



INCREASING THE PRODUCTIVITY OF DECLINING MELON VARIETIES

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<https://doi.org/10.5281/zenodo.18900228>

Abstract: This article investigates the effect of treating melon (*Cucumis melo*) seeds with a solution of Zircon (2 drops) + Potassium Humate (1 mg/L). The treatment accelerated fruit ripening by 7–11 days compared to the control. Among the varieties studied, Samarkand Yellow melon produced the highest marketable yield of 43.4 t/ha (126%), Local Yellow melon yielded 40.1 t/ha (121%), and Black Eyebrow variety produced 32.0 t/ha (118%), demonstrating significant increases in productivity.

Keywords: Melon, sowing, yield, variety, local, growth period, stem, flowers.

Introduction: In Uzbekistan, the number of local melon varieties is decreasing, creating a risk of losing some valuable ancient varieties preserved through traditional selection. Therefore, it is important to strengthen scientific research aimed at the propagation of these rare local melon varieties and to ensure their complete conservation. Presidential Decree PF-5388 dated March 29, 2018, “On Additional Measures for the Rapid Development of Horticulture and Vegetable Growing in Uzbekistan,” Decree PQ-5853 dated October 23, 2019, “On Approving the Strategy for the Development of Agriculture in the Republic of Uzbekistan for 2020–2030,” and Decree PQ-20 dated November 23, 2021, “On Developing Family Entrepreneurship in Horticulture, Vegetable Growing, and Viticulture, and Increasing the Share of Household Farms in Agricultural Production” provide the strategic framework. Additionally, the Resolution No. 114 of the Cabinet of Ministers dated February 12, 2019, “On Measures to Increase Melon Cultivation in Khorezm Region,” and the Law No. URQ-521 dated February 16, 2019, “On Seed Production in the Republic of Uzbekistan” regulate seed production, selection, sale, and quality control. These legal frameworks enable the propagation of local varieties, production of high-quality seeds, and export of seeds.

Materials and Methods: This study examined six declining melon varieties in Uzbekistan: Local Yellow melon (standard), Orange Red, White Skullcap, Black Eyebrow, Samarkand Yellow, and Obi Novvot. Growth, development, and productivity were assessed. The experiment was conducted in a four-replicate design, with each plot measuring 6 m in length and containing 24 plants. The nutrition area of each plot was 16.8 m².

Results: The phenological development of declining melon varieties was monitored. Emergence of 2–3 true leaves, appearance of male and female flowers (10% and 75%, respectively), and the period of fruit ripening were recorded. No significant differences (3–4 days) were observed among varieties regarding the emergence of 2–3 true leaves. However, there were pronounced differences in the timing of male and female flower opening. Analysis revealed that Samarkand Yellow and Local Yellow melon varieties initiated male flowers earlier than the other varieties, reaching 75% male flowering 30–33 days after sowing. Other varieties entered male flowering slightly later. In the Black Eyebrow variety, male flowers appeared 38–

42 days after sowing. In the remaining varieties, male flowers emerged 35–40 days after sowing (see Table 1).

In melon, male flowers appear earlier and in much greater numbers compared to female flowers. Male flowers remain open for only one day, whereas female flowers stay open for 3–5 days. The experiment also evaluated the effectiveness of pre-sowing seed treatments with growth-promoting substances. Compared to the control (seeds soaked in clean water), seeds treated with a solution of Zircon (2 drops) + Potassium Humate (1 mg/L) and Biogutten (80 mg/L) showed earlier male flowering. Among the treatments studied, the application of Zircon (2 drops) + Potassium Humate (1 mg/L) produced the best results across all varieties, accelerating male flower appearance by 2–4 days compared to the control. Table 1

Progress of growth and development phenophases of declining melon varieties (2023-2025 yy.).

Varieties	Experimental Variants	Flowering Time (days)		Fruit Ripening Period (days)
		Paternal	Maternal	
Mahalliy sariq handalak	Soaking seeds in clean water before sowing – Control	33	36	69
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	30	32	58
	Soaking seeds in Biogutten (80 mg/L) solution	31	33	61
Handalak oranjeviy krasniy	Soaking seeds in clean water before sowing – Control	40	44	79
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	37	41	70
	Soaking seeds in Biogutten (80 mg/L) solution	38	42	74
Oq kallaposh	Soaking seeds in clean water before sowing – Control	40	45	78
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	36	41	68
	Soaking seeds in Biogutten (80 mg/L) solution	37	40	72
Qora qosh	Soaking seeds in clean water before sowing – Control	42	48	80
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	38	43	73
	Soaking seeds in Biogutten (80 mg/L) solution	40	46	75



Samarqand sariq handalak	Soaking seeds in clean water before sowing – Control	33	34	65
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	31	32	58
	Soaking seeds in Biogutten (80 mg/L) solution	31	33	60
Obi novvot	Soaking seeds in clean water before sowing – Control	38	42	76
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	35	39	68
	Soaking seeds in Biogutten (80 mg/L) solution	36	40	71

Significant differences were also observed among melon varieties regarding the timing of female flower opening. Analysis of 75% female flowering showed that the Samarkand Yellow and Local Yellow melon varieties flowered earlier than the other varieties. In the Samarkand Yellow variety, female flowers appeared 32–34 days after sowing, while in the Local Yellow variety, flowering occurred 32–36 days after sowing.

