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THE IMPACT OF THE TRITICALE VARIETY ON BIOMETRIC INDICATORS

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ABSTRACT
This article examines the impact of mineral fertilizers and foliar feeding (using a urea suspension) on the growth, development, and productivity of triticale plants. During the study, the primary biometric parameters of the plant, including spike length, number of grains per spike, grain weight per spike, and the thousand-grain weight, were analyzed. The results indicate that an improved nutritional regime led to a significant enhancement in biometric parameters. Specifically, the highest performance was recorded in the variant where foliar feeding was applied three times during the critical stages of the growing season (tillering, stem elongation, and flowering) against an NPK background. This substantiates an adequate supply of essential nutrients to the plants, resulting in maximum crop productivity.

Keywords: Triticale, biometric parameters, mineral fertilizers, foliar feeding, urea suspension, spike length, grain weight, thousand-grain weight, productivity**.**

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INTRODUCTION

Today, further improving the cultivation of cereal crops, including triticale—a promising new crop—fully realizing its biological potential, and increasing its productivity is of great significance. Triticale possesses high nutritional value, and the fertilization system plays a vital role in enhancing its growth, development, and grain quality. Because natural soil nutrients cannot fully satisfy the biological demands of the plants, the application of scientifically grounded mineral fertilizers and supplementary feeding methods is essential.

According to the studies by S.G. Enikeev and N.S. Frolov [35, p. 17], when triticale was cultivated at a seeding rate of 90–112 kg per hectare, maximum productivity was achieved due to larger grain size and a higher thousand-grain weight. Under the conditions of Stavropol Krai, O.I. Petrova and V.V. Kataeva [58, pp. 26–27] scientifically recommended that when triticale is cultivated for fodder production in livestock farming, the sowing rate should be set at 2–3 million viable seeds per hectare.

Quyida matningizning grammatik, stilistik va qishloq xo‘jaligi terminologiyasiga to‘liq moslashtirilgan ilmiy varianti keltirilgan:

Effective agrotechnical practices for establishing seed production plots in triticale cultivation have been developed by V.V. Shvedskiy and N.N. Ovsyannikov [74, p. 32]. According to their conclusions, to maximize seed quality indicators for the "Stavropolskiy-1" variety, sowing should be carried out during the first ten days of September. Restricting the seeding rate to 1,5–2,0 million viable seeds per hectare creates a solid foundation for producing high-quality seed grain that fully complies with agronomic standards and exhibits high viability by the end of the growing season. Furthermore, according to researchers such as A. Banneicr [79, pp. 468–495], G. Hamman [80, pp. 417–422], and K. Marzar, F. Schadlich, and R. Metz [83, pp. 55–62], the maximum grain productivity of triticale varieties in their respective studies was recorded in variants where 3,0–4,0 million viable seeds were sown per hectare. At the same time, it is scientifically recommended to reduce the seeding rate to 2,5 million seeds per hectare in soils with high agrochemical

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fertility, and conversely, to proportionally increase the seeding rate in soils with low nutrient availability (low fertility) or when sowing is delayed.

CONDITIONS AND METHODS OF RESEARCH

Research Conditions Experimental studies were conducted in the experimental field of the Tashkent State Agrarian University. The soil of the experimental plot consists of long-irrigated typical sierozem soils, which are non-saline due to the deep groundwater table. In the plow layer (0–30 cm), the humus content is 1,152%, total nitrogen is 0,126%, mobile phosphorus is 80,8 mg/kg, and exchangeable potassium is 190 mg/kg.

The climate of the region is sharply continental, with hot, dry summers and relatively mild winters. The air temperature and precipitation amount during the experimental years (2024–2026) were higher than the long-term averages, creating favorable conditions for the growth and development of triticale plants.

In the field experiment, all scientific work was carried out based on the generally accepted methodology of B.A. Dospekhov (1985).

Quyida matningizning grammatik, stilistik va xalqaro ilmiy-agronomik talablarga moslashtirilgan varianti keltirilgan:

The experiments were conducted in wide-row furrows. Each variant consisted of four furrows, of which the two outer furrows served as guard rows, and the two middle furrows served as the harvest (or accounting) area.

The total plot area for each variant was 100 m^2 (3.6 meters wide and 28 meters long), of which the harvested (accounting) area was 50 m^2. All phenological observations and measurements in the experiment were carried out within the harvested area.

