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Seeds and planting material as an innovative crop product

***The purpose of the article** is to investigate and make suggestions as to the need to strengthen the innovative development of crop production through the use of new cultivars and hybrids of agricultural crops.*

***Research methods**. In the course of the research were used dialectical methods of cognition of processes and phenomena, in particular monographic method (for analysis of development and provision of innovations in crop production in Ukraine and the world), empirical method (for concerning the complex assessment of the current state of the research object), comparative analysis (for identifying problems and objectives of innovation support in Ukraine), abstract-logical (for synthesis and formulation of conclusions).*

***Research results**. In the process of studying the issues of the development of innovations in crop production and in some European countries, the current state of innovation support was disclosed and its economic and social aspects were analysed. The main results concerning the innovative support of the crop production industry in Ukraine were revealed.*

***Elements of scientific novelty**. The theoretical positions regarding investment development in agriculture were further developed based on modernisation of the varietal composition of seed production of agricultural enterprises, taking into account the achievements of scientific and technological progress, accelerating the solving of important tasks regarding timely cultivar renewal and cultivar substitution, which will promote the introduction of advanced technologies in plant growing, increase productivity and earnings.*

***Practical significance**. Along with some positive changes in innovation, systemic barriers to their development were identified. Proposals for their elimination by active methods, including at the expense of state regulation, were made. Tabl.: 4. Refs.: 16.*

***Keywords**: seed and planting material; innovative product; innovative development; cultivar renewal; cultivar substitution; bank of genetic resources.*

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Scientific problem. Sowing innovation is an innovation in the breeding industry, based on the use of scientific achievements and best practices. The end result of innovation is the creation of a new cultivar. At the same time, when the process of creating a new plant cultivar in which this invention or discovery is brought to the stage of practical application and begins to give an economic effect is innovation.

Development (innovation) is considered complete (innovation), when the plan of research is fully executed and a certain result is obtained. In this case, a very substantial production check is required. For example, in relation to new cultivars of agricultural crops this stage is a state cultivar test (qualification examination). Along with the production inspection is the stage completion of completed developments, such as objects of intellectual property, the issuance of patents and licenses. Scientific development will be an innovation only after approbation and its recommendation for mass introduction into production.

That is, an innovative product in agriculture should be understood as the result of innovation, which has received practical implementation in the form of a new product, technology or service and which when introduced into production gives a certain effect.

The focus of science and practice on the continuous improvement of the innovation support mechanism is due to the objective process of functioning of economic systems, which underscores the crucial importance of innovation processes. However, as in any process, there is a need to evaluate the efficiency of the plant cultivar, which we will try to justify. The problem is obvious, but it becomes very relevant in relation to the agrarian sector of the economy, taking into account the complex of specific problems of implementing the innovation process in crop production.

Analysis of recent research and publications. Scientists such as S. Bakay, M. Zubets, O. Zakharchuk, A. Klyukach, M. Litvinenko, and M. Zubaryan made significant contribution to the development of innovative seed production, to increase the rate of sorts upgrading and sorting, to organise methodological and methodological principles of conducting varietal policy in Ukraine and in the world. E. Netjevich, K. Nazarenko, P. Marinich, O. Pichkur, V. Oreshnikov, L. Khudolii, P. Tsybulev, O. Shpilkiak, V. Shelepov and many others [1-6, 11-14, 16].

The purpose of the article is to investigate and make suggestions as to the need to strengthen the innovative development of crop production through the use of new cultivars and hybrids of agricultural crops.

Research results. The innovation process in the agroindustrial complex is defined as a set of consistent actions taken to create a new or improved product and organise its production based on the use of research results and developments. How important features of this process should be its duration in time and certain stages.

The innovative process in agriculture is characterised by a cultivar of organisational forms that have fundamental differences in the nature of funding and the economic basis of functioning. An essential feature of the functioning of innovative formations is an integrated approach that defines the main goal of functioning: from the development of the technical and technological idea to its scientific elaboration, implementation (implementation) and the provision of information and consulting services.

A very significant difference is observed in the scale of the functioning of the mentioned formations: from the international and state level to the volumes of one agricultural enterprise.

A departure from the principles of administrative management of the economy creates prospects for the development and experimentation with organisational forms, increasing the cultivar of options for the implementation of this or that scientific and technological innovation. At the same time, with the provision of economics of market content, opportunities for the development of effective organisational forms of innovation processes are expanding. The conducted researches and practical experience of their functioning and development allow to distinguish in the agroindustrial production the following main stages of the innovative process of creating a plant cultivar: creation of innovations, their distribution and development by commodity producers and formation of the economic effect from the development of seeds and planting material (Table 1).

