,
Damian Dragomir, Vlăduţ Loredan Holt

Research and Development Station for Fruit Tree Growing Băneasa

Keywords: population dynamics, agroecosystems, proximity effect, pest-crop interactions.

Abstract: The present study investigates the effect of rapeseed (*Brassica napus subsp. napus*) crop proximity on the incidence and population dynamics of the pest *Epicometis hirta* in apple orchards. Observations conducted in the Vlăsia Plain area, specifically at the Moara Domnească Experimental Base of the Research and Development Station for Fruit Growing Băneasa, revealed that flowering rapeseed fields act as strong attractants for adult beetles, influencing their migration into nearby apple orchards. The results demonstrate a clear relationship between rapeseed proximity and increased *E. hirta* incidence, with flowering fields contributing to higher beetle movement and population levels within adjacent orchards. These findings improve the understanding of ecological interactions within mixed agricultural landscapes and support the development of more sustainable plant protection strategies.

Multi-Location Assessment of Sunflower Genotypes in Romania Over Two Drought-Affected Years

Florin Gabriel Anton¹, Maria Joița Păcureanu^{1,2},
Elisabeta Sava³, Elena Partal¹

¹National Agricultural Research-Development Institute Fundulea

²Center of Study and Research for Agroforestry Biodiversity
“Acad. David Davidescu”, Bucharest

³State Institute for Variety Testing and Registration, Bucharest

Keywords: sunflower, hybrids, seed yield, G×E interaction.

Abstract: In Romania, sunflower was cultivated on 1243250 hectares in 2024 and on 1183640 hectares in 2025, less with 59610 hectares than in year 2024. Both years, 2024 and 2025 were affected by drought especially in period of flowering and seed ripening (BBCH 70-85). This study evaluated four sunflower hybrids, FD15E27 (Express Sun hybrid), HS2372C (conventional hybrid), HS2312CLP (Clearfield Plus hybrid) and HS2309E (Express Sun hybrid) - across ten locations in Romania during 2024 and 2025, to assess genotype and environment (G×E) interactions. Average seed yield of these four sunflower hybrids was 2315 kg/ha in year 2024 and 2650 Kg/ha in 2025, lower with 335 kg/ha in year 2024 than 2025. In year 2024, the highest seed yield where registered by sunflower hybrid HS2372C (3703 kg/ha) in Mircea Vodă location, Brăila County and the lowest seed yield where 1171 kg/ha in Roșiorii de Vede location, Teleorman County, registered by the same sunflower hybrid. In year 2025, the highest seed yield where registered by sunflower hybrid FD15E27 (4244 kg/ha) in Mircea Vodă location, Brăila County and the lowest seed yield where 617 kg/ha in Giurgita location, Dolj County, registered by sunflower hybrid HS2372C. Plant height in year 2024 ranged from 84 cm in HS2309E (Inand, Bihor County) to 220 cm in HS2312CLP (Negrești, Vaslui County). In 2025, plant height ranged from 109 cm in HS2309E (Inand, Bihor County) to 190 cm in HS2312CLP (Mircea Vodă, Brăila County).

The thousand seed weight (TSW-grams) where in year 2024 between 28 g at HS2312CLP in Roșiorii de Vede location, Teleorman County and 72 g at HS2309E in Peciu Nou location, Timiș County. One thousand seed weight (TSW-grams) where in year 2025 between 30 g at HS2309E in Cogealac location, Constanța County and 91 g at HS2312CLP in Mircea Vodă location, Brăila County.

Hectoliter weight (HW - kg/hl) where in year 2024 between 33 kg/hl at HS2309E in Inand location, Bihor County and 43 kg/hl at FD15E27 in Peciu Nou location and in Timiș County, Dâlga location, Călărași County and at HS2312CLP in Peciu Nou location, Timiș County. Hectoliter weight (HW - kg/hl) where in year 2025 between 33 kg/hl at HS2312CLP in Râmnicu Sărat, Buzău County, Tecuci location, Galați County and 47 kg/hl at sunflower hybrids FD15E27 and HS2372C in Peciu Nou location, Timiș County.

