

# Influence of Seeding Norms and Mineral Fertilizer Rate on the yield of Winter Barley

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**Abstract:** *The article presents the results of studies on the responsiveness of winter and two-handled barley varieties on the terms of sowing and mineral fertilizers in conditions of light-yellow soil of the Kashkadarya region. It is established that, as the planting time lags, efficient mineral fertilizers are reduced. The highest grain yield is formed when sowing on October 15 with the application of mineral fertilizers N180P90K60 kg / ha.*

**Keywords :** *winter barley, two-rowed barley, deadline sowing, crop, sort, mineral fertilizer, soil, Mavlon, Bolgali, yield, grain.*

## I. INTRODUCTION

Grain production provides the population with food, livestock - with feed, industry - with raw materials. Therefore, grain production is a key issue in the development of agriculture. Barley is the main grain crop in the Republic of Uzbekistan. Despite the great importance of barley in the republic, its yield on irrigated land remains low at 30–35 c / ha. In this regard, the problem of increasing yields must be addressed through the wide use of the achievements of breeding, the further improvement of the technology of cultivation of this crop. To realize the high potential productivity of new varieties of barley, modern cultivation technologies adapted to the hot, arid climate of the south of the republic are needed. Numerous studies have been carried out in Uzbekistan concerning the selection, seed production and technologies for the cultivation of winter barley [1], [2].

In our studies, the effect of sowing dates, fertilizer rates on the yield of winter barley varieties included in the State Register of the Republic of Uzbekistan was studied. In recent years, new varieties of winter barley "Mavlon", two-handled "Bolgali" with a potential yield of 6.0-7.5 t / ha currently occupying the main areas of sowing for irrigation have been developed in the republic. But due to the lack of cultivation technology, taking into account the biological characteristics of varieties and the soil and climatic conditions of the region, the yield of barley remains low. Therefore, the improvement of the technology elements for them, taking into account the biological characteristics and the soil and climatic conditions of the region, is currently highly relevant. To achieve the task, the following tasks were performed:

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- to justify the optimal time for sowing and mineral fertilizers of barley varieties, ensuring maximum grain yield;
- to determine the reaction of winter barley varieties to the doses of mineral fertilizers and the economic efficiency of the cultivation technologies of intensive winter barley varieties taking into account the biological characteristics of the varieties and the soil and climatic conditions of the region.

The advantages of winter barley are manifested in the rotation. Ripening before winter wheat and spring barley for 8-15 days, it provides for the production of feed grains in an earlier period. In addition, freeing the fields after harvesting early, winter barley is a good precursor for repetitive crops.

An important feature of winter barley is that in early spring, starting to grow and continuing to bush, it suppresses weeds before other crops, thereby eliminating the need for the use of expensive herbicides.

Studies by many authors have shown that the factors that ensure the growth of yields and gross yield of grain for new varieties of barley include: placing them according to the best predecessors and planting seeds in optimal agrotechnical periods with recommended norms [3] and [4].

Determining the optimal sowing time and fertilizer rates for specific environmental conditions for barley is very important because they greatly affect the timeliness of emergence and fullness of seedlings, the subsequent growth and development of plants and, ultimately, the yield.

The aim of our research is to identify the optimal sowing dates and fertilizer rates, ensuring a high yield with good quality of winter grain and two-handled barley varieties on the irrigated lands of Kashkadarya region. The object of the research was the Mavlon winter barley variety and the Bolgali variety of two handles included in the State Register. The experiments were conducted on the experimental fields of the Kashkadarya Research Institute for Breeding and seed production of cereals.

## II. MATERIALS AND METHODS

The experiments were carried out in 4-fold repetition, the accounting area of plots 50 m<sup>2</sup>. The sowing was carried out with an SFK-6-10 seeder with 15 sm row spacing. The seeding depth is 5 sm. The depth of groundwater is 2.5-3.0 meters. The soils are light gray, the humus content in the topsoil (0-30 sm) of soil is 0.87%, total nitrogen is 0.03-0.07%, total phosphorus is 0.15-0.18% of total potassium 1.8-2.0 %,

