UDC 633.853.483:631.52

YIELD INDICATORS OF WHITE MUSTARD (SINAPIS ALBA L.) COLLECTION SAMPLES IN RAINFED FIELDS

Mavlanov Laziz Bakhtiyor o'g'li[1]

Independent researcher

Kushmatov Bakhtiyor Sa'dullayevich[2]

Head of the laboratory, Doctor of Philosophy in Agricultural Sciences

Mavlanov Javokhir Sarvar ugli[1]

Researcher

Scientific Research Institute of Rainfed Agriculture[1]

Bakhmal Scientific Experimental Station[2]

Abstract. This study was conducted from 2018 to 2019 in the mountainous and foothill rainfed areas of the Bakhmal Scientific-Experimental Station of the Research Institute of Rainfed Agriculture. Thirty collection samples of white mustard (Sinapis alba L.) were evaluated based on their agrobiological characteristics and yield indicators. According to the research results, the samples differed significantly from each other in their main agronomic characteristics, particularly in plant height, 1000-seed weight, and yield. The varieties KGL-15, KGL-8, KGL-13, KGL-1, KGL-11, KGL-12, KGL-15, and KGL-4, which demonstrated the highest indicators, were selected as promising samples.

Keywords: Mustard, Sinapis alba L., rainfed farming, yield, thousand-seed weight, oilseed crop, collection sample.

Introduction. Mustard (Sinapis alba L.) it is an annual plant belonging to the Brassicaceae family and is of particular importance among oilseeds. It is widely used in the food industry, in the production of medicines, and as a source of fodder. In particular, its seeds are rich in 35-40% vegetable oil, which plays an important role in the production of environmentally friendly and high-quality oils [6].

Mustard is considered one of the promising oilseed crops for rainfed areas due to its short growing season (80-100 days), drought resistance, and frost tolerance [5]. In particular, the species

Sinapis alba L. has a strong root system, disease resistance, the ability to better utilize nutrients in the soil, which allows it to adapt to arid and rocky areas [2].

In the rainfed regions of Uzbekistan, especially in foothill and arid regions, under conditions of water scarcity and severe climate, there is a need for new, stable, high-yielding and oil-producing varieties of mustard. This need is especially related to the domestic demand for oil products and the expansion of the production of import-substituting products.

On a global scale, selection and variety testing of mustard has been widely established in India, Canada, China, and Russia. For example, Sharma and others. (2019) in a study in the Indian state of Punjab identified drought-resistant, high-oil-producing varieties of mustard.[1] Also, in scientific research conducted in Kazakhstan, adaptive varieties of mustard have been identified in rainfed conditions[3]. These foreign experiences are important scientific and practical directions for Uzbekistan.

Materials and methods. Experimental work was carried out during 2018-2019 at the Bakhmal Research Station of the Research Institute of Irrigated Agriculture in the Bakhmal district of the Jizzakh region. The experimental site is located in a mountainous region, at an altitude of 1650-1700 m above sea level, and the terrain is located on foothill slopes. The soil is moderately and severely affected by erosion, consisting of heavy loamy dark gray soils with semi-arid climatic conditions. The average annual rainfall is 478,1 mm.

Mustard (Sinapis alba L.) 30 varieties were involved. Each variety was placed without repetitions, with a seeding rate of 2,5 million seeds per hectare. Each repeated area was 1 m^2. During the experimental years, agrotechnical measures were carried out uniformly based on the institute's methodology.

The following characteristics were evaluated: Plant height (cm), flowering period (days), number of stems (units), weight of 1000 seeds (g), seed yield (t/ha).

Results of scientific research and their analysis. In field experiments conducted in 2018-2019 under dryland agroecological conditions of the Bakhmal district of the Jizzakh region, reliable differences in morphological development and yield characteristics of mustard (Sinapis alba L.) samples were revealed. Among the varieties participating in the experiment, the “Nika” variety was used as a control.

When studying the plant height, weight of 1000 seeds, and yield indicators of mustard samples, the standard variety Nika averaged 88,2 cm, the weight of 1000 seeds averaged 1,9 g, seed yield averaged 74,4 g, compared to the standard, the plant height of the studied KGL-1, KGL-2, KGL-6, KGL-7, KGL-8, KGL-11, KGL-13, KGL-15, KGL-16 samples was 90,2-96,6 cm, the weight of 1000 seeds of the KGL-1, KGL-5, KGL-7, KGL-12, KGL-13, KGL-15, KGL-16 and KGL-19 samples was 2.0-2.3 g, the seed yield of the KGL-1, KGL-4, KGL-5, KGL-6, KGL-11, KGL-12, KGL-14, KGL-15, KGL-16 and KGL-18 samples was 82,4-95,0 g (Table 1).

