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EFFECT OF SOWING DATE, IRRIGATION REGIME AND MINERAL FERTILIZER RATE ON GRAIN YIELD OF WINTER WHEAT VARIETIES IN SOIL CONDITIONS OF DESERT REGION

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ABSTRACT:
In this article, in the conditions of the barren soils of the desert region of Kashkadarya region, in 2015-2017, the varieties of winter wheat "Zimnitsa" and "Gozgon" were planted in the periods 01-05.10 and 15-20.10, and in their cultivation 70-75-60 and 75-80-70% compared to LFWC irrigation procedures and NPK of mineral fertilizers 100:75:50; The norms of 180:120:90 and 250:175:125 kg/ha, in the conditions of light sierozem soils of the desert region, in the maintenance of winter wheat varieties "Alekseeich", "Bunyodkor" and "Shams" in 2020-2022 compared to LFWC 70-70-60 and 75-80-70% irrigation procedures and NPK of mineral fertilizers- 120:80:60; The analysis of the scientific data obtained on the effect of winter wheat varieties on grain yield when using the norms of 180:120:90 and 240:160:120 kg/ha is presented.

Keywords: soil, climate, region, winter wheat, variety, sowing, date, rate, fertilization, irrigation, grain, harvest.

Introduction

Today, the yield of winter wheat on irrigated lands in our republic is on average 30-40 centners per hectare in many farms, but the potential yield of intensive wheat varieties is 100-120 centners per hectare [1]. One of the main reasons for such a large difference between the potential yield and the actual yield is that the scientific basis of the agrotechnology of cultivation, including the timing of sowing of winter wheat, fertilization and irrigation, has not been developed [2]. Providing the plant with sufficient moisture during the growing season, growing an abundant and high-quality crop without harming the yield while using little water is one of the main problems in the grain industry of our country today [3]. Therefore, the most urgent problem in grain cultivation is to determine the biological characteristics of winter wheat, the optimal rates of mineral fertilizers - nitrogen, phosphorus and potassium, as well as irrigation methods, taking into account the soil and climate conditions of the region [4].

It is known that one of the main indicators of plants is its yield. The amount of yield depends on the type, number and quality of agrotechnical measures used in plant cultivation. Based on this, the effects of sowing dates, mineral fertilizers and irrigation methods on the grain yield of local and foreign varieties of winter wheat in the conditions of barren soils of the desert region of Kashkadarya region were studied. In the study, these agrotechnical measures used in winter wheat cultivation showed their effect on winter wheat grain yield [5; 6].

METHODS AND MATERIALS

Laboratory, field and production test experiments, plant sampling and analysis, phenological observations and biometric measurements were carried out in accordance with the " Methodology of the State variety testing of agricultural crops" manuals.

RESULTS AND DISCUSSION

According to the data obtained from the experiment carried out in 2015-2017 in the barren soils of the desert region, it was found that the sowing date winter wheat has a direct effect on its grain yield. The winter wheat variety "Zimnitsa" when planted early in the period of 01-05.10, the grain yield was on average 39.0-57.1 c/ha according to the options, while in the options planted in the period 15-20.10, this indicator was on average 34.9-53.6 c/ha it was found that, when planted in the early period, an additional grain yield of 3.4-4.6 c/ha was obtained.

Table 1 Grain yield of winter wheat varieties in the conditions of barren soils of the desert region, (2015-2017)

Var no.	Winter wheat varieties	Sowing dates, days	Irrigation order, relative to LFWC, %	Rate of mineral fertilizers, kg/ha	Grain yield by year, c/ha			
					2015 year.	2016 year.	2017 year.	Average
1	"Zimnitsa"	01-05.10	70-75-60	$N_{100}P_{75}K_{50}$	38,2	39,7	39,1	39,0
2				$N_{180}P_{120}K_{90}$	53,3	55,4	54,5	54,4
3				$N_{250}P_{175}K_{125}$	53,5	55,7	54,7	54,6
4			75-80-70	$N_{100}P_{75}K_{50}$	40,4	42,0	41,3	41,2
5				$N_{180}P_{120}K_{90}$	55,8	58,0	57,1	56,9
6				$N_{250}P_{175}K_{125}$	56,0	58,2	57,3	57,1
7		15-20.10	70-75-60	$N_{100}P_{75}K_{50}$	34,2	35,6	35,0	34,9
8				$N_{180}P_{120}K_{90}$	49,0	51,0	50,1	50,0
9				$N_{250}P_{175}K_{125}$	50,6	52,6	51,7	51,2
10			75-80-70	$N_{100}P_{75}K_{50}$	36,1	37,6	36,9	36,8
11				$N_{180}P_{120}K_{90}$	51,3	53,4	52,5	52,3
12				$N_{250}P_{175}K_{125}$	52,5	54,6	53,7	53,6
13	"Gozgon"	01-05.10	70-75-60	$N_{100}P_{75}K_{50}$	39,4	41,0	40,3	40,2
14				$N_{180}P_{120}K_{90}$	55,2	57,4	56,5	56,3
15				$N_{250}P_{175}K_{125}$	55,3	57,5	56,6	56,4
16			75-80-70	$N_{100}P_{75}K_{50}$	41,4	43,1	42,4	42,3
17				$N_{180}P_{120}K_{90}$	57,3	59,6	58,6	58,5