The Black Eyebrow variety flowered relatively later, with female flowers emerging 43–48 days after sowing, whereas in other varieties, female flowering occurred between 39–45 days. The results indicate that pre-sowing treatment of seeds with growth-promoting substances was effective. Compared to seeds soaked in clean water, seeds treated with Zircon (2 drops) + Potassium Humate (1 mg/L) and Biogutten (80 mg/L) solutions exhibited earlier female flowering. Among the treatments, the Zircon + Potassium Humate solution consistently produced the best results, advancing female flower appearance by 2–4 days across all varieties. This early flowering was associated with faster seedling emergence, increased resistance to diseases, and enhanced growth and development.

Phenological observations also determined the timing of first and last harvests for each variety. The first harvest occurred earlier in Samarkand Yellow and Local Yellow melons, indicating early ripening. In Samarkand Yellow, the first harvest was recorded 58–65 days after sowing, and in Local Yellow, it occurred 58–69 days after sowing. The Black Eyebrow variety matured relatively later, with first harvests recorded 73–80 days after sowing, while other varieties reached maturity between 68–79 days. These results further confirm that pre-sowing seed treatments positively influenced earlier fruit ripening. Among the treatments, seeds treated with Zircon + Potassium Humate and Biogutten matured earlier than the control, with the Zircon + Potassium Humate treatment leading to the earliest ripening, advancing fruit maturity by 7–11 days compared to untreated seeds. This effect is attributed to faster seedling emergence, enhanced disease resistance, and improved growth and development leading to early flowering. Biometric measurements of the aboveground parts of melon plants were also conducted. The main stem length, number of lateral branches, total vine length, and number of leaves were recorded (see Table 2).

According to biometric data, the main stem length was greatest in Obi Novvot, Samarkand

Yellow, and Local Yellow varieties, ranging from 160.3 to 190.5 cm. The White Skullcap variety exhibited the shortest stems, measuring 122.5–144.3 cm, while other varieties ranged from 139.2 to 160.5 cm. Application of Zircon + Potassium Humate increased main stem growth by 7–16 cm across all varieties compared to the control. Regarding the number of lateral branches, Obi Novvot and Local Yellow varieties showed the highest values, with 3.8–4.2 branches per plant. White Skullcap had the fewest lateral branches (3.4–3.6), while other varieties ranged from 3.5–3.9 branches. For this trait as well, the application of Zircon + Potassium Humate produced the best results. In terms of total vine length, Obi Novvot demonstrated relatively high values, ranging from 558.2–570.4 cm across the experimental treatments. 2 table

Aboveground Growth and Biometric Parameters of Melon Plants (2023–2025)

Varieties	Experimental Variants	Main Stem Length (cm)	Number of Lateral Branches	total Vine Length (cm)	Number of Leaves
Mahalliy sariq handalak	Soaking seeds in clean water before sowing – Control	168,5	4,0	500,6	88,4
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	174,8	4,1	515,5	93,6
	Soaking seeds in Biogutten (80 mg/L) solution	171,2	3,8	495,0	91,2
Handalak oranjeviy krasniy	Soaking seeds in clean water before sowing – Control	139,2	3,5	461,4	85,4
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	152,9	3,7	480,4	90,5
	Soaking seeds in Biogutten (80 mg/L) solution	148,7	3,6	452,4	87,7
Oq kallaposh	Soaking seeds in clean water before sowing – Control	122,5	3,4	332,5	80,8
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	144,3	3,6	380,5	86,4
	Soaking seeds in Biogutten (80 mg/L) solution	138,6	3,6	366,0	82,3



Qora qosh	Soaking seeds in clean water before sowing – Control	143,5	3,7	484,6	88,8
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	160,5	3,9	522,8	99,1
	Soaking seeds in Biogutten (80 mg/L) solution	158,8	3,8	500,4	97,4
Samarqand sariq handalak	Soaking seeds in clean water before sowing – Control	160,3	3,7	475,5	87,6
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	172,8	3,8	498,8	92,4
	Soaking seeds in Biogutten (80 mg/L) solution	166,4	3,7	488,5	90,3
Obi novvot	Soaking seeds in clean water before sowing – Control	180,5	4,0	558,2	94,2
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	196,4	4,2	570,4	101,3
	Soaking seeds in Biogutten (80 mg/L) solution	190,5	4,0	564,3	98,6

