Past, Present and Future Prospects of Grain Farming in Uzbekistan

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Keywords: Planting Machine, Seedling Automation, Sand Afforestation.

Abstract: Wheat is one of the most important food crops in agriculture. In most countries of the world, the bulk of the diet consists of products from grains and legumes. In connection with this, grains, including wheat, are of great importance in our lives. Currently, an average of about 760 million tons of grain are stored annually in the world; by 2030, this figure is planned to increase to 850 million tons. In Uzbekistan, too, during the years of independence, very great achievements were noted in grain growing. During the years of independence, the gross grain harvest increased from 943 thousand tons to 8 million 200 thousand tons, and grain yield from 11.9 ts/ha to 78.0 ts/ha. The results of the experiment carried out in a variant where a suspension from a leaf was applied once in the grafting "Sila Kremniy" at a norm of 200 g/ha and a one-year spike against weeds Starpik 24% e.k. when spraying herbicide 0.15 liters per hectare, an additional grain yield l of 10.8 ts/Ha was obtained compared to the control option of 79.7 ts/ha. In grading, a variant that uses "Sila Kremniy" twice in the 200 g/ha norm has a total of 80% s.e.k against annual spike and double-bladed and perennial double-bladed when herbicide was administered at 30 grams per hectare, the grain yield was 82.1 ts/ha, with an additional grain yield of 13.2 ts/ha per control option.

1 INTRODUCTION

Cereal crops are of great economic and production importance in the national economy of the Republic of Uzbekistan. Cereal crops play an important role in meeting the food needs of the population, providing livestock with concentrate and coarse fodder, and raw materials for some industries.

Increasing grain production is the main problem in agriculture. After the independence of the Republic of Uzbekistan, a number of practical works were carried out, decrees and laws were adopted to increase the production of grain, to meet the demand of the country's population and the national economy for grain at the expense of the grain crop grown in the republic.

Altman (1983), Atabayeva & Azizov (2008), Arabi & Javhar (2000), Azizov et al. (2021a), Charshanbiev et al. (2021) and Yodgorov et al. (2023), on the development of grain growing in our country, increasing the yield of grain crops, Azizov et al. (2017), Azizov et al. (2021b) and Charshanbiev (2023), conducted scientific research.

Scientists such as R.I.Siddikov, A.A.Amonov, A.O.Amanov conducted research on the selection and breeding of grain crops in different regions of our country, and created many varieties of wheat.

Scientists such as Professor Kh.N. Atabaeva, N.Kh. Khalilov, B.M.Azizov carried out scientific research on the technologies of growing autumn and spring wheat under irrigated conditions, the resistance of wheat to winter and various stress factors, and the nutrition of wheat from roots and without roots .

Scientists such as A.I.Nurbekov, P.Kh.Bobomirzaev, G'.Gaybullaev carried out scientific research on the development of

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technologies for growing wheat in dry conditions, minimizing tillage.

D. Altman, M. Arabi on grain production and especially wheat cultivation in foreign countries. Many scientists, such as Z. Borlan A. Kassan, conducted scientific research. Nevertheless, there are many problems in grain farming today. Grown grain cannot fully satisfy the population's need for this product. Global economic changes are causing a number of difficulties in the cultivation of winter wheat and other grain crops, the grain quality is relatively low.

There are different views on a number of issues in grain farming, and these problems await resolution. Therefore, it is appropriate to continue scientific research in this regard, to conduct scientific research on innovative technologies.

2 MATERIALS AND METHODS

In order to ensure the reliability of data in the conduct of every scientific work and scientific analysis, it is necessary to ensure that the research is carried out methodologically correctly.

Field experiments were carried out according to B.A. Dospehov's "Methods of conducting field experiments", statistical analysis of data was carried out using "Excel 2010" "Statistisa 7.0 for Windows" computer programs based on B.A. Dospehov's "Metodika polevogo opyta" method. on the basis of the panel data obtained in our research, the results of the analysis were obtained using the "Variable effect" (Random effects) model in the STATA-17 program package in the economic assessment of the factors affecting the productivity of durum wheat in dry farming.

Led to the depletion of groundwater resources due to the unauthorized construction of water intake structures and uncontrolled water extraction. which led to a percent decrease and depletion of water reserves in some sources. Applying the technology of solar panels, which is considered a renewable energy source, to the water transmission networks in our country, as well as to all sectors, allows to eliminate technical failures and excess energy consumption in the system and provide the population with water at the same rate (Arabi & Javhar, 2000; Azizov et al., 2017; Azizov et al., 2021b).

