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Determination of the Complex Influence of Preparations on the Growth, Development, And Yield of Melon

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Abstract. *This article examines the influence of a complex of preparations on seeds and plants, focusing on phenological characteristics, plant growth and development, and melon yield. In terms of taste qualities, melons are on par with the most exquisite fruits. Melon fruits are consumed both fresh and processed. As early as the 6th century, the Spanish botanist Herrera wrote: "If it is good, then it is the best of fruits, and no other can surpass it." Due to the special value of fresh melons, they are processed in smaller quantities than watermelons.*

Key words: *melon, seeds, plants, preparations, fruits, average weight, yield.*

Introduction. In terms of taste qualities, melons are on par with the most exquisite fruits. Melon fruits are consumed both fresh and processed. As early as the 6th century, the Spanish botanist Herrera wrote: "If it is good, then it is the best of fruits, and no other can surpass it." Due to the special value of fresh melons, they are processed in smaller quantities than watermelons. From melon juice, melon honey (bekmes) is obtained, which contains 60% sugar; from the pulp - puree, compotes, preserves, jam, and jelly; from the rind - candied fruit. Melon honey, besides being consumed directly as food, is used in the preparation of cookies, gingerbread, spice cakes, and other sweet pastries. Halva is made from bekmes and flour. From overripe melons with the addition of flour, melon flatbreads (kaun-kurt) are prepared, which, after drying in the sun, are stored in a dry, cool place until spring. Processed dried melon products are in demand abroad

In recent years, the field of nanotechnology has been developing rapidly, as it becomes an increasingly important part of modern innovative technologies. Nanomaterials are closely linked to nanotechnology, which is progressively entering our everyday lives. Nanoparticles, also known as nanopowders or nanocrystals, consist of particles that exist in the form of agglomerates or aggregates. According to the European Commission recommendation 2011/696/EU, at least half of these particles fall within the size range of 1 to 100 nm

The application of nanotechnology in modern agricultural research across various countries continues to expand. Studies have demonstrated that nanoparticles, when used as micro-fertilizers, readily penetrate plants, exerting a positive influence on the photosynthesis process. These nanoparticles also enhance plant resistance to diseases and adverse climatic conditions, as well as contribute to increased crop yields

Research methodology. In order to determine the effects of complex preparations on melon seeds and plants, we conducted research in this direction. In 2023-2024, experiments were carried out in the experimental field of the Research Institute of Vegetable, Melon Crops and Potato to substantiate the positive impact of using preparations for pre-sowing seed treatment and growth regulators.

Various treatments were tested on the Oltin tepa melon variety, which is regionalized in the republic:

Experience options	*Sowing-emergence, days*	From germination to		
		male flowers blooming, days	female flowers blooming, days	first fruit ripening, days
Control (seed soaking in water)	10	45	51	95
Nanosilicon 0.1 g/l (seed soaking)	9	43	49	92
Nanosilicon 0.1 g/l + Bio fertilizer 1 g/l	9	38	44	86
Nanosilicon 0.1 g/l + MnO_2 1 g/l	9	39	45	88
Nanosilicon 0.1 g/l + Fe_2O_3 1 g/l	9	37	42	*84*

Control (soaking seeds in water); Nanosilicon 0.1 g/l water-soluble concentrate (seed treatment and spraying plants twice before flowering); Bio fertilizer - 1 g/l (seed treatment with Nanosilicon at a rate of 0.1 g/l and double spraying of plants with NPK+microelements before flowering); MnO_2 - 1 g/l (seed treatment with Nanosilicon at a dose of 0.1 g/l and double foliar application of manganese dioxide before flowering); Fe_2O_3 - 1 g/l (seed treatment with Nanosilicon at a dose of 0.1 g/l and double foliar application of iron oxide before flowering). Biometric measurements were conducted on 10 marked plants during the melon growing season according to the "Methodology for Conducting Experiments in Vegetable Growing, Melon Growing, and Potato Growing" by B.Zh. Azimov and B.B. Azimov (2002) [5]. The parameters measured included the length of main stems, number of lateral shoots, stem thickness, and number of leaves.

Research results. Phenological indicators of melon plants, observed in experiments where melon seeds were treated with Nanosilicon water-soluble concentrate at a rate of 0.1 g/l and then sprayed with nanoparticles twice (at a rate of 1 g/l) before flowering, are presented in Table 1 and Picture 1.

According to the obtained results, seed germination in all tested variants was observed one day earlier than in the control. The opening of male flowers in the control variant occurred on the 45th day, while in the variant with the application of Nanosilicon, it occurred on the 43rd day (2 days earlier than the control). In the variants with the application of growth regulators, the opening of male flowers was observed even earlier: Bio fertilizer-1 g/l (38 days), MnO_2 - 1 g/l (38 days), Fe_2O_3 - 1 g/l (37 days), which is 6-8 days earlier than the control.

Table 1.