These results show substantial variability among sunflower hybrids under drought-affected conditions, highlighting the importance of G×E interactions in sunflower performance across Romania.

Population Dynamics of Wheat Pests in the Context of Climate Change

Ana-Maria Vălean¹, Laura Șopterean^{1*}, Adina Tărău¹,
Loredana Suciuc², Florin Russu¹

¹Agricultural Research and Development Station Turda

²University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca

Keywords: pests, wheat, monitoring, agroforestry shelterbelts, temperature.

Abstract: The major importance of wheat cultivation for global food security means that any factor affecting its productivity can have significant worldwide consequences. In this context, climate change represents an increasingly serious threat to sustainable wheat production, not only through its direct negative effects on the plant's physiological processes but also through its impact on the biology and population dynamics of insect pests. Increasing temperatures can lead to the acceleration of the biological cycles of insect pests, an increase in the number of generations per year, and the expansion of their distribution range. Therefore, pest monitoring plays an essential role, as it allows the timely identification of harmful species, the assessment of infestation levels, and the determination of the optimal timing for implementing control measures.

Considering the importance of pest monitoring in assessing phytosanitary risks and supporting integrated crop protection strategies, a study was conducted at ARDS Turda to monitor insect pests in winter wheat, with the aim of highlighting their population dynamics in the context of climate change. Pest collection activities were carried out within an agroecosystem characterized by protective agroforestry shelterbelts, using an entomological sweep net as the sampling method. The study monitored the dynamics of the main wheat pests over two distinct periods, 2016-2018 and 2022-2024. To accurately reflect natural population dynamics, the results presented are derived from experimental plots where no insecticide treatments were applied.

The results of this study showed that, during the 2022-2024 period, average temperature values were higher compared to the 2016-2018 interval, and during the same period a significant increase in wheat pest density was recorded. All evaluated species, including cereal aphids (Aphididae), wheat thrips (*Haplothrips tritici*), cereal stink bugs (*Eurygaster* sp.), and cereal leafhoppers (Delphacidae, Cicadellidae), exhibited higher population levels in 2022-2024 than in 2016-2018.

Testing the Efficacy of Pelargonic Acid and Acetic Acid for Weed Control in an Apple Orchard

*Alexandra Maria Bardoş Martiş, Mihaela Olaru, Ailin Moloşag,
Mihaela-Cecilia Dogaru, Maria-Marinela Dragnea, Vlăduţ Loređan Holt*

Research and Development Station for Fruit Tree Growing Băneasa

Keywords: pelargonic acid, acetic acid, apple orchards, natural herbicides.

Abstract: This project evaluates the effectiveness of two natural herbicides, one containing pelargonic acid and the other acetic acid, on apple yield and weed infestation under field conditions at the Moara Domnească Experimental Base of the Research and Development Station for Fruit Growth Băneasa during the 2025 growing season.

The experimental setup included five treatments: mechanical control, natural herbicides with pelargonic acid and acetic acid, a conventional herbicide, and an untreated control. These treatments were arranged in a randomised complete block design with three replicates. Each plot measured 29 m², with treatments applied between plants along the row. The dynamics were monitored through assessments carried out before treatment, at 7 days, and at 30 days after application. 66% of the weeds found in plots were dicotyledons from six botanical families. In the case of pelargonic acid, after treatment and the final assessment, the mean reduction for dicotyledons was 63%. Acetic acid herbicide, under the same conditions, reduced dicotyledon growth by 33%. Compared with the conventional herbicide, which had 100% reduction for both dicotyledons and monocotyledons.

Yield was measured at the plot level (kg/ha), and the crop's phytosanitary status and ground cover were evaluated. These results are expected to reveal the impact of implementing agroecological practices and natural herbicides as sustainable alternatives to traditional weed-control methods in apple orchards.

