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Analysis of Productivity Elements of Winter Barley Varieties in the Conditions of the Central Region of Uzbekistan

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Annotation: Relevance and necessity of the topic. Description. Barley is a cereal, a member of the grass family with edible grains. Its flowers are clusters of spikelets arranged in a distinctive herringbone pattern. Each spikelet has a long thin awn (to 160 mm (6.3 in) long), making the ears look tufted. The spikes are in clusters of three. In six-row barley, all three spikes in each cluster are fertile; in two-row barley, only the central one is fertile [2]. It is a self-pollinating, diploid species with 14 chromosomes [3].

Spread. Archaeobotanical evidence shows that barley had spread throughout Eurasia by 2,000 BC. Genetic analysis demonstrates that cultivated barley followed several different routes over time [4]. By 4200 BC domesticated barley had reached Eastern Finland [5]. Barley has been grown in the Korean Peninsula since the Early Mumun Pottery Period (*circa* 1500-850 BC) [6]. Barley (*Yava* in Sanskrit) is mentioned many times in the *Rigveda* and other Indian scriptures as a principal grain in ancient India [7]. Traces of barley cultivation have been found in post-Neolithic Bronze Age Harappan civilization 5,700-3,300 years ago [8]. Barley beer was probably one of the first alcoholic drinks developed by Neolithic humans, later it was used as currency [9]. The Sumerian language had a word for barley, *akiti*. In ancient Mesopotamia, a stalk of barley was the primary symbol of the goddess Shala [10].

Rations of barley for workers appear in Linear B tablets in Mycenaean contexts at Knossos and at Mycenaean Pylos [11]. In mainland Greece, the ritual significance of barley possibly dates

back to the earliest stages of the Eleusinian Mysteries. The preparatory *kykeon* or mixed drink of the initiates, prepared from barley and herbs, mentioned in the Homeric hymn to Demeter. The goddess's name may have meant "barley-mother", incorporating the ancient Cretan word *δηαί* (dēai), "barley" [12: 13].

The practice was to dry the barley groats and roast them before preparing the porridge, according to Pliny the Elder's *Natural History* [14].Tibetan barley has been a staple food in Tibetan cuisine since the fifth century AD. This grain, along with a cool climate that permitted storage, produced a civilization that was able to raise great armies [15]. It is made into a flour product called *tsampa* that is still a staple in Tibet [16]. In medieval Europe, bread made from barley and rye was peasant food, while wheat products were consumed by the upper [17].

Place of research, soil - climatic conditions. Scientific research work was carried out in 2022-2024 in the Plant genetic resources scientific research institute. The experimental farm is located in the upper reaches of the Chirchik River, at an altitude of 481 m above sea level, at 41011II north latitude and 38031II east latitude, in Kibrai district of Tashkent region.

The soil of the experimental farm is a typical gray loam that has been irrigated for a long time. This soil contains 0.8 - 1.0% humus, about 0.058 - 0.089% nitrogen, about 0.141 - 0.184% phosphorus and about 0.154 - 0.148% potassium, which indicates that the nutrients used by the plant during the growing season are very small. The soil is not saline. It differs in soil water permeability, softening complexity.

The main part of atmospheric precipitation occurs in the form of snow in the mountain region, and in the form of rain in the hilly and plain regions. Most of the precipitation falls in the winter and spring months, and a small amount falls in the autumn months. In the summer months, there is almost no rain. In autumn, the warm days last much longer, the air temperature slowly decreases. At the end of October or at the beginning of November, frost falls and the period of field crops stops. During this period, the amount of precipitation increases.

In the experiment, the amount of precipitation was taken into account when implementing irrigation factors. This led to changes in the number and rate of irrigation over the years. In general, by analyzing the climatic conditions of Tashkent region, it is possible to conclude that this area is suitable for growing any type of agricultural crops, and the power of sunlight, the possibilities of artificial irrigation ensure the cultivation of high-quality crops from field crops.

Planting method and depth. At present, the seed of cereal crops sowing in large irrigated areas with seed sowing machine SZ-3.6 ; It is sown using SZU-3.6 and pneumatic precision nesting drills, then furrows are made with 70 or 90 cm between rows. For planting in our field experiments, furrows of 70 sm were first made using KXU-4 model cultivator. Since our field experiments were conducted in small areas, the seed was planted by hand at a depth of 3 - 4 cm at different planting rates.

