Effectiveness of using innovative technologies in the production of plant products

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Abstract. This article highlights the importance of innovative agro-technologies in increasing the production of plant products, and provides information about the projects implemented in agriculture in Kashkadarya region. Also, the advantage of pollination with bees, which is considered one of the environmentally friendly agrotechnologies in increasing the yield of plant products, has been scientifically substantiated based on the results of the experiment.

1 Introduction

In the world community, innovation is considered as an important factor in ensuring food security and sustainable development of agriculture, and is being researched as a global problem. In particular, scientific research aimed at increasing the productivity and efficiency of agricultural crops based on the use of genetic modification, modern fertilizers, new irrigation technologies, artificial intelligence in data analysis, and the use of such innovative methods and technologies. special attention is paid. However, taking into account the fact that each country has its own natural and climatic conditions and gene pool, it is necessary to carry out research on the further improvement of the organizational and economic foundations of the innovative development of the agricultural sector.

Consistent measures are being taken to ensure wider integration of science, education and production, to create and apply new knowledge, to introduce innovative technologies and best practices in the conditions of the new Uzbekistan. However, the results of the research on the introduction of innovative technologies and the development of the agrarian sector do not reach the lowest levels of the sector, and problems that have not been solved for years prevent the agricultural sector from developing more rapidly. Therefore, in the future "as one of the main directions of agricultural development, to create effective mechanisms for the dissemination of knowledge integrated with the production of research, education and consulting services, to develop the system of science, education, information and consulting services" , "to increase the income of peasants and farmers by at least 2 times through the intensive development of agriculture on a scientific basis, to bring the annual growth of agriculture to at least 5%, to improve the system of providing agro-services based on science and innovation, to supply raw materials to agro-industrial enterprises and to increase the volume of production by 1.5 times" setting it as a priority has turned the issue of improving the organizational and economic foundations of the

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innovative development of agriculture, including the cultivation of plant products, into one of the most urgent problems of the present day. We don't have to wait a few decades to see how innovative agricultural solutions will affect human life in the future. On the contrary, it is necessary to take an important step for our economy by quickly introducing the latest technologies that will change the methods of cultivation, transportation, storage and management of products of farmers and peasant farms.

2 Materials and methods

Economists of foreign countries and our country have conducted scientific and research work in various directions on the scientific and methodological basis of increasing the efficiency of innovative processes in the agrarian sector of the economy. In particular, the effectiveness of innovative technologies in stabilizing agricultural sectors was analyzed by scientists such as I. Nechayev, Y.I. Bershinsky, Z.R. Tavasieva, M. Porter, I.S. Sandu, B. Santo.

The objective necessity of innovative technologies in the processes of production, processing and servicing of agricultural products, its directions, scientific methodical bases of innovative development by the agrarian economists of our country K.A. Choriyev, R.X. Ergashev, S.N. Khamraeva, I.B. Rustamova researched.

According to the analysis of research conducted on these issues in scientific sources, the problems of using digital technologies in improving the organizational and economic foundations of innovative development of crop production, introducing innovative technologies in the crop production network on the basis of public-private partnership, and ways to solve them are not sufficiently covered. Graphical and monographic methods, as well as abstract-logical and questionnaire-survey methods were used in the analysis of the laws under consideration within the framework of the research.

3 Results and Discussion

In the 21st century, the problem of management, organization of innovative activity, selection of methods and mechanisms for innovative development of various sectors of the economy has been in the focus of attention of economists.

Innovation, innovative activity, innovative process, and similar concepts are firmly established in various aspects of daily life, enterprise activity, and economic sectors. In developed countries, innovation is one of the important factors in increasing the competitiveness of enterprises, strengthening their position in the market and producing consumer goods. The process of rapid development of economy based on knowledge and innovation continues in all leading developed countries. In the next 10 years, 2/3 of the volume of agricultural products is related to the implementation of the results of scientific and technical development. Stabilization of agriculture is important, technological modernization of agriculture is one of the priorities.

In particular, according to the Decree of the Republic of Uzbekistan "On the Approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" developed with the participation of international organizations and experts, as one of the priority areas of the implementation of the Strategy "science, education, information and consulting services in agriculture" system development" is defined. As a result of the ongoing reforms, certain actions have been taken to attract investments to the sector, introduce resource-efficient technologies, and provide agricultural producers with modern equipment.

In particular, a total of 111 projects for the development of agriculture in Kashkadarya region were implemented in 2023, of which 11 projects were implemented in the field of fruit and vegetable production, 87 in the field of animal husbandry and 13 in other areas of agriculture. (Table 1)

Table 1. Investment projects implemented in the field of agriculture in Kashkadarya region (in 2023).

