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TECHNOLOGICAL TRANSFER OF AGROBIOLOGY RESEARCH RESULTS IN THE NATIONAL ECONOMY OF THE REPUBLIC OF MOLDOVA

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Abstract: *At the beginning of 2024, the Academy of Sciences of Moldova began hearings on reports on the results of scientific research in the field of agriculture, biology and food security for the period 2020-2023. Major importance was given to the results of the technological transfer, achieved during this period, which includes: the implementation of the "Soil Register of the Republic of Moldova" and the "Program of land improvement in order to ensure the sustainable management of soil resources for the years 2021-2025". An important leap was made in the wine complex by increasing the commodity production of table grapes to about 100 thousand tons, of which 80 thousand tons for export to the EU states, Ukraine, Belarus and the Russian Federation. Projects have been carried out in the technology of grape processing and the production of competitive wines on the world market, including the EU, China, the USA, Canada, and the UK. A new technology was implemented to produce high-quality food vinegar from apple and grape concentrates, spiced and sherry. A new strain of acetic bacteria was used at the base of the production line. Thanks to the high result of the selection of fish from the surface lakes "Crap de Mândâc" and "Crap de Telenesti", ensuring 100% the market of the Republic of Moldova with fry and fresh fish. Animal science has achieved the first technological transfer of new breeds and lines of goats, sheep and milking cows "Bălțata", ensuring 100% of the branch with high quality semen. The "Selectia" Institute secured 70% of the seed market of the soybean culture on the entire area of 50 thousand ha annually.*

Keywords: *agricultural science, food security, technological transfer, agro biology*

JEL classification: Q00

INTRODUCTION

Moldavia's agriculture was a primary occupation of its people, ensuring its budding existence.

The development of the agro-industrial complex of the Republic of Moldova has experienced stages of ascent, but also periods of decline. One of the causes of the decrease in the volume of agricultural production was the privatization of agricultural land in the variant, when each inhabitant of the communes was allocated a share of land with fractionation into plots of plantations with trees, vines, or small arable land. The breakup of the Soviet Union deprived Moldova of the market for agricultural production in former importing countries: The Russian Federation, Kazakhstan, Belarus, Ukraine and the Baltic states.

The political conflicts that arose as a result of the collapse of the Soviet empire, generated numerous embargo situations on most agro-industrial products in the country. The first case of a total export ban in the Russian Federation, at the beginning of 2006, generated considerable financial losses due to the non-reimbursement of economic agents – suppliers of fruits, vegetables, meat, eggs, wines and spirits. With the participation of scientists from the country, a new strategy for exiting the crisis was developed, based on which the decision was made to reform the structure of agri-food products with orientation to the markets of the

European Union, North American states, China and Japan. The agro-industrial branch obtained the necessary credits for the restructuring of the agricultural domains strictly oriented towards the production demanded mainly on the markets of Germany, the Czech Republic, Romania, Great Britain and Asian countries and the Far East. (Cucereanu Gh., 2023)

Within these colossal and costly changes, the center of gravity was placed on the new elaborations of technical-scientific progress, made both in the country and abroad. New varieties of agricultural crops, animal crosses, high-performance technologies in their cultivation and breeding have been implemented. For their production, agro-industrial sectors were equipped with high-performance equipment, produced primarily in the countries of the European Union. The agro-industrial production in the country was subjected to a rigorous phyto-sanitary and medico-sanitary control with its certification by the competent bodies of the Republic of Moldova, as well as those of the European Union (Gaina B., 2023). Special attention was paid to the technologies for growing products and "bio" industrial production, the demand for which was and is very high in the European Union, the USA, Canada and Japan.

MATERIAL AND METHODS

Based on the systemic analysis of the economic indices from the main branches of the national economy of the Republic of Moldova in the last 10 years, the impact of the implementation of the results from the field of Research/Development in the country's economy was assessed. The materials and the report on the state of science in the Republic of Moldova in 2023 developed by the Academy of Sciences of Moldova, of the Life Sciences Section, reports of the National Vine and Wine Organization of Moldova for the period 2020-2023, statistical data, etc. were used. The statistical processing of the obtained data allowed us to trace the development trend of one of the most important branches - viticulture and winemaking.

