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MUSTARD (*SINAPIS ALBA* L.) EVALUATION OF SEED GERMINATION IN LABORATORY AND FIELD CONDITIONS

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Annotation. *In this article, 10 varieties of mustard (*Sinapis alba* L.) were studied in laboratory and field conditions, including the seeds of the "5/2019 (Bakhmal-70)" variety. For each variety, germination was observed three times, both in laboratory conditions and separately in field conditions. The "Bakhmal-70" variety showed the highest results: 95.3% germination in the laboratory and 72.7% in the field.*

Keywords: *mustard, *Sinapis alba*, germination, laboratory test, field experiment, Bakhmal-70, selection*

Log in. In recent years, there has been a noticeable decrease in crop yields due to the destabilization of global climate conditions, a sharp decrease in water resources, and soil degradation. This situation requires a reassessment of the degree of resistance of existing varieties to environmental stresses and the selection of new, adaptive genotypes. In particular, there is a growing need for crops with a short growing season and stable yields. One such crop is mustard (*Sinapis alba* L.) it attracts attention as a technical crop that is resistant to difficult climatic conditions and easily cultivated in terms of agricultural techniques.

Mustard is a cultivated species that provides economic benefits in many ways. It is widely used not only in the technical and food industries, but also in pharmaceuticals, forage, biofumigation, and as a green fertilizer that restores soil. The chemical composition of its seeds is characterized by a high content of fat (35-40%) and protein (20-28%), which makes it valuable as a diversified source of raw materials. Seed quality and germination level serve as an important scientific basis as initial criteria for selection and variety testing.

Among them, mustard (*Sinapis alba* L.) is an important source of raw materials in several areas of the national economy. Due to its high oil content, proteins, and essential oils in its seeds, mustard is used in the food industry, pharmaceuticals, technology, forage, and even as a green manure. Along with the agronomic significance of this crop, its role as a soil-healing plant in the agroecosystem is also increasing[1,2].

The process of creating high-yielding varieties of mustard and their introduction into cultivated areas begins, first of all, with the assessment of their seed quality. Seed germination serves to determine the viability of the variety, its adaptive potential, and

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resistance to climatic influences at the initial stage. However, germination indicators determined in laboratory conditions may not always be confirmed in field conditions. Therefore, testing the viability of varieties under two different conditions is one of the most reliable methods of selection evaluation [3,5].

In this study, a comparative assessment of the germination characteristics of mustard varieties under laboratory and field conditions was carried out. In particular, the seeds of the "5/2019 (Bakhmal-70) " variety were selected as the main object of analysis. The goal was to determine the relationship between laboratory and field germination results, and to scientifically substantiate the possibilities of attracting promising varieties to early breeding.

Research conditions and methodology. Research work was carried out in 2024 at the central experimental farm site of the Bakhmal Scientific Experimental Station of the Scientific research institute of rainfed Agriculture. For the experiment, 10 varieties of the genus *Sinapis alba* L., including the promising variety "5/2019 (Bakhmal-70)," were selected. Each variety was evaluated in laboratory and field conditions.

Laboratory experiments. Seed germination under laboratory conditions was determined according to GOST 12038-84. Seeds in Petri dishes were placed on filter paper based on 3 repetitions consisting of 50 seeds for each variety. The temperature was maintained at 25°C, humidity at 65-70%. The experiment was conducted for 9 days. Laboratory tests were conducted on the basis of clean and healthy seeds. Seed germination was determined by the following formula:

$$\text{Germination percentage (U\%)} = \frac{\text{number of germinated seeds}}{\text{number of sown seeds}} \times 100$$

Field experiments. Experiments on germination under field conditions 50 seeds of each variety were sown manually on March 15 to a depth of 1-2 cm. Each variety was sown in 3 replications. Seeds germinated between March 23-25.

The number of seedlings grown in field conditions was determined by counting and evaluated by the following formula:

$$\text{Field germination rate} = \frac{\text{number of sprouts}}{50} \times 100$$

The results of laboratory and field germination were compared, and an average for each variety was calculated.

Results and their analysis. Laboratory and field studies have shown significant differences in the germination rate of mustard varieties. The germination rate of seeds in the laboratory was on average from 82.7% to 95.3%, and in the field from 65.3% to 72.7% (Table 1).

According to the results of experiments conducted under laboratory conditions, the variety "5/2019 (Bakhmal-70) " showed the highest result - 95.3%. This variety showed a germination rate of more than 94% in each of the 3 repeated trials, which indicates its high seed quality.

Among the remaining varieties, 2/2019 (92.0%), Nika (st) (90.7%), 6/2019 (89.3%) and Kristal (88.7%) had relatively high germination rates. The lowest laboratory indicator was noted in the 4/2019 variety (82.7%).

The results of field germination also partially corresponded to the laboratory results. These tests showed that the seeds sown on March 15 sprouted between March 23-25. The variety "5/2019 (Bakhmal-70) " also showed a high result - 72.7%. Its germination period is 8 days, which indicates the variety's rapid growth and adaptability to climate.

Among other varieties that showed good results were Nika (70.0%), 3/2019 (68.7%), Bravo (68.0%), and 4/2019 (68.0%). The lowest field germination was observed in the Kristal variety (65.3%).

To make a reliable decision on the selection of varieties by comparing the results obtained under both conditions, experiments were conducted under both conditions. These indicators are clearly reflected in Table 1:

Table 1.

**Laboratory and field germination indicators of mustard varieties
(Baxmal-2024)**

No.	Variety name	Laboratory germination (%)	Field germination (%)	Average number of germinated seeds (units)
1.	Nika (st)	90.7	70.0	136 / 105
2.	1/2019	88.0	67.3	132 / 101
3.	Bravo	88.0	68.0	132 / 102
4.	Crystal	88.7	65.3	133/98
5.	2/2019	92.0	66.0	138/99
6.	3/2019	86.0	68.7	129 / 103
7.	Bella	84.7	69.3	127 / 104
8.	April 2019	82.7	68.0	124 / 102

9.	5/2019 (Baxmal-70)	95.3	72.7	143 / 109
10.	6/2019	89.3	66.7	134 / 100

Conclusion. As can be seen from the above results, the variety "5/2019 (Bakhmal-70) " was the only variety that showed consistently high germination in laboratory and field conditions. The seeds of this variety germinated quickly and uniformly, which allows it to be selected as the main donor for breeding. Other varieties, in particular Nika, 2/2019, 6/2019, also showed slightly lower germination indicators, but Bakhmal-70 significantly surpassed them.

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