Figure 1: Conducting experiments to determine the leaf surface. View of the experimental field.

3 RESULTS AND DISCUSSION

For the sustainable development of grain farming in our country, including the cultivation of grain crops, we need to thoroughly study and analyze the past of grain farming, identify the shortcomings and develop ways to eliminate them. You can't take a bold step into the future without knowing the past.

Indeed, during the years of independence, great work was done in the field of grain production in our country, and we achieved great victories. Grain yield has increased almost 5-6 times.

After the independence of the Republic of Uzbekistan, major changes took place in the structure of cultivated areas. Areas of the main crop cotton and fodder crops were reduced, and the area of grain crops was increased dramatically. There are 4.3 million hectares of irrigated and 750 thousand hectares of arable land in our republic (Yodgorov et al., 2023; Saidova, et al., 2024; Saidova, 2024).

After the independence of our republic, the yield of corn and other grain crops has been increasing year by year. In 1992-1994, the yield of grain crops on irrigated land reached 12 t/ha, 41 t/ha in 2004, and 78.0 t/ha by 2023. The increase in productivity is observed for all grain crops. Table 1 provides information on the increase in grain cultivation and the growth rate of grain yield in Uzbekistan during the years of independence.

Before independence, the gross harvest in grain cultivation in Uzbekistan was 990 thousand tons, and the grain yield was 9-10 t/ha. The main reasons for this are that most of the grain arable land is grown in relatively low-fertility areas and dry lands. In the irrigated areas, the cultivated area was less.

Data on the gross wheat crop grown in Uzbekistan during the years of independence (1991-2023) are presented in Figure 1. In the first years of independence, the gross harvest was 1,200-1,550 thousand tons, and the grain yield was 11.9-13.0 tons/ha. Because in this period, there was not yet enough experience in grain growing, grain growing technologies had not been developed. Low-yielding wheat varieties were planted in the main fields. The rate of grain planting is 3 mln. Ha, and the planting dates in most cases corresponded to November.

By 2002, due to the planting of intensive varieties such as Yuna, Kroshka, Demintra, Kupava, Chillaki, Sanzar 4, Sanzar 8, Yonbosh, and Marjon, the total grain yield reached 4500 thousand tons and the grain yield reached 42.0 t/ha.

It was arranged to sow 5-6 million grain seeds in October in all areas. A cotton-cereal short rotation cropping system was formed.

Finally, in 2022-2023, due to the use of innovative technologies in grain farming, programming of mineral fertilizers for the planned harvest on a scientific basis, the widespread introduction of foliar feeding, and the use of biostimulants, the gross grain yield reached 7193-8200 thousand tons in the next two years. Grain yield reached 69.8-78.0 tons/ha.

In the first years of independence in 1991-1992, the number of plants in the field was 1.5-2 million, the total leaf area was only 10-15 thousand m2/ha, in 2001-2002, the number of plants was 2.5-3.0 million ha, the total leaf area was 20-25 thousand m2/ha, by the last years 2022-2023, the thickness of seedlings was 4.0-4.5 million ha, the total leaf area was 35-40 thousand m2/ha.

Foliar feeding of winter wheat in grain production increased the total leaf area in the field, accelerated physiological processes, and significantly increased the efficiency of plant absorption of mineral fertilizers.

It was observed that when winter wheat is fed through the usual roots, only 35-40% of mineral fertilizers, especially nitrogen fertilizers, are absorbed by the plant, and the nitrogen that is not absorbed by the plant has a negative impact on the environment (ecology). When winter wheat is foliarly fed, the absorption rate of mineral fertilizers by the plant increases to 80-85%.

It was found that feeding winter wheat from the leaves in addition to the roots increases the efficiency of mineral fertilizers, increases the immunity of the plant to pests and diseases, and has a positive effect on the grain quality.

The conducted scientific research shows that when autumn wheat is fed with leaves and roots, the amount of protein in the grain increases by 1.5-2%, and the amount of gluten increases by 3-4%. Foliar feeding of winter wheat has been shown to significantlyincrease immunity to plant-sucking pests along with a positive effect on grain quality.