Yield and Quality of Spring Barley Genotypes in the Transylvanian Plateau

Ioana Crișan, Florin Russu, Adina Tărău, Camelia Urdă

Agricultural Research and Development Station Turda

Keywords: spring barley, genotype, yield, quality, environmental conditions.

Abstract: In the context of current climate change, evaluating the yield and quality of spring barley genotypes under varying pedoclimatic conditions is essential for identifying optimal cultivation areas. At the Agricultural Research and Development Station (ARDS) Turda, a comparative trial was conducted over three consecutive growing seasons (2021-2023), including both established varieties and promising breeding lines of spring barley. Two lines (To 2033/18 and To 1990/18) were recently registered as varieties under the names Ioana and Dumbrăvița.

The experiment was arranged in a randomized complete block design with five replications and included 25 spring barley genotypes. Yield stability of the new genotypes was additionally assessed under diverse environmental conditions at four SIVTR testing sites (Hărman, Dej, Rădăuți, and Sibiu).

During 2021-2023, the new spring barley genotypes developed at Turda demonstrated high and stable yields. The Ioana variety (To 2033/18) achieved yields ranging from 6,000 to 7,700 kg/ha, with the highest yields recorded at Dej and Sibiu, indicating a strong yield potential. The Dumbrăvița line (To 1990/18) recorded average yields between 5,500 and 6,800 kg/ha, with uniform and stable performance across sites, demonstrating adaptability to different growing conditions. The superiority of the new genotypes over the control (Romanița) confirms the progress achieved in barley breeding at ARDS Turda.

Protein content ranged from 10.28% to 11.38% among the tested material. In conclusion, Ioana is an intensive genotype combining high yield potential under favorable conditions with suitability for the malting industry, whereas Dumbrăvița is characterized by pronounced stability and high ecological plasticity.

Sunflower Genotype Reactions to *Orobanche Cumana* under Natural Infestation in Brăila County, Romania

Florin Gabriel Anton¹, Maria Joița-Păcureanu^{1,2}, Luxița Rîșnoveanu^{3,4},
Mihaela Cergan¹, Laura Coșescu¹, Sabina Pintilia¹

¹National Agricultural Research-Development Institute Fundulea

²Center of Study and Research for Agroforestry Biodiversity
“Acad. David Davidescu”, Bucharest

³University Economic Studies of Bucharest

⁴Agricultural Research Development Station Brăila

Keywords: sunflower, hybrids, broomrape.

Abstract: In countries around the Black Sea area, such Turkey, Ukraine, Bulgaria and Romania the the most virulent races of sunflower broomrape are present. In this paper we studied the behavior of some sunflower genotypes under natural field infested with parasitic plant *Orobanche cumana* Wallr, in Brăila County during the years, 2024 and 2025. Attack frequency (F) in year 2024 ranged from 0% in sunflower hybrids FD22CLP32 to 100% in the hybrids FD22CLP64 and HS1122C as well as in old variety Record. In 2025, attack frequency (F) ranged from 13.6% in FD22CLP64 to 100% in hybrid HS1122C and old variety Record. The attack intensity (I) in year 2024 where between 0% at sunflower hybrids FD22CLP32 and FD22CLP64 and 5.75% at old variety Record. Attack intensity (I) in year 2025 ranged from 0.13% in hybrid FD22CLP64 to 1.06% in hybrid FD22CLP32.

From Genes to Fields: Advancing Wheat Resistance to Fungal Diseases

*Daniel Cristina, Matilda Ciucă, Alina Turcu, Elena-Laura Conțescu,
Violeta Ionescu, Alexandru Dumitru*

National Agricultural Research-Development Institute Fundulea

Keywords: wheat, disease resistance, MAS, genes, KASP.

Abstract: Durable genetic resistance to fungal diseases remains a major priority in wheat breeding programs worldwide. Marker-assisted selection (MAS) and gene pyramiding are essential tools for accelerating genetic improvement, enabling precise introgression and combination of multiple resistance genes. In this study, we assessed the molecular profiles of a diverse set of parental wheat genotypes (cultivars, breeding lines and synthetic hexaploid wheat) used in a resistance-focused improvement program targeting brown rust, yellow rust, stem rust, common bunt, Fusarium head blight, and Septoria leaf blotch.

