

INTEGRATION OF UKRAINIAN AGRICULTURAL SCIENCE INTO THE GLOBAL ENVIRONMENT*

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In light of the war in Ukraine and the global economic crises, science is becoming increasingly important. The role of agricultural science in solving global food security issues is felt to be especially necessary. The article defines the important role of Ukrainian agricultural science in the economy of Ukraine and the post-conflict restoration of agricultural lands. The purpose of the research is highlighting the importance of the role of Ukrainian agricultural science in the global environment. In the process of writing a scientific article, creation of objects of intellectual property law at the National Academy of Agrarian Sciences of Ukraine, and also the results of the commercialization of scientific and knowledge-intensive products of the National Academy of Agrarian Sciences of Ukraine were determined. The main international institutions of which the National Academy of Agrarian Sciences of Ukraine is a member are outlined. Defined the main strategic directions of scientific support for the socio-economic development of the agricultural sector of Ukraine. Characterised Bank of plant genetic resources and Bank of animal genetic resources which was made by NAAS. Defined priority tasks for innovation of development of NAAS. Established that the National Academy of Agrarian Sciences of Ukraine is an important component of Ukrainian and international science, which is aware of modern realities and implements measures for the development of the scientific sphere. In particular the academy overcomes negative trends and challenges, taking into account the war in Ukraine. Responsibility for scientific and production indicators of activity is increased, an action plan is formed to identify problematic issues and eliminate the causes of their occurrence. The academy takes an active part in post-conflict reconstruction of agricultural territories of Ukraine. The resources of the scientific, technical and material base are mobilised, the dependence on commercial structures is reduced, conditions are created for the strengthening of scientific and industrial complexes, coordination of their work and development at the local level. The academy develops at the expense of innovative infrastructure, taking into account European integration processes and access to international investment resources.

Key words: innovation, agriculture, agri-food, intellectual property, global food security, science, integration, standards.

JEL Classification: Q16, Q18, O34

Abbreviations:

NAAS – National Academy of Agrarian Sciences of Ukraine;

R&D– research and development;

IP – intellectual property.

Introduction. Science is becoming a vital factor in the country's growth, a means of achieving both military and economic power. Technological renewal and the development of the agro-industrial complex are defined by law as strategic priority areas of innovative activity in Ukraine. The task of agricultural science: to contribute to the creation of innovative agriculture. The mission of NAAS is to meet the needs of the agro-industrial complex for advanced scientific knowledge and technologies. The priority areas of scientific research are: development of the agro-industrial complex and rural areas; food, biological and energy security; breeding independence and self-sufficiency; sustainable land use.

Statement of the problem. The main task of agricultural science is to provide an innovative model for the development of the country's agriculture, to help it become successful and competitive, and to ensure the

country's food security both on the domestic and foreign markets. And this should become the main indicator of success, the success of agricultural science. One of the main challenges for Ukrainian agronomy is competition. The National Academy of Agrarian Sciences of Ukraine must be ready to compete in the markets of scientific products. And for this it is necessary to understand the scientific potential and the important role of Ukrainian agricultural science in the global environment.

Formation of the objectives of the article (task statement). The purpose of the study is to highlight the importance of the role of Ukrainian agricultural science in the global environment.

Summary of the main research material. Ukraine, like most countries in the world, has chosen an innovative path for its economic development. Intellectual assets are beginning to play an increasingly important role in

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Table 1 – Creation of intellectual property objects at the National Academy of Agrarian Sciences of Ukraine

Year	Inventions	Useful models	Characteristics of goods and services	Plant varieties, hybrids and parental components	Breeding achievements in animal husbandry	Objects of copyright and related rights	Total
Submitted applications							
2020	26	121	2	174	-	41	364
2021	25	83	1	142	1	32	284
2022	22	53	1	106	1	13	196
Received security documents							
2020	24	129	2	184	3	28	370
2021	25	83	1	142	1	32	284
2022	14	41	-	125	-	23	203

Source: [3; 4]

the reporting structure of enterprises. In countries with a developed innovation environment, such as the EU countries, the USA and Japan, the share of innovative products in the balance is 23, 14 and 13.8 % respectively. However, the share of innovative products in the balance of Ukrainian enterprises is only 4%.

