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Influence of Sowing Terms and Feeding Norms on Technological Quality Indicators of Wheat Grain

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Abstract

Under the conditions of the south of Uzbekistan with sowing varieties of winter wheat in mid-October with an increased rate of fertilizer ($N_{210}P_{110}K_{70}$), compared with the recommended standards ($N_{180}P_{90}K_{60}$) by improving the quality of grain increased weight of 1000 grains in the 1,9-2,7 g; natural weight of 15-20 g/l; glassiness 4-9%; protein by 0,5-1,0% and 1,2-1,8% in the gluten.

Keywords: grain of wheat, quality of grain, gluten, 1000 grain weight, natural weight, glassiness, technology of grain

Introduction. Uzbekistan has gained grain independence by growing soft wheat varieties on irrigated lands[1, 56 p.]. However, it is not always possible to make high-quality bread and bakery products from soft wheat grains. This is due to the fact that the quality of wheat grain varies due to genetic variation, growing conditions, agro-technological measures and other factors. Therefore, the correct assessment of the quality of cultivated wheat grains, especially soft wheat grains, during the initial processing plays an important role in determining in which area it will be used[2,p.64; 3; p.30].

Given the fact that the quality of grain of winter soft wheat varieties depends on the applied agro-technological processes[6,p.298; 7,p.415; 8,p.340], since 2004, research has been conducted on the timing of sowing and feeding standards of wheat. When we studied the technological parameters that determine the quality in the process of feeding, it was shown that the quality of grain varieties can be improved if winter soft wheat is sown at optimal times in each soil-climatic conditions and fed in appropriate proportions[4, p.22-23; 5, p.112].

Literature review. The higher the grain mass and natural weight, the better the quality as a result of improved vitreousness[9,p.303]. However, scientific data on the timing of sowing wheat, the effect of nutritional standards on the mass of 1000 grains, the natural weight of the grain and the degree of vitreous are very limited.

U.K. Abdirahimov[10,p.40-42], N. Yodgorov[11,p.36], P. Torishev[12,p.21] emphasize that frequent changes in the weather in autumn, winter and spring in the southern regions of the country play an important role in predicting the winter hardiness of winter cereals and accurately determine the timing of sowing in biological control.

Variations in the timing of sowing of winter wheat by region can be seen in the results of experiments conducted by A. Turaev [13,p.42-43] in the conditions of irrigated light gray soils of Kashkadarya region and P.Kh. Bobomirzaev [14,p.62] in the conditions of typical gray soils of this region.

S.Kh. Tashilov[15,p.214], based on his research, reports that if winter wheat is fed with nitrogen in a moderate and timely manner, the leaf area will increase.

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N. Khalilov [16,p.41] studied the feeding of winter wheat with nitrogen fertilizers in the conditions of Samarkand region and found that if wheat is planted at the right time and fed in moderation, it gives a rich and high yield.

Research methods. For the study, samples of wheat grains sown at different times and fed at different rates were taken to determine the grain weight, natural weight, vitreous, protein and gluten content of 1000 grains.

The experiments were conducted in four repetitions in one tier, the size of the experimental plots was 180 square meters, the calculation plots were 100 square meters, the width of the plots was 7.2 meters, and the length was 25 meters.

Wheat grain samples for technological analysis At the farm "Saipov Shakhboz" in Kasan district, the optimal sowing time and feeding standards of winter soft wheat were obtained on the basis of field experiments studied in 2015-2017, 1000 grain mass, natural weight and vitreousness were determined according to GOST-9353-84, gluten according to GOST-13586-1-68, and protein according to *Kjeldahl* method.

Before the proteins in the grain were separated, they were purified from substances such as carbohydrates, lipids, and nucleic acids. To do this, the kernel was peeled from its husk, then ground into flour. The floured material was first washed in ether, then in acetone, and then the protein was extracted using an appropriate solvent. The proteins transferred to the solution were separated by precipitation.

According to the **results** of the study, winter wheat was sown in mid-October in the grassy gray soils of Kashkadarya region, and the recommended rate of mineral fertilizers ($N_{180}P_{90}K_{60}$) was increased ($N_{210}P_{110}K_{70}$) or decreased ($N_{150}P_{70}K_{50}$). When applied in accordance with the norms of mineral fertilizers in relation to the control option, which did not apply NPK, 1000 grains were sown in early November and mid-November, according to the natural weight and vitreousness of the grain, the same norms of mineral fertilizers was observed to be higher than grown (Table, Figures 1-2).

