

**CURRENT CHALLENGES AND REALIZATIONS IN PLANT BIOLOGY
DISCUSSED AT THE INTERNATIONAL SCIENTIFIC CONFERENCE
«GENETICS, PHYSIOLOGY AND PLANT BREEDING»**

On October 7–8, 2024, the International Scientific Conference «Genetics, Physiology and Plant Breeding» organized by the Institute of Genetics, Physiology and Plant Protection of the Moldova State University in partnership with the Scientific Association of Geneticists and Breeders of the Republic of Moldova was held in Chisinau. The Conference was focused on the promotion and dissemination of new scientific results obtained in the field of genetics, physiology, breeding and plant protection, aimed at the genetic and physiological aspects of creating and control the productive and adaptive potential of crop plants; principles and procedures for increasing and quantifying genetic variability; genetic and physiological diversity, conservation of the plant genetic resources; advanced technologies of cultivation and protection of crop plants.

The scientific event involves the latest outstanding results in genetics, physiology and plant breeding, by bringing scientists from different scientific centers in the country and abroad. This year, 331 researchers from 14 universities and research institutions from Republic of Moldova, and 43 from abroad (representatives of 10 countries — Romania, Ukraine, Turkey, Georgia, Sweden, Lithuania, Italy, Czech Republic, Slovakia and Belarus) took part in the event.

During the plenary session, 12 public lectures was presented according to the conference topics: Genetic and physiological aspects of creating and directing the productive and adaptive potential of crop plants; Principles and procedures for increasing and quantifying hereditary variability; Genetic and physiological diversity, conservation of the plant gene pool; Plant protection and advanced agricultural technologies.

The second working day continued with the discussion of the conference topics in the form of oral reports, as well as posters, which were materialized in 134 scientific articles edited in the collection of materials of the scientific forum.

In frame of the sections «Genetic and physiological aspects of creating and control the productive and adaptive potential of crop plants» and «Principles and procedures for increasing and quantifying genetic variability» were debates upon the methodological approaches to increase diversity in developing of topics in genetics and plant breeding, phenotypic plasticity and plant resistance to abiotic stresses, peculiarities of manifestation of the degree of transgression in populations of different species for inheritance of breeding value elements; the performance of crops in various environmental conditions, pathogen-host interactions under conditions of extreme climatic events.

The opportunities for adaptation and development of agriculture in the context of climate change were reported on the theme «Genetic and physiological diversity, conservation of plant genetic resources». As major importance was noted the works that include the highlighting of progress in the evaluation, maintenance and rational use of the plant gene pool, the improvement of leguminous crops, maize, aromatic and medicinal plants, pome rootstocks, etc. Of particular interest were the reports about physiological and genetic basis of mobilization, creation and rational use of the original gene fund of diverse species in Ukraine.

In the section «Plant protection and advanced agricultural technologies» the optimization of the technological elements of crop cultivation were analyzed, and the results of controlling the pests of different agricultural crops were presented, including in the ontogenetic stages of development and/or by applying pheromonal traps. The perspectives of ecological agriculture in solving food safety problems, the possibilities of obtaining and using natural biopesticides and bioregulators in integrated protection, and increasing plant productivity were analyzed.

The participants pointed out the relevance of discussed scientific problems under conditions of climate changes, underling the fragility of current production systems, and emphasizing the importance of moving towards a resilient system capable to reducing the negative effects on crop productivity, combating the effects of climate changes, and adapted to match the dangerous impacts, ensuring access to sustainable production.

It was pointed that traditional plant breeding methods have provide the required of food bulk for a long period of time. At the same time, breeding efforts have ensured remarkable diversity amongst various crop species and even creation of some new crops. However, the trends in agriculture indicated that traditional methods alone will not be able to keep pace with the growing demands for food, fibre and fuel. High temperatures, longer periods of drought and heat, increased late frost risks, increased heavy rainfall events and extreme weather events are endanger agricultural production systems. The intensification of agricultural systems and the excessive use of land have negative effects on the environment, such as habitat fragmentation/loss and biodiversity loss, degradation of water resources and soil health.

Plant biotechnology offers an important role to improve crop yields, can strengthen plant breeding efforts to meet these new challenges in a sustainable way, largely through exploitation of vegetal germplasm, plant vigor, yields of crops, conducted to substantially increasing of conventional breeding programs. Intervarietal and interspecific hybridizations, coupled with genetic and phytopathological manipulations, continue to be useful in plant improvement for resistance to diseases (fungus and viruses) and abiotic stresses. Scientists are continuously developing better tools to improve plant breeding.

New innovations in precision agriculture, which include advanced tools — devices such as sensors, detectors, combined with management technologies can ensure precise and more efficient control of the production systems.

The participants were actively involved in the discussions focused on the themes and research directions presented in the plenary and sections communications, thus accumulating an exchange of experience and establishing new collaborative relationships in the areas of common interest. It was proposed to expand the collaboration in the field of genetics, physiology and plant improvement by developing research projects on topics of interest with the training of specialized laboratories from educational, research and branch institutions.

During the debates, the importance of partnerships was highlighted by establishing a scientific dialogue regarding research results in the field and their applicability. We consider it opportune to initiate active on-farm conservation of the valuable germplasm with the involvement of peasant households and the financial support of the state, which will lead to the dynamic preservation of local genetic resources and the maintenance of the genetic structure of populations. Also, activities related to the reintroduction of plant samples from the Gene Bank to peasant households and in research programmers where be useful.

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