Table 1. Stages and content of the innovation process in horticulture

Stages	Content	Main performers
Creating cultivar	Allocation of funds for the creation of a cultivar. The state of studying the problem in the industry, in the world. The origin of the idea and its inclusion in the plan of the GDR. Conduct fundamental research. Conducting applied research and development. Registration of completed scientific and technical developments as objects of intellectual property in the seed. Production and sale of seeds and seedlings. Adapting the cultivar to production	Research institutions NAAN and other breeders (owners of patents)
Spread of cultivar	Allocation of funds for distribution of cultivar. Implementation of management functions. Promotion of innovation through the management of agribusiness. Information support of various organisational and legal forms of agroindustrial complex. Activities of information and consulting services. Media activities	Agribusiness management bodies together with patent holders

Continuation of Table 1

Mastering of cultivar	Allocation of funds for the development of the cultivar. Bringing information about the cultivar to commodity producers. Organisational and economic mechanism for the development of cultivars by commodity producers. Contract relations of producers with patent holders and information and consulting services. Initiative and activity of commodity producers. Productive demand for commodity producers for innovation	Product Producers, together with patent holders and supporters of cultivars
Formulation of the effect of mastering of cultivar	The effectiveness of innovation in the agroindustrial complex is determined by the ratio of additional products or profits received by commodity producers, and the cost of creating (purchasing) innovations, their development in production	Product Producers, together with patent holders and supporters of cultivars

Source: Own development.

The development of innovations by producers of agro-industrial production gradually forms the conditions for accelerating scientific and technological progress in the field of seed production. It should be emphasised that the production reaches the calculated effect of the development of plant cultivars: for additional output of products per unit area, reducing the cost of its unit with the total receipt of additional profits.

Such aggregate additional income should exceed the cost of the creation (acquisition) and development of innovative seeds. The cumulative additional effect obtained directly from the production of scientific and technological progress, is not enough to finance the scientific and technical sector of the industry. Therefore, in all countries, the scientific and technical sphere is financed mainly from the state budget. And the more funds are allocated to the development of science, the higher the pace of acceleration of scientific and technological progress. Such a pattern during the last century is quite stable, especially clearly it is traced in the states with a sufficiently high level of scientific and technical potential.

The allocation of the stages of the innovation process is conditional and relates to the speed of its organisation. If to consider this process from the point of view of its organisation, in addition to the mentioned stages it is necessary to distinguish organisational blocks of innovation activity. In organisational terms, innovation activity has the main interconnected blocks that resemble themselves in the process of functioning and implementation of the innovation process in the industry.

In agriculture, an assessment of the innovation process requires a clear allocation of its stages. The innovation process in this industry is divided into three main stages: creation of innovations, their distribution and development by commodity producers. At all stages, the implementation of the process will depend, first of all, on providing certain intellectual, material and financial resources for this.

The most important and the longest stage of the innovation process is the creation of a cultivar. From the very beginning of this stage there is the birth of the idea of future innovation. In practice, this is manifested in the in-depth analysis of this problem, not only in the country but also abroad, especially in the most developed countries.

Substantial basic and applied research and development, despite the fact that it involves a certain risk of unwanted consequences, is too important and responsible. The development is considered complete, if the research plan is fully executed and a concrete result is obtained. Under all conditions, such a development is necessarily subject to an industrial test. In particular, this is the emergence of new cultivars of agricultural crops, which are transmitted to state cultivar testing.

Along with the production inspection is carried out not less important work — execution of completed developments as objects of intellectual property with the issuance of patents and licenses. It is important here to adhere to the conditions under which the actual figures coincide with the transformation of these achievements into concrete innovations. Scientific development becomes an innovation if it is recommended for mass introduction into production. But in this case, she must go through the stage of preparation for such a mastery of her in production, which will promote the full use of potential opportunities for innovation. Responsibility for the stage

of its creation, as a rule, depends on the scientific institution. The effectiveness of its functioning is evidenced by the quantity and quality of new plant cultivars and their development in production.

In contrast to the creation of innovations, the diffusion stage covers various trends and specific channels for their penetration into agro-industrial production — from training and retraining of managers of personnel, specialists and workers of mass professions to the development of informational and advocacy and management activities in the agroindustrial complex. However, under current conditions, this stage is not given due attention. In the future, with the development and improvement of information technologies, it is necessary to create conditions for commodity producers to learn about innovations not only from the production experience of advanced enterprises, but also directly from science at the stage of innovation. This practice is common in all economically developed countries. More information on the innovations recommended for development, as well as about the prospects for creating the next innovations that scientists are already working on, greatly expands opportunities for selection and contributes to increasing the innovation activity of commodity producers.

Successful development of innovation processes at the stage of the dissemination of innovations will largely depend on the information provision of the industry. Responsibility for the proper accomplishment of this important task should be relied upon by the management bodies of the agro-industrial complex, regional centres of scientific support and their information-consulting services. However, they cannot remain aloof from this case, and scientific organisations are the creators of innovation. They are directly interested in promptly informing commodity producers about what is being prepared for them in laboratories and experimental farms.