It is noted that despite the patenting of intellectual property objects in 2017–2018, their development through production and commercial use during this period, the value of the intangible balance assets in the institutions is minimal, and in some is not defined at all. Thus, for the years 2017–2018, the largest number of patents was obtained by the Plant Production Institute nd. a. V. Ya. Yuryev National Academy of Agrarian of Ukraine. However, in general there is no information about the value of the intangible balance assets of the institution. The situation is different at the NAAS Institute of Agriculture, where the share of intangible assets is quite significant, but the number of patents is not comparable. This situation certainly affects the investment attractiveness of the sector [1].

The National Academy of Agrarian Sciences of Ukraine was founded as the All-Ukrainian Academy of Agricultural Sciences on 22 May 1931 (since 1990 – the Ukrainian Academy of Agrarian Sciences). The current status has been in force since 6 January 2010 according to the Decree of the President of Ukraine «On Granting the Ukrainian Academy of Agrarian Sciences the Status of National» No. 8/2010. Structurally, the Academy is divided into 6 branches: Agriculture; Land Reclamation and Mechanisation; Crop Production; Animal Husbandry; Veterinary Medicine; Agricultural Economics and Food; and Scientific Support for Innovative Development.

At the current stage of domestic economic development, the specific weight of innovatively active enterprises in Ukraine is about 18.4%, most of which are engaged in technological innovations. In 2017, according to the ratings, Forbes Ukraine selected the top 20 innovative enterprises of Ukraine, including 5 agricultural enterprises [2].

Material and technical support of the National Academy of Agrarian Sciences of Ukraine consists of: institutions,

enterprises and organisations (267 units), total fixed assets (243,47 million EUR), total area (490,1 thousand hectares).

In 2022, the indicators of registration of objects of intellectual property rights have decreased significantly. This is connected with the beginning of the war in Ukraine. Many institutes have lost the opportunity to work normally.

However, looking at the situation in Ukraine in general, it was found that the most active in the field of protection of intellectual property objects among national applicants were enterprises and organisations working in the field of education and science [5].

Table 2 – Commercialisation of the results of scientific and knowledge-intensive products of the National Academy of Agrarian Sciences of Ukraine

Year	Licence agreements and agreements on the use of intellectual property rights	
	quantity, units	funds received, thousand EUR
2020	920	47156,2
2021	994	1 109
2022	740	670,02

Source: [3; 4]

The indicators for the commercialisation of innovations also fell in 2022 due to the start of the war in Ukraine.

The Union of European Academies for Science Applied to Agriculture (UEAA) was founded in October 2000 by 14 National Academies from European Member States and Candidate Countries, all committed to the advancement of science. NAAS is also a founding member of this organisation.

NAAS actively participates in the EU programme Horizon 2020 – the framework programme for research and innovation: the estimated cost of the projects is: agriculture – 5670 thousand EUR; plant growing – 5220 thousand EUR; animal husbandry – 4625 thousand EUR.

NAAS is a member of many international institutions. For example: International Union of Soil Sciences (IUSS); UNESCO Program «Human and the Biosphere»; Food and Agriculture Organization of the United Nations (FAO);

International Maize and Wheat Improvement Center (CIMMYT), etc.

The strategic directions of scientific support for the socio-economic development of the agricultural sector of Ukraine are as follows:

1) Development of sustainable land use in Ukraine: conservation of landscape and biodiversity; balanced use and protection of soils; halting soil degradation processes.

2) Development of agriculture and rural areas: scientific support of legislative and regulatory work in the context of European integration; pro-European village-preserving model of agricultural entrepreneurship and rural structure.

3) Food security and efficiency of foreign trade: meeting the food needs of the state; increasing production and exports of agricultural products; scientific support for healthy nutrition of the nation.

4) Biological safety: creation of environmentally safe living conditions for the population; continuous monitoring of dangerous animal diseases; implementation of scientifically based disease prevention measures.