T/p	Name of networks	Number of projects	Project cost (million sums)	Funding sources			Jobs to be created
				Own funds, million sums	bank credit line, (million sums)	Foreign credit line, (thousand dollars)	
Total		111	424 623	261 362	160 300	2 961	415
I	Direction of fruit and vegetable growing	11	30 027	20 527	7 000	2 500	51
1	*Development of horticulture*	2	2 233	1 533	200	500	8
2	*Organization of modern greenhouses*	6	16 108	13 708	400	2 000	29
3	*Development of viticulture*	1	333	333			10
4	*Organization of agrologistics centers*		2 628	1 128	1 500		
5	*Organization of refrigerating capacities*	2	8 724	3 824	4 900		4
II	Animal husbandry direction	87	343 499	190 938	152 100	461	279
6	*Development of beekeeping*	1	2 821	1 071	1 750		2
7	*Development of fisheries*	4	5 108	2 508	2 600		15
8	*Poultry development*	8	169 410	54 460	114 950		34
9	*Animal feed*	2	6 537	2 217	4 320		8
10	*Development of animal husbandry*	72	159 623	130 682	28 480	461	220
III	Other agricultural sectors	13	51 097	49 897	1 200		85
11	*Cultivation of landscape plants*	1	12 750	11 550	1 200		15
12	*Cultivation of medicinal plants*	2	7 171	7 171			30
13	*Organization of a modern irrigation system*	7	18 601	18 601			24
14	*Services in agriculture*	3	12 575	12 575			16

According to the analysis, a total of 456,898 million soums were allocated for the implemented projects, of which 61.6% were financed by agricultural producers, 37.8% by bank loans and 0.7% by international financial organizations. As a result of the implemented projects, 415 jobs were also created. According to our conducted research, the

projects implemented in the region are mainly aimed at the development of the livestock sector, and 343,499 million soums of the financed projects are directed to this sector.

Projects implemented in the field of plant breeding are being carried out in such directions as the development of horticulture, the establishment of modern greenhouses, the development of viticulture, and the establishment of a modern irrigation system.

At the same time, the implementation of some projects will have a positive effect on the development of not only one sector, but also the crop and livestock sector. Among such projects are measures aimed at the development of beekeeping in these regions.

In recent years, ecologically friendly innovative agrotechnical measures have been used in plant breeding to increase the productivity of agricultural crops. One such measure involves the use of bees for pollination of crops.

Thanks to the pollination activity of bees, the productivity of plants increases by 60-90%, and the income from increased productivity is 15-20 times higher than the value of beekeeping products. No other agricultural activity gives such a high result. Because these insects control crops by pollinating plants and can increase productivity by replacing chemicals with environmentally safe and crop protection systems, agriculture is increasingly innovating its technologies to help protect bees and increase their pollination capacity, and is using commercially raised bees. The system does not require water spraying or the use of tractors. Instead, a scientifically engineered beehive allows bees to travel across a field to pollinate and protect specific plants by spraying pest-fighting powders on their feet. This innovation in agricultural technology will help improve sustainable farming, yield and soil quality. Suitable for many crops that require chemical solutions, including cotton, greens, sunflowers, apples and tomatoes, it caters to farmers and ranchers of all sizes.

The number of bee families needed for pollination depends on the type of crops, the area of the crop, the period of flowering and a number of other factors. The following table shows the number of bee families required for bee pollination of crops developed by scientists.

Table 2. The number of bee families required for pollination of agricultural crops on 1 hectare and the increase in productivity.

Crop type	Number of bee families	Productivity increase, %
Buckwheat	2-2.5	40-60
Sunflower	0.5-1	40-50
Coriander	2-3	60-80
Vegetable crops	0.3-0.5	30-160

Pollination of agricultural crops with the help of bees has a positive effect not only on the increase in productivity, but also on the quality indicators of the obtained product. In the course of the research, we compared the indicators of economic efficiency in the implementation of agrotechnical measures for pollination of crops in the Kashkadarya region, using traditional and bees (Table 3).

Table 3. Information about agricultural products grown by traditional and bee technology of farmers and peasant farms in Kashkadarya region.

Farm name	total area, ha	direction	2022 year												
			areas where no beehives have been placed, (from 1 hectare)					beehive sites, (from 1 hectare)					Yield variance, (percentage +/-)	Profit difference (thousand sums, +/-)	Profitability difference (percent, +/-)
			yield quintal / ha	cost, thousand sums	income, thousand sums	profit, thousand soums	profitability, %	yield quintal / ha	cost, thousand sums	income, thousand sums	profit, thousand soums	profitability, %			
Tursunov Shoxrux	0.35	vegetable growing	263	6300	18000	11700	186	341	6300	24000	17700	281	30	6000	95
Maxmatqosim Dilshodbek	51	wheat	53	8800	15900	7100	81	65	8800	19500	10700	122	23	3600	41
		cotton	26	14000	26000	12000	86	36	14000	36000	22000	157	38	10000	71
Qahramon Mirziyo	52.4	wheat	55	9000	16500	7500	83	62	9000	18600	9600	107	13	2100	24
		cotton	27	12500	27000	14500	116	37	12500	37000	24500	196	37	10000	80
Jumanov Normurod	0.4	vegetable growing	248	5200	16000	10800	208	335	5200	22000	16800	323	35	6000	115
Yuqori sifat innovatsion qurilish	17	vegetable growing	251	5700	12000	6300	111	324	5700	15500	9800	172	29	3500	61
Darman-farm	171	horticulture and grapes	91	4800	15500	10700	223	114	4800	19418	14618	305	25	3918	82
Namuna bog'	203	cotton	27	12500	27000	14500	116	33	11800	33000	21200	180	22	6700	64
		wheat	48	8000	14400	6400	80	55	8000	16500	8500	106	15	2100	26
Shamshar	103	cotton	26	12300	26000	13700	111	34	12300	34000	21700	176	31	8000	65
		wheat	48	8800	14400	5600	64	60	8800	18000	9200	105	25	3600	41
Yangiqurg'on istiqboli	40	cotton	25	11900	25000	13100	110	31	11900	31000	19100	161	24	6000	51
		wheat	48	9200	14400	5200	57	58	9200	17400	8200	89	21	3000	32

