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Effect of seeding systems and application rates of mineral and organic fertilizers on stem height of sunflower

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Abstract: This article examines the effect of sowing scheme, organic and biohumus fertilizers on the germination of sunflower seeds and seedling density. The highest germination rate was observed when organic fertilizers were applied at a rate of 20 tons per hectare, and the seeds were 70x20-1; 70x25-1; When studying the 4-5-6 variants planted in 70x30-1 systems and applying 10-15-20 tons of manure per hectare in addition to the mineral fertilizers N150P105K150 kg/ha during the growth period, the stem height was 17.0-19.0-20.5 cm in the 1st pair of leaves formation phase, 38.3-41.3-44.5 cm in the 3rd pair of leaves formation phase, 64.7-69.4-74.0 cm in the basket formation phase, 96.1-102.8-108.9 cm in the flowering phase, 119.4-129.1-138.4 cm in the seed setting phase, and 134.0-148.7-162.7 cm in the full ripening phase, and the seeds 70x20-1; 70x25-1; 70x30-1 systems were planted, and mineral fertilizers were applied at the rate of N150P105K150 kg/ha during the growing season.
Keywords: sunflower, growing season, organic fertilizer, biohumus, mineral fertilizer, flowering phase, basket formation, double leaf formation,

Introduction. It is known from scientific literature that the stem height of agricultural crops varies primarily depending on the biological characteristics of the variety, the soil and climatic conditions of the region, and the agrotechnical measures applied during the growing season.

In our studies, it was observed that the effect of seed planting systems and mineral and organic fertilizers on the stem height of sunflower plants was significant.

Materials and methods of the study were conducted in the conditions of the Fergana region. The experimental variants consisted of 18 variants, placed in 3 rows, and the sunflower variety “Rodnik (P453)” was planted in small plots. The sunflower row spacing was 70 cm, 8 rows, the width of the variants was 5.6 m, the height was 50 m, and the area was 280 m2 (Table 1). Of this, the calculated area was 140 m2.

During the experimental years, phenological observations of the growth and development of the sunflower variety “Rodnik (P453)” were carried out based on the following methods:

The germination of the seeds sown in the studies was carried out in accordance with the requirements of GOST 12038-66* in the laboratory, and the germination of seeds in field conditions was carried out according to the “Methods of conducting field experiments”. Phenological observations were conducted in accordance with the instructions for the "State Varietal Control of Agricultural Crops".

In variant 1, where the seeds were sown in the 70x20-1 system and mineral fertilizers N150P105K150 kg/ha were applied during the growth period, the stem height was 15.2 cm in the phase of formation of the 1st pair of leaves, 35.3 cm in the phase of formation of the 3rd pair of leaves, 60.5 cm in the phase of basket formation, 90.1 cm in the flowering phase, 110.4 cm in the seed setting phase, and 120.2 cm in the full ripening phase. In variants 2-3, where the seeds were sown in the 70x25-1 and 70x30-1 systems and mineral fertilizers N150P105K150 kg/ha were applied during the growth period, the stem height was 16.4-17.2 cm in the phase of formation of the 1st pair of leaves, The 3rd pair of leaves is 37.2-39.1 cm in the stage of formation, 63.3-66.0 cm in the stage of basket formation, 94.1-97.6 cm in the flowering stage, 116.3-121.7 cm in the stage of seeding, 129.2-137.3 cm in the stage of full ripening, and the seeds are planted in 70x20-1 system. Compared to option 1, the height of the stem is 1.2-2.0 cm higher in the phase of the formation of the 1st pair of leaves, 1.9-3.8 cm in the phase of the formation of the 3rd pair of leaves, 2.8-5.5 cm in the phase of the basket formation, 4.0-7.5 cm in the flowering phase, 5.9-11.3 cm in the phase of seeding, 9.0-17.1 cm in the phase of full ripening was found to be**.**

Results. Seeds 70x20-1; 70x25-1; When studying the 4-5-6 variants planted in 70x30-1 systems and applying 10-15-20 tons of manure per hectare in addition to the mineral fertilizers N150P105K150 kg/ha during the growth period, the stem height was 17.0-19.0-20.5 cm in the 1st pair of leaves formation phase, 38.3-41.3-

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44.5 cm in the 3rd pair of leaves formation phase, 64.7-69.4-74.0 cm in the basket formation phase, 96.1-102.8-108.9 cm in the flowering phase, 119.4-129.1-138.4 cm in the seed setting phase, and 134.0-148.7-162.7 cm in the full ripening phase, and the seeds Compared to variants 1-2-3, when planted in the 70x20-1; 70x25-1; 70x30-1 systems and applied mineral fertilizers at the rate of N150P105K150 kg/ha during the growth period, the stem height was 1.8-2.6-3.3 cm in the 1st pair of leaves formation phase, 3.0-4.1-5.4 cm in the 3rd pair of leaves formation phase, 4.2-6.1-8.0 cm in the basket formation phase, 6.0-8.7-11.3 cm in the flowering phase, 9.0-12.8-16.7 cm in the seed setting phase, and 13.8-19.5-25.4 cm in the full ripening phase. If seeds 70x20-1; 70x25-1; When analyzing the 7-8-9 variants planted in 70x30-1 systems and applying 5-10-15 tons of biohumus per hectare in addition to the mineral fertilizers N150P105K150 kg/ha during the growth period, the stem height was 17.4-19.5-21.0 cm in the 1st pair of leaves formation phase, 39.2-42.0-45.1 cm in the 3rd pair of leaves formation phase, 66.3-70.9-75.5 cm in the basket formation phase, 98.1-104.8-110.9 cm in the flowering phase, 122.3-131.8-141.0 cm in the seed setting phase, and 138.2-152.6-166.4 cm in the full ripening phase, and the seeds It was found that the stem height of the 1st pair of leaves was 2.2-3.1-3.8 cm in the phase of formation of the 1st pair of leaves, 3.9-4.8-6.0 cm in the phase of formation of the 3rd pair of leaves, 5.8-7.6-9.5 cm in the phase of basket formation, 8.0-10.7-13.3 cm in the phase of flowering, 11.9-15.5-19.3 cm in the phase of seed setting, and 18.0-23.4-29.1 cm in the phase of full ripening, compared to the 1-2-3 variants, where mineral fertilizers were applied at the rate of N150P105K150 kg/ha during the growth period.