Table

Dependence of technological quality changes of winter soft wheat grain on sowing dates and feeding norms

T/r	Experiment options	1000 grain weight, g	Natural weight, g/l	Glassiness rate,%	Protein, %	Gluten,%
When planted at 15.X						
1	Non-NPK (st)	40,5	790	65	12,9	27,0
2	$N_{150}P_{70}K_{50}$	41,2	781	67	13,1	27,8
3	$N_{180}P_{90}K_{60}$(st)	42,4	777	69	13,4	28,2
4	$N_{210}P_{110}K_{70}$	43,2	770	74	13,9	28,8
When planted in 1 - XI						
1	Non-NPK (st)	39,7	781	64	12,6	25,8

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2	$N_{150}P_{70}K_{50}$	40,5	775	66	12,9	26,6
3	$N_{180}P_{90}K_{60}$(st)	41,8	770	69	13,1	27,7
4	$N_{210}P_{110}K_{70}$	42,4	765	72	13,5	28,0
When planted in 15 - XI						
1	Non-NPK (st)	38,3	775	60	12,3	25,5
2	$N_{150}P_{70}K_{50}$	39,2	771	63	12,6	26,1
3	$N_{180}P_{90}K_{60}$(st)	40,4	767	67	12,8	26,9
4	$N_{210}P_{110}K_{70}$	41,2	760	71	13,3	27,2

When winter wheat was sown in mid-October, the NPK was found to be 0.7–2.7 g more per 1000 grain weight than the non-applied control option in proportion to the mineral fertilizer standards applied (Figure 1). A similar situation was observed when wheat per 1,000 grains was sown in early and mid-November, which was higher than the non-NPK control option in proportion to the mineral fertilizer standards applied.