At the final stage of the innovation process, innovation is being mastered in production. The success here will depend to a large extent on commodity producers. It is important for them to have a sufficiently clear organisational and economic mechanism for mastering innovations in production. The main place in this responsible and truly innovative work should be deduced contractual relations of commodity producers themselves with the creators of innovation, as well as with the information and consulting service of the agro-industrial complex. To the initiative of commodity producers, their desire to master a certain innovation should add another prerequisite for success - the acquisition of innovation itself and science-intensive products, without which its development is impossible — seeds of new cultivars.

Given the particular complexity of individual stages of the innovation process, when choosing the criteria for their evaluation should not seek a single indicator, it is better to focus on a multi-criteria approach to determining the effectiveness of a particular stage of the process. The criteria for evaluating the innovations created are usually determined by the purpose and capabilities of the predicted scientific and technical products.

At the stage of creating innovation, the main criteria for its evaluation are: the overall value as the development of a new generation, the degree of novelty and compliance with the modern world level; estimated growth of gross output and improvement of its qualitative indicators; maximum resource saving and cost reduction per unit of output; increasing productivity and improving working conditions; growth of profitability of production and increase of mass of profit; preservation of a normal ecological situation and environment. In accordance with these criteria, the assessment of innovation at the stage of its development is developing a system of valuation indicators, which enables to determine technological, economic, social and environmental efficiency.

The main criteria for evaluating the innovation process at the stage of innovation are the maximum efficiency of informing commodity producers about new knowledge, the achievement of science and technology, using for this various channels of its receipt. At this stage, it is important to involve all structural units: the system of training and retraining of personnel, power structures at all its levels; system of information and consulting services; special promotion of innovation through scientific organisations and the media. The sooner the information about the innovations being created, which are being prepared for development in the industry, is brought to the commodity producer, the more effective the stage of the innovation process will be given.

The criteria of development efficiency in the production of innovations (innovations) are: technological renewal of production with increasing its technological and economic efficiency; growth of labor productivity and social efficiency; output growth per unit of production space; improving financial performance and increasing the actual mass of profits; protection of the environment.

Taking into account the mentioned criteria of efficiency of the innovation process at its various stages, a system of valuation indicators is developed, which, in relation to a particular industry and the nature of the prepared or mastered innovation, can vary considerably and, if necessary, be corrected.

At the first stage of the innovation process, first of all, to give a preliminary assessment of the created innovation even before its development in production. Here the main indicators are the value of innovation, the degree of its novelty, as well as compliance with the world level. The following indicators are usually recommended for this purpose: the level of novelty (high, medium, insufficient); the level of value for science and production (high, medium, not enough); the degree of compliance with the latest domestic or foreign achievements (higher, at the level, lower); the level of demand for innovation (high, medium, low).

The value of the created cultivar as a result of intellectual work is also determined by the growth of the relevant knowledge in comparison with the current level, the prospects for their dissemination, and the ability to make a certain additional contribution to the development of the industry and increase the efficiency of production.

Technological efficiency of the innovation process at the stage of creating a cultivar is reduced to the calculation indicators, reflecting the degree of use of land, labor and material resources. This is primarily the productivity of agricultural crops, the energy intensity of production, its gross indicator in comparable prices per 1 hectare, per employee, per unit of fixed assets of production purpose. The calculation finds the difference between the main production indicators in terms of mastering the cultivar and the use of traditional technology. This difference is estimated by the output of products per unit of production area (per hectare of arable land, sowing, conditional arable land). The growth of gross output in natural terms or in comparable prices per unit of additional resources is also determined.

Calculation of the system of indicators of technological efficiency remains the main evaluation of any stage of the innovation process. Indeed, from such reliable information will ultimately depend on economic efficiency, which indicates how productive the resources are used. It is about the cost in terms of money per unit of output, the level of resource conservation, labor productivity, energy and capital intensity of products, its competitiveness.

Specific indicators of economic efficiency include: gross output at actual prices, gross income and profits per unit area or unit of livestock; level of labor productivity, cost and profitability of production. One of the important indicators of the economic efficiency of innovation is the total cost of its creation, which will in a significant way influence the further evaluation of the innovation process as a whole. Such an expedient assessment of innovation is now complicated by the lack of precise accounting for the stages and elements of its creation. That is why calculations should be made on long-term data, distributing total costs on average over the years on the number of created innovations or completed developments that are ready for implementation in production.

Methods for assessing the effectiveness of innovations are special in that they should include indicators reflecting the overall integrated effect of the creation, production and use of scientific developments. This allows you to determine the contribution of each participant in the innovation process to the final effectiveness. The simplest integral indicator of innovation in general can be the payback of additional costs associated with the creation and development, expressed in the amount of additional net income of 1 UAH of additional costs.

The maximum effect is possible in a situation where the additional income from the development of innovation in production will exceed the total cost of their creation. To a large extent, this will depend on the scale of the implementation of this innovation. In practice, the additional effect of scientific and technological progress directly in production is not enough to fully pay back the costs of creating and mastering innovation. There-

fore, it should be emphasised once again that in all countries the scientific and technical sphere is financed mainly from the state budget. And the higher the level of financing of science, the tendency is higher rates of acceleration of scientific and technological progress. Such a pattern is traced during the second half of the last century, especially in countries with relatively high levels of development of scientific and technical potential.