In the White Skullcap variety, the lowest total vine length was recorded, ranging from 332.5 to 380.5 cm across treatments. In the other varieties, total vine length ranged from 461.4 to 515.5 cm. The number of leaves per plant was also recorded. Obi Novvot and Black Eyebrow varieties had the highest leaf number, ranging from 88.8 to 101.3 leaves per plant across treatments. In White Skullcap, the number of leaves was relatively lower, ranging from 80.8 to 86.4, while the remaining varieties had 85.4–93.6 leaves per plant. The application of growth-promoting substances positively influenced these traits, with the Zircon (2 drops) + Potassium Humate (1 mg/L) treatment showing the most pronounced effect.

Based on the results, the aboveground parts of Obi Novvot, Samarkand Yellow, and Local Yellow melons demonstrated strong growth in main stem length, number of lateral branches, total vine length, and leaf number. Among the varieties, White Skullcap had relatively short vines. Pre-sowing seed treatment with Zircon + Potassium Humate was found to significantly enhance aboveground growth and development in all varieties. During the study, disease resistance to powdery mildew, as well as fruit productivity and quality, were assessed. The yield

at each harvest was weighed separately and divided into marketable and non-marketable fractions. For each plant, the number of fruits, fruit weight, and pulp thickness were determined (see Table 3). Observations indicated that the number of fruits per plant did not vary significantly among varieties, ranging from 2.0 to 2.9 fruits per plant. The highest results were observed in Samarkand Yellow and Local Yellow varieties, producing 2.5–2.9 fruits per plant.

Table 3

Number of fruits, fruit weight, pulp thickness, and incidence of powdery mildew in declining melon varieties (2023–2025)

Varieties	Experimental Variants	Number of Fruits	Fruit Weight (kg)	Flesh Thickness (cm)	Powdery Mildew Infection (%)
Mahalliy sariq handalak	Soaking seeds in clean water before sowing – Control	2,7	0,9	3,6	2,5
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	2,9	1,0	3,7	0
	Soaking seeds in Biogutten (80 mg/L) solution	2,8	1,0	3,8	0
Handalak oranjeviy krasniy	Soaking seeds in clean water before sowing – Control	2,0	1,1	4,0	2,5
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	2,1	1,2	4,8	0
	Soaking seeds in Biogutten (80 mg/L) solution	2,0	1,2	4,4	0
Oq kallaposh	Soaking seeds in clean water before sowing – Control	2,2	1,0	3,5	5,0
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	2,2	1,1	3,8	2,5
	Soaking seeds in Biogutten (80 mg/L) solution	2,3	1,0	3,6	5,0
Qora qosh	Soaking seeds in clean water before sowing – Control	2,2	0,9	3,8	5,0



	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	2,3	1,0	4,2	0
	Soaking seeds in Biogutten (80 mg/L) solution	2,2	1,0	4,0	0
Samarqand sariq handalak	Soaking seeds in clean water before sowing – Control	2,5	1,0	4,0	5,0
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	2,7	1,2	4,8	0
	Soaking seeds in Biogutten (80 mg/L) solution	2,7	1,1	4,7	2,5
Obi novvot	Soaking seeds in clean water before sowing – Control	2,0	1,5	4,8	0
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	2,1	1,6	5,2	0
	☐ Soaking seeds in Biogutten (80 mg/L) solution	2,0	1,6	5,0	0

The determination of fruit weight in melon varieties showed that almost all varieties and treatments produced small fruits weighing 0.9–1.2 kg. Relatively large fruits were observed only in the Obi Novvot variety, with a weight of 1.5–1.6 kg across the treatments.

It is known that fruit flesh thickness is also an important economic trait among melon varieties. Investigation of fruit flesh thickness revealed that thin-fleshed fruits, measuring 3.5–3.8 cm, were characteristic of the Makhalliy Sarik Khandalak and Oq Kallaposh varieties. In other varieties, this indicator ranged from 4.0–5.2 cm. The thickest flesh, 4.8–5.2 cm, was recorded in the Obi Novvot variety. In the conducted experiment, the incidence of powdery mildew, a common disease in melon plants, was determined. The plants were visually inspected twice during the growing season: before the flowering of the parental flowers and before harvest.

The results showed that, except for the Obi Novvot variety, all melon varieties exhibited partial infection. In particular, variants that were irrigated with clean water (control) showed damage up to 5.0%. In other variants treated with growth-promoting substances, the damage was lower, up to 2.5%. However, the results indicated that all varieties of melon treated with a solution of Zircon (2 drops) + Potassium Humate (1 mg/L) were resistant to powdery mildew, and the



plants remained healthy

The study of rare melon varieties also determined overall and marketable yield indicators (see Table 4). According to the generally accepted "Wide Unified Classifier of the CMEA and the International Classifier of CMEA for Cucumis melo" (1980), the yields of the studied varieties were grouped relative to the standard as follows: very low – below 70%, low – 71–90%, medium or uniform – 91–110%, high – 111–130%, and very high – above 130%.