5) Energy security: bio-substitution of imported energy sources.

6) Breeding safety: gene pool and breeding in crop production; gene pool and breeding work in livestock.

The National Gene Bank of Plants of Ukraine, created by the National Academy of Agrarian Sciences of Ukraine, contains more than 146,000 plant samples representing 378 species of agricultural crops, 224 forest and ornamental plants and 1203 species of wild plants. The value of unique samples with a complex of valuable characteristics on the international market is more than 100 thousand USD, and the fund of the gene bank is estimated at more than 10 billion USD.

The National Academy of Agrarian Sciences of Ukraine has created the Ukrainian National Bank of Animal Genetic Resources, which includes more than 247 thousand samples of genetic material, in particular – 14,3 thousand heads of animals and 32 breeds of poultry; 200 families of bees; 122 breeds of silkworms; 143 thousand spermatozoa

of breeders (32 breeds); 360 embryos; DNA samples – 118, somatic cells – 4,1 thousand units. The value of the collection of the gene bank of animal resources of Ukraine is estimated at more than 55 billion USD. The animal gene bank is a unique source of genetic diversity for breeding and research.

The share of NAAS varieties in the total cultivated area of Ukraine is as follows: winter wheat – 60%, barley (spring) – 75%, rye (winter) – 95%, buckwheat – 99%, soybeans – 50%, millet, rice – 97%. New high-yielding, high-quality varieties and hybrids of the National Academy of Sciences have ensured a grain harvest of 76.4 million tonnes in 2020. This is 2.25 times more than in 1995, while the share of scientific developments in the achieved result is about 70% (Figure 1).

The NAAS system produces nearly 145,000 tonnes of basic seed each year, providing certified seed that can be used to sow more than 10 million hectares of arable land, fully meeting the demand for planting material with local varieties at the lowest price in the market.

Priority tasks for innovation of development of NAAS:

1) Establishment of a science park with a network for the transfer of knowledge-intensive technologies in the format of innovation and investment business projects.

2) Development of instruments for state support of innovation in the agricultural sector.

3) Creation of a state system of rural development and agricultural advisory services at the national, regional and local levels.

4) Creation of a competitive corporate system of innovation transfer in the agricultural sector based on the integration of state, science, education and business.

In line with the requirements of the times, the National Academy of Sciences is systematically improving its work, including by reorganising and optimising the network of its scientific institutions. In recent years, for example, significant work has been carried out to improve scientific support for sub-sectors of agriculture, which has generally contributed to stabilising the price situation on the relevant

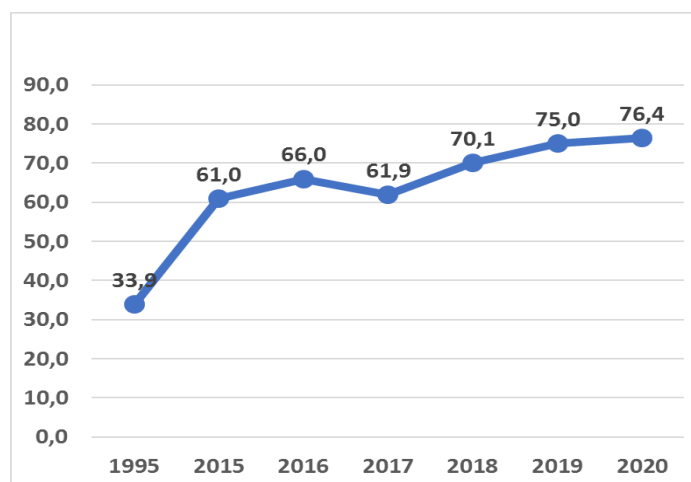


Figure 1 – Dynamics of gross grain harvest in Ukraine, million tonnes

food markets and improving the quality of life of the population.

NAAS comprises more than 250 institutions, companies and organisations, which enables research to cover all natural and climatic zones and administrative regions of Ukraine, significantly increasing the quality and reliability of the scientific results obtained and their suitability to the needs of local agricultural producers.