RESULTS AND DISCUSSION

In recent years the path to global sustainability has been guided by the International Scientific Council which works at the planetary level to convene and catalyze scientific expertise, advice and influence on issues of major interest to both science and society. Representing the global voice of science, the International Scientific Council played an important role in the process of initiating and promoting the International Decade of Science for Sustainable Development (2024-2033), proclaimed by the United Nations General Assembly on 25 August 2023. We are honored that the Academy of Sciences of Moldova also contributed to the process of promoting the International Decade of Sciences for Sustainable Development. (Report, 2023)

In the realization of the decisions of the authorities of our state, a primary role belongs to science, research, implementations and technological transfer of the most effective technologies and technological processes from the arsenal of recent elaborations of profile institutions from the Republic of Moldova, from the European Union as well as those from the USA, Canada, Japan, China and other countries. The high potential of the new achievements brought their considerable contribution to the fundamental restructuring of the branches of the

national economy, especially agriculture and the food industry, which currently contribute substantially to the formation of the country's budget.

A "significant leap" in the economic reform in the Republic of Moldova (in the words of academician Prof. Valeriu Tabără, president of the Academy of Agricultural and Forestry Sciences in Romania) is currently being witnessed in the wine sector, the potential of which is currently 121 thousand ha of vine plantations vineyard with 88 thousand ha of massive young trees planted as part of the reforms and bearing fruit. Along the way, the republic annually produces 350-370 thousand tons of grapes for industrial processing, makes use of 15-17 million dal of wines and exports about 10 thousand tons of table grapes, for fresh consumption. The main varieties are: *Moldova*, *Suruceni Alb*, *Leana*, *Arcadia*, *Codreanca* and others. Wine production has expanded considerably on the markets of Germany, Romania, the Czech Republic, Great Britain, China, the USA and Canada, the volume of which is on a permanent rise. (Gaina B., 2022)

These results are largely due to the indisputable contribution of research and development institutions that ensured the transition to new varieties of agricultural crops, implementing them in production and exporting to the most requested markets of the European Union. We mention in the first place: seeds and oil of sunflower, rapeseed, certified "Bio" cereals, fruits and vegetables, wines and distillates, pastry products and others. In the re-use of raw material processing enterprises, the researchers from the Republic of Moldova tested through screening the most efficient technological equipment, procured from the European Union and installed practically at all entities of the agro-industrial branch (canning, winemaking, processing of cereals, livestock products, oil extraction and others). Figure 1.

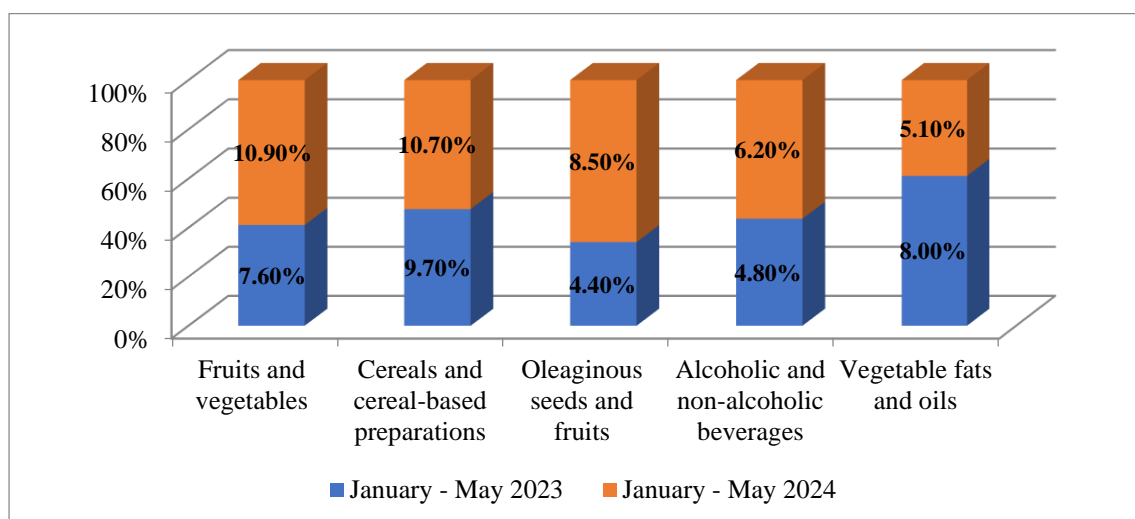


Figure 1. Share of agri-food products in the export structure of the Republic of Moldova