The substantiated economic evaluation of the innovation process is necessary at all its stages. Under this condition, it is much more fully possible to use the potential of the scientific and technical potential of the industry to further increase the efficiency of agro-industrial production.

Of great significance in the implementation of the innovation process is the need to identify promising opportunities for the implementation of an innovation project, since the development of innovation requires the attraction of significant investment investments. Therefore, under certain conditions, innovation, rather than the expected competitive advantages, can cause significant financial problems for agro-industrial enterprises. An assessment of the possibilities of implementing an innovation project is based on the method of comparative analysis of actual economic resources at the disposal of the company and necessary for the implementation of an innovation project. Comparison of own means of the enterprise and necessary in accordance with the innovative project, taking into account the forecasted results from investment investments, makes it possible to analyse variants of economic efficiency of the innovative component of the project under specific economic conditions. An assessment of the possibilities of implementing an innovation project involves research and identifying the optimal conditions for the introduction of innovation taking into account the economic situation and prospects of the development of a particular enterprise.

It is necessary to carry out economic calculations, which should be systemic in nature and provide an estimate of the resources and necessary expenses for the implementation of the innovation project in each of the main areas of economic activity: innovation, marketing, production, finance and personnel. First, it is important to determine the possibilities of adapting innovation to the conditions of the enterprise; the availability of raw materials, technical, capital, marketing and professional-human resources. All this is crucial for the implementation of an innovation project.

Then, on the basis of the performed calculations, they conclude that there is sufficient or insufficient amount of financial and economic resources for the implementation of the innovation project, as well as assess the degree of autonomy or dependence of the enterprise on external financial and economic sources. This approach makes it possible to determine whether the business entity can implement the project on its own and how likely the situation is, in which the enterprise as a whole or the project in particular will fail because of the mismatch of available resources necessary.

To form an economic model for assessing the conditions for the implementation of new technology at the enterprise can, moving on the technological chain of the innovation project. To do this, it is necessary to calculate elementally the costs of acquiring innovation, its adaptation to the conditions of the enterprise, marketing research, the launch of the production of a scientific product. That is, it is first necessary to determine the costs necessary for the implementation of each stage of the innovation project, and then they need not be compared with the available resources.

In NAAS system, innovative seed production is carried out in 46 scientific institutions, 135 experimental farms, 550 cultivars and hybrids of 87 crops. Annually more than 60,000 tons of basic seeds, 5,0 thousand tons of seeds of primary units, 1,1 thousand tons of parental forms of hybrids of corn, sunflower, sugar beet, sorghum, 70-80 tons of vegetable seeds and over 100 tons are produced. melon crops, 20,0 thousand tons of elite seed of potatoes, 1,5 million tons of fruit seedlings, 1,5 million tons of grape seedlings, as well as seeds and seedlings of other crops. Seed crops must have at least one or two fields in the crop rotation (10-20%). In addition, most seed crops require spatial isolation of 0.8-3 km, which requires their placement among fields of other crops.

On the basis of the Institute of Plant V. Ya. Yuriev in 1993 created the National Bank of Plant Genetic Resources of Ukraine. The Bank of Plant Genetic Resources is classified as one of the 10 largest genetic banks in the world,

which is a national heritage. Ukraine is also a member of the international system of genetic resources of plants, managed by the World Food and Agriculture Organisation (FAO).

The evaluation of the results is carried out by morphological, physiological, immunological, biochemical and other features. The result is an average of about 7,000 sources of valuable properties, and after an in-depth genetic study of this number, about 100-130 donor samples are allocated. It is they who serve as the basis for further breeding work. The research of world genetic resources for the estimation of genetic diversity of plants and the allocation of new sources of breeding grounds has gained practical significance. Only on the basis of the Institute of Plant Cultivation to them. V. Ya. Yuriev at the National Bank of Genetic Resources of Plants of Ukraine preserves 146.0 thousand samples of seeds, much of which is studied and can be used for further genetic research and for breeding practice. Of these samples of Ukrainian origin, about a third. The world's largest genetic resources are owned by the United States - 530 thousand, China - 390 thousand, India - 340 thousand, Russia 320 thousand, Japan - 240 thousand, and South Korea - 190 thousand samples of seeds.

The National Bank of Plant Genetic Resources of Ukraine is represented by 378 species of agricultural crops, 224 forest and ornamental crops and 1203 species of wild plants. In general, Ukraine's contribution to the European Information Infrastructure for Genetic Resources (39 participating countries) is 20% of the samples. As a result of researches of recent years, 1300 sources of selection and valuable features have been allocated, of which 493 - only in grain crops.