18				$N_{250}P_{175}K_{125}$	57,4	59,7	58,7	58,6
19		15-20.10	70-75-60	$N_{100}P_{75}K_{50}$	36,1	37,5	36,9	36,8
20				$N_{180}P_{120}K_{90}$	50,6	52,6	51,8	51,6
21				$N_{250}P_{175}K_{125}$	51,8	53,8	53,0	52,8
22			75-80-70	$N_{100}P_{75}K_{50}$	37,6	39,1	38,5	38,5
23				$N_{180}P_{120}K_{90}$	52,3	54,4	53,5	53,4
24				$N_{250}P_{175}K_{125}$	53,7	55,9	54,9	54,8

Similar patterns were observed in the Gozgon variety of winter wheat, in which the yield was 40.2-58.6 c/ha when planted in the early date, and 3.4-5.1 c/ha additional grain yield was obtained compared to the second sowing date. Among the varieties, we can observe that the grain yield of the "Gozgon" variety is 0.3-0.5 c/ha higher than the "Zimnitsa" variety.

So, planting winter wheat varieties 10 days earlier compared to planting in the period of 15-20.10 provides an additional grain yield in the amount of 3.5-5.0 c/ha.

Irrigation of winter wheat variety "Zimnitsa" in a higher order compared to LFWC ensured a higher grain yield. According to the received data, irrigation was carried out at 70-75-60% in relation to LFWC in options 1; 2 and 3, the grain yield was 39.0-54.4-54.6 c/ha compared to LFWC, irrigated at 75-80-70% soil moisture in the 4^{th}, 5^{th} and 6^{th} options, these indicators were on average 41.2-56.9-57.1 c/ha, and additional grain yield was achieved in the amount of 2.2-2.5 c/ha. Laws of the order of experience 7; 8; 9; 10 was the same; It was also observed in options 11 and 12, and the additional grain yield was 1.9-2.4 c/ha.

Similar data were obtained for winter wheat "Ghozgon" variety.

It can be concluded from the information obtained on the irrigation regimes that irrigating winter wheat varieties in the order of 75-80-70% in relation to high LFWC ensures an additional grain yield of 1.9-2.5 c/ha.

According to the information obtained on the effect of mineral fertilizers, the maintenance of winter wheat varieties using high rates of mineral fertilizers had a positive effect on its grain yield. According to the data, the average grain yield is 50.0-57.1 c/ha when winter wheat "Zimnitsa" variety is used with NPK 180:120:90 and 250:175:125 kg/ha mineral fertilizers, 15.1-16.8 c/ha of additional grain yield was achieved compared to the options used at the rate of NPK 100:75:50 kg/ha. These indicators were 51.6-58.6 c/ha in the "Gozgon" variety, and the additional grain yield was 14.8-16.3 c/ha. At this point, it should be noted that the use of mineral fertilizers at the rate of NPK 250:175:125 kg/ha increased grain yield by 14-15 c/ha compared to the use of NPK 100:75:50 kg/ha, but NPK 180:120:90 compared to the kg/ha standard, the grain yield showed almost the same indicators when planted in the early term or the difference was 0.1-0.2 c/ha, only in the options planted in the second period, the additional yield was slightly more, it was found that 1.2-1.3 c /ha. it can be said from this that winter wheat, when planted in relatively late periods, has a high demand for mineral fertilizers.

The data are presented in Table 1 of the article.

According to the results of the three-year experiment, it can be concluded that in the conditions of the barren soils of the desert region, the highest grain yield is achieved by

planting the Gozgon variety of winter wheat early in the period 01-05.10 and applying mineral fertilizers NPK 180:120:90 and 250:175:125 kg/ha using the norms, irrigation was carried out in the order of 75-80-70% compared to LFWC. It was determined in 16,17 variants, and the average grain yield in three years was 58.5-58.6 c/ha. If planting winter wheat falls on the period of 15-20.10, it is advisable to use NPK at the rate of 250:175:125 kg/ha and carry out irrigation in the order of 75-80-70% in relation to LFWC.

In another experiment conducted on light sierozem soils of the desert region, three varieties of winter wheat, "Alekseeich", "Bunyodkor" and "Shams" were studied. This experiment was conducted in 2020-2022.

According to the data obtained from this experiment, the highest grain yield among the varieties was observed in the "Bunyodkor" variety of winter wheat.

According to the data, the average grain yield in this variety is from 43.7 c/ha to 60.8 c/ha in different variants (except control), "Alekseeich" variety is from 43.3 c/ha to 59.0 c/ha, and "Shams" variety is from 41,1 c/ha to 55.9 c/ha.

