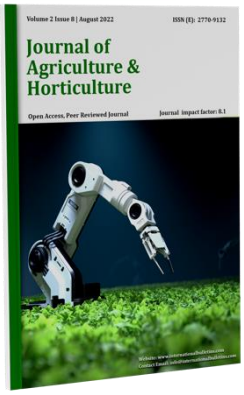

SEED PRODUCTION TECHNOLOGY OF MELISSA IN SOUTHERN UZBEKISTAN

Karshieva Saodat Khurramovna
Head of Laboratory, Surkhandarya Experimental Station,
Research Institute of Vegetable, Melons, and Potato growing
E-mail: qarshiyeva.saodat@mail.ru
https://doi.org/10.5281/zenodo.17083148

Abstract: This article presents the results of studies on the seed productivity and sowing qualities of lemon balm seeds introduced in the conditions of Uzbekistan. Studies have shown that in the conditions of Uzbekistan, with different sowing dates, lemon balm plants successfully undergo a full development cycle and form high-quality seeds. It has been established that the yield and sowing qualities of lemon balm seeds are significantly higher than in other regions. All this indicates the prospects of introducing lemon balm in the conditions of Uzbekistan.

Keywords: lemon balm, introduction, sowing dates, development phases, plant height, seed productivity, weight of 1000 seeds, seed germination.

Introduction.

Melissa belongs to the Lamiaceae family. Medicinal lemon balm (Melissa officinalis L.), originating from Mediterranean countries, is considered highly valuable due to its composition. The essential oils, biologically active substances, phenolic compounds, and vitamins in Melissa increase its biological value [2].

Melissa is widely used in medicine, perfumery, cosmetics, and the food industry in many countries of the world [5]. According to experts, the demand for essential oil derived from Melissa is about 500 tons per year, of which 200 tons are directly used in medicine [2].

Melissa has long been considered one of the traditional medicinal plants. Today, it is included in the composition of more than 300 types of medicines [3].

In the food industry, Melissa is used to prepare aromatic teas and vinegars, fragrant liqueurs, and beverages. It can serve as a substitute for tea [4].

The young leaves of medicinal lemon balm (*Melissa officinalis*) are used as a spice for preparing salads, soups, fish, mushrooms, smoked and canned products. In addition, it is also used in the preparation of compotes, sauces, dairy dishes, and minced products [1].

Our research aims to introduce lemon balm, which is considered a medicinal, healing, and spice crop containing essential oils, into the conditions of our republic and to develop its seed production technology.

Research Methods.

In conducting the research, the following methodologies and methodological guidelines were used: Methods of conducting experiments on vegetable, melon, and potato crops (Tashkent, 2023); Methodological guidelines for ecological testing of vegetable crops in open fields (Moscow, VNIISSOK, 1987, Part 1); Methodological guidelines for the breeding of leafy, spice–aromatic, and perennial vegetable crops (Moscow, VIR–VNIISSOK, 1987); Guide on the varietal appraisal of vegetable crops and forage root crops (Moscow, Kolos, 1982);

Methodology of the State variety testing of agricultural crops (Moscow, 2019, Part 1); Field experiment methodology (Dospekhov B.A., 1985).

As the object of research, several varieties of *Melissa* were comprehensively studied, including *Limonny Aromat*, *Limonny Balzam*, *Svezhest*, *Dozya*, and *Kholodok*. Based on the results of these studies, the variety *Dozya* was selected for detailed research. The experiments were carried out during spring and autumn periods. Seedlings were grown in unheated greenhouses. The planting scheme was 70 × 25 cm. The experiment was conducted in four replications. The accounting plot area was 4.5 m^2, each plot consisting of two rows. The number of plants per plot was 20.

RESULTS.

The introduction of any agricultural crop is associated not only with valuable agronomic traits but also with the plant's ability to produce high-quality seeds with good sowing properties. Based on this, the seed productivity and sowing qualities of Melissa plants sown in autumn and spring were studied.

The introduction of a particular crop is closely linked to its ability to pass through all developmental phases under new ecological conditions and to produce high-quality seeds.

To determine the seed productivity of Melissa, the plants were sown at the same time as the experiments aimed at measuring green and dry mass yield. The periods from germination to flowering and their duration were discussed in the previous sections. In this section, we consider the timing and duration of the flowering-to-seed maturation phase (see Table 1).