Created, studied by valuable economic characteristics, maintained in live condition and transmitted for practical use collection of gene pool of 23 rare species of wheat - 330 specimens, 20 species of wild relatives of wheat — kinds Aegilops and Dasypyrum - 220 samples, 80 amphidiplonidous wheat of different genomic structure. Purposeful breeding work for the formation of cultivars with new valuable features promises a significant increase in the stability, endurance of plants, quality of the products received. Innovative breakthrough in breeding work is expected due to the use of original selection methods, remote cross-breeding, gene and cellular engineering, biotechnology methods, as well as computer programs for processing image samples that scans at early stages of the selection process.

The potential of new cultivars is encouraging. For example, winter wheat of prestigious cultivar (selections of the Selection-Genetic Institute of NAAS) provides yields of 99.5 c / ha. The cultivar is resistant to diseases, frost-resistant. It should be noted that only in 2018, 84 new high-yield cultivars of spring and winter soft wheat and 4 cultivars of spring and winter wheat were introduced into the State Register of Selection Achievements. Selection and genetic research on the triticale allowed the Yaroslav breed to be harvested with a high frost resistance of plants, resistance to diseases, yielding more than 90.0 c / ha. In general, in the cereals crop, the State Register of Plant Varieties suitable for distribution in Ukraine replenished 241 cultivars and hybrids for 2018. All of them have confirmed their high selection qualities.

Particular importance was acquired in the selection of cereals and legumes. This allowed them to be transmitted to the State Register of Plant Varieties, suitable for distribution in Ukraine. In the State Register of Ukraine for the first time in 2018 12 domestic and foreign cultivars of sorghum, 11 cultivars of peas and 72 maize hybrids, cultures that are rapidly gaining the newest grain corn market are included for the first time.

At the same time, the huge scientific potential of breeding activity is used only partially in Ukraine. The reason is well known: extremely low level of budget financing, loss of qualified personnel. The movement of breeding achievements to practice is hampered by the organisational and economic weakness of seed and production enterprises. Therefore, in order to support breeding activities, it is necessary to highlight the following areas in the field of development of new technologies for crop production:

- technologies with the predominant use of multi-operational agricultural machines and implements, which minimises the cost of cultivating soil, cropping and harvesting;
- new technologies for managing the food and logistical potential of agro-ecosystems and agro-landscapes on the basis of differentiated use of resources and the use of agro-ecosystem and positional means (adaptive plant growing);

- for each sub-sector of plant growing and crops, zonal technologies are developed that meet the three main criteria: resource conservation, environmental safety, economic feasibility (increasing competitiveness).

The existing innovative potential of the AIC is used only within the range of 4-5%. A large number of scientific and technical developments do not become an innovative product. Every year, most of them remain unclaimed agricultural production. The analysis of the scientific provision of the agroindustrial complex showed that only 2-3% of the total number of completed, accepted, paid by the customer and recommended for implementation of applied scientific and technical developments was implemented in limited volumes, 4-5% in one — two farms, and a share of 60-70 percentage Development in 2-3 years was not known to customers, developers, or consumers of scientific and technical products.

The substantiated economic evaluation of the innovation process at all its stages contributes to the full utilisation of the potential of the scientific and technical potential of the industry for further enhancement of the efficiency of agro-industrial production. The system of management of innovative activity in agroindustrial production is aimed at significant structural changes in favour of production of high and medium technology industries.

Seed management solves two interrelated tasks. The first of them — the reproduction of high-quality cultivars of seeds new, introduced in the production of cultivars to the sizes that provide the needs of farms in it. However, in the process of mass reproduction and prolonged cultivation, the quality of cultivars is deteriorating. Therefore, the second seeding task is to preserve the cultivars and the qualities of the seeds of all recommended cultivars. In accordance with these tasks in seed work, two main processes are carried out — cultivar renewal and cultivar substitution.

Cultivar substitution is a complete replacement of one old cultivar in production crops to another, a new cultivar. Typically, new cultivars significantly exceed the old crop and other selective values. Therefore, cultivar substitution should be carried out quickly, within one, for a maximum of two years. The operational change of the cultivar allows faster and fuller use of the biological, economic benefits of the new cultivar and simultaneously get rid of the pressure of diseases and pests that accompanied the old cultivar.

Sorting is carried out in the year of the recommendation of a new cultivar. Sowing work with the old cultivar stops in advance, 1-2 years before sorting. Accelerated introduction of new cultivars in production depends on the successful work of each of the seeds seeding, slow implementation of cultivars - an indicator of poor organisation of seed production. Breeders have developed measures for accelerated seed propagation at the initial stages of the introduction of new cultivars into production. One of them is an increase in the seed multiplication factor, that is, the ratio of the amount of seed produced to the sown.

One of the reasons for the slow introduction of new cultivars is that in the early years, a significant amount of seeds is directed at commodities, and not used for seeds. To accelerate the introduction into production, grown seed of new cultivars should be transferred to as many farmers as possible to reproduce.