Seeds 70x20-1; 70x25-1; In the 10-11-12 variants, when planted in 70x30-1 systems and mineral fertilizers N180P125K180 kg/ha were applied during the growth period, the stem height was 16.5-18.2-18.8 cm in the 1st pair of leaves formation phase, 37.3-39.8-43.6 cm in the 3rd pair of leaves formation phase, 63.5-67.3-72.5 cm in the basket formation phase, 94.4-99.8-106.4 cm in the flowering phase, 116.7-124.6-135.0 cm in the seed setting phase, and 129.8-141.8-157.4 cm in the full ripening phase, indicating that the seeds were 70x20-1; 70x25-1; It was found that the 70x30-1 system, planted in a ratio of 150 kg/ha of mineral fertilizers N150P105K150, showed higher results in stem height compared to the 1-2-3 variants, which were applied at the rate of 1.3-1.7-2.3 cm in the phase of formation of the 1st pair of leaves, 2.0-2.6-4.5 cm in the phase of formation of the 3rd pair of leaves, 3.0-4.0-6.5 cm in the phase of basket formation, 4.3-5.7-8.8 cm in the phase of flowering, 6.3-8.3-13.3 cm in the phase of seed setting, and 9.6-12.6-20.1 cm in the phase of full ripening.

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3.4-жадвал

The effect of sowing systems and mineral and organic fertilizer application rates on sunflower stem height, cm (2023)

№	Seed planting systems	Annual rates of mineral fertilizers, kg/ha	Standards of organic fertilizer application, t/ha	Biohumus application norms, t/ha	Phases of development					
					Forming 1st pair of leaves	Formation of 3 pairs of leaves	The formation of the basket	Flowering	Fertilization	Full ripening
1	70x20-1	$N_{150}P_{105}K_{150}$	-	-	15,2	35,3	60,5	90,1	110,4	120,2
2	70x25-1		-	-	16,4	37,2	63,3	94,1	116,3	129,2
3	70x30-1		-	-	17,2	39,1	66,0	97,6	121,7	137,3
4	70x20-1		10	-	17,0	38,3	64,7	96,1	119,4	134,0
5	70x25-1		15	-	19,0	41,3	69,4	102,8	129,1	148,7
6	70x30-1		20	-	20,5	44,5	74,0	108,9	138,4	162,7
7	70x20-1		-	5	17,4	39,2	66,3	98,1	122,3	138,2
8	70x25-1		-	10	19,5	42,0	70,9	104,8	131,8	152,6
9	70x30-1		-	15	21,0	45,1	75,5	110,9	141,0	166,4
10	70x20-1	$N_{180}P_{125}K_{180}$	-	-	16,5	37,3	63,5	94,4	116,7	129,8
11	70x25-1		-	-	18,2	39,8	67,3	99,8	124,6	141,8
12	70x30-1		-	-	18,8	43,6	72,5	106,4	135,0	157,4
13	70x20-1		10	-	19,0	42,1	70,7	104,6	131,7	152,6
14	70x25-1		15	-	21,2	46,3	77,1	113,5	144,8	172,4
15	70x30-1		20	-	22,5	50,8	83,7	122,3	158,1	192,4
16	70x20-1		-	5	19,5	43,8	73,6	108,4	137,2	160,7
17	70x25-1		-	10	21,7	48,1	80,2	117,6	150,7	181,1
18	70x30-1		-	15	23,1	52,0	86,4	126,1	163,1	199,7
19	70x20-1	$N_{210}P_{145}K_{210}$	-	-	17,1	38,1	64,9	96,4	119,5	134,0
20	70x25-1		-	-	18,7	40,5	68,6	101,7	127,2	145,7

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21	70x30-1		-	-	20,1	44,4	73,9	108,4	137,8	161,6
22	70x20-1		10	-	20,2	43,0	72,3	106,9	134,9	157,4
23	70x25-1		15	-	22,6	47,2	78,6	115,6	147,8	176,9
24	70x30-1		20	-	25,0	51,7	85,4	124,8	161,5	197,5
25	70x20-1		-	5	21,0	44,7	75,1	110,5	140,2	165,2
26	70x25-1		-	10	23,7	49,0	81,8	119,9	153,9	185,9
27	70x30-1		-	15	26,0	53,0	88,1	128,5	166,5	204,8

Conclusion. It can be seen from the results that although the effect of sowing systems on the stem height of sunflower plants was significant, it was observed that the increased application of mineral fertilizers as a secondary factor also had a positive effect on stem height. The effect of the application of organic fertilizers in addition to the mineral fertilizers was also significant, and it was noted that increasing the rates of mineral and organic fertilizers, in turn, had a noticeable effect on stem height.

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