20.2 c/ha in the control variant of winter wheat "Bunyodkor" without fertilizers, 43.7-47.2 c/ha in variants with NPK 120:80:60 kg/ha, NPK 180:120:90 and in the options used for 240:160:120 kg/ha; it was 56.0-56.5, 60.6-60.8 c/ha. It can be seen from the data that the additional grain yield is 35.8-39.6 c/ha compared to the control, NPK 120:80:60 kg/ha fertilizer in the options where mineral fertilizers are used at the rate of NPK 180:120:90 and in the given option 240:160:120 kg/ha, it was 23.5-26.0 c/ha.

Similar information was obtained in the winter wheat varieties "Alekseeich" and "Shams".

Table 2 Grain yield of winter wheat varieties in light sierozem soils of the desert region (2020-2022)

No	Winter wheat varieties	Irrigation regime, relative to LFWC, %	Rate of mineral fertilizers, kg/ha	Grain yield by year, c/ha			
				2020 year.	2021 year.	2022 year.	Average
1	"Alekseeich"	70-70-60	Control (without fertilizer)	19,0	20,1	19,8	19,6
2			$N_{120}P_{80}K_{60}$	41,9	44,4	43,6	43,3
3			$N_{180}P_{120}K_{90}$	52,8	56,0	54,9	54,6
4			$N_{240}P_{160}K_{120}$	53,2	56,4	55,3	55,0
5		75-80-70	Control (without fertilizer)	19,8	21,0	20,6	20,5
6			$N_{120}P_{80}K_{60}$	45,3	48,0	47,1	46,8
7			$N_{180}P_{120}K_{90}$	56,9	60,3	59,2	58,8
8			$N_{240}P_{160}K_{120}$	57,1	60,5	59,4	59,0
9	"Builder"	70-70-60	Control (without fertilizer)	19,5	20,7	20,3	20,2
10			$N_{120}P_{80}K_{60}$	42,3	44,8	44,0	43,7
11			$N_{180}P_{120}K_{90}$	54,2	57,5	56,4	56,0
12			$N_{240}P_{160}K_{120}$	54,7	58,0	56,9	56,5
13		75-80-70	Control (without fertilizer)	20,5	21,7	21,3	21,2

14			$N_{120}P_{80}K_{60}$	45,7	48,4	47,5	47,2
15			$N_{180}P_{120}K_{90}$	58,6	62,1	60,9	60,6
16			$N_{240}P_{160}K_{120}$	58,8	62,3	61,2	60,8
17	Shams	70-70-60	Control (without fertilizer)	18,6	19,7	19,3	19,2
18			$N_{120}P_{80}K_{60}$	39,8	42,2	41,4	41,1
19			$N_{180}P_{120}K_{90}$	50,0	53,0	52,0	51,7
20			$N_{240}P_{160}K_{120}$	50,3	53,3	52,3	52,0
21		75-80-70	Control (without fertilizer)	19,4	20,6	20,2	20,0
22			$N_{120}P_{80}K_{60}$	43,0	45,6	44,7	44,4
23			$N_{180}P_{120}K_{90}$	53,9	57,1	56,1	55,7
24			$N_{240}P_{160}K_{120}$	54,1	57,3	56,3	55,9

Therefore, it can be concluded from the obtained data that increasing the rate of mineral fertilizers from NPK 120:80:60 kg/ha to NPK 180:120:90 and 240:160:120 kg/ha in autumn wheat cultivation in the conditions of light sierozem soils of the desert region increases by providing 56-61 c/ha the grain yield, on average, an additional grain yield of 35-39 centners per hectare is obtained compared to the option without fertilizer.

According to the information obtained on the irrigation of winter wheat, it was found that the higher regime of irrigation in the irrigation of wheat in this region was more effective in terms of grain yield when irrigation was carried out at 75-80-70% soil moisture compared to LFWC.

According to the obtained data, the grain yield of "Bunyodkor" variety was 20.2-43.7-56.0-56.5 c/ha in variants irrigated at 70-70-60% humidity compared to LFWC, and In the variants irrigated at 75-80-70% humidity compared to LFWC, these indicators were respectively 21.2-47.2-60.6-60.8 c/ha, in which the additional grain yield was found to be 1.0-3.5-4.6-4.3 c/ha. The above laws were also found in the remaining two varieties of winter wheat.

From the data obtained on winter wheat irrigation, it can be concluded that under the conditions of these soils, irrigation of winter wheat at a moisture content of 75-80-70% relative to LFWC is 3.5-4.6 c/ha additional grain compared to irrigation at a moisture content of 70-70-60% relative to LFWC provides a harvest. The data is presented in Table 2 of the article.

CONCLUSION

In general, in this experiment, the highest grain yield was achieved by the "Bunyodkor" variety of winter wheat, when mineral fertilizers were applied at the rate of NPK 180:120:90 and 240:160:120 kg/ha, and irrigation was carried out at 75-80-70% soil moisture compared to LFWC were received. Based on this, it can be said that in order to obtain a relatively high grain yield in the conditions of light sierozem soils of the desert region, in the cultivation of winter wheat, using the mineral fertilizers NPK 180:120:90 and 240:160:120 kg/ha, it is advisable to carry out irrigation at 75-80-70% soil moisture relative to it is advisable to carry out irrigation at 75-80-70% soil moisture relative to LFWC.

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