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THE INFLUENCE OF HETEROAUXIN STIMULATOR ON SEED SIMILARITY AND SEEDLING GROWTH OF TULIP TREE (*Liriodendron tulipifera*)

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Abstract:
The article presents the research results on the seeding rates of seeds and a tulip tree seedlings output in a typical serozem conditions of Tashkent region. Sowing tulip tree seeds in normal is 1 kg/m² without heteroauxin processing ensured the seedlings yield 350 thousand/ha, a with 100 mg/l heteroauxin processing 1010 thousand/ha, then at 2 kg/m² rate - 520 thousand/ha, and with processing with 200 mg/l heteroauxin - 1820 thousand/piece per hectare.

Keywords: Seeding rate, seed germination, seedlings, growth stimulator, biometric indicators.

INTRODUCTION.

The growth regulators action is diverse and they allow you to directly influence the change in the metabolism of the plant organism: accelerate seed germination, the root system development, the onset of the flowering and fruiting phase, etc. [1]. A growth regulator increases the adaptive capacity of plants, and thus leads to an increase in their productivity [2; 3; 4; 5].

RESEARCH METHODS.

The experiment on seed reproduction of the tulip tree (*Liriodendron tulipifera*) was established in a typical sierozem of Tashkent region with a humus content - 1.18%, total nitrogen - 0.09-0.12%, phosphorus - 0.15-0.18%. Since the germination rate of tulip tree seeds is very low (3-5%) to obtain, a large number of seedlings, sowing was carried out at high rates - 1 kg per 1 m². The following options were studied:

1. A tulip tree seeds 1 kg per m² without processing with heteroauxin were sown on prepared burns (control);
2. A tulip tree seeds at 1 and 2 kg rate per m² were soaked in heteroauxin solution at 100 and 200 mg/l concentration for 10 hours, and then sown in prepared firewoods. Ridges with sown seeds were well moistened and mulched with rotted manure.

RESEARCH RESULTS AND REVIEW.

Seed shoots of the tulip tree began to appear from April 20, the growth phase of the shoots began in the second decade of May, the linear growth phase in early June. The heteroauxin growth stimulants effect on seed germination and seedling growth, depending on the seed sowing rate, is given in table-1 and figure

Table – 1. Germination of tulip tree seeds depending on the processing with heteroauxin

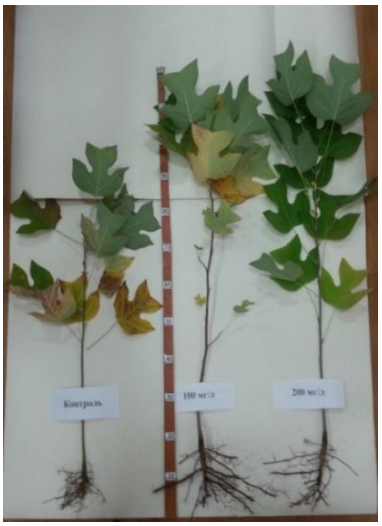
№	Options	Observation days					
		20.04.	5.05.	22.05	5.06	15.06	25.06
1	Control, 1 kg, without processing	10	17	32	42	51	51
2	1 kg with sample 100 mg/l	27	32	140	168	177	177
3	2 kg without processing	49	62	245	253	265	265
4	2 kg with sample 200 mg/l	87	108	296	308	312	312

Observations on the germination of tulip tree seeds carried out on April 20 showed that at 1 kg rate per m² of the control variant, where the sowing was carried out without processing with heteroauxin, the number of seedlings was 10 pieces, with the processing with heteroauxin 100 mg /l 27 pieces. При норме 2 кг без обработки 48 шт, а с обработкой гетероауксином 200 мг/л 87 шт на м². Observations of seed germination of which were determined on May 5, i.e. 15 days after the first observation, showed that in the control variant at 1 kg rate per m² without

heteroauxin processing, it was 17 pcs, with processing – 32 pcs, at the same time, at 2 kg/m² rate without processing - 62 pieces, with heteroauxin processing - 106 pcs.

Observations carried out on May 22 showed that in the control variant without heteroauxin processing, tulip tree seeds seedlings was 32 pcs/m², with processing with 100 mg/l heteroauxin 140 pcs/m². At the same time, at a rate of 2 kg per m², respectively, 245 and 296 pcs/m². The seedlings count carried out on June 15 showed the following number of tulip tree seedlings appeared: at 1 kg/m² rate without processing 51 pcs, with processing 177 pcs, at 2 kg/m² rate without processing 265 pieces, with processing 312 pieces. The enumeration carried out on June 25 showed that after June 15, additional seedlings of the tulip tree no longer appeared.

1



2

Fig. 1- General view of the experimental site for sowing seeds of a tulip tree; 2- Two-year model seedlings

The seedlings yield and quality depend on the seeding rate. Observations have shown that with an increase in the seeds sowing rate of a tulip tree, the seedlings yield per hectare increases (table-2).

