THE YIELD OF CHERRY TOMATO, DEPENDING ON THE INFLUENCE OF PLANT GROWTH REGULATORS IN THE RIGHT-BANK FOREST-STEPPE OF UKRAINE

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The importance of plant growth regulators for covered area is important, since accelerating the ripening of fruits grown in greenhouses can increase the yield of early, more profitable products and increase the profitability of production [1, p. 142].

The influence of plant growth regulators on the increase of crop productivity is due to the fact that they accelerate the division of cells, intensify the processes of plant life, increase the permeability of intercellular membranes and accelerate biochemical processes in them, which leads to increased processes of nutrition, respiration, photosynthesis. Thanks to these preparations the resistance of crops to unfavorable weather conditions and to their damage by pests and diseases are increased.

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In general, under the influence of biostimulants, the genetic potential of plants, created by nature and selection work, is more fully realized [2, p. 94]. However, longstanding complex studies of growth regulators of the new generation, the study of their effect on plants of new genotypes of tomato at different stages of life, their productivity and quality of fruits in conditions of covered soil were not carried out. In this connection, there is a need for a more detailed study of the influence of growth regulators on tomato plants in the conditions of greenhouses. Therefore, the use of growth regulators, determining the direction of their action on specific hybrids to increase the productivity of tomato plants when growing in greenhouses is a modern and topical task in vegetable growing.

The purpose of the experiment: to find out the influence of different plant growth regulators on the growth of the seedlings and its quality indicators, the level of acclimatization after deplantation and the productivity of the cherry tomato.

Studies on the influence of plant growth regulators on the quality of cherry tomato seedlings were conducted in 2017-2018 on the basis of the Uman National University of Horticulture in the hangar hothouse. Two hybrids of cherry tomatoes, Sun F1 and Lucy Plus F1, and three plant growth regulators: Reastim, Stimpo, and Ivin were studied. The Summer Sun-F1 hybrid was used for control with seed and seedling treatment by distilled water.

The field, static and laboratory methods of research were used during the experimental work. Phenological observations, biometric measurements, records and analyzes were conducted. Phenological observation: the beginning and mass appearance of seedlings, budding and flowering.

Before sowing, the seeds were soaked in solutions of growth regulator Reastim (10 ml / 500 ml of water for 18 hours), Stimpo (5 ml / 500 ml of water for 18 hours), Ivin (1 ml / 500 ml of water for 18 hours) and distilled water. Ivin is a synthetic preparation of auxin-like action; Stimpo (emistim C + microelements) is created by a combination of derivatives of pyridine with a complex of phytohormones analogues; Reastim is a growth regulator, which includes the fertilizer "Reakom", as well as gibberellin, amber acid, humic acids.

With the use of growth regulators, the first emerging crops were marked in the hybrid Lucy Plus F1 in variants with Ivin and Stimpo and in the hybrid Summer Sun F1 in the variant with Stimpo – on 4-5 day. In all other variants, including control, the appearance of massive crops was noted on 9-10 day.

On average, in the 2017-2018, the plants of Summer Sun F1 hybrid with using of Stimpo were blooming fastest, on 48 day. Plants in the control version bloomed 6 days later. The difference in the flowering phase between the investigated hybrids varied within ten days, and between growth regulators of a single hybrid – within 5-6 days.

Investigated growth regulators also had a significant effect on the biometric indices of the cherry tomato seedlings (Table 1).

Thus, hybrid Lucy Plus F1 predominated the studied hybrid Summer Sun F1 by the main morphological parameters, which can be explained by genetic properties. Comparing with control, the thickness of the stem increased by 0.08 cm, the leaf area increased by 1.2 dm2 per plant.

Table 1

Growth regulator	Thickness of stem,	Number of leaves,	Leaves area,				
	cm	pieces	dm2 / plant				
Summer Sun F1							
Water (control)	0,64	7,9	11,2				
Stimpo	0,74	8,6	12,0				
Reastim	0,67	8,0	11,5				
Ivin	0,73	8,4	11,8				
Lucy Plus F1							
Water	0,72	8,4	12,4				
Stimpo	0,80	9,2	13,1				
Reastim	0,74	8,5	12,4				
Ivin	0,78	8,8	12,9				

Biometric indices of tomato seedlings depending on the hybrid and the action of a plant growth regulator (average for years 2017-2018)