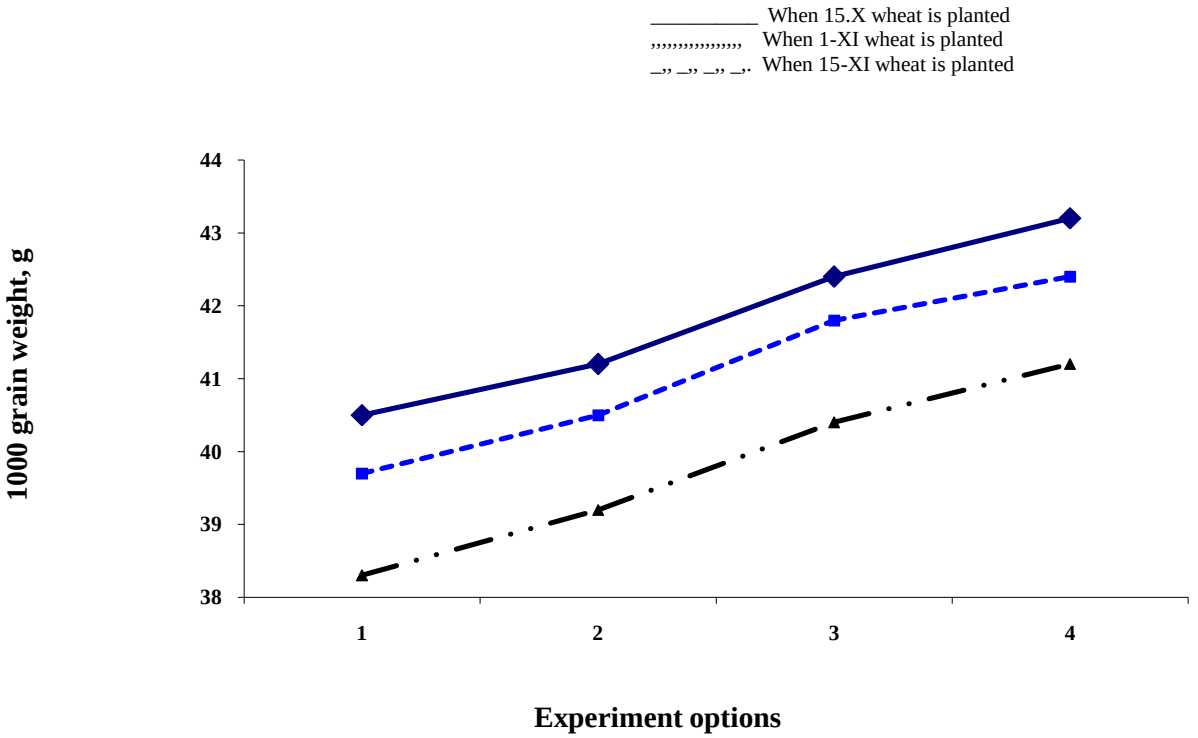

Figure 1. Influence of sowing and feeding times per 1000 grains of wheat

The natural weight of winter wheat sown in mid-October, the recommended rates and proportions of which mineral fertilizers have been increased or decreased, was observed to increase from 15 g/l to 20 g/l compared to the non-NPK control option.

Even when wheat was planted in early and mid-November, the natural weight of the grain was almost equal to that of the control option without NPK. However, when winter wheat is sown in mid-October, the natural weight of the grain is 790-770 g/l in proportion to the norms and ratios of applied and unused mineral fertilizers, when sown in early November, this the figure was 781–765 g/l, and when planted in mid-November it was 775–760 g/l, a decrease from 10 g/l to 15

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g/l. This is in line with the law on the weight of 1,000 grains.