SCIENTIFIC ANALYSIS OF RESEARCH RESULTS. As is known, high crop yields indicate a well-formed crop structure. Spike length, number of grains in a spike, grain weight in a spike, and weight of 1000 grains are considered to be the main parameters that determine the weight of winter cereal crops. Almost all of these indicators are closely related to the biological characteristics of the variety, seedling density, plant water supply, mineral fertilizer application, and other factors. Also, it is envisaged to increase the quality indicators of the obtained grain crop in the conditions of irrigated farming from winter cereal crops [1; 398-p.].

Scientific sources emphasize that feeding barley plants with mineral fertilizers has a significant impact on indicators such as the number of grains per spike, the weight of grains per spike, and the mass of 1,000 grains. In particular, if the nitrogen element is lacking in grain crops during the period of spike formation and filling, it has been found that the number and weight of spikes and grains in the spike decrease [2; 7].

In the conducted field experiment, the spike length, number of grains in the spike, weight and weight of 1000 grains of barley varieties were determined and the obtained data are presented in Table 1 below.

According to the analysis of the data in this table, in the “Ikhtiyor” variety, which was studied as a control variety, the seeding rate was 3.0 million seeds/ha and mineral fertilizers $N_{150}P_{80}K_{100}$ kg/ha. In variant 1, the length of one spike was 8.8 cm, the number of grains per spike was 33.7 grains, the weight of one spike was 1.01 g, and the weight of 1000 grains was 37.1 g.

Table 1. Spike length, number of grains in one spike, weight and weight of 1000 grains of winter barley varieties

№	Name of varieties	Seed sowing rates, million units/ha	Fertilization rate kg/ha	Length of one spike, sm	The number of grains in one spike, pcs	Weight of one spike, gr	Weight of 1000 grains, gr
1	Ikhtiyor (control)	3,0	$N_{150}P_{80}K_{100}$	8,8	67,4	2,02	37,1
2		3,0	$N_{180}P_{110}K_{140}$	9,2	71,8	2,08	38,3
3		3,5	$N_{150}P_{80}K_{100}$	8,1	65,0	1,84	35,4
4		3,5	$N_{180}P_{110}K_{140}$	9,0	68,2	1,94	36,5
5		4,0	$N_{150}P_{80}K_{100}$	7,6	61,3	1,76	33,7
6		4,0	$N_{180}P_{110}K_{140}$	8,4	62,5	1,86	34,2
7	Obikor	3,0	$N_{150}P_{80}K_{100}$	7,8	62,8	1,82	34,3
8		3,0	$N_{180}P_{110}K_{140}$	8,7	66,2	1,94	35,7
9		3,5	$N_{150}P_{80}K_{100}$	7,2	63,4	1,78	33,1
10		3,5	$N_{180}P_{110}K_{140}$	7,8	61,0	1,84	33,8
11		4,0	$N_{150}P_{80}K_{100}$	7,0	58,6	1,70	31,3
12		4,0	$N_{180}P_{110}K_{140}$	6,7	61,6	1,74	31,7
13	Kyzylkurgan	3,0	$N_{150}P_{80}K_{100}$	9,8	68,8	2,06	39,9
14		3,0	$N_{180}P_{110}K_{140}$	10,6	73,4	2,16	41,3
15		3,5	$N_{150}P_{80}K_{100}$	8,9	66,2	1,92	38,4
16		3,5	$N_{180}P_{110}K_{140}$	9,7	71,6	1,96	40,5
17		4,0	$N_{150}P_{80}K_{100}$	8,3	65,1	1,82	36,8
18		4,0	$N_{180}P_{110}K_{140}$	9,1	66,2	1,88	37,4

In the winter barley variety "Ikhtiyor" with a seeding rate of 4.0 million seeds/ha and mineral fertilizers $N_{150}P_{80}K_{100}$ kg/ha, in variant 5, the length of one spike was 7.6 cm, the number of grains per spike was 30.7 grains, the weight of one spike was 0.88 g, and the weight of 1000 grains was 33.7 g. In the "Ikhtiyor" variety, the seed sowing rate was 4.0 million units/ha, but in variant 6, where mineral fertilizers were applied at an increased rate of $N_{180}P_{110}K_{140}$ kg/ha, the length of one spike was 8.4 cm, the number of grains per spike was 31.3 grains, the weight of one spike was 0.93 g, and the weight of 1,000 grains was 34.2 g.

