

The Effect of Sowing Rates on the Duration of Phenological Stages and Yield of Soft Wheat Varieties

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Annotation: The article presents the results of the influence of the sowing rate of winter wheat varieties on yield indicators and structure in the conditions of rainfed semi-prosperous and flat-hilly zones. It is also noted that the productivity indicators of wheat varieties in rainfed conditions vary depending on their genotypic characteristics, as well as soil and weather conditions, humidity regimes, nutrition and agrotechnological measures.

Keywords: rainfed, flat-hilly zone, crop rotation, technology, wheat, pure fallow, plant biomass.

Introduction. At present, one of the main factors limiting the productivity of grains and other agricultural crops in the rainfed areas of the republic is the deep degradation of soil fertility and structure, as well as the deficiency of essential nutrients required for plant growth. It is important to emphasize that achieving high-quality and abundant yields of cereal crops under any weather conditions in all areas of the republic, including rainfed regions, requires the adoption of improved and environmentally safe technologies. These include the use of mineral fertilizers and pesticides to protect plants from weeds, diseases, and pests.

V.G. Mineev and A.N. Pavlov [2;] emphasize that producing high-quality wheat necessitates selecting suitable predecessors for the soil and crop variety, timely and efficient implementation of all elements of agronomy, and applying fertilizers in the most effective manner based on soil and weather conditions as well as the biological characteristics of the variety. They also highlight the importance of using high-quality seeds for sowing, adhering to optimal sowing times and rates, and ensuring timely and effective harvesting.

Experiments have shown that the heavier and larger the weight of 1,000 grains of soft wheat, the larger the embryo tends to be. A larger embryo is directly related to the number of plants per square meter [3; 6]. However, as the weight of 1,000 grains increases, the number of grains per spike decreases, indicating a negative correlation between these traits. The generative organs of wheat plants are particularly sensitive to drought and heat [4; 5; 12].

Research Object and Methods. The experiments were conducted on typical medium loamy rainfed grey soils at the central experimental farm of the institute. The 0-40 cm soil layer contained 0.632-0.710% humus, 0.017-0.022% total nitrogen, 0.130-0.210% total phosphorus, and 0.925-1.007% potassium, with low levels of available nitrogen (NO_3) and phosphorus. The experiments were carried out in four replications, with experimental plots systematically arranged in three tiers, each with a plot size of 50 m².

In the rainfed field experiments, planting rates for soft wheat varieties were established based on the designated sowing scheme at rates of 2.0, 2.5, and 3.0 million grains per hectare. For the "Bakhmal-97" wheat variety, the planting rates were calculated considering germination capacity, seed viability under laboratory conditions, and the weight of 1,000 grains.

During the growing season, rainfall exceeded the long-term average, creating favorable conditions for autumn-sown cereal crops. As a result, the soil for field experiments was plowed, prepared for sowing, and seeds of autumn cereals were sown in November. Prior to sowing, all variants received 40 kg/ha of phosphorus and an equal amount of potassium fertilizers in pure form during the autumn soil preparation

In all experimental variants, phenological observations were conducted throughout the vegetation period of cereal crops. Key parameters were measured, including the number of tillers per square meter, the number of productive stems, plant height, the length of a single spike, the number of spikelets, the weight of grains per spike, the weight of 1,000 grains, and grain yield based on replications.

Results and Analysis. During the years of the experiment, the air temperature for cereal crops sown in the field trials was higher than the long-term average (+1.0 °C). The sowing-to-germination period for the "Bakhmal-97" soft wheat seeds ranged between 50-52 days across the variants. By March, although precipitation was 39.9 mm below the long-term average, sufficient moisture accumulation in the soil created favorable conditions for tillering and stem elongation phases.

In the experiments, the duration of phenological stages showed that the sowing rate and weather conditions influenced the time from germination to heading for the "Bakhmal-97" soft wheat variety, which ranged from 114 to 116 days. The total vegetation period of the "Bakhmal-97" variety lasted 147-149 days, with an observed extension of two days as the sowing rate increased.

In rainfed fields, as well as in all areas where wheat is sown in autumn, the structure and biometric characteristics of wheat varieties can vary significantly. These variations are influenced not only by their genetic traits but also by soil and weather conditions, moisture and nutrient regimes, and agricultural technologies. According to the results obtained from the experiment, the biometric indicators and yield of the "Bakhmal-97" soft wheat variety in the reporting year were as follows.

The Effect of Sowing Rates on the Structure and Yield of the "Bakhmal-97" Soft Wheat Variety in Rainfed Fields, Gallaaral, 2024

№	Sowing Rate (million grains/ha)	Plant Weight, g/m ²		Plant Height, cm	Spike Length, cm	In one Spike		Weight of grain in one spike, g	Weight of 100 grain, g	Yield according to repetitions, ts/ha			average c/ha
		Total	Piece			Number of small spike	Number of small grain			I	II	III	
1	2.0	246,2	114,2	80,8	9,0	15,8	25,4	1,0	40,8	10,4	11,9	12,0	11,4
2	2,5	264,3	121,0	86,0	9,5	17,7	31,5	1,3	39,5	11,0	13,2	13,0	12,1
3	3,0	257,5	103,5	85,1	9,9	16,7	26,9	1,0	40,3	10,6	9,5	10,9	10,3

The structural composition of the "Bakhmal-97" soft wheat variety varied significantly depending on the sowing rate in the experiments. The highest values for all structural elements and grain yield were recorded in the variant with a sowing rate of 2.5 million grains/ha. In this variant, the plant weight per square meter before harvest reached 264.3 g. However, when the sowing rate was increased to 3.0 million grains/ha, the plant weight decreased by 6.8 g, the weight of 1,000 grains decreased by 0.8 g, and the yield dropped by 1.8 quintals/ha.

According to the analysis results, in the variant with a sowing rate of 2.0 million grains/ha, the number of spikelets per spike for the "Bakhmal-97" soft wheat variety was 15.8, while it was 16.7 in the 3.0 million grains/ha variant. The highest value, 17.7 spikelets, was observed in the 2.5 million grains/ha variant. The number of grains per spike ranged between 25.4 and 31.5 across the variants, with the highest value of 31.5 grains recorded in the 2.5 million grains/ha variant, which was 6.1-4.6 grains higher than the other variants.

Conclusion

The structure and biometric characteristics of autumn-sown wheat varieties in rainfed fields were observed to vary depending on their genetic traits, as well as soil and weather conditions, moisture and nutrient regimes, and agricultural technologies.

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