4 Conclusion

According to studies, it was found that the yield and profitability of bee-pollinated fields are significantly higher than those without bee hives. In particular, productivity in cotton growing increased to 22-38%, profitability level increased to 64-71%, grain productivity increased to 20-25%, profitability increased to 24-41%, profitability level increased to 29-35%. it can be seen that profitability has increased by 82 percent.

In order to widely spread this foreign experience to our country and to widely introduce the practice of bee pollination to increase the productivity of agricultural crops, the Cabinet of Ministers of the Republic of Uzbekistan dated June 12, 2023 “On additional measures to support the beekeeping network and pollination of agricultural crops with bees” was adopted. According to it, it is planned to implement the following measures:

- To increase cotton productivity in 2023 on an area of 200,000 hectares, use agrotechnics of cotton pollination with bees.
- In 2023-2024, to increase the number of bee families, to organize provision of bee pollination services to increase the productivity of agricultural crops.
- Training of qualified specialists who provide the service of pollination of agricultural crops with bees.
- Further improvement of agrotechnics of bee pollination of agricultural crops and its application.
- Development of recommendations for solving problems in this regard.
- Promoting best practices in beekeeping by inviting qualified specialists and scientists from countries with developed beekeeping.

- The importance of using agrotechnics of bee pollination in cotton fields and intensive fruit orchards at the “Farmers' School”, its economic effect, the effect on the increase in the yield and quality of agricultural crops, and the use of experiences in foreign countries with developed beekeeping industry in this regard. It is decided to organize training courses for cotton-textile clusters, farms and intensive orchard owners. Also, in the decision, in 2023, cotton-textile clusters in the Kashkadarya region will make 19,500 hectares of cotton-textile agro-techniques, and 39,000 beehives will be placed there.

References

1. Bee pollination. Should beekeepers be paid, https://agroinfo.kz/pcheloopylenie-nado-li-platit-pchelovodam
2. "Decision of the Cabinet of Ministers of the Republic of Uzbekistan “On additional measures to support the beekeeping network and pollination of agricultural crops with bees”. 12.06.2023 No. 239, https://lex.uz/docs/
3. Development strategy of new Uzbekistan for 2022-2026, https://lex.uz/uz/docs/-5841063
4. J.I. Bershitsky, Program-target strategy for innovative development of the agro-industrial complex: monograph
5. Q.A. Choriyev, Methodological recommendations on increasing the efficiency of modernization of agriculture based on innovations, UzBIITI, Tashkent, 35 (2013)
6. Decree of the President of the Republic of Uzbekistan dated October 23, 2019 No. PF-5853 “On approval of the strategy for the development of agriculture of the Republic of Uzbekistan for 2020-2030” (2019)
7. Shirin Fayziyeva, Gulnoza Samiyiva, Shakhribonu Yuldosheve, Ensuring food safety in Uzbekistan and its forecasting, BIO Web of Conferences, 71 (2023) 10.1051/bioconf/20237101072
8. V.I. Nechaev, Development of innovative activities in crop production (Kolos S, Moscow, 2010)
9. M. Porter, J. Bright, B. Twiss, I.S. Sandu, Problematic issues of innovative development of the agro-industrial complex (RosAKO APK, Moscow, 2005)
10. I.B. Rustamova, Effectiveness of innovative techniques and technologies and the development of technical and economic studies, Economy and education, **1**, 48-52 (2015)
11. Analysis of factors to increase the efficiency of the use of peasant farms and the land of the field, E3S Web Conf., 392 (2023)
12. S. Khamraeva, N. Ochilova, Assessment of innovative potential of farmers and homestead land owners, E3S Web Conf., **480**, 03003 (2024)
13. Rakhmatulla Ergashev, Determining the prospects of the development of the cooperative of fruit and vegetable products, E3S Web Conf., **480**, 03002 (2024)
14. B. Santo, Innovation as a means of economic development: Trans. from Hungarian, General ed. and entry Art. B.V. Sazonova (Progress, Moscow, 1990)
15. Z.R. Tavasieva, Organizational, technological and economic mechanisms of innovative development of crop production. Diss. Candidate of Economic Sciences Vladikavkaz, 167 (2014)