

# ENCOURAGEMENT WAYS OF THE INTRODUCTION OF INNOVATIVE TECHNOLOGIES IN PROVIDING AGROCHEMICAL SERVICES

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## Abstract

The article presents the role of innovative technologies in the development of agrochemical services in agriculture, existing problems and proposals for the effective implementation and support of innovations in the provision of agrochemical services.

**Key words:** agrochemical services, agroclusters, infrastructure, science, education, personnel, subsidies, factors, innovative technologies.



**Introduction.** Agriculture, through the production of products, plays an important role not only in ensuring the country's food security, but also in the development of the country's export potential. However, specific characteristics of agriculture hinder the development of the industry. In particular, production is inextricably linked with natural and climatic conditions, it is seasonal in nature, lack of material and financial resources, slow application of innovations, etc.

Therefore, in this case, by applying innovations in agriculture and attracting innovative investments, it is possible to eliminate the most important problems, such as not only increasing production, but also improving product quality, eliminating environmental problems of the regions, and increasing labor productivity. [4]

The purpose of the research.

The purpose of the research is to develop scientific proposals and recommendations for increasing the effectiveness of the introduction of innovative technologies in the provision of agrochemical services in agriculture.

Research methodology.

Data processing, logical observation, critical study of literature, analysis and synthesis, induction and deduction, comparison, modeling, economic analysis methods were used.

Relevance of the research topic.

Innovative development of agrochemical services in agriculture involves bringing science, education and production integration to a higher level in production, modernization of technological processes based on innovative technologies. The application of innovative technologies in the provision of agrochemical services is carried out mainly through the use of modern techniques and technologies.

There should be necessary conditions for the development of innovative processes in the provision of agrochemical services. These will require information-consulting service, marketing, financial resources, qualified personnel, material and technical base providing modern services, regulatory and legal framework for innovative activities.

By applying innovative achievements in the provision of agrochemical services, it is possible to achieve the following:

- increasing the productivity of plants;
- save spent resources;
- improvement of the ecological condition of soil, air and water resources.

At the current stage of the development of the agricultural sector, there is still a lack of demand

for science and innovation. Even in the provision of agrochemical services, the implementation of scientific achievements achieved to date is not at the required level. In particular, based on the world experience, the failure to use modern laboratories, drones, GIS technologies, remote sensing, innovative devices, automatic control systems in the provision of agrochemical services reduces the effectiveness of the used fertilizers.

The lack of attractiveness of innovative activity is directly related to the imperfection of the organizational and economic mechanism of introducing innovations in the provision of agrochemical services. In order to tackle this problem, appropriate legal frameworks are being developed. In particular, the decree of the President of the Republic of Uzbekistan No. PD-6159 "On the further development of the system of knowledge and innovations in agriculture and the provision of modern services" adopted on February 3, 2021 "The concept of priority development of the system of knowledge and innovations in agriculture in 2021-2025" was adopted. Based on the concept, the National Center and their regional agricultural service centers were established. Budgetary funds and subsidies, own funds of enterprises, loans, grants of foreign countries and organizations, and other financial funds provided for by legislation are involved in the introduction of innovations in the provision of agrochemical services. [1]

Also, according to the Regulation of the Cabinet of Ministers of the Republic of Uzbekistan No. 311 dated June 7, 2022, "On the formation and use of funds of the Plant Quarantine and Protection Agency of the Republic of Uzbekistan Plant Quarantine and Protection System Fund Development Fund", aimed at strengthening the material and technical base, retraining specialists and increasing their qualifications. [2]

Implementation of small programs is important in introducing innovations in the provision of agrochemical services. In particular, it is to encourage the purchase of high-tech machines and equipment in the provision of agrochemical services, to create a system of providing information to agriculture based on the formation of information consulting services, to systematically train and retrain personnel in the provision of agrochemical services, and to support start-up projects on the promotion of innovative activities.

In the introduction of innovations in the field of agrochemical services, the problem of personnel occupies the main place. According to the results of the survey conducted among the farms of the Syrdarya region on the study of the state of providing agrochemical services, the respondents asked "What do you think is

the level of knowledge and skills of specialists working in agrochemical service enterprises?" to the survey, 79.4 percent consider it average. "What do you think is the composition and competence of the staff in the provision of general agrochemical services?" to the question, 8.5 percent believe that they have higher education and 91.5 percent have secondary education. Of this, more than half of the provided agrochemical services are carried out by machinery and the acceleration of the use of modern innovative technologies further increases the need for qualified specialists (Table 1).

Due to the increasing number and type of agrochemical services, the need for qualified personnel for its management, administration and accounting is increasing.