Source: Created by authors based on data <https://statistica.gov.md/ro/comertul-international>

As for the viticulture branch, we note a reorganization of the assortment of varieties for wines, widely implementing Romanian varieties (*Feteasca Albă*, *Feteasca Regală*, *Feteasca Neagră*), local ones (*Rara Neagră*, *Codru*, *Plavai*), but also with great success the new ones, obtained through intraspecific selection at the National Vine and Wine Institute of Moldova (*Viorica*, *Legenda*, *Riton*, *Luminița* and others.) (Dobrei A-G, 2021). The activity in

the field of scientific-practical assistance in this branch was carried out through great human efforts and financial instrument by scientists and researchers from the State Agricultural University of Moldova, the Technical University of Moldova (recently united by absorption at UTM), the Cooperatist-Commercial University from Moldova, the State University of Moldova, but also scientists from the agrobiological institutes of the Academy of Sciences of Moldova: The Institute of Genetics, Physiology and Plant Protection, the Scientific-Practical Institute for Horticulture and Food Technologies, the "Selection" Field Crops Institute, the "Porumbeni" Maize and Sorghum Research Institute, the Institute of Pedology and Agrochemistry, the Scientific-Practical Institute for Biotechnologies in Animal Husbandry and Veterinary Medicine, the Institute of Zoology, the Institute of Ecology and Geography, the Institute of Chemistry, the "Acvagenresource" Center and others.

Tangible achievements are also due to the scientific schools in the Republic of Moldova, such as the wine school, previously created by corresponding member of the Academy of Sciences of Moldova P. Ungurean (P. Ungurean, 1960), by academician Gh. Cimpoeș, academician B. Gaina, corresponding member of the Academy of Sciences of Moldova V. Ungureanu, professor A. Balanuță, professor N. Taran, Ph.D. G. Arpentin, Ph.D. Gh. Savin, dr. hab. E. Alexandrov, doctor G. Musteață, doctor C. Olaru and others. The achievements of the genetic school of intraspecific selection of grapevine culture are due to the well-known breeders corresponding member of the Academy of Sciences of Moldova N. Guzun, professor D. Verderevchii, C. Voitovici, G. Savin, doctor T. Cazac and others, the varieties of which demonstrated a high organoleptic quality and increased resistance to the biotic and abiotic factors of the vine vegetation conditions life of Moldova. Nowadays the National School of Crop Protection Scientists with a Specialization in Viticulture is represented by the team of corresponding member of the Academy of Sciences of Moldova M. Vronskikh, professor L. Voloshchuk, doctor V. Ciobanu and others. As a result, a new spectrum of phytosanitary products was implemented in the protection of vines, mainly produced in the European Union, the USA, China and Japan, which ensure a high effect of the treatments and a high horticultural sanitation. A considerable contribution to the revitalization of the viticulture complex was made by the Scientific School of corresponding member of the Academy of Sciences of Moldova I. Hăbășescu, professor L. Volconovici, dr. hab. V. Cerempei, doctor I. Pasat and others.

An important place in the economy of Moldova is held by the creation of a network of wine tourism (Gaina B., 2004). Over 10 years, an integrated system of wine tourism has been created and approved by the National Bureau of Vine and Wine, in which about 26 economic agents in the sector are involved. Each entity is accredited on the basis of meeting the European requirements for each wine tourism point: the presence of massifs of vines in excellent condition, road access, modern grape processing enterprise, high level sanitation, production and storage halls, rich collections of wines, restaurant certified by the Ministry of Health and the National Food Safety Agency, (Law 352 RM, 2006, Sturza R., 2017) parking lots for transport, sanitary blocks, etc.