Table – 2. Biometric indicators of one- and two-year-old tulip tree seedlings treated with a heteroauxin stimulator

№	Options	Output from 1 hectare		Height		Diameter	
		Thousand pcs	%	cm	%	mm	%
Annuals (2018)							
1	1 kg control without	350	100	8,2±0,45	100	3,3±0,15	100
2	1 kg with 100 mg/l processing	1010	288,5	10,2±0,24	124,4	3,8±0,14	115,5
3	2 kg untreated	520	100	10,7±0,3	130,5	3,8±0,15	115,5
4	2 kg with processing 200 mg/l	1820	350,0	10,6±0,44	129,3	3,4±0,16	103,3
Biennial (2019)							
1	1 kg control without processing	366	100	61,1±1,96	100	6,6±0,19	100
2	1 kg with 100 mg/l processing	1032	281,9	76,6±2,03	125,3	7,5±0,19	113,6
3	2 kg without processing	520	100	62,5±1,82	100	6,8±0,16	100
4	2 kg with processing 200 mg/l	1865	358,6	77,2±1,49	123,5	7,9±0,16	116,2

In the experiment for 2019, in the sowing department of the seed plot, the growth and development observations of two-year-old tulip tree seedlings treated with heteroauxin were continued. For comparison, we present the biometric data of the first (2018) and second years (2019) of growing tulip tree seedlings. In the second year of cultivation, the growth and development of tulip tree seeds seedlings increased, which were treated with different heteroauxin concentrations. When treated with heteroauxin at 100 mg/l concentration, the two-year-old tulip tree seedlings height was 76,6±2,03 cm, root collar diameter was 7,5±0,19 mm, against the control 61,1±1,96 cm and 6,6±0,19 mm respectively, which amounts to 25.3 and 13.6% more.

When treated with heteroauxin at 200 mg/l concentration, the seedlings height was 77,2±1,49 cm, root collar diameter was 7,9±0,16 mm, against 62,5±1,82 cm and 6,8±0,16 mm control, respectively, which is 23,5 and 16,2%. If we compare the biometric indicators of the first year with the second year of heteroauxin action then there is an advantage of the first year of action. For example, when treated with heteroauxin 100 mg/l, the annual seedlings height was 24,4 % when treated with 200 mg/l – 29,3%. The seedling yield in the second year of seedling growing increased due to the seedlings output in 2019. For example, in the variant with 100 mg/l heteroauxin processing, the seedlings yield per hectare in comparison with 2018 increased by 9,8%, and when processing 200 mg/l by 12.0%.

The total yield of two-year-old seedlings in 2019 was 366 thousand pieces/ha in the control without processing, with 100 mg/l processing is 1032 thousand pieces/ha, 200 mg/l is1865 thousand pieces/ha.

We studied the dry matter accumulation by one- and two-year-old tulip tree seedlings depending on the seeding rate and processing with heteroauxin.

From the data given in Table 3, it can be seen that according to dry matter accumulation by 1-year-old tulip tree seedlings there are no significant differences in the experience options – it is in 2,4-2,9 g range per 1 model seedling

Table – 3. The air-dry mass accumulation by one- and two-year-old seedlings of a tulip tree

№	Options	Dry weight of 1 model seedling, g					
		Leaves	Stem	Root	Total	Roots number, pcs	Roots length, cm
Annual seedlings (2018)							
1	Without processing with heteroauxinseeding rate is 1 kg/m²	1,0	0,6	0,8	2,4	9,0	1
2	With heteroauxin processing (100 mg/l) seeding rate is 1 kg/m²	1,3	0,6	0,6	2,5	10,0	2
3	Without processing with heteroauxin seeding rate is 2 kg/m²	1,2	0,8	0,9	2,9	10,5	3
4	With heteroauxin processing (200 mg/l), seeding rate is 2 kg/m²	1,3	0,8	0,6	2,7	12,5	4
Biennial seedlings (2019)							
1	Without heteroauxin processing, the seeding rate is 1 kg/m²	5,8	6,3	5,4	17,5	16	77,5
2	With heteroauxin processing (100 mg/l) seeding rate is 1 kg/m²	9,4	14,2	22,1	45,7	19	118,8
3	Without heteroauxin processing, the seeding rate is 2 kg/m²	6,1	6,6	5,8	18,5	18	84,0
4	With heteroauxin processing (200 mg/l), seeding rate is 2 kg/m²	11,6	9,4	10,1	31,1	22	127,3

In the second year of seedling cultivation, dry matter accumulation varied greatly according to the experiment variants. For example, the dry weight of one model seedling at 1 kg / m² seed rate with processing with 100 mg/l heteroauxin was 45,7 g versus 17,5 g of the control, at 2 kg/m² sowing rate with 200 mg/l processing, the dry weight of the seedlings was 31,1-18,5, respectively.

The number and length of seedlings' roots also changed. The number of sucking roots according to the experiment variants was in 18-22 pieces range, root length at 1 kg/m² seed rate with heteroauxin processing 100 mg/l was 118,8 cm, at 2 kg/m² rate and with processing with 200 mg/l, the heteroauxin concentration is 127.3 and 84 cm, respectively. From this it can be seen that the processing of tulip tree seeds with heteroauxin during sowing significantly increases the roots number and length for the next 2-3 years of growing seedlings.

CONCLUSIONS.

Thus, with an increase in the seeds sowing rate of a tulip tree the yield of seedlings per hectare increases. Sowing a tulip tree seeds at 1 kg/m² rate without heteroauxin processing provided seedlings yield of 350 thousand/ha, and with processing with 100 mg/l heteroauxin 1010 thousand/ha, then at 2 kg/m^2 rate - 520 thousand/ha, and with processing with 200 mg/l heteroauxin - 1820 thousand/piece per hectare. Processing of tulip tree seeds with heteroauxin at 100 and 200 mg/l concentration in the second year of cultivation has a positive effect on the biometric parameters of the tulip tree, increasing the height by 23.5%, and the root collar diameter by 25.3%.

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