Table 4

Yield Indicators of Rare Melon Varieties (2023–2025)

Varietiesr	Experimental Variants	Total Yield (t/ha)	Marketable Yield (t/ha)	Relative to Control (%)	Share of Marketable Yield (%)
Mahalliy sariq handalak	Soaking seeds in clean water before sowing – Control	34,7	33,0	100	95
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	41,4	40,1	121	97
	Soaking seeds in Biogutten (80 mg/L) solution	39,9	37,9	115	95
Handalak oranjeviy krasniy	Soaking seeds in clean water before sowing – Control	31,4	29,5	100	94
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	36,0	34,6	117	96
	Soaking seeds in Biogutten (80 mg/L) solution	34,3	32,6	110	95
Oq kallaposh	Soaking seeds in clean water before sowing – Control	32,4	30,5	100	94
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	34,6	32,9	108	95
	Soaking seeds in Biogutten (80 mg/L) solution	32,8	30,8	101	94
Qora qosh	Soaking seeds in clean water before sowing – Control	28,3	27,2	100	96



	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	33,0	32,0	118	97
	Soaking seeds in Biogutten (80 mg/L) solution	32,4	31,4	115	97
Samarqand sariq handalak	Soaking seeds in clean water before sowing – Control	35,7	34,3	100	96
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	44,3	43,4	126	98
	Soaking seeds in Biogutten (80 mg/L) solution	42,4	41,1	120	97
Obi novvot	Soaking seeds in clean water before sowing – Control	42,8	41,0	100	96
	Soaking seeds in Zircon (2 drops) + Potassium Humate (1 mg/L) solution	48,0	47,0	115	98
	Soaking seeds in Biogutten (80 mg/L) solution	45,7	44,3	108	97

Based on the objectives of our study, the effects of treating seeds of rare melon varieties with growth-regulating substances were compared to a control variant in which seeds were soaked and sown in clean water.

According to this comparison, the total yield of melon varieties ranged from 32.4 to 44.3 t/ha across the treatments, and we analyzed the marketable yield, which is one of the main agronomic traits. When analyzing the marketable yield among the different melon varieties, the highest yield was observed in the Obi Novvot variety, ranging from 41.0 to 47.0 t/ha. In contrast, the relatively low-yielding Qora Qosh variety produced 27.2–32.0 t/ha. However, when applying growth-regulating substances, higher marketable yield percentages compared to the control were observed in variants where seeds were treated with Biogutten (80 mg/L) and Zircon (2 drops) + Potassium Humate (1 mg/L) solutions, showing increases of 115% and 126%. This group included the following varieties: Samarkand Sarik Khandalak (120%, 41.1 t/ha – 126%, 43.4 t/ha), Makhaliy Sarik Khandalak (115%, 37.9 t/ha – 121%, 40.1 t/ha), and Qora Qosh (115%, 31.4 t/ha – 118%, 32.0 t/ha). For Hantalak Orange Krasniy (117%, 34.6 t/ha) and Obi Novvot (115%, 47.0 t/ha), only the treatment with Zircon (2 drops) + Potassium



Humate (1 mg/L) resulted in a higher yield, while other treatments showed marketable yields similar to the control.

Additionally, over the years of experimentation, the portion of marketable yield was separated from the total yield obtained from treated seeds. It was found that across all varieties, the proportion of marketable yield was quite consistent, ranging from 94% to 98%. Relatively high marketable yield percentages were recorded in the Obi Novvot and Samarkand Sarik Khandalak varieties, reaching 97–98%. This indicates that these melon varieties produce a large volume of high-quality, sweet fruits suitable for market demands.

Conclusion: The study confirmed that the Samarkand Sarik Khandalak and Makhalliy Sarik Khandalak varieties reach early maturity. Treatments with Zircon (2 drops) + Potassium Humate (1 mg/L) and Biogutten (80 mg/L) accelerated fruit ripening compared to the control. The highest effect was observed with Zircon + Potassium Humate, resulting in fruits ripening 7–11 days earlier than the control across all varieties. The above-ground growth parameters—main stem length, number of lateral branches, total vine length, and number of leaves—showed strong development in the Obi Novvot, Samarkand Sarik Khandalak, and Makhalliy Sarik Khandalak varieties. When using growth-regulating substances, the marketable yield in treated seeds compared to control was highest in the Zircon (2 drops) + Potassium Humate (1 mg/L) variant, with Samarkand Sarik Khandalak producing 43.4 t/ha (126%), Makhalliy Sarik Khandalak 40.1 t/ha (121%), and Qora Qosh 32.0 t/ha (118%).

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