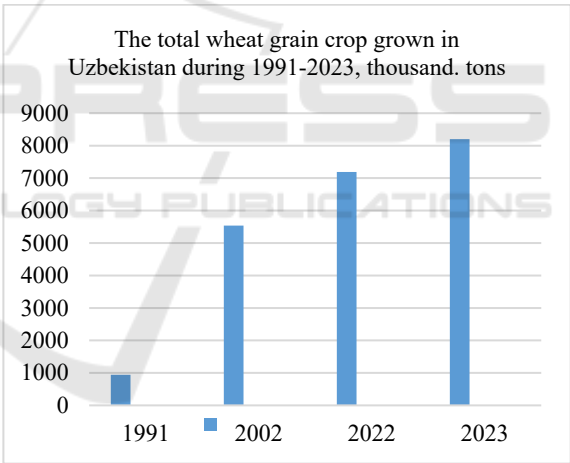

Figure 2: Development dynamics of grain cultivation in Independence 1991-2023 (per thousand tons).

Table 1: Information on the growth dynamics of wheat grain cultivation in Uzbekistan during the years of independence.

Years	**1990**	**1992**	**1994**	**1996**	**1998**	**2000**	**2002**	**2022**	**2023**
Harvest, Thousand/ton	990	1200	1550	2550	3000	3100	4500	7193	8200
Productivity, ts/ha	10.0	11.9	13.0	21.3	25.2	26.1	42,0	69.8	78.0

From the above data, it can be seen that in the first years of independence, the gross grain yield of our country was only 943 thousand tons. This harvest could not satisfy the population's need for grain. The early years of independence were planted in dry lands with low gross grain yields, as well as in low-fertility lands. Mainly old local varieties with low productivity are planted. Wheat is traditionally cultivated in a primitive way. The seed production system is not well established. The seed sowing rate

was only 80-100 kg/ha. As a result, low grain yield and productivity have been recorded. Because of this, increasing grain production was considered one of the most urgent tasks.

As a result of increased attention to grain production, by 2002, the total grain yield reached 5139 thousand tons. Gross yield has increased almost 5-5.5 times. The gross grain harvest in 2022 was 7192 thousand tons, and in 2023 it was 8200 thousand tons. A record was set in grain production. In our country, a significant increase was noted in the grain yield as well as the gross wheat yield.

Data on the growth dynamics of wheat grain yield are presented in Figure 2.

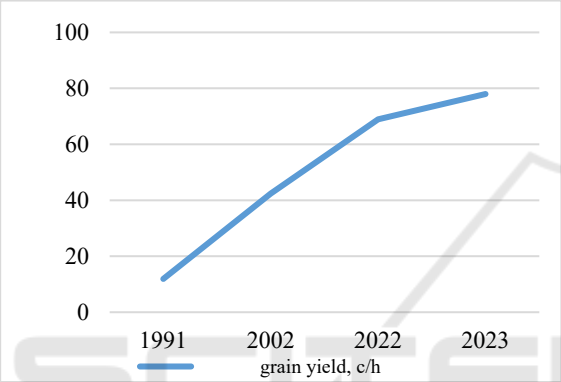

Figure 3: Wheat grain yield in 1991-2023.

As can be seen from the above data, in the early years of independence, the yield of wheat grain in our country was 11.9 t/ha, in 2002 the yield was 42.4 t/ha, in 2022 69.8 t/ha, and in 2023 78.0 made ts/ha. According to the indicator of grain productivity, Uzbekistan was ranked from 98 to 12 out of 210 countries in the world. However, these indicators are not enough, the strategy of actions indicates to increase the yield of wheat grain to 80-85 tons/ha by 2025-2030.

Due to the significant increase in grain yield in Uzbekistan in recent years, it entered the top 10 in the world ranking in terms of yield in 2022. The first place in the world ranking is Ireland - 100.8 t/ha, the second place is New Zealand - 97.1 t/ha, the third place is Great Britain - 78.1 t/ha, Uzbekistan - 69.8 t/ha grain yield

List of countries with the top 10 grain yields:

1. Ireland - 100.8 tons/ha;
2. New Zealand - 97.1 ts/ha;
3. Great Britain - 78.1 ts/ha;
4. Germany - 73.0 ts/ha;
5. France - 70.3 tons/ha;
6. Uzbekistan - 69.8 tons/ha;
7. Egypt - 64.5 tons/ha;
8. China - 58.1 tons/ha;
9. Ukraine - 45.3 tons/ha;
10. South Africa - 43.1 ts/ha.