In the experiment, the barley variety "Obikor" was sown at a rate of 3.0 million seeds per hectare and mineral fertilizers $N_{150}P_{80}K_{100}$ kg/ha. In variant 7, the length of one spike was 7.8 cm, the number of grains per spike was 31.4 grains, the weight of one spike was 0.92 g, and the weight of 1000 grains was 34.3 g. In variant 8, at a sowing rate of 3.0 million seeds, but with an increased rate of mineral fertilizers $N_{180}P_{110}K_{140}$ kg/ha, the length of one spike was 8.7 cm, the number of grains per spike was 33.1 grains, the weight of one spike was 0.97 g, and the weight of 1000 grains was 35.7 g.

In variant 9, where the seeding rate of the winter barley variety “Obikor was 4.0 million seeds/ha and mineral fertilizers $N_{150}P_{80}K_{100}$ kg/ha were applied, the length of one spile was 7.0 cm, the number of grains per spike was 29.3 grains, the weight of one spike was 0.85 g, and the weight of 1000 grains was 31.3 g. In the “Ikhtiyor” variety, the seed sowing rate was 4.0 million

units/ha, but in variant 12, where mineral fertilizers were applied at an increased rate of $N_{180}P_{110}K_{140}$ kg/ha, the length of one spike was 6.7 cm, the number of grains per spike was 30.8 grains, the weight of one spike was 0.87 g, and the weight of 1,000 grains was 31.7 g.

Figure 1. Barley Varieties Spike Analysis Procedures

In field research, the barley variety "Kyzilkurgan" was sown at a rate of 3.0 million seeds per hectare and mineral fertilizers $N_{150}P_{80}K_{100}$ kg/ha. In variant 13, the length of one spike was 9.8 cm, the number of grains per spike was 34.4 grains, the weight of one ear was 1.03 g, and the weight of 1,000 grains was 39.9 g.

In variant 14, at a sowing rate of 3.0 million seeds, but with an increased rate of mineral fertilizers $N_{180}P_{110}K_{140}$ kg/ha, the length of one spike was 10.6 cm, the number of grains per spike was 36.7 grains, the weight of one spike was 1.08 g, and the weight of 1,000 grains was 41.3 g.

In variant 17, where the seeding rate of the winter barley variety "Kyzylkurgan" was 4.0 million seeds/ha and mineral fertilizers $N_{150}P_{80}K_{100}$ kg/ha were applied, the length of one spike was 8.3 cm, the number of grains per spike was 32.5 grains, the weight of one ear was 0.91 g, and the weight of 1000 grains was 36.8 g. It was noted that in variant 16, where the seeding rate of the “Kyzilkurgan” variety was 4.0 million seeds/ha, but mineral fertilizers were applied at an increased rate of $N_{180}P_{110}K_{140}$ kg/ha, the length of one spike was 9.1 cm, the number of grains per spike was 33.1 grains, the weight of one spike was 0.94 g, and the weight of 1,000 grains was 37.4 g.

Summary. It was observed that factors such as the rate of planting seeds and the use of mineral fertilizers in different rates affect the length of the spike, the number of grains in the spike, the weight and the weight of 1000 grains of winter barley varieties. In particular, when the rate of planting barley seeds was increased from 3.0 million units/ha to 4.0 million units/ha, it was noted that the length of the spike, the number of grains in the spike, and the weight of one spike decreased as a result of the increase in the number of plants. Among the barley varieties studied, the "Kyzilkurgan" variety had the highest spike length, number of grains per spike, weight per spike, and 1000-grain weight. In variant 14, the optimal sowing rate was 3.0 million units/ha and the annual application rate of mineral fertilizers was $N_{180}P_{110}K_{140}$ kg/ha.

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