The effect of pre-sowing treatment with various preparations on the rate of phenological growth and development phases in Oltin tepa melon variety seeds, 2023-2024

It was found that female flowers opened 2 days earlier in the variant with Nanosilicon application compared to the control, and 6-9 days earlier in the variants with growth regulators (Bio fertilizer - 1 g/l, MnO_2 - 1 g/l, Fe_2O_3 - 1 g/l). The duration of the period from emergence to the ripening of the first fruit indicates the early maturity of the melon. The ripening of the first fruit in the control variant was observed after 95 days, while in the Nanosilicon variant, the fruits ripened 3 days earlier (92 days). When using growth regulators, fruit ripening occurred: Bio fertilizer - 1 g/l - 9 days earlier (86 days), MnO_2 - 1 g/l - 7 days earlier (88 days), Fe_2O_3 - 1 g/l - 11 days earlier (84 days).

Picture 1. The opening of male and female flowers and the ripening of fruits in the Oltin tepa melon variety

The effects of the tested preparations on the biometric indicators and yield of melon plants are presented in Table 2 and Picture 2.

According to the obtained results, in the control variant, the average fruit weight was 2.7 kg, and the total yield was 24.4 t/ha. In the variant with the application of Nanosilicon (0.1 g/l), the average fruit weight reached 2.9 kg, which is 0.2 kg more than in the control variant, while the yield was 25.9 t/ha, which is 6.1% higher than in the control variant. In variants using a complex of preparations (Bio fertilizer - 1 g/l, MnO_2 - 1 g/l, Fe_2O_3 - 1 g/l), superiority was observed over both the control variant and the Nanosilicon variant (0.1 g/l) in terms of main stem length, number of lateral shoots, stem thickness, and number of leaves.

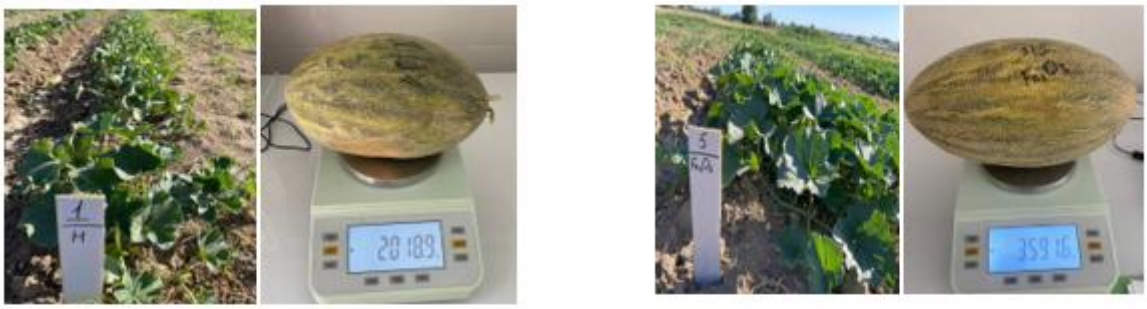
Table 2. The effect of pre-sowing seed treatment with various preparations on the growth of aboveground vegetative parts and yield of the Oltin Tepa melon variety (2023-2024)

Experience options	In the period of mass ripening					Total yield		
	main stem length, cm	stem thickness, cm	number of side branches, units	side branches length, cm	number of leaves, pieces	fruit weight (kg)	t/ha	% to the control
Control (seed soaking in water)	110,3	1,3	3,8	401,4	103	2,7	24,4	100,0
Nanosilicon 0.1 g/l (seed soaking)	119,6	1,3	4,0	417,6	104	2,9	25,9	106,1
Nanosilicon 0.1 g/l + Bio fertilizer 1 g/l	129,8	1,4	4,1	473,1	121	3,3	29,9	122,5
Nanosilicon 0.1 g/l + MnO_2 1 g/l	130,8	1,4	4,0	440,0	110	3,3	29,6	121,3
Nanosilicon 0.1 g/l + Fe_2O_3 1 g/l	162,0	1,6	4,2	585,4	141	3,6	30,7	125,8

As a result of the increased growth in the above-ground vegetative parts of plants, which positively affected the process of photosynthesis, it was determined that the fruit mass and overall yield surpassed the indicators of both the control

Conclusions. A positive effect has been established for a complex of preparations used in pre-sowing treatment of melon seeds and for spraying plants during the vegetation period on the growth, development, and yield of the plants. The best results were achieved by treating melon seeds with

Nanosilicon (0.1 g/l) and double-spraying the plants with an iron oxide solution (Fe_2O_3 - 1 g/l) before flowering. Compared to the control group, the fruit weight increased by 0.9 kg, and the yield improved by 25.8% (6.3 t/ha).



a) b)

Picture 2. ***a)*** *Control (seed soaking in water) variant of melon: plant development and fruit weight.* ***b)*** *Fe_2O_3 - 1 g/l (seed treatment with Nanosilicon at a dose of 0.1 g/l and double foliar application of iron oxide before flowering) variant of melon: plant development and fruit weight*

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