Table 1. The timing of developmental phases in seed *Melissa* plants sown in spring and autumn, 2023–2024.

Developmental phases		**I***	**II***
In its first year			
Date of emergence	**10%**	05.02.22	22.10.22
	75%	11.02.22	25.10.22
Date of technical maturity	**10%**	07.05.23	01.05.23
	75%	13.05.23	08.05.23
In its second year			
Date of regrowth	**10%**	09.02.24	05.02.24
	75%	15.02.24	11.02.24
Date of technical maturity	**10%**	27.04.24	22.04.24
	75%	02.05.24	28.04.24
Date of flowering	**10%**	14.05.24	10.05.24
	75%	20.05.24	17.05.24
Date of seed maturation	**10%**	21.07.24	14.07.24
	75%	27.07.24	20.07.24

Note. I – spring period, II – autumn period

In the first year of growth, during the spring sowing period, the plants did not produce flowers. In the second year, the initial flowering of spring-sown plants was observed on May 14, while full flowering occurred on May 20. For autumn-sown plants, the initial flowering was recorded on May 10, and full flowering on May 17.

In the first year of its life, melissa does not produce seeds.

In the second year of its life, during the spring period, seed ripening occurred between August 21–27, while in the autumn period it was observed between August 14–20.

Regarding the duration of these phases, the difference in the first year of life was quite significant depending on the sowing period, as shown in Table 2.

In the first year, the duration of the germination–technical maturity stage lasted 90–96 days in the spring period, while in the autumn period it lasted 185–192 days. Thus, in the spring period, this stage was 86 days shorter compared to the autumn period.

In the second year of life, the duration of the germination–flowering stage was 93–99 days in the spring period and 88–95 days in the autumn period. This stage was 4–5 days shorter in the autumn period, and the difference between them was not very large.

Table 2. The duration of the developmental stages of seed-producing melissa plants in spring and autumn periods, 2023–2024.

	Developmental phases		**I**	**II**
	In its first year			
Sowing–emergence, days		10%	11	7
		75%	17	10
From germination, days	Until technical maturity	10%	90	185
		75%	96	192
	In its second year			
	Regrowth, days	10%		
		75%		
	Until technical maturity	10%	76	72
		75%	83	78
	Date of flowering	10%	93	88
		75%	99	95
	Until seed maturity	10%	160	154
		75%	166	159

The duration from emergence to seed maturity in the spring sowing period was 160–166 days, while in the autumn sowing period it was 154–159 days, with a difference of 5–6 days between them. The manifestation of the morphobiological traits of seed plants under different sowing periods is presented in Table 3.

In the first year of life, the plant height was 29.0 cm in the spring period and 33.0 cm in the autumn period. The number of lateral branches was 34 in the spring and 48 in the autumn. Leaf dimensions were also slightly larger in the autumn-grown plants. During the first year of life, the Melissa plant did not flower and did not produce seeds.

Table 3. Manifestation of morphobiological traits of Melissa plants grown for seed production in spring and autumn periods, 2023–2024

Crop name	Sowing period	Plant height, cm	Number of lateral branches, pcs/plant	Leaf size, cm		Inflorescence length, cm	Number of inflorescences, pcs/plant
				Length	Width		
Melissa	In its first year						
	I	29,0	34,0	4,2	3,0	-	-
	II	33,0	48,0	5,0	3,1	-	-
	In its second year						
	I	49,0	61,0	4,3	3,1	14,0	48,0
	II	58,0	73,0	5,3	4,4	19,0	54,0

In the second year of life, the height of seed plants was 49.0 cm in the spring planting period and 58.0 cm in the autumn planting period, with plants in the autumn period being 9.0 cm taller. The number of lateral branches was 61.0 in the spring period and 73.0 in the autumn period.

In the second year of life, the height of seed plants was 49.0 cm in the spring planting period and 58.0 cm in the autumn planting period, with plants in the autumn period being 9.0 cm taller. The number of lateral branches was 61.0 in the spring period and 73.0 in the autumn period. In the autumn period, the number of lateral branches was greater by 12.0. Compared to the first year, the number of lateral branches in the second year increased by 27.0 in the spring period and by 25.0 in the autumn period.