The weight of plants for 45 day is an important indicator of growth processes. It greatly affects on the yield of plants after planting to a permanent place. The studies conducted with cherry tomato plants, indicate that the parameters of the above-ground part and the root system depended to a large extent on the action of various growth regulators. Establishment of these parameters was carried out just before planting of the seedlings into open ground. The largest mass of the above-ground part of the seedlings was observed in the variant with the use of Stimpo – 68,1-83,3 g depending on the hybrid. This parameter was lesser in the plants that were treated with Ivin solution – 66.7-81.9 g and Reastim – 63.6-77.5 g. Depending on the growth regulators, the largest mass of roots, during the planting period, was observed in the seedlings which were treated by Stimpo – 15.2-17.7 g, and in control variant by 2.5-5.0 g less. The largest share of the roots to the mass of the overground part was noted in variants using Stimpo and Ivin growth regulators – 21.1-22.1%, in the variant with Reastim this indicator was 19.9 and 21.7% depending on the hybrid.

Applying of the growth regulator helps to increase the area of tomato leaves. During the fruiting period of the eighth truss, the fastest increase in the area of the leaf surface was observed in plants that were treated with the Stimpo solution: in the hybrid Summer Sun F1 – 66.0 thousand m^2 / ha, in Lucy Plus F1 – 65.7 thousand m^2 / ha, which is 2,8 and 2,5 thousand m^2 /ha more in comparison with the control variant.

During the years of the research, the number of fruits on average per plant varied depending on the properties of the hybrid and growth regulator. The highest indicator was noted in the Summer Sun F1 hybrid at plant spraying with Stimpo Growth Regulator – 118.1 pieces /plant, which is 26.2 pieces /plant higher than in the control one. In the studied hybrids, the average weight of the fetus did not significantly change depending on the influence of the growth regulators and was within the range: in the hybrid Summer Sun F1 – 7.2-18.2 g and in the hybrid Lucy Plus F1 – 26.5-27.7 g.

Table 2

The yield capacity of cherry tomatoes is the main indicator and depends on a significant degree on the weight and number of fruits per plant (Table 2).

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Growth regulator		⊥ to control				
	2017	2018	average over the years	\pm to control t / ha		
Summer Sun F1						
Water (control)	25,1	28,3	26,7	0		
Stimpo	27,5	32,6	30,1	+3,4		
Reastim	25,9	29,7	27,8	+1,1		
Ivin	26,6	31,5	29,1	+2,4		
Lucy Plus F1						
Water	32,3	35,7	34,0	+7,3		
Stimpo	34,4	37,8	36,1	+9,4		
Reastim	32,8	36,2	34,5	+7,8		
Ivin	33,6	36,9	35,3	+8,6		
HIP_{05} factor A	1,02	1,02				
factor B	1,44	1,07	—			
interaction AB	2,04	2,05				

Cherry tomato yield, depending on the hybrid and the influence of growth regulators, kg / m^2

On average over the years of the research, lower yield of cherry tomatoes, $26.7 \text{ kg} / \text{m}^2$, was obtained in plants of the control variant without applying of growth regulators. A large significant yield was obtained while Ivin using, which, in comparison with the control, helped to get 2.4 kg and 8.6 kg / m² of high-quality cherry tomato fruits aditionally.

For a detailed description of the hybrids of the Cherry tomato, the study of the chemical composition of the fruits is important. Studies have showed that the studied hybrids were distinguished by the dry matter content, even without applying of the growth regulators (5.3-5.4%), as Stimpo and Ivin raised the current index from 0.2 to 0.6%. The mass fraction of sugars was found at the level of 3,12-3,28%, which allowed to provide high flavoring properties of the fruits. Stimpo was notable by the content of vitamin C in the fruits in the hybrid Lucy Plus F1 – 11.7 mg / 100 g. Somewhat lower content of ascorbic acid has been noted in the variants with applying of Reastim – 11.4 mg / 100 g in Lucy Plus F1 hybrid and 11, 52 mg / 100 g in Summer Sun F1 hybrid. The amount of nitrates did not exceed the maximum permissible concentration for the tomato of the covered soil (up to 300 mg / kg).

Thus, in the zone of the Right-bank Forest-steppe of Ukraine it is expedient to grow seedlings of cherry tomatoes of hybrids Summer Sun F1 and Lucy Plus F1 with the use of the growth regulator of Stimpo.

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