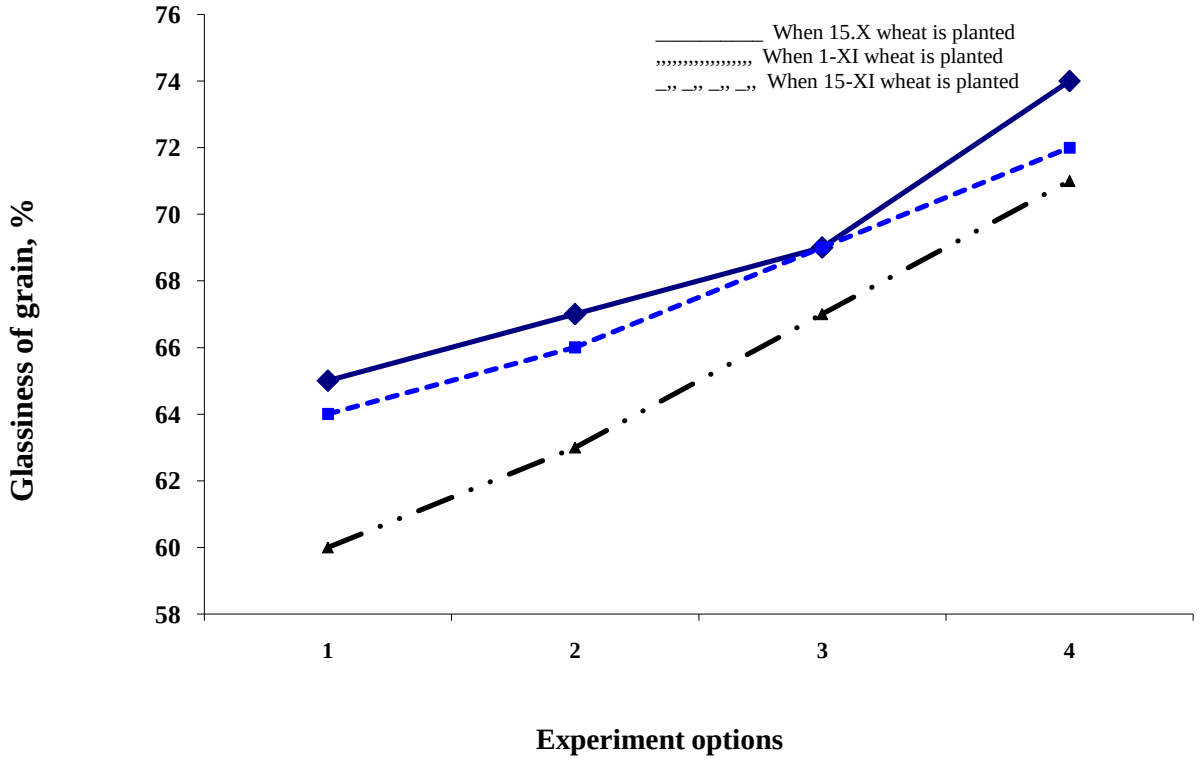

Figure 2. Influence of sowing and feeding times on wheat germ

The vitreous level of wheat grains also confirmed the observed pattern of 1000 grains and the natural weight of grains, with mineral fertilizers used in early sowing having a positive effect on grain vitreous level and decreasing in late sowing.For example, when winter wheat was planted in mid-October and the recommended rate and ratio of mineral fertilizers($N_{180}P_{90}K_{60}$) were increased($N_{210}P_{110}K_{70}$) and reduced($N_{150}P_{70}K_{50}$), the degree of virtuousness of the grain increased from 2% to 9% compared to the non-NPK control option. The same situation was repeated when wheat was applied in early and mid-November under the influence of the norms and ratios of mineral fertilizers applied (Figure 2).

However, when winter soft wheat was sown in mid-October, the grain viscosity ratio was 65-74% in proportion to the norms and proportions of mineral fertilizers used and not applied in the experimental options, when planted in mid-November instead, it was 60-71%.

It is observed that the morphophysiological parameters that determine the quality of winter soft wheat grain, the weight of 1000 grains, natural weight, degree of vitreous, the recommended dose of mineral fertilizers and rise and falls in it, has experienced an increase in 1000 grain weight from 0,7 to 2,9 grams, the natural weight of the grain from 15 to 20 g/l and the degree of vitreous from 2.0% to 9.0% that non-NPK option. However, this variety of winter wheat weighed 40.5-43.2 grams per 1,000 grains when sown in mid-October and 38.3-41.2 grams when sown in mid-November, indicating the benefits of early sowing. The same situation was repeated in terms of natural weight and vitreousness of the grain, which showed the advantages of sowing winter wheat in mid-October in the conditions of grassland gray soils of Kashkadarya region.

Winter soft wheat is planted in mid-October at the recommended rate of mineral fertilizers ($N_{180}P_{90}K_{60}$); Increased to $N_{210}P_{110}K_{70}$ kg/ha; When reduced to $N_{150}P_{70}K_{50}$kg/ha, an increase in grain protein content of 0.2-1.0% was observed compared to the non-NPK control option.

The increase in protein content in wheat grains compared to the non-NPK control option

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was repeated when this variety of winter wheat was sown in early and mid-November.However, due to the high efficiency of mineral fertilizers when sowing winter wheat early, the total protein content is 12.9-13.9%. When wheat is sown in early November, the total protein content is 12.6-13.5%, and when wheat is sown in mid-November, it is 12.3-13.3%. This indicates that the mineral fertilizers used in the early fall sowing of wheat have a high positive effect on the level of protein accumulation.

An increase in the gluten content of wheat grains, as well as protein, was observed when winter soft wheat was sown in mid-October, which has applied the recommended norm of mineral fertilizers ($N_{180}P_{90}K_{60}$) and from the recommended norm increased to $N_{210}P_{110}K_{70}$ kg/ha and decreased to $N_{150}P_{70}K_{50}$ kg/ha in the grassy gray soil region of Kashkadarya region.However, it was observed that the fertilizer application rate was slightly higher than the non-NPK control option.

Wheat has a high gluten content in mid-October and a lower late sowing. Nitrogen fertilizers and their other mineral fertilizer components are a key factor in improving the gluten balance of winter wheat even later in the winter.

Conclusion. It is observed that the morphophysiological parameters that determine the quality of winter soft wheat grain, the weight of 1000 grains, natural weight, degree of vitreous, the recommended dose of mineral fertilizers and rise and falls in it, has experienced an increase in 1000 grain weight from 0,7 to 2,9 grams, the natural weight of the grain from 5 to 20 g/l and the degree of vitreous from 2% to 11% that non-NPK option.

The problem can be solved by sowing the amount of protein and gluten in winter wheat early and getting enough nutrition. Even when wheat varieties are planted late, adequate nitrogen and other fertilizers can increase the amount of protein and gluten in the grain.

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