Molecular screening revealed substantial allelic variation among the parental forms, allowing the identification of complementary resistance sources. These genotypes were subsequently used in targeted crossing schemes designed to combine multiple resistance loci. The resulting populations were subjected to MAS-based selection to track the presence and accumulation of favorable alleles. Several derived lines successfully pyramided multiple resistance genes, including combinations of three or more rust resistance loci together with genes or QTLs conferring resistance to bunt, Fusarium, and/or Septoria.

The results demonstrate the effectiveness of integrating molecular diagnostics with conventional breeding to develop wheat lines with broad-spectrum and potentially durable resistance. This study highlights the critical role of MAS and gene pyramiding in accelerating the development of improved germplasm and supports their continued implementation in wheat disease-resistance breeding programs.

Evaluation of the Resistance of Some Varieties and Lines of Triticale (*Triticosecale wittmack*) to the Attack of the Pathogene *Puccinia striiformis* in the Climatic Conditions of 2023 - ARDS Pitești-Albota

Maria-Magdalena Podea, Cristina Ghiorghe, Mariana-Cristina Nicolae,
Marian Robert Gheorghe, Cătălin Dinuță,
Diana Popescu, Oana-Daniela Badea

Agricultural Research and Development Station Pitești

Keywords: *Puccinia striiformis*, triticale, lines, yellow-striped rust, varieties.

Abstract: Initially, the *Triticosecale* species was thought to serve as a bridge between the transfers of resistance genes to various pathogens and pests, mainly from rye to wheat. Although its better resistance to pathogens compared to wheat and rye has become questionable over time, it still looks like a healthy crop. In the Southern Subcarpathians, triticales are susceptible to the attack of the pathogen *Puccinia striiformis* (striped yellow rust), a disease that occurs under certain temperature and humidity conditions, conditions met in 2023.

In this study, the disease was monitored under conditions of natural infection in 18 varieties and 7 lines, and the resistance of the plants to *P. striiformis* was evaluated. The biological material used was: Plai, Titan, Stil, Haiduc, Negoiu, Oda FD, Pisc, Tulnic, Cascador, Utrifun, Vifor, Vultur, Zori, Zvelt, Zaraza, FDL Ascendent, FDL Cordial, T F2, 14225 T1-02, 16026 T4-1, 14187 T1, 16322 T1, 16007T1-1, 15038 T1-1, 15183 T1-2.

The intensity of the attack ranged from 22% (Zaraza) to 86% (Cascador); attack frequency varied between 15% (Zaraza) and 97% (Tulnic); and the attack degree (A.D.) ranged from 3.3% (Zaraza) to 81.7% (Cascador). These results highlight substantial variability in the resistance of the tested genotypes under the climatic conditions of 2023.

The Perspective of Cultivation and Utilization of the Switchgrass, *Panicum virgatum* in Moldova

Victor Țiței

“Alexandru Ciubotaru” National Botanical Garden (Institute)
of the Moldova State University, Chișinău

Keywords: biochemical composition, biochemical methane potential, forage quality, *Panicum virgatum* genotypes, productivity.

Abstract: The goal of this research was to evaluate the productivity and quality indices of phytomass from switchgrass (*Panicum virgatum*) genotypes grown in the experimental plot of the National Botanical Garden (Institute), Chișinău, Republic of Moldova, as forage and feedstock for the production bio methane. It was determined that the productivity of studied switchgrass genotypes varied from 3.85 to 4.45 kg/m² fresh mass or 1.41 to 1.75 kg/m² dry matter. The analysis of the biochemical composition suggested that the dry matter of the whole plant mowing middle flowering stage had 61-68 g/kg CP, 412-419 g/kg CF, 422-433g/kg ADF, 653-692 g/kg NDF, 49-52 g/kg ADL, 231-259g/kg HC, 373-381 g/kg Cel, 82-93 g/kg ash. The nutritive and energy value of switchgrass fresh mass forage was 52.2-56.0% DDM, 9.04-9.06 MJ/kg ME and 5.05-5.018 MJ/kg NEI. The biochemical methane potential of fresh mass substrates 310 l/kg. Switchgrass, *Panicum virgatum* is multi-purpose crops, may be use as alternative forage and feedstock for bio methane production.