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mobile forms of N-NO<sub>3</sub> 0.068, phosphorus 0.105, exchangeable potassium 190 mg / kg of soil. In the experiments, the sowing of the Mavlon winter barley variety and the two-rowed barley Bolgali varieties were carried out on October 1; October 15; November 1 and November 15 in the following variants of the rate of fertilizers: 1) control (without fertilizers); 2) P<sub>90</sub>K<sub>60</sub>-background; 3) background + N<sub>60</sub>; 4) background + N<sub>120</sub>; 5) background + N<sub>180</sub> kg/ha. The seeding rate of 4.0 million viable seeds/ha. Cotton predecessor. In the experiments, the soil moisture during the growing season was maintained not lower than 70% of the soil EFC (extreme field capacity). In the experiments, 10–15 days before sowing, water recharge irrigation was carried out at a rate of 800 m<sup>3</sup>/ha. Phosphate and potash fertilizers were applied for plowing. Nitrogen fertilizers were applied according to the scheme of experience, depending on the rate of nitrogen fertilizers in the early spring, in the tillering stages, going into the pipe, earing as a top dressing.

### III. RESULTS

Barley seeds against the background of water-recharge irrigation gave amicable shoots. As the sowing time lags, field germination decreased. The highest seed germination was observed at the time of sowing on October 15. Mineral fertilizers did not significantly affect field germination. The highest safety of plants for harvesting was observed in optimal sowing dates. Winter resistance and varietal characteristics of barley had a significant effect on the safety of plants for harvesting. The winter hardiness of the two-rowed barley Bulgali cultivars was lower than that of the Mavlon winter variety.

As a result of research, it was found that as the dose of nitrogen fertilizers increased from 120 to 180 kg / ha, a significant increase in yield was not observed. When sowing cultivar two-rowed barley Bolgali, on October 1, the highest yield was established on plots background + N<sub>120</sub> and background + N<sub>180</sub> kg / ha, respectively, 41.6 and 42.6 centners / ha, yield increase compared with the control variant 15.2; 16.2 c / ha. These figures for the grade Mavlon respectively amounted to 45.1; 46.6 c / ha, yield increase 19.7; 21.2 c / ha.

The optimal sowing date for barley varieties in the conditions of Kashkadarya region is the second decade of October. When sown on October 15, the yield increased in comparison with the crops on October 1, and the efficiency of mineral fertilizers increased. The yield of the two-rowed barley Bolgali on the background + N<sub>120</sub> plots and the background + N<sub>180</sub> kg / ha was 46.4 and 49.1 c / ha, the winter variety of Mavlon was 48.7; 52.7 c / ha, the yield increase from mineral fertilizers varieties accounted for, 17.2; 15.4; 20.8 and 24.8 c / ha.

It was revealed that the winter lodging variety Mavlon has a high resistance to lodging, winter hardiness and responsiveness to mineral fertilizers in comparison with the variety of the two-rowed barley Bolgali. As the sowing time lags, the yield decreased. When sowing on November 15 compared with October 15, there was a decrease in yield. The yield of the Bolgali variety on plots using background + N<sub>120</sub> and background + N<sub>180</sub> kg / ha was 37.1 and 36.9 c / ha, for the winter Mavlon variety, these figures were respectively 35.6; 38.2 centner / ha of yield increase 13, eight; 13.6 and

12.2; 12.6 c / ha The decrease in yield as the lagging time from the optimal sowing period for the Mavlon variety was significantly compared with the Bolgali variety, which is explained by the higher responsiveness of the Mavlon variety to fertilizer and the sowing dates. With early and late sowing of October 15, the mass of grains from one ear, the number of grains in one ear and the mass of 1000 grains decreased. On the plots of the Bolgali variety, when applying high doses of mineral fertilizers, background + N<sub>180</sub> kg / ha, partial lodging of plants was observed.

### IV. FINDINGS

Under the conditions of light-gray soils of the Kashkadarya region, the highest grain yield is formed by the conditions of the winter variety Mavlon and the two-rowed barley Bolgali Bolgali when sown on October 15 with the addition of N<sub>180</sub>P<sub>90</sub>K<sub>60</sub> kg / ha. Early or late sowing of barley from October 15 leads to a decrease in the effectiveness of mineral fertilizers. Mavlon's winter variety, compared to the Bolgali double-handled variety, is more resistant to lodging and has good winter hardiness. It was found that the variety Mavlon is more responsive to the sowing dates and mineral fertilizers.