Cultivar renewal — is a replacement of high-quality seed of low reproduction, which has degraded the cultivars and biological qualities, for seeds of the same cultivar, but higher reproductions. Graduation is carried out with basic seed or certified seeds of the first year in terms accepted by a research organisation in the zone of its activity.

The use of high-quality varietal seeds in the production for many years impairs its varietal and seed quality as a result of mechanical and biological clogging, disease, pests, violations of agricultural engineering and storage conditions.

The timing of cultivar renewal depend on the level of organisation of seed production in the farm: in the conditions of high seed quality, the quality of seeds is preserved for many years before the sixth and seventh reproduction, at a low level, they are lost in the first reproductions.

Crop yield of cultivar depend on the effects of many factors, so the seeding task is to preserve the genetic potential of the cultivar's productivity. There is no consensus on the meaning of reproductions in scientific literature. Some researchers argue that there is practically no significant difference between the reproductions of varietal seeds. Others believe that the crop is declining — from basic seed to remote certified seed.

The effect of reproduction on the quality of the seeds was studied by the researchers of the Myroniv Institute of Selection and Seedling of Wheat. M.V. Crafts. Experiments were carried out according to the scheme, which ensured the comparison of the quality of the basic seed and certified seeds of different years, grown not at farms, but in the fields of the Institute, that is, in identical conditions.

The obtained data show that the seed quality — a mass of 1000 grains, germination energy, laboratory similarity of the basic seed and the following years of certified seed - were almost identical. Significant decline in yield compared to the base begins with the certified seed of the third year. When seeded certified seeds of the 3rd and subsequent years reduced the number of productive stems per unit area, the number and weight of grain in the ear, which reduced the weight of grain from one square meter and one hectare.

When using certified seed the younger years in farms there is a deterioration in its quality under the influence of biological and mechanical clogging, damage to diseases, pests, low level of agricultural engineering. These factors reduce the yield quality of the seeds. By well-organised seed production, you can slow down this process, but you cannot stop it. Therefore, periodic cultivar renewal is required. The terms for varietal renewal for different cultures are not the same and depend on the biology of culture and the level of seed production. In countries with a highly developed economy, seed production is conducted on an industrial basis. Farms producing agricultural products are not engaged in seed production, but receive it annually from specialised seed companies. Thus sorting is carried out annually.

In Ukraine, with well-established seedlings in Soviet times, the annual cultivars were cultivated by seeds of the elite in the breeding areas, the first seed was sown on the seed plots, the second reproduction on the marketplaces.

In connection with the reform of the agrarian sector, the Ministry of Agrarian Policy and Food and the National Academy of Agrarian Sciences have approved a new sorting regimen. On cereals (except corn and sorghum), oilseed crops are allowed in agricultural enterprises to sow seed at least certified seed of the 4th year, sunflower — certified seed of the 1st year of cultivars and the first generation of hybrids. In corn, sorghum is decided in agricultural enterprises of sowing to produce seed of hybrids of the 1st generation and cultivars not lower than the certified seed of the 3rd year. Beekeeping farms, on their applications, sugar factories provide the release of factory certified seed of the 1st year of cultivars and hybrids of the 1st generation, entered in the Register of Plant Varieties of Ukraine. For potatoes on commercial crops, seed is used not lower than the certified seed of the 4th year. In spring and winter rapeseed, seed and seedlings are grown by scientific research institutions, certified seeds of 1 year — seed farms. Certified seed of the first year is sold to commodity farms for annual varietal renewal.

The sowing of vegetables, melons and fodder roots in agricultural enterprises is allowed to carry seeds of generation hybrids and cultivars of reproduction. Grown in seminal formations of seeds in special seed plants is brought to seed conditions, established by the State standard, and through branded stores and branches sold to commodity producers.

In the process of reproduction and production use hereditary morphological, biological and economic-valuable signs and properties of the cultivar gradually deteriorate as a result of mechanical and biological clogging, the appearance of mutations, reducing resistance to diseases and pests, etc.

Therefore, there is a need to perform cultivar renewal — replacing such seed with a higher quality of the same cultivar. Typically, sorting and sorting are carried out with basic seeds or certified in the first year.

According to Art. 16 of the Law of Ukraine "On Seeds and Planting Material" establishes the following terms for renewal (number of generations of reproduction) of seeds (Table 2).

Guided by these terms and the results of field testing, make a plan for sorting, based on the following provisions:

1. A sorting is carried out with a basic seed or a certified first year.

In the latter case, the next cycle of sorting comes in a year earlier than the established terms.

2. The output of conditioned seeds per hectare should be calculated from the planned yield of the crop in the following limits: winter wheat — 60-75%; winter rye — 60-70%; barley — 60-70%; oats — 50-65%; millet — 40-50%; buckwheat — 50-65%; peas — 70-80%; sunflower — 50-60%; Sudanka - up to 50%; perennial herbs — up to 50%.