The Biomass Productivity and Quality Indices of Some Permanent Grasslands

Adrian-Ilie Nazare¹, Victor Țiței², Ana Guțu², Costel Samuil¹, Vasile Vîntu¹

¹“Ion Ionescu de la Brad” University of Life Sciences, Iași

²“Alexandru Ciubotaru” National Botanical Garden (Institute)
of the Moldova State University, Chișinău

Keywords: biochemical composition, biochemical methane potential, *biomass productivity*, *Elytrigia repens* grasslands, *Festuca valesiaca* grasslands, fodder values, theoretic ethanol potential.

Abstract: The research was conducted on a permanent grasslands dominated by *Festuca valesiaca* Gandin and *Elytrigia repens* (L.) Nevski. It was determined that biomass productivity of investigates grasslands ranged from 1.59 to 7.93 t/ha dry matter. The quality indices of grassland dry matter was 85-91 g/kg CP, 382-424 g/kg CF, 86-89 g/kg ash, 415-450 g/kg ADF, 658-753 g/kg NDF, 44-60 g/kg ADL, 355-416 g/kg Cel, and 241-303 g/kg HC. The forage values were as follows: 53.8-56.7% DMD, 10.76-11.28 MJ/kg DE, 8.84-9.26 MJ/kg ME, and 4.86-5.26 MJ/kg NEI. In addition to its fodder value, the grasslands biomass may be used as feedstock for biofuels production with gross energy value 17.5-18.3 MJ/kg, estimated biochemical methane potential 305-333 l/kg VS and theoretic ethanol potential 433-523 l/t VS.

The biomass from the studied grasslands can be used as fodder for livestock, also as feedstock for biofuels production as renewable energy.

Depending on the possibilities, through mineral fertilization ($N_{100}P_{100}$ kg/ha⁻¹) or organic (30 t/ha⁻¹ sheep manure applied at 2 years), the pasture dominated by *Festuca valesiaca* can be significantly improved by increasing green mass production and improving forage quality by modifying the floristic composition.

Exploring *ZmVTE4* Polymorphism in Local Maize Germplasm

*Elena-Laura Coșescu, Matilda Ciucă, Daniela Horhocea,
Daniel Cristina, Alina Turcu, Violeta Ionescu*

National Agricultural Research-Development Institute Fundulea

Keywords: *ZmVTE4*, tocopherol content, maize germplasm, genetic variability.

Abstract: Tocopherol content in maize kernels is influenced by genetic variation at the *ZmVTE4* locus. This study investigated local maize populations using INDEL118 and INDEL7 markers to identify alleles associated with higher tocopherol levels. Favorable alleles (373 bp and 160 bp) were detected in several genotypes, while a distinct ~180 bp fragment observed for INDEL7 in the Portocaliu 1 population indicates a previously unreported polymorphism. Molecular screening identified Românesc de Studina and several modern inbred lines as promising sources for enhanced α -tocopherol content. These results highlight the effectiveness of marker-assisted selection for improving nutritional traits in maize germplasm.

Opportunities for Circular Bioeconomy Development in the Romanian Cereal Sector

Elena-Laura Conțescu¹, Steliana Rodino^{2,3}, Elena Partal¹, Florin Gabriel Anton¹

¹National Agricultural Research-Development Institute Fundulea

²Institute of Research for Agriculture Economy and Rural Development, Bucharest

³National Institute of Research and Development for Biological Sciences, Bucharest

Keywords: circular bioeconomy, cereal production, agricultural residues, resource efficiency.