If our country's annual need for grain for bread and bakery products is 6.0-6.5 million tons, the annual need for grain to meet the needs of the population for food products, industry for raw materials, and livestock for concentrate feed is 16-20 million Makes a ton. That is, in order to bring grain production to the level of developed countries, we need to grow at least 500-600 kg of grain per capita. In the future, it is expected that the increase of grain production in our country will be carried out mainly due to the increase of productivity, the development and introduction of technologies for intensive cultivation in grain growing.

In order to further improve the above processes, we conducted several experiments on winter wheat. In increasing the productivity of winter wheat, agro-measures such as timely provision of its food requirements, keeping the field free of weeds and protection against diseases and pests play an important role.

The experiments were carried out to ensure the nutritional requirements of winter wheat and to protect against weeds. The experiments were conducted in the grassland soils of the Tashkent region and were carried out on Asr and Vassa varieties of winter wheat.

Winter wheat was fed according to the norm adopted in the farm to ensure its need for mineral fertilizers during the growth period. In addition, it was additionally suspended with "Nano silicon" (Sila silicon) through the leaves at the rate of 150, 200 g/ha, once and twice.

Experiments were conducted on Asr and Wassa varieties of winter wheat. In the experiments carried out on Asr variety, in the control variant, mineral fertilizers were applied in the norms of N250P175K125, and the yield of winter wheat was obtained on average of 63.8 t/ha when no herbicide was sprayed against weeds. In the cultivation of winter wheat, N250P175K125 (FON) mineral fertilizer is used, "Sila kremniy" 150 g/ha once from the leaves, Starpik 24% e.c. When 0.2 liters of herbicide was sprayed per hectare, the yield increased by 4.6 t/ha compared to the control option (68.4 t/ha). "Sila kremniy" 150 g/ha is added to mineral fertilizers in the feeding of winter wheat against annual spike and dicotyledonous weeds and perennial dicotyledonous weeds Total 80% s.e.g. When 40 grams of herbicide was sprayed per hectare, the yield

increased by 7.8 t/ha compared to the control option (71.6 t/ha).

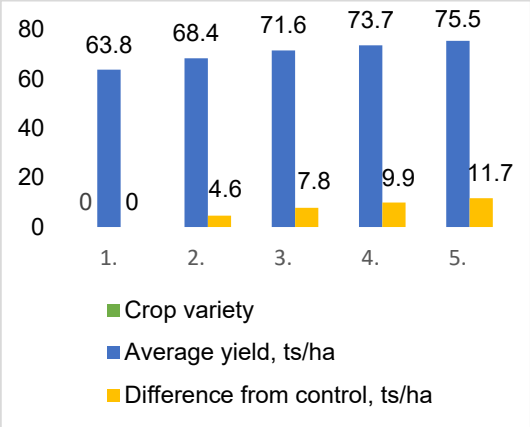

Figure 4: Effect of mineral fertilizers, foliar feeding and herbicide application on winter wheat yield.

Addition to mineral fertilizers "Sila kremniy" 200 g/ha once applied against one-year spiked weeds Starpik 24% e.c. When 0.15 liters of herbicide was applied per hectare, the yield was increased by 9.9 t/ha compared to the control option (73.7 t/ha). "Sila kremniy" 200 g/ha twice-applied option against annual spike weeds, annual spike and dicotyledonous weeds and perennial dicotyledonous weeds Total 80% s.e.g. When 30 grams of herbicide was applied per hectare, the yield was increased by 11.7 t/ha compared to the control option (75.5 t/ha) (Table 2).

In the experiments carried out on the Vassa variety of winter wheat, an average yield of 68.9 t/ha was obtained in the control option. When winter wheat is fed with mineral fertilizers, "Sila silicon" 150 g/ha once as a leaf suspension and Starpik 24% e.c. When 0.2 liters of herbicide was sprayed per hectare, the yield increased by 6.3 t/ha compared to the control variant (75.2 t/ha). "Sila kremniy" 150 g/ha is added to mineral fertilizers in the feeding of winter wheat against annual spike and dicotyledonous weeds and perennial dicotyledonous weeds Total 80% s.e.g. When 40 grams of herbicide was applied per hectare, the yield was increased by 8.9 tons/ha compared to the control option (77.8 tons/ha).