Table 2. Timing of cultivar renewal (number of generation renewal) seed

Cultivated plant	Timing	Limit allowed years of certification	
		on the seed plots	on common sowing
Winter wheat, winter rye, spring wheat, barley, oats	every 3 years	First	Third
Pea	every 4 years	Second	Fourth
Buckwheat	every 2 years	First	Second
Vicia, Lathyrus, soybeans, beans, Sorghum	every 5 years	Third	Fifth
Sunflower, millet	every year	Basic	First
Perennial fabaceae plants	every 4 years	Second	Fourth
Perennial poaceae plants	every 4 years	Second	Fourth

Source: Own development

The seed rate for individual crops and cultivars is determined by the number of grains, taking into account the weight of 100 seeds and seed yield, as well as depending on predecessors, timing of sowing, soil moisture, etc.

Sowing suitability (P) is determined by the formula:

$$P = A \times B$$

where A - seed similarity,%;

B - seed purity,%.

Then determine the weighting rate (N, kg / ha):

$$H = K \times M \times 100 / P$$

where K - number of seeds per 1 ha, million pieces;

M - weight of 1000 seeds, g;

P - seed yield of seed,%.

The insurance fund is filled with spring cereal crops in the amount of 15% of the total demand for seeds of winter and spring cereal crops.

The influence of natural factors and different methods of agricultural engineering on agricultural plants is complex, it is rather difficult to isolate and evaluate the significance of a separate factor or individual agro-consumption in the final part of the harvest. However, according to many scientists, the share of seeds and planting material, as the main factor affecting the yield of crops over the past 50-70 years, has increased significantly, from 5 to 25 percent (Table 3).

Other factors such as natural soil fertility — 10%, weather — 15%, soil cultivation — 10%, fertilisers — 25%, plant protection — 15% — make up 75%. An even greater role of seeds and planting material in increasing the yield of soybeans and winter and spring rape — 30%, corn — 40%, sunflower — 45%.

Table 3. Influence of the main factors on the crop yield of cereal, %

Factor	1940-1950 years	2000-2018 years
Natural soil fertility	40	10
Weather	20	15
Soil cultivation	20	10
Fertiliser	10	25
Seed and seeding material	**5**	**25**
Plant protection	5	15
Total	**100**	**100**

Source: Own development.

Note that at the beginning of the 21st century, the influence of such a factor as the introduction of mineral and organic fertilisers was extremely levelled, namely, their introduction decreased by 5-6 times to the 1990 level, that is, the weight of this factor also fell accordingly. At the same time sorting and sorting played an increasingly important role. In addition, one should also pay attention to those factors that, due to timely sorting and sorting, directly affect the increase in crop yields. Only due to improved indicators of grain crops' resistance to falling, culling and diseases and pests, the gross harvest of cereals may be increased to 25% (Table 4).

Table 4. Influence of the other factors on increasing gross tax crop yield of cereal

Factor	Influence of the factor on increasing of gross tax crop yield cereal, %
Stability to abscission	5
Stability to sinking	5
Resistance to diseases and pests	15

Source: Own development.

Conclusions. We believe that scientific institutions and seed farms will take further measures to reduce the widespread proliferation of new cultivars and hybrids from 6-7 years old to 3-4 years. Due to the development of modern seed production methods, the genetic and crop quality of the secondary and basic seeds, as well as the seeds of parent hybrid forms will be significantly increased. To further develop the creation of corporate structures based on scientific institutions and commercial seed production units on the production of high quality seeds on a mutually beneficial basis. New biotechnological and molecular genetic methods of seed control will be developed and introduced into the seed process, in particular, to determine the degree of purity, the identification of the cultivar, the degree of hybridisation, the level of sterility, etc. Also, the material and technical base of breeding and seeding will be strengthened.

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Захарчук О.В., Завальнюк О.І. Насіння і садивний матеріал – інноваційний товар рослинництва

***Мета статті** – дослідити та надати пропозиції щодо необхідності посилення інноваційного розвитку рослинництва за рахунок використання нових сортів та гібридів сільськогосподарських культур.*

***Методика дослідження**. У процесі дослідження використано діалектичні методи пізнання процесів і явищ, монографічний метод (аналіз розвитку та забезпечення інноваціями в рослинництві в Україні та світі), емпіричний (щодо комплексної оцінки сучасного стану об'єкта дослідження), порівняльного аналізу (визначено проблеми й цілі інноваційного забезпечення в Україні), абстрактно-логічний метод (узагальнення та формулювання висновків).*

***Результати дослідження**. У процесі вивчення питань розвитку інновацій у рослинництві країни та в деяких європейських державах розкрито сучасний стан інноваційного забезпечення та проаналізовано його економічні й соціальні аспекти. Виявлено головні результати щодо інноваційного забезпечення рослинницької галузі України.*