Figure 1. Stem of the Melissa (Melissa officinalis L.) variety “Dozya” seed plant

Figure 2. Seeds of the Melissa (Melissa officinalis L.) variety “Dozya”

Leaf size was larger in the autumn period plants.

The length of the inflorescence in the second year of life was 14.0 cm in the spring period and 19.0 cm in the autumn period. The number of inflorescences was 48.0 in the spring period plants and 54.0 in the autumn period plants.

As noted earlier, Melissa did not produce seeds in the first year of its life. In the second year, the seed yield of spring-sown plants amounted to 12.6 g, while in autumn-sown plants it was 15.7 g. The seed productivity was 75.6 g/m^2 and 94.2 g/m^2, respectively (Table 4).

Table 4. Seed productivity and sowing qualities of Melissa plants in spring and autumn sowing periods, 2023–2024

Crop name	Planting periods	Seed productivity of one plant, g/plant	Seed yield g/m2	Weight of 1000 seeds, g	Germination %	
					Standard*	Actually
	In its second year					
	I	12,6	75,6	0,75	70	84
	II	15,7	94,2	0,84	70	87

The weight of 1000 seeds was 0.75 g in the spring period and 0.84 g in the autumn period.

The germination rate of the seeds was also significantly higher compared to the standard requirement. According to the standard, the germination rate of first-class seeds should be 70%. The germination rate of Melissa seeds grown in southern Uzbekistan was 84.0% in the spring period and 87.0% in the autumn period. The studies showed that the seed productivity of Melissa in southern Uzbekistan is considerably high (see Table 5).

Table 5. Seed productivity of Melissa cultivated in spring and autumn periods, 2023–2024.

Sowing time	Yield kg/m^2		The average is two years	
	2023	2024	kg/m^2	kg/ha
In its second year				
I	0,073	0,079	0,076	760,0
II	0,090	0,098	0,094	940,0

In terms of ideal hectare yield, Melissa seed productivity in the spring period amounted to 760 kg/ha, while in the autumn period it reached 940 kg/ha.

Conclusions. In southern Uzbekistan, the Melissa plant goes through all stages of development and produces high-quality seeds in its second year of life. Melissa produces seeds in its second year under the climatic conditions of southern Uzbekistan. In the spring period, seed productivity was 12.6 g per plant, and in the autumn period 15.7 g, which corresponds to 760.0 and 940.0 kg/ha, respectively. The research showed that in southern Uzbekistan, Melissa successfully completes its full development stages and produces high-quality seeds. Indicators such as seed productivity, yield per hectare, 1000-seed weight, and germination percentage were higher in autumn-grown plants and in the second year of growth compared to spring-grown plants in the first year. This demonstrates that the introduction of Melissa cultivation in southern Uzbekistan is promising and that seed production can provide high efficiency.

References:

1.Boltabekova Z.V. Pharmacognostic study on the standardization of new medicinal products based on Melissa officinalis herb (Melissa officinalis). Abstract of dissertation ... pharmaceutical sciences. Samara, 2003. pp. 23–25.
2.Dospekhov B.A. Methods of field experiment. 1985. pp. 160–166.
3.Ivoilov A.V., Khapugin I.A. The effect of fertilizers on the productivity of Melissa officinalis and the content of essential oils. Agrochemistry, 2021, No. 9, pp. 80–96.
4.Zuzuk B.M., Kutsyk R.V. Melissa officinalis (Melissa officinalis L.): An analytical review. Provizor, 2002, No. 1, pp. 38–42.
5.Ludilov V.A., Ivanova M.I. The ABC of vegetable growing. Moscow: Drofa-Plus, 2004. 496 p.
6.Methodical guidelines for the breeding of leafy, spicy–flavoring, and perennial vegetable crops. Moscow: VIR-VNIISSOK, 1987. pp. 43–48.
7.Methodical guidelines for the ecological testing of vegetable crops in open ground. Moscow: VNIISSOK, 1987. Part 1, pp. 35–42.
8.Moradkhani H., Sargsyan E., Bibak H., et al. Melissa officinalis L., a valuable medicinal plant: A review. Journal of Medicinal Plants Research, 2010, Vol. 4, No. 25, pp. 2753–2759.