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THE EFFECT OF SOWING DATES ON THE YIELD OF WINTER WHEAT IN IRRIGATED MEADOW-SIEROZEM SOILS

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Abstract
The article presents the fertility of irrigated meadow-sierozem soils, where the Davr variety of winter wheat was cultivated under different experimental variants, and the effect of sowing dates on its yield was determined. It was found that in irrigated meadow-sierozem soil conditions, when all agrotechnical processes are carried out on time and sowing is conducted between early September and the first ten days of October, the yield and quality of the Davr variety of winter wheat reach a high level.

Keywords: Meadow-sierozem, soil, variant, yield, winter wheat, fertilizer, seed, sowing date.

Introduction

Currently, one of the most pressing issues worldwide is the study of hydromorphic soils with poor meliorative conditions, varying degrees of salinity, and low fertility to develop scientifically based measures for improving their productivity.

In the soils of Central Fergana, the root systems of natural and cultivated plants are mainly located in the upper soil layers. Consequently, the humus layer in these soils is shallow, and its reserve is lower compared to other soil types [1, 2, 3].

It is well known that organic matter in the soil, regardless of its quantity and quality, serves as a source of carbon dioxide, nutrients, and energy for plants. Humus increases the sustainability of agriculture and performs many functions in soil formation. The humus content and fertility of the soil are key criteria for obtaining high and quality yields from agricultural crops, particularly winter wheat.

Additionally, achieving a high yield from winter wheat primarily depends on attaining the optimal plant density in the field. To achieve sufficient plant density, sowing must be carried out on time and with high quality. One of the main factors influencing the growth, development, winter hardiness, and productivity of winter wheat is the sowing date. When winter wheat is sown at an optimal time, seeds germinate fully, the plants tiller adequately before the onset of cold weather, and they overwinter well.

The sowing date of cereal crops depends on the biological characteristics of the variety and the soil-climatic conditions of the cultivated area. If winter wheat is sown late, germination is sparse,

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plants do not have time to tiller before winter, seedlings become weak, and winter hardiness decreases. To achieve high crop yields, it is essential to develop agro-technical measures specific to each variety. Increasing yields should not rely on expanding cultivated areas but rather on introducing new, high-yielding varieties and cultivating them with advanced agro-technical practices. The cultivation technology for each variety should be adapted to the soil and climatic conditions of the grain-growing region. Among agro-technical measures affecting wheat yield, determining the optimal sowing date is one of the most crucial.

Methods and Materials

The chemical analysis of soil samples, including the determination of soil humus, total and mobile nitrogen, phosphorus, and potassium content, was carried out using the standard methodology of the Uzbekistan Cotton Research Institute (SoyuzNIXI, 1973) and the guidelines from "Rukovodstvo po ximicheskomu analizu pochv" [4]. Field experiments and research were conducted based on the methodology outlined in the Uzbekistan Cotton Research Institute's (SoyuzNIXI, Tashkent, 1981) manual "Metodika zakladki polevix opitov s xlopchatnikom."

To study the effect of sowing dates on the yield of the Davr variety of winter wheat, an experiment was conducted in the "Navbaxor Paxtakori-2020" farm in the Toshloq district of Fergana region.

Research Results

The region's climate is sharply continental, with the highest temperatures reaching +40°C in July and the lowest temperatures dropping to -15°C in January in some years. The average annual precipitation is about 200-220 mm. The soils belong to the meadow-swamp type and have been irrigated for a long time. The groundwater depth ranges from 1.5 to 2.5 meters.

Research results indicate that the excessive and continuous use of mineral fertilizers and various pesticides to achieve high agricultural yields has led to a significant reduction in soil microorganisms and a noticeable decline in the transformation of organic matter into humus (Table 1).

Agrochemical composition of soils

Cross-section t/r	Layer, sm	Humus, %	C:N	Yalpi, %			Harakatchan, mg/kg		
				Nitrogen	Phosphorus	Potassium	Nitrogen (NH4)	Phosphorus	Potassium
Old irrigated meadow-sierozem soils									
28[A]	0-35	1,405	7,8	0,148	0,345	1,94	21,5	20,7	229,0
	35-54	1,310	7,0	0,136	0,320	1,85	14,7	17,2	192,0

According to the data presented in this table, the humus content in the plow layers of old irrigated soil cross-sections is around 1.405%.

The C:N ratio in soils is a relative indicator of the nitrogen richness of humus. For gray soils, this ratio is typically 8, indicating a high nitrogen content in the humus [3, 5]. In saline soils with low humus content in Central Fergana, the C:N ratio ranges from 5.6 to 7.8, showing a moderate level of mineralization. In desert conditions, where groundwater flows slowly, pedolithic meadow-sierozem soils have formed [2].