***Елементи наукової новизни**. Набули подальшого розвитку теоретичні положення щодо інвестиційного розвитку в сільському господарстві, в основу яких покладено модернізацію сортового складу насінництва сільськогосподарських підприємств з урахуванням досягнень науково-технічного прогресу, прискорення вирішення важливих завдань щодо своєчасного сортооновлення та сортозаміни, що сприятиме впровадженню в галузях рослинництва прогресивних технологій, підвищенню продуктивності праці та отриманих прибутків.*

***Практична значущість**. Поряд з окремими позитивними змінами в інноваційному забезпеченні встановлено системні перешкоди на шляху розвитку. Внесено пропозиції щодо їх усунення активними методами, в тому числі й за рахунок державного регулювання. Табл.: 4. Бібліогр.: 16.*

***Ключові слова**: насіння і садивний матеріал; інноваційний товар; інноваційний розвиток; сортооновлення; сортозаміна; банк генетичних ресурсів.*

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Захарчук А.В., Завальнюк А.И. Семена и посадочный материал – инновационный товар растениеводства

***Цель статьи** – исследовать и дать предложения о необходимости усиления инновационного развития растениеводства за счет использования новых сортов и гибридов сельскохозяйственных культур.*

***Методика исследования**. В процессе исследования использованы диалектические методы познания процессов и явлений, монографический метод (анализ развития и обеспечения инновациями в растениеводстве в Украине и мире), эмпирический (по комплексной оценки современного состояния объекта исследования), сравнительного анализа (определены проблемы и цели инновационного обеспечения в Украине), абстрактно-логический метод (обобщение и формулирование выводов).*

***Результаты исследования**. В процессе изучения вопросов развития инноваций в растениеводстве страны и в некоторых европейских государствах раскрыто современное состояние инновационного обеспечения и проанализированы его экономические и социальные аспекты. Выявлены главные результаты инновационного обеспечения растениеводческой отрасли Украины.*

Элементы научной новизны. *Получили дальнейшее развитие теоретические положения относительно инвестиционного развития в сельском хозяйстве, в основу которых положены модернизация сортового состава семеноводства сельскохозяйственных предприятий с учетом достижений научно-технического прогресса, ускорение решения важных задач по своевременному сортообновлению и сортозамене, что будет способствовать внедрению в отраслях растениеводства прогрессивных технологий, повышению производительности труда и полученных доходов.*

Практическая значимость. *Наряду с отдельными позитивными изменениями в инновационном обеспечении установлены системные препятствия на пути развития. Внесены предложения по их устранению активными методами, в том числе за счет государственного регулирования. Табл.: 4. Библиогр.: 16.*

Ключевые слова: *семена и посадочный материал; инновационный товар; инновационное развитие; сортообновление; сортозамена; банк генетических ресурсов.*

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Новини АПК

Зменшення цін на агропродукцію призвело до рекордного зниження рентабельності сільгосппідприємств у 2019 році – Юрій Лупенко

За розрахунками Інституту аграрної економіки, рівень рентабельності агровиробництва у сільськогосподарських підприємствах може зменшитися з 22,8 % у 2018 р. до у 7,6 % у 2019 р. Це – найнижчий з 2006 року показник рентабельності виробництва продукції сільського господарства, поінформував директор Національного наукового центру «Інститут аграрної економіки», академік НААН **Юрій Лупенко**, презентуючи розробку науковців установи «Очікувані показники собівартості продукції, її дохідності, прибутковості та рентабельності в сільськогосподарських підприємствах України у 2019 році: методика і розрахунки (грудень 2019 року)».

За його словами, основними чинниками зменшення рентабельності стало зниження цін по більшості основних видів сільськогосподарської продукції на фоні зростання собівартості її виробництва.

Торік ціни на зернові культури знизилися проти 2018 року на 7,4 %, соняшник – майже на 11 %, ріпак – майже на 7 %. Найбільший спад цін відбувся по ячменю (-18 %), сої (-17 %) та пшениці (-11,8 %), зауважив Юрій Лупенко.

У тваринництві найбільший спад цін на яйця (-22,5 %) та приріст живої маси великої рогатої худоби і свиней (-5 %).

Водночас, у 2019 р., по більшості видів сільськогосподарської продукції, включаючи традиційно чутливі жито, гречку, овес, картоплю, овочі, плоди і ягоди, а також приріст птиці, молоко та вовну, збереглася динаміка зростання цін, зазначив науковець.

Загалом виручка агропідприємств від реалізації сільськогосподарської продукції зросла майже на 13 % – при підвищенні собівартості на 28,6 %. При цьому в рослинництві виручка збільшилася на 15,4 %, а собівартість – на 32,1 %. Виручка виробників тваринницької продукції зменшилася на 1,5 % при зростанні собівартості майже на 12 %.

Досвід 2019 року, коли при збільшенні обсягів агровиробництва відбувається зниження його ефективності, свідчить про необхідність створення дієвої системи підтримки цін і доходів сільськогосподарських товаровиробників в умовах несприятливої кон'юнктури світового та внутрішнього ринку, підсумував Юрій Лупенко.

Прес-служба ННЦ «Інститут аграрної економіки»