At present, almost 50 scientific institutions of the Academy conduct research within the framework of 44 scientific programmes, which are coordinated with the main provisions of the state target programme for the development of the Ukrainian countryside for the period until 2025. Approval and implementation of research results are carried out in more than 150 experimental farms, which form the experimental base of the National Academy of Sciences. The Academy trains postgraduate students in 58 specialities and doctoral students in 20 specialities.

According to the state statistics, in 2020–2022 agricultural sciences, together with veterinary sciences, will account for the largest number of scientific and technological works performed in the country – 6,247 units. Agricultural sciences also remain the locomotive in terms of the number of received protection documents for objects of intellectual property rights, occupying the second place after medical sciences.

Conclusions. The National Academy of Agrarian Sciences of Ukraine is an important component of

Ukrainian and international science, which is aware of modern realities and implements measures for the development of the scientific sphere.

Step 1. The Academy is overcoming negative trends and challenges, including the war in Ukraine. Responsibility for scientific and production performance will be increased, and an action plan will be developed to identify problematic issues and eliminate their causes. Measures will be taken to increase the share of agricultural science in the industry.

Step 2. The Academy takes an active part in the post-conflict reconstruction of agricultural areas of Ukraine. It mobilises resources of the scientific, technical and material base, reduces dependence on commercial structures, and creates conditions for strengthening research and production complexes, coordinating their work and development at the local level.

Step 3. The Academy is developing through innovative infrastructure, taking into account European integration processes and access to international investment resources. The system of agricultural science is being strengthened on the economic and legal basis of public-private partnership. The Academy is becoming a major player in the creation and development of innovation and investment-type business structures. The prospect of further development of agrarian science is the creation of a science park integrated into market relations, which will become an effective conductor of innovations in high-tech agricultural production.

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ІНТЕГРАЦІЯ УКРАЇНСЬКОЇ АГРАРНОЇ НАУКИ В ГЛОБАЛЬНЕ СЕРЕДОВИЩЕ

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У світлі війни в Україні та глобальної економічної кризи наука набуває все більшого значення. Роль аграрної науки у вирішенні глобальних проблем продовольчої безпеки відчувається особливо необхідною. У статті визначено важливу роль української аграрної науки в економіці України та постконфліктному відновленні сільськогосподарських земель. Метою дослідження є висвітлення важливості ролі української аграрної науки в глобальному середовищі. У процесі написання наукової статті було визначено створення об'єктів права інтелектуальної власності в Національній академії аграрних наук України, а також результати комерціалізації наукової та наукоємної продукції Національної академії аграрних наук України. Окреслено основні міжнародні інституції, членом яких є Національна академія аграрних наук України. Визначено основні стратегічні напрями наукового забезпечення соціально-економічного розвитку аграрного сектору України. Охарактеризовано Банк генетичних ресурсів рослин та Банк генетичних ресурсів тварин, який створено НААН. Визначено пріоритетні завдання інноваційного розвитку НААН. Встановлено, що Національна академія аграрних наук України є важливою складовою української та міжнародної науки, яка усвідомлює сучасні реалії та реалізує заходи щодо розвитку наукової сфери. Зокрема, академія долає негативні тенденції та виклики, враховуючи війну в Україні. Підвищується відповідальність за наукові та виробничі показники діяльності, формується план дій щодо виявлення проблемних питань та усунення причин їх виникнення. Академія бере активну участь у постконфліктній відбудові сільськогосподарських територій України. Мобілізуються ресурси науково-технічної та матеріальної бази, зменшується залежність від комерційних структур, створюються умови для зміцнення науково-виробничих комплексів, координації їх роботи та розвитку на місцевому рівні. Академія розвивається за рахунок інноваційної інфраструктури з урахуванням євроінтеграційних процесів та доступу до міжнародних інвестиційних ресурсів.

Ключові слова: інновації, сільське господарство, агропродовольство, інтелектуальна власність, глобальна продовольча безпека, наука, інтеграція, стандарти.

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