An important role in the improvement of the legislation of the Republic of Moldova regarding tourism in general and wine tourism in particular was and is being played by the Academy of Economic Studies of Moldova, the Academy of Sciences of Moldova, the Institute of Cultural Heritage and other entities in the field of research and innovation.

In this way, the practice of wine tourism in the Republic of Moldova has grown in recent years, attracting approximately 250-300 thousand visitors, mainly from the European Union, Great Britain, China, Japan and South Korea.

Only this sector of services in the field of viticulture, oenology, national cuisine and handicraft allowed to pay into the budget of the Republic of Moldova the amount equal to the income from the sale of wines and distillates, valued at 350-500 million US dollars. This international classification, with the location of the Republic of Moldova in second place in the world for the most appreciated wine tourism destinations, testifies once again that as a result of the collaboration of scientists and specialists in the field of viticulture and winemaking, of the implementation of world achievements in new viticulture technologies, it has allowed the achievement of these high performance appreciated worldwide. (Conference, 2024)



Figure 2. Ranking of wine tourism destinations

Source: <https://www.moldpres.md/news/2024/10/08/24008011>

In 2023, the Republic of Moldova won the 9th place at the prestigious CIFTT (Committee of Tourism Film Festivals) international competition in the "People's Choice" category alongside the countries: Portugal, Peru, Cuba, Bosnia and Herzegovina, Mexico, Poland, Croatia and Spain. The competition promotes and rewards the most successful videos about travel, tourist destinations and the tourism industry, organized by the International Committee of Travel Film Festivals with the support of the World Tourism Organization and the European Commission for Tourism.

In 2023, collective tourist accommodation structures were visited by 391.5 thousand tourists (17.2% more than in 2022) and in January-June 2024, collective tourist accommodation structures were visited by 209.2 thousands of tourists (36.6% more than January-June of the previous year).

The Republic of Moldova has become the European capital of wine tourism by hosting the General Assembly of "INTER-VITIS- *Les Chemins de la vigne*" - the European wine

tourism route that records the landscapes and wine heritage of the member countries, supported by the European Federation ITER VITIS and certified according to the standards of the Council of Europe since 2009.

Another forum of scientific achievement in the field of viticulture and winemaking is "National Wine Day 2024", XXIII edition. This edition was held under the new slogan "Our amazingly good wine", which emphasizes the continuous evolution of the industry, millennial traditions in winemaking and innovation. The format of the event has been improved to give each participant the opportunity to fully enjoy the diversity and quality of wines, alongside the most acclaimed winemakers in the country. This event was attended by over 150,000 visitors, 120,000 bottles sold, of which 36,000 bottles were tasted, 50,323 tastings based on the "Taster Book", 40 wineries offered tours, wine tastings, of which 8 wineries organized special events, 25,000 tourists visited the wineries within the event, 250 participants in the "Wine School".

CONCLUSIONS

The analysis of the process of technological transfer of research results and innovations in the agro-industrial complex of the Republic of Moldova eloquently testifies that only through the implementation of the achievements of the technical-technological process can an upward growth of the indices of economic activities in the country.

The collaboration of the Republic of Moldova with the states of the European Union and primarily with Romania allows the scientific community in the country to carry out vital projects of the economy of the agro-industrial complex despite the multiple challenges such as global warming, droughts, epiphytosis of agricultural crops, etc.

Investments in wineries and the state's initiative to put Moldova on the map of European wine tourism have led to the creation of itineraries, which allow visiting many fields and wineries. The tourist potential of the Republic of Moldova also derives from the agricultural specifics.

The most astringent problems in dynamism wine tourism are: improving the financial climate, improving infrastructure, roads, access roads, raising the sanitary level of routes and agro-pensions, training staff, increasing the quality of services of any kind (accommodation, translations, food, currency exchange, tastings, procurement of souvenirs and gifts, etc.).

Focusing efforts on protecting the environment and the rural beauty of the vineyards so that the region retains its charm and its rationale for being a wine destination.

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