Abstract: The circular economy offers a development model that seeks to optimize resource use by reducing waste, reusing materials, and valorizing by-products. In agriculture, the adoption of circular principles is becoming increasingly important in response to growing pressure on natural resources and the need to minimize environmental impacts. Romania's cereal sector, a key component of national agricultural production, generates significant quantities of residues and secondary products that hold considerable potential for circular bioeconomy applications. Integrating these resources into sustainable value chains can enhance farm profitability, improve resource efficiency, and strengthen the resilience of agro-food systems.

Our study provides an analysis of circular economy principles and their applicability in agriculture, complemented by an overview of global practices and their current uptake in Romania. This framework supports the identification of opportunities to improve resource efficiency and circularity within agricultural systems. We examine the structure of cereal cultivation and map the waste streams and by-products generated from key crops such as wheat, barley, triticale, and maize. Regional data on secondary product availability illustrate the spatial distribution of resources and their potential for valorization. Several opportunities for waste reduction and the circular use of cereal residues were identified. Overall, the findings highlight concrete pathways for developing integrated circular value chains that support environmental objectives and strengthen economic resilience within Romanian agriculture.

Effect of Different Soil Tillages on Yield and Quality for Maize Crop

Marius Bordei¹, Elena Partal¹, George Cizmaș¹, Florin Gabriel Anton¹,
Emil Georgescu¹, Lavinia Udrea²

¹National Agricultural Research-Development Institute Fundulea

²Valahia University of Târgoviște

Keywords: maize, soil tillages, yield, quality, soil moisture.

Abstract: The relationship between crop and technological measures is very important for establishing the most efficient management strategies aimed at increasing yield, improving production quality and effects of three of tillage systems: conventional tillage (CT), minimum tillage (MT) and no-till (NT) on corn yield, quality and soil moisture over two years (2023-2024) on a chernozem soil at NARDI Fundulea, Romania. Soil moisture determinations were an integral part of the climatic characterization of the agricultural year and provided annual reference data. In 2023, very low soil moisture values were recorded, differing depending on the tillage system, which led to a minimum value of only 16.0% ($400 \text{ m}^3 \text{ ha}^{-1}$) for the CT system with spring plowing, a maximum of 19% ($540 \text{ m}^3 \text{ ha}^{-1}$) in the NT system and intermediate values in the MT system with 16% ($504 \text{ m}^3 \text{ ha}^{-1}$) for the chisel variant. Statistical analyses showed significant effects of all tillage methods on corn yield and quality and their interactions with other technological links. The average results over two years showed that the highest yields were recorded for MT (4.9 t ha^{-1}), while the averages for CT and NT were lower (4.2 t ha^{-1} and, respectively, 2.8 t ha^{-1}). The implementation of technological links, associated with a possible climate forecast, will increase the chances of the corn crop in Romania to successfully overcome the vegetation period with deficiencies and provide high and stable yields.

**Phenotypic Investigation of Wheat Varieties
from the „Mihai Cristea” Vegetal Genetic Resources Bank,
Suceava Collection in IULS-Ezăreni Research Farm Condition**

*Tiberiu Emilian Sârbu¹, Dănuț-Petru Simioniuc¹, Danela Murariu²
Violeta Simioniuc¹, Iulian Gabur¹*

¹“Ion Ionescu de la Brad” University of Life Sciences, Iași
²“Mihai Cristea” Vegetal Genetic Resources Bank, Suceava

Keywords: wheat, phenome, Ezăreni research station, trait correlations.

Abstract: Bread wheat (*Triticum aestivum* L.) is the most widespread self-pollinating crop worldwide, belonging to the *Gramineae* (*Poaceae*) botanical family. Correlation coefficients highlight the degree of association between different traits, thus helping the selection process for obtaining new high-yield wheat varieties.