**Table 1.**  
The results of the survey conducted among the farms of Syrdarya region for the purpose of evaluating agrochemical services\*

№	Content of the given question	Results of given answers, %			
		low	middle	high	I don't know
1	What do you think is the level of knowledge and skills of specialists working in agrochemical enterprises?	6,3	79,4	11,6	2,6
		Permanent workers		Seasonal workers	
		higher education	secondary education	higher education	secondary education
2	What do you think is the composition and competence of the staff in the provision of general agrochemical services?	7,8	46,3	0,7	45,2

\* Prepared by the authors based on the results of the survey

On average, more than 4.5-5 thousand specialists are working in agrochemical service enterprises across the country. Due to the growing demand of agricultural entities for quality agrochemical services, it is necessary for the personnel providing them to be qualified specialists.

The high level of equipping employees with basic tools affects the quality of agrochemical services and labor productivity. For example, experts in the field "in many countries of the world, color charts, chloromillimeters, optical sensors and many other similar equipments have been effectively used in the application of nitrogen fertilizers. These devices measure the nitrogen demand of the soil during the growth period of agricultural crops and serve to determine the amount of nitrogen fertilizer needed for the crop. This, in turn, increases the efficiency of the given nitrogen fertilizer, reduces excessive costs and environmental damage caused by the use of nitrogen fertilizer in agricultural production. [6]

Specialists of the ZEF project of UNESCO have successfully tested the GreenSeeker optical sensor device under the conditions of Uzbekistan on the main crops (cotton and grain). The use of these innovative technologies makes it possible to save up to 10% of nitrogen fertilizers. If a total of 448,478 tons of nitrogen fertilizers were used in agriculture in our republic in 2021, up to 45,000 tons of nitrogen fertilizers can be saved by applying the above-mentioned innovative technologies. (Table 2).

Depending on the market value, the

funds spent on these innovative technologies will pay for themselves within 1 to 5 years. Experts who conducted this research expressed confidence that the production of cheap types of this equipment is starting abroad, and that optical sensor equipment will be widely used in the agricultural practice of Uzbekistan in the future. However, as expected, innovative developments remain unpopular among agricultural producers. This is influenced by the lack of promotion of the use of innovative technologies and the lack of sufficient promotional activities.

The extremely low level of innovative activity in the provision of agrochemical services is due to a number of factors:

- very low level of close cooperation between state and private business;
- very little expenditure on field science, scientific-research works of agricultural subjects;
- the low level of up-to-date knowledge of specialists on industry innovations and the lack of sufficient motivation of employees to adopt and implement innovations, etc.

In order to develop innovative activities in the provision of agrochemical services, it is important to inform service processes, to develop specific recommendations on various aspects of network activity. The highly effective use of modern information technologies based on the formation of an appropriate database allows the use of methods of quantitative forecasting of services provided in the future. The application of these modern methods in practice optimizes the use of limited resources and increases the efficiency of mineral and organic fertilizers. Accordingly, the coordination and support of the joint efforts of science and agricultural subjects by the state will allow to increase innovative activity in the agro-industrial complex of our country in the future. [15]

Conclusions and suggestions:

State support of innovative activities is a set of measures implemented by state authorities in accordance with legislation. It is desirable to support innovative activity by the state based on the following principles:

- development and implementation of a plan of measures for state support;

**Table 2.**  
The amount of nitrogen fertilizers used in agriculture in the Republic of Uzbekistan, in pure form, in tons

	2015	2016	2017	2018	2019	2020	2021
<b>Republic of Uzbekistan</b>	<b>695164</b>	<b>706185</b>	<b>677097</b>	<b>493465</b>	<b>493463</b>	<b>449325</b>	<b>448478</b>
Republic of Karakalpakstan	23405	26437	27849	20531	20531	16926	15636
regions:							
Andijan	50542	52188	49101	37410	37407	28890	32068
Bukhara	60239	60535	60339	39807	39807	34318	37976
Jizzakh	136136	137406	121949	63886	63886	61024	50279
Kashkadarya	71265	72775	74020	71051	71051	69652	69308
Navoi	18018	17903	17321	14258	14258	13262	13672
Namangan	45542	46583	43779	23198	23198	20965	24048
Samarkand	46370	46356	46491	32617	32617	30788	31762
Surkhandarya	47137	47315	46131	38631	38631	36294	33975
Syrdarya	41732	42491	42055	43769	43769	46407	44605
Tashkent	68732	69132	65846	41170	41170	39309	41071
Ferghana	39418	39511	37235	37531	37531	29380	33311
Khorezm	46629	47553	44980	29606	29606	22110	20768

Source: Information of the Statistical Committee of the Republic of Uzbekistan

- establishment of state support at all stages of innovation (agroclusters, infrastructure entities, farmers and peasant farms);
- wide introduction of market mechanisms and forms of public-private partnerships for innovation promotion;
- formation of innovative infrastructure and its development;
- ensuring transparency of state support for innovative activities;
- stimulation of private initiative to introduce innovations;
- ensuring the effectiveness of state support for innovative activities.

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