The study investigated the effect of a background mineral fertilizer rate and foliar feeding with urea suspension during the growing season on a winter triticale variety:

Variant 1 (Control): Unfertilized (without fertilizers)

Variant 2: Background ($N_{200}P_{140}K_{100}$)

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Variant 3: Background + 1 foliar application (5% urea suspension during the tillering stage)
Variant 4: Background + 2 foliar applications (5% urea suspension during tillering + 10% during stem elongation)
Variant 5: Background + 3 foliar applications (5% urea suspension during tillering + 10% during stem elongation + 15% during flowering)
Phenological observations were carried out on 50 tagged plants marked with special flags in each variant. Agrochemical analyses were performed using standard laboratory methods generally accepted in agricultural research.

RESULTS OF THE STUDY AND THEIR DISCUSSIONS

The impact of mineral fertilization and foliar feeding methods on the growth and productivity of triticale plants was studied. The primary biometric parameters of the plant, including spike length, number of grains per spike, grain weight per spike, and thousand-grain weight, were analyzed. The results obtained showed that these parameters improved as the nutritional regime was enhanced.
In the unfertilized control variant, triticale plants developed solely at the expense of natural soil nutrients. As a result, the spike length was 12,5 cm, the number of grains per spike was 49,2, the grain weight per spike was 1,63 g, and the thousand-grain weight was 44,6 g. Due to the scarcity of nutrients, spike and grain development was weak, resulting in the lowest productivity level.
In the background variant with mineral fertilizers ($N_{200}P_{140}K_{100}$) the nutritional status of the plants improved. In this variant, spike length increased up to 13.6 cm, the number of grains per spike was 50,2, grain weight per spike was 1,71 g, and thousand-grain weight was 45,7 g. While nitrogen enhanced the development of vegetative and generative organs, phosphorus and potassium had a positive effect on grain formation. However, because foliar feeding was not applied, the results remained limited.
In the variant where a single foliar application of a 5% urea suspension was carried out against the NPK background during the tillering stage, the biometric parameters of the plants further improved. Spike length reached 14,0 cm, the

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number of grains per spike was 50,7, grain weight per spike was 1,89 g, and thousand-grain weight was 46,5 g. Foliar-applied nitrogen during the tillering stage contributed to the active formation of tillers and generative organs.

In the variant where double foliar feeding was applied against the NPK background, i.e., when a 5% urea suspension was given during tillering and a 10% suspension during the stem elongation period, biometric indicators increased even further. In this variant, the spike length reached 14,2 cm, the number of grains per spike was 51,6, the grain weight per spike was 2,02 g, and the weight of 1000 grains was 48,5 g. Foliar feeding administered during the stem elongation period had a positive effect on the full formation of grains inside the spike.

The highest results were observed in the variant where triple foliar application was carried out against the NPK background. As a result of applying a 5% urea suspension during tillering, a 10% suspension during stem elongation, and a 15% suspension during flowering, spike length reached 14,9 cm, the number of grains per spike was 52,5, grain weight per spike was 2,10 g, and thousand-grain weight was 48,8 g. This indicates that the plants were adequately supplied with essential nutrients throughout the entire growing season. The combination of mineral fertilizers and foliar feeding significantly improves the biometric parameters of triticale plants. In particular, triple foliar feeding during the critical stages of the growing season enhances spike and grain development, ensuring maximum productivity.

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Table 1

Treatments	Foliar feeding periods			Biometric characteristics of theplant			
	Tillering	Stem elongation	Flowering	Spike length cm	Number of grains per spike, pcs,	Grain weight per spike, g,	1000 grain weight,g
Unfertilized control	-	-	-	12,5	49,2	1,63	44,6
$N_{200}P_{140}K_{100}$ (backgroun d)	-	-	-	13,6	50,2	1,71	45,7
NPK+ 1 st foliar feeding	5%- Urea suspension	-	-	14	50,7	1,89	46,5
NPK+ 2 nd foliar feeding	5% - Urea suspension	10%- Urea suspension	-	14,2	51,6	2,02	48,5
NPK+ 3 rd foliar feeding	5% li Urea suspension	10%-Urea suspension	15%- Urea suspension	14,9	52,5	2,10	48,8

CONCLUSION

In the unfertilized control variant, the lowest parameters were recorded because the plants developed solely at the expense of natural soil nutrients (spike length: 12,5 cm; thousand-grain weight: 44,6 g). When the mineral fertilizer background ($N_{200}P_{140}K_{100}$)was applied, the nutritional status of the plants improved, and an increase in performance was observed.

To achieve maximum productivity and economic efficiency, triple foliar feeding with a urea suspension is recommended: 5% during the tillering stage, 10% during the stem elongation stage, and 15% during the flowering stage. The implementation

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of this fertilization system makes it possible to increase grain yield up to 70,5 cwt/ha (or 7,05 t/ha) and net profit up to 8,5732 thousand UZS/ha.

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