Term of crops	Norms of fertilizing, kg/ha	Crop-producing power			Medium	Additional yield	
		2010	2011	2012		By term sowing	By fertilizing
<b>Bolgali</b>							
1- October	Without fertilizing	26,5	24,6	28,1	26,4	-	-
	P <sub>90</sub> K <sub>60</sub> -background	31,2	27,4	32,3	30,3	-	3,9
	Background d+N <sub>60</sub>	37,5	33,7	39,5	36,9	-	10,5
	Background d+N <sub>120</sub>	42,6	38,1	44,2	41,6	-	15,2
	Background d+N <sub>180</sub>	43,3	39,4	45,3	42,6	-	16,2
15- October	Without fertilizing	29,8	25,6	32,3	29,2	2,8	-
	P <sub>90</sub> K <sub>60</sub> -background	34,5	31,0	35,6	33,7	3,4	4,5
	Background d+N <sub>60</sub>	41,5	36,7	43,5	40,5	3,6	11,3
	Background d+N <sub>120</sub>	46,3	42,3	50,7	46,4	4,8	17,2
	Background d+N <sub>180</sub>	5,1	45,4	51,8	49,1	6,5	15,4
1- November	Without fertilizing	27,4	26,2	28,1	27,2	0,8	-
	P <sub>90</sub> K <sub>60</sub> -background	32,7	30,5	33,9	32,3	2,0	5,1
	Background d+N <sub>60</sub>	38,3	36,9	38,6	37,9	2,0	10,7
	Background d+N <sub>120</sub>	43,8	39,6	44,7	42,7	1,1	15,5
	Background d+N <sub>180</sub>	44,3	41,4	45,8	43,8	1,1	16,6



15- November	Without fertilizing	24,5	23,3	22,3	23,3	-3,1	-
	P <sub>90</sub> K <sub>60</sub> -background	28,5	26,6	29,2	28,1	-2,2	4,8
	Background d+N <sub>60</sub>	33,5	31,7	35,4	33,5	-1,6	10,2
	Background d+N <sub>120</sub>	36,8	34,6	40,1	37,1	-4,5	13,8
	Background d+N <sub>180</sub>	38,6	35,4	37,1	36,9	-5,7	13,6
<b>Mavlono</b>							
1- October	Without fertilizing	25,5	23,2	27,5	25,4	-	-
	P <sub>90</sub> K <sub>60</sub> -background	33,3	29,7	35,4	32,8	-	7,4
	Background d+N <sub>60</sub>	39,6	35,9	44,1	39,8	-	14,4
	Background d+N <sub>120</sub>	44,8	39,1	51,5	45,1	-	19,7
	Background d+N <sub>180</sub>	45,3	42,4	52,2	46,6	-	21,2
15- October	Without fertilizing	28,4	26,1	29,3	27,9	2,5	-
	P <sub>90</sub> K <sub>60</sub> -background	34,9	33,5	37,6	35,3	2,5	7,4
	Background d+N <sub>60</sub>	43,9	40,2	47,8	43,9	4,1	16,0
	Background d+N <sub>120</sub>	49,4	44,5	52,4	48,7	3,6	20,8
	Background d+N <sub>180</sub>	53,1	51,4	53,7	52,7	6,1	24,8
1- November	Without fertilizing	26,5	25,6	27,3	26,4	1,0	-
	P <sub>90</sub> K <sub>60</sub> -background	29,9	28,3	31,1	29,7	-3,1	3,3
	Background d+N <sub>60</sub>	34,7	32,9	38,2	35,2	-4,6	8,8
	Background d+N <sub>120</sub>	39,5	37,6	44,9	40,6	-4,5	14,2
	Background d+N <sub>180</sub>	42,3	39,2	46,3	42,6	-9,6	16,2
15- November	Without fertilizing	23,4	22,4	21,3	23,3	-3,1	-
	P <sub>90</sub> K <sub>60</sub> -background	26,4	24,6	27,2	27,1	-3,2	2,8
	Background d+N <sub>60</sub>	32,5	29,5	34,4	33,5	-4,6	7,2
	Background d+N <sub>120</sub>	35,3	32,6	39,1	37,4	-8,5	10,8
	Background d+N <sub>180</sub>	36,8	34,4	35,2	34,9	-10,7	12,4

## V. DISCUSSION AND CONCLUSION

The article presents the results of studies on the responsiveness of winter and two-handled barley varieties on the terms of sowing and mineral fertilizers in conditions of light-yellow soil of the Kashkadarya region. It is established that, as the planting time lags, efficient mineral fertilizers are reduced. The highest grain yield is formed when sowing on October 15 with the application of mineral fertilizers N180P90K60 kg / ha.

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