This study aimed to characterize 20 wheat genotypes from the germplasm collection of the “Mihai Cristea” Vegetal Genetic Resources Bank Suceava (SVGB). Wheat cultivars were analyzed for different morphological and yield traits between 2021 and 2023 at the IULS Ezăreni Research Farm. Genotypic and phenotypic variability for different traits was highlighted, and the relationships between different types of traits were estimated using Pearson correlations. The traits analyzed include plant height, spike density, glume color, awns, presence of hairs on glumes, and grain yield. The results show that the wheat germplasm from SVGB has high variability and high agronomic value, and the genotypes studied can be introduced as initial material in wheat breeding programs.

Yield and Quality Performance of New Alfalfa Cultivars under Climate-Induced Drought Stress

*Mihaela Popa¹, Maria Schitea², Elena Petcu¹, Matilda Ciucă¹, Daniel Cristina¹,
Margareta Naie³, Călin Sălceanu⁴, Iulia Vărzaru⁵*

¹National Agricultural Research-Development Institute Fundulea
²“Gheorghe Ionescu-Șișești” Academy of Agricultural
and Forestry Sciences, Bucharest

³Agricultural Research and Development Station Secuieni

⁴Agricultural Research and Development Station Caracal

⁵The National Research - Development Institute for Animal Biology
and Nutrition (INCDBNA-IBNA), Balotești

Keywords: alfalfa, yield, quality, adaptability, molecular markers.

Abstract: Alfalfa is the most important forage crop in Romania. The main objectives in alfalfa breeding include improving quality, dry matter yield, as well as biotic and abiotic stress tolerance.

Abiotic stress conditions cause extensive losses to agricultural production worldwide especial in perennial crops, like is alfalfa.

Climate change is expected to intensify drought and increase aridity in several key regions of Romania, particularly in the southern part of the country, as observed in 2025. Under these conditions, nine new varieties of alfalfa were studied for production, quality and adaptability.

In order to shorten the breeding process, in the last year also started works that include the selection assisted by molecular markers.

The experiments were in the second year of vegetation, they were installed in the spring of 2024 and will be studied and in the next year.

Evaluation of Spring Barley Varieties for Post-Anthesis Drought Tolerance

*Emanuela Filip¹, Camelia Urdă¹, Matilda Ciucă², Felicia Chețan¹,
Alina Șimon¹, Ioana Crișan¹, Marius Aipătioaie¹, Florin Russu¹*

¹Agricultural Research and Development Station Turda

²National Agricultural Research and Development Institute Fundulea

Keywords: spring barley, heat stress, chemical desiccation, assimilate remobilization, breeding.

Abstract: Heat stress is one of the most severe abiotic factors limiting cereal productivity and requires intensified breeding efforts. Although high temperatures may occur during different phenophases, their incidence in the post-anthesis period causes significant yield losses by disrupting grain formation and filling processes. Even though the experiment was conducted in a favorable barley-growing area, local meteorological data indicate a consistent increase in post-anthesis temperatures over the past three decades. Consequently, barley is increasingly affected by the negative effects of this stress factor.

In this context, assessing heat tolerance and cultivar performance in relation to current climatic trends becomes essential. In the present study, chemical desiccation was employed to simulate the effects of heat stress and inhibit photosynthesis, aiming to evaluate the capacity of spring barley varieties to remobilize assimilates from vegetative organs to the grain as a compensatory mechanism. The research was conducted over three years at the Agricultural Research and Development Station Turda and included ten spring barley varieties evaluated under both simulated stress and natural field conditions. The analyzed traits focused on the main yield components: number of grains per spike, grain mass per spike, and thousand-kernel weight (TKW).

Application of chemical desiccation proved effective in differentiating genotypes based on their adaptive responses, facilitating the identification of cultivars with enhanced heat tolerance. Identifying high-performing parents can steer breeding programs in more focused directions and accelerate the introduction of heat-tolerant varieties into the crop.

Acknowledgement: This research was funded by the Ministry of Agriculture and Rural Development, Project ADER no. 123/17.07/2023: Conservation of soil resources was achieved through the use of technological components of regenerative agriculture in order to obtain economic and sustainable harvests of straw cereals in the Transylvanian Plateau.