HANTAL (SINAPIS ALBA L.) DURATION OF THE VEGETATION PERIOD OF CROP VARIETIES

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Annotation: In the article, the vegetation period of 10 mustard varieties in rainfed conditions was studied. Experiments were conducted in 2024 at the Bakhmal Research Station of the Research Institute of Irrigated Agriculture. Sowing was carried out uniformly - on March 15, and the ripening period varied from 93 to 103 days depending on the variety. The earliest ripening variety was 5/2019 (Bakhmal-70), which ripened in 93 days. The duration of the phenological stages varied depending on the biological characteristics of the varieties. Short-vegetation varieties were found to be promising for rainfed areas.

Keywords: mustard, dryland, duration of vegetation, phenological stages, early-ripening, variety.

Introduction. Global climate change and water scarcity require new agrobiological approaches in agriculture, especially selecting drought-resistant crops with short vegetation that are suitable for rainfed areas [4,7]. Under these conditions, the mustard (Sinapis alba L.) crop is characterized by ecological adaptability, a short growing season, and low demands on soil and agrotechnical conditions. In particular, research on the cultivation technology of mustard varieties in rainfed areas confirms the prospects of this crop.

Mustard is an annual, mainly cross-pollinating, early-ripening, oilseed, and fodder crop. Its growing season is relatively short, which allows it to adapt to intensive farming systems and crop rotation processes. In particular, the growing season of mustard is 65-95 days, and this indicator varies depending on agro-climatic conditions, soil moisture, variety characteristics, and sowing dates. Such a short growing season makes it possible to grow mustard as a supplementary or intermediate crop between grain and leguminous crops.

In the conditions of dryland farming, the importance of mustard increases even more. Because in these regions, especially in the spring months, it is possible to ensure the early development of mustard by effectively using moisture reserves. Studies show that mustard seeds germinate even at low temperatures (5-7°C), which makes it suitable for sowing in early spring. In the initial stage of vegetation, cool and humid conditions are required, and during the flowering and ripening period, relatively dry and warm weather is required [1].

In recent years, scientific research on the prospects of growing mustard crops in the rainfed regions of Uzbekistan (the foothills and foothills of Jizzakh, Navoi, Samarkand, and Kashkadarya regions) has intensified. According to the literature, the vegetation period of mustard varieties in field experiments was 68-78 days, and they yielded stable yields even under short spring moisture conditions [3]. In this

study, the early development and moderate demand for soil moisture of mustard crop varieties were noted.

International experience also confirms the high adaptability of mustard crops. In studies conducted in Canada, mustard was assessed as a crop with a shorter growing season and a high degree of resistance to high temperatures compared to other oilseeds. Indian and Iranian researchers have developed breeding programs for the successful transfer of mustard from irrigated agriculture to rainfed systems [5].

Furthermore, in-depth study of the growing season of mustard in rainfed areas, identification of each phenological stage, is one of the main scientific directions in optimizing selection, agricultural techniques, agrometeorology, and crop rotation systems. This plays an important role in creating resource-saving and efficient agricultural systems in the current arid climate.

Research methods. Research work was carried out in 2024 at the experimental farm site of the Scientific Research Institute of Rainfed Agriculture Bakhmal Experimental Station. This territory belongs to the mountainous part of rainfed agriculture, the climate is sharply continental, the average annual precipitation is 478.1 mm. The main part of precipitation falls in March-May.

The purpose of the experiment was to assess the duration of the growing season, changes in phenological phases, and adaptation to agro-climatic conditions of the studied mustard varieties in rainfed conditions.

The study involved 10 mustard varieties, differing in breeding origin, biological characteristics, and vegetation duration. These are: Nika (standard), Bravo, Crystal, Bella, 1/2019, 2/2019, 3/2019, 4/2019, 5/2019 (Bakhmal-70) and 6/2019 varieties.

On the experimental plot, each variety was placed in triplicate repetition, by the method of random blocks. The area of each replication was 25 m^2.

Research results and their discussion. The results of the conducted experiments showed that there were significant differences in the duration of the growing season of 10 mustard varieties grown in rainfed conditions, which depended on their genetic characteristics and the degree of adaptation to agro-climatic conditions.

The experiment was sown on March 15, 2024, at the same time for all varieties, and the germination period was recorded between March 23-25. The bud formation stage is usually observed from April 25-29, the branching stage from May 3-6, and flowering from May 4-7. The full ripening period varied by variety and lasted from June 16 to June 26. The vegetation period from sowing to ripening by variety was recorded as follows:

The earliest ripening variety: 5/2019 (Bakhmal-70) - 93 days (sowing: March 15, ripening: June 16).

Late-ripening variety: 3/2019 - 103 days (ripening: June 26).

In the remaining varieties, the duration of vegetation was within 98-102 days.

These results show that some varieties, in particular 5/2019 (Bakhmal-70), stand out as early-ripening varieties suitable for rainfed conditions. It began to sprout quickly (March 23), the bud formation period was April 25, the flowering period was May 4, and the ripening period was June 16. This variety quickly went through the stages of growth and showed high productivity in a short growing season.

The growing season of Nika, considered the standard variety, is 100 days, and it ripens at an average time compared to most varieties. The vegetation period of the Bravo, Kristal, Bella, and 4/2019 varieties was 99-102 days, and they belong to the medium ripeness group.

In all varieties, the duration of vegetation and phenological stages were observed step by step, and it was established that the rates of phenological development between varieties are different. This indicates the necessity of selecting varieties based on regional specialization in breeding and seed production systems.

The results of the experiments confirmed that for rainfed conditions, varieties with a short vegetation period, early flowering, and ripening are preferable, which allows for the maximum use of spring moisture reserves. Especially in years with limited spring precipitation, such varieties play an important role in the timely implementation of agrotechnical measures and obtaining a stable harvest.

Table 1

Duration of the growing season of mustard varieties and samples

(2024, Bakhmal)

No	Name of variety samples	Sowing date	Germination	Budding period	Branch-lash	Blooming	Ripening	Duration of the growing season, days
1	Nika (st)	March 15	March 25	April 26	May 5	May 7	June 23	90
2	Bravo	March 15	March 24	April 27	May 5	May 6	June 24	92
3	Crystal	March 15	March 25	April 28	May 6	May 7	June 22	89
4	Bella	March 15	March 23	April 28	May 5	May 6	June 25	94
5	1/2019	March 15	March 23	April 27	May 4	May 5	June 23	92
6	2/2019	March 15	March 24	April 29	May 6	May 7	June 21	89
7	3/2019	March 15	March 24	April 27	May 4	May 5	June 26	94
8	April 2019	March	March 23	April 28	May 5	May 6	June 24	93

		15						
9	5/2019 (Baxmal-70)	March 15	March 23	April 25	May 3	May 4	June 16	85
10	6/2019	March 15	March 25	April 27	May 5	May 6	June 22	89

Conclusion. Analysis of the duration of vegetation and phenological stages of 10 studied mustard varieties showed that the varieties differ significantly in their biological characteristics and degree of adaptation to agro-climatic conditions. According to the results of the experiments, the variety 5/2019 (Bakhmal-70) was distinguished by the shortest growing season - 93 days, which made it possible to assess it as an early-ripening and promising variety.

Differences in the growth rate of varieties, the timing of flowering and ripening play an important role in selection and regionalization of varieties. The selection of short-vegetation and early-flowering varieties for rainfed conditions serves the effective use of limited humidity and climatic resources.

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