Table 2: Effects of feeding and weed control on winter wheat yield (2019, 2021, 2023).

№	Crop variety	Mineral fertilizer rate, kg/ha		Organic fertilizer rate, g/ha	Herbicide name and rate kg/ha, l/ha		Productivity, ts/ha	
							Average yield, ts/ha	Difference from control, ts/ha
1	2007375 Asr	Control	$N_{250}P_{175}K_{125}$ (FON)	-	No herbicide	-	63,8	-
2		FON+Sila Kremniy	FON	150 g once	Starpik 24% e.k. g/kg	0,21	68,4	4,6
3			FON	150 g Twice	Total, 80% s.e.g.	40 g	71,6	7,8
4			FON	200 g once	Starpik 24% e.k. g/kg	0,15 l	73,7	9,9
5			FON	200 g twice	Total, 80% s.e.g.	30 g	75,5	11,7
6	2010420 Vassa	Control	$N_{250}P_{175}K_{125}$ (FON)	-	No herbicide	-	68,9	-
7		FON+Sila Kremniy	FON	150 g once	Starpik 24% e.k. g/kg	0,2 l	75,2	6,3
8			FON	150 g Twice	Total, 80% s.e.g.	40 g	77,8	8,9
9			FON	200 g once	Starpik 24% e.k. g/kg	0,15 l	79,7	10,8
10			FON	200 g twice	Total, 80% s.e.g.	30 g	82,1	13,2

"Sila kremniy" 200 g/ha once as a foliar suspension against annual spike weeds Starpik 24% e.c. When 0.15 liters of herbicide was sprayed per hectare, the yield increased by 10.8 tons/ha compared to the control option (79.7 tons/ha). "Sila Kremniy" at the rate of 200 g/ha twice applied against annual spike and dicotyledonous and perennial dicotyledonous weeds Total 80% s.e.g. when herbicide was applied at 30 grams per hectare, yield was increased by 13.2 t/ha compared to the control option (82.1 t/ha) (Table 2, Fig. 4).

Figure 5: Calculate wheat yield.

The results of the experiment show that feeding plays an important role in increasing the yield of winter wheat. In addition to the use of mineral fertilizers, it was found that the growth of winter wheat can be achieved by using the drug "Sila silicon" created on the basis of nanotechnology through the leaf during the growth period, by applying herbicides with high efficiency against weeds in one and two times.

Figure 6: Analysis of experimental results.

Therefore, in the future development of grain growing in our country, the main attention should be focused on increasing grain yield, increasing product quality, increasing soil fertility, and improving ecological conditions.

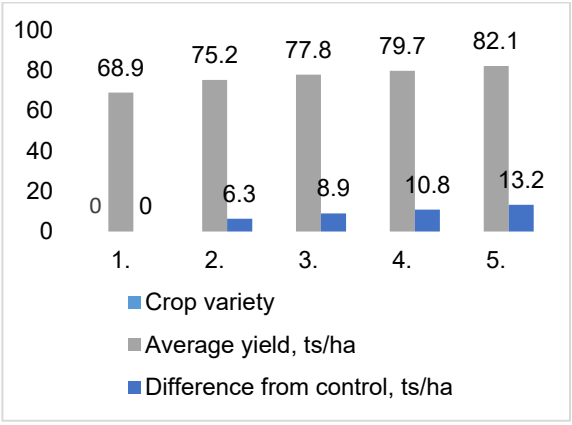

Figure 7: Effect of mineral fertilizers, foliar feeding and herbicide application on winter wheat yield.

4 CONCLUSIONS

Based on the above information, we can draw the following conclusions:

1. Wide introduction of new innovative technologies in grain production to further increase wheat grain yield and improve grain quality;
2. Organization of planting of winter wheat varieties of intensive type with high potential productivity:
3. Improvement of crop rotation system, introduction of short rotation rotation;
4. Timely and scientifically based application of all agrotechnical measures;
5. In addition to the roots, foliar feeding, using micro-fertilizers along with macro-fertilizers;
6. Application of biostimulants in grain cultivation.
7. Application of advanced foreign technologies in grain cultivation;
8. The use of such as the use of smart agriculture in grain production is important..

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