The height of the studied specimens ranged from 72,6 cm to 99,3 cm, with the highest specimens recorded in KGL-15 (99,3 cm), KGL-8 (99,2 cm), KGL-13 (96,6 cm), which may be

associated with intensive vegetative development and the formation of a strong root system. In the control variety “Nika”, this indicator was 88,2 cm.

The mass of 1000 seeds varied within the range of 1,8-2,3 g, the highest value was noted in the following samples KGL-1 and KGL-11 – 2,3 g. This indicator is taken as a relative expression of seed quality and oil content. In the control variety, this indicator was 1,9 g.

Seed yield varied within the range of 5,5 c/ha to 9,5 c/ha across varieties, with the maximum values recorded in samples KGL-12 (9,5 c/ha), KGL-15 (9,3 c/ha), and KGL-4 (9,0 c/ha). This indicator was on average 1,8 c/ha (19,6%) higher than that of the “Nika” variety.

The results obtained in this study scientifically prove that the samples KGL-15, KGL-8, KGL-13, KGL-1, KGL-11, KGL-12, KGL-15 and KGL-4 are highly adapted to rainfed agroecological conditions. During the experiment, it was established that this variety is statistically significantly ($p<0.05$) superior to other varieties in terms of vegetative development rate, seed quality (1000 seed weight), and yield.

Table 1

Indicators of plant height, weight of 1000 seeds, and yield of mustard (Sinapis alba L.) samples

(Bakhmal-2018-2019)

№	Sample name	Plant height, (cm)	Mass of 1000 seeds (g)	Seed yield 1 m², g
1	Nika (standard)	88,2	1,9	74,4
2	KGL-1	91,3	2,3	83,3
3	KGL-2	90,2	1,9	73,1
4	KGL-3	78,4	1,9	86,9
5	KGL-4	80,8	2,1	90,4
6	KGL-5	84,6	2,1	55,7
7	KGL-6	93,5	2,0	89,4
8	KGL-7	90,1	1,9	74,7
9	KGL-8	99,2	1,9	65,8
10	KGL-9	82,1	1,8	73,4
11	KGL-10	80,8	1,9	68,2
12	KGL-11	92,2	2,3	87,4
13	KGL-12	83,6	2,2	95,0
14	KGL-13	96,6	2,2	59,2
15	KGL-14	88,9	1,9	86,2
16	KGL-15	99,3	2,1	92,7
17	KGL-16	90,8	1,9	79,3
18	KGL-17	72,6	1,9	73,7

19	KGL-18	81,6	2,0	82,4
20	KGL-19	86,9	1,8	64,8

In terms of yield, the KGL-15 and KGL-12 samples showed a result 19-20% higher than the control variety Nika with an indicator of 9,3-9,5 c/ha, respectively. Traits such as yield and plant height are important agrobiological traits for breeding, and the dominance of KGL-15, KGL-8, and KGL-13 samples in them also indicates its genetic potential and ecological adaptability[1,3].

Also, in rainfed conditions, the agrobiological properties of the crops are stable, and the yield varies from year to year. The fact that the KGL-15 and KGL-12 and KGL-4 samples showed stable results in consecutive years during 2018-2019 allows it to be used as the main variety in the breeding process.

Therefore, the KGL-15, KGL-12, and KGL-4 samples are recommended for breeding as promising genotypes due to their superiority in agrobiological traits, suitability for the soil and climatic conditions of rainfed lands, and yield stability.

Conclusion. As a result of field studies conducted in 2018-2019 in rainfed conditions of the Bakhmal district of the Jizzakh region, the main morpho-biological and yield indicators of mustard (Sinapis alba L.) varieties and samples were assessed. In the studies, high results were obtained for all agronomic traits of the KGL-15, KGL-12, and KGL-4 samples, especially for the weight and yield of 1000 seeds, compared to the control variety Nika.

These samples showed positive indicators in terms of vegetative development, seed quality, and adaptability to rainfed conditions, with a yield of 19-20% higher. Also, the fact that the samples show stable results year after year confirms that it is a reliable genotype for breeding.

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