The studied soils have a C:N ratio between 5.0 and 7.8. There is a direct correlation between total

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nitrogen content and humus, as the variation in nitrogen levels across the soil profile follows the same trend as humus distribution. The total phosphorus content in the soil cross-sections varies between 0.210% and 0.320%, while the total potassium content ranges from 1.61% to 1.90%.
Based on the levels of available nutrients, these soils belong to the group of poorly supplied soils. This indicates that irrigated, moderately saline hydromorphic soils with diverse mechanical compositions require systematic application of mineral and organic fertilizers to achieve high and stable yields in agricultural crops. The humus, nitrogen, phosphorus, and potassium levels in the studied soils are insufficient for the optimal growth and development of agricultural crops.

Experimental setup

In the experiments, seeds of the Davr variety of winter wheat were sown on September 6, October 8, and October 25. The experiment included three variants with four replications. Each variant occupied an area of 108 m² (3.6 m × 30 m), with a calculation area of 54 m² (1.8 m × 30 m).
For wheat cultivation in the experimental field, a total of 200 kg/ha of nitrogen, 100 kg/ha of phosphorus, and 50 kg/ha of potassium fertilizers were applied. The first fertilization was conducted at sowing, with 40 kg/ha of nitrogen, 100 kg/ha of phosphorus, and 50 kg/ha of potassium. The second fertilization was carried out in the first ten days of March, applying 40 kg/ha of nitrogen fertilizer (ammonium nitrate). The third fertilization was performed in mid-April, using 40 kg/ha of nitrogen fertilizer. The fourth fertilization took place in early May, before flowering, with the application of 80 kg/ha of nitrogen fertilizer (ammonium sulfate).

Irrigation and yield measurement

Winter wheat is a moisture-loving crop, and its irrigation regime was designed to maintain the limited field moisture capacity at 65:70:70%. Considering this requirement, 10-12 irrigations were carried out. The yield parameters of winter wheat were determined in the experiment. Before harvesting, wheat plants were sampled from four different points in each variant, each from a 0.25 m² area.

Table 2 **Effect of sowing dates on wheat yield indicators of the Davr variety**

Indicators by Variants	Sowing Date		
	September 6	October 8	October 25
1. Number of Productive Tillers per 1m²	504	502	386
2. Stem height, cm	105,4	102,8	88,7
3. Spike length, cm	9,3	9,3	7,4
4. Number of grains in one ear, pcs.	41,2	42,3	35,1
5. Weight of 1000 grains, gr.	42,5	42,4	38,1

Based on the data in the table above, it can be seen that before harvesting, the number of productive tillers per 1 m² was 504 in the variant where wheat seeds were sown on September 6, 502 in the variant where seeds were sown on October 8, and 386 in the variant where seeds were sown on October 25. The plant height was 105.4 cm, 102.8 cm, and 88.7 cm, respectively. The length of the wheat spike was 9.3 cm in the variant sown on September 6, 9.3 cm in the variant sown on October 8, and 7.4 cm in the variant sown on October 25. The number of grains per spike was

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41.2, 42.3, and 35.1, respectively. The weight of 1000 grains was 42.5 g in the variant sown on September 6, 42.4 g in the variant sown on October 8, and 38.1 g in the variant sown on October 25.

From the presented data, it can be concluded that the productivity indicators of winter wheat were higher in the variant where the seeds were sown on October 8 compared to the other variants. The primary purpose of agricultural experiments is to scientifically substantiate the effect of the investigated practice or factor on plant productivity. Yield is considered the main indicator of agricultural production, and the main goal of crop management is to increase the yield per unit area. In our experiment, the winter wheat yield for each variant was determined.

Table 3 **Effect of sowing dates on wheat yield of the Davr variety (s/ha)**

Variants (Fertilizer N200P100K50)	Replicates				Average
	I	II	III	IV	
1. **Wheat seeds sown on September 6**	65,3	66,1	64,8	63,8	65,0
2. Wheat seeds sown on October 8	67,9	68,3	66,4	65,7	67,1
3. Wheat seeds sown on October 25	52,2	53,6	51,4	50,3	51,8

Based on the data from Table 3 and Figure 1, it can be seen that in the experiments, the wheat yield was 65.0 q/ha for the variant sown on September 6, 67.1 q/ha for the variant sown on October 8, and 51.8 q/ha for the variant sown on October 25. In all variants, the wheat plants (Fertilizer N200P100K50) were fertilized with the same amount of mineral fertilizers.

Based on the results of the experiments, it was observed that in the conditions of the Toshloq district of Fergana region, when winter wheat seeds were sown in irrigated meadow soils between September 6 and October 8, the yield of the Davr variety of winter wheat increased up to 67.1 q/ha."

Conclusion

The studied soils are categorized as being low in available nutrients. In irrigated meadow soils, when all agro-technical processes are carried out on time, and the seeds are sown between the beginning of September and the first ten days of October, the yield and quality of the Davr variety of winter wheat reach a high level.

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