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Editorial office: Křižíkova 384/101 Karlín, 186 00 Praha

E-mail: info@european-science.org

Web: www.european-science.org

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AGRICULTURAL SCIENCES

ВПЛИВ СПОСОБІВ ТА СТРОКІВ ЗАСТОСУВАННЯ РЕГУЛЯТОРА РОСТУ ЕМІСТИМ С НА ЕЛЕМЕНТИ ПРОДУКТИВНОСТІ СОРТІВ КАРТОПЛІ В УМОВАХ ЛІСОСТЕПУ ПРАВОБЕРЕЖНОГО

Поліщук М.І.

*кандидат сільськогосподарських наук, доцент,
завідувач кафедри землеробства, ґрунтознавства та агрохімії
Вінницького національного аграрного університету*

THE INFLUENCE OF METHODS AND TERMS OF APPLICATION OF THE GROWTH REGULATOR EMISTIM C ON THE ELEMENTS OF PRODUCTIVITY OF POTATO VARIETIES IN THE CONDITIONS OF THE FOREST STEPPE

Polishchuk M.

*candidate of Agricultural Sciences, Associate Professor, Head of the Department of Agriculture, Soil Science and Agrochemistry
Vinnytsia National Agrarian University*

АНОТАЦІЯ

В статті представлено трьохрічні результати досліджень по вивченню впливу способів та строків застосування регулятора росту Емістим С на елементи продуктивності сортів картоплі в умовах Лісостепу Правобережного, на сірих лісових ґрунтах.

В середньому за 2017-2019 роки найбільш ефективною виявилась обробка регулятором росту Емістимом С картоплиння, ніж безпосередньо перед садінням бульб. У сортів Дніпрянка і Поляна найвищу урожайність отримано на варіанті 6, де регулятором росту Емістимом С картоплиння оброблялось у фазі сходів, відповідно – 27,2 і 31,3 т/га.

Встановлено, що в середньому за 2017-2019 роки, спостерігалось суттєве збільшення кількості бульб під кушем у сортів Дніпрянка і Поляна, при обробці картоплиння у фазі сходів, відповідно до 13 і 18,5 шт., проти 9,9 і 14,3 шт. на контролі, маса товарних бульб зростала відповідно до 77,6 і 87,6 г, проти 66,1 і 65,3 г на контролі, товарність відповідно до 89,3 і 87,1 %, проти 81,1 і 76,8 % на контролі.

Способи та строки обробки регулятором росту більше впливали на вміст сухих речовин і крохмалю в бульбах картоплі сорту Дніпрянка, даний сорт також відзначався вищими показниками вмісту сухої речовини та крохмалю порівняно із сортом Поляна. Найбільший ефект отримано для сорту Дніпрянка на варіанті 6, де картоплиння оброблялось регулятором росту Емістимом С у фазі повних сходів, вміст сухої речовини і крохмалю відповідно становив 22,6 і 16,3 %. Для сорту Поляна відмічено тенденцію до збільшення цих показників на варіанті 8 при трикратній обробці Емістимом С картоплиння у фазі сходів, бутонізації, цвітіння, відповідно сухої речовини і крохмалю – 19,0 і 13,0 %.

ABSTRACT

The three-year results of researches on studying of influence of ways and terms of application of the growth regulator Emistim C on elements of productivity of grades of a potato in the conditions of the Forest-steppe of the Right bank, on gray forest soils are presented.

On average, in 2017-2019, the treatment of potatoes with the growth regulator Emistim C was more effective than just before planting the tubers. In the varieties Dniprolyanka and Polyana, the highest yield was obtained in variant 6, where the growth regulator Emistim C potatoes were cultivated in the germination phase, respectively – 27,2 and 31,3 t / ha.

It was found that on average in 2017-2019, there was a significant increase in the number of tubers under the bush in varieties Dniprolyanka and Polyana, when processing potatoes in the germination phase, respectively, 13 and 18,5 pcs., Against 9,9 and 14,3 pcs. . on control, the weight of marketable tubers increased respectively to 77,6 and 87,6 g, against 66,1 and 65,3 g on control, marketability according to 89,3 and 87,1%, against 81,1 and 76,8 % on control.

Methods and timing of growth regulator treatment had a greater impact on the dry matter and starch content in potato tubers of Dniprolyanka variety, this variety was also characterized by higher dry matter and starch content compared to Polyana variety. The greatest effect was obtained for the Dniprolyanka variety in variant 6, where potatoes were treated with the growth regulator Emistim C in the phase of full germination, the dry matter and starch content was 22,6 and 16,3%, respectively. For Polyana variety, there is a tendency to increase these indicators in option 8 with three treatments of potatoes by Emistim C in the phase of germination, budding, flowering, respectively, dry matter and starch – 19,0 and 13,0%.

Ключові слова: сорти картоплі, регулятор росту, висота рослин, кількість стебел у куці, площа листя, урожайність, товарність та крохмальність бульб.

Keywords: potato varieties, growth regulator, plant height, number of stems in the bush, leaf area, yield, marketability and starch of tubers.

Formulation of the problem. Potatoes - are among the main foods for people in the world. It ranks fifth among energy sources in the diet of people inferior: wheat, corn, rice and barley. 100 g of raw mass of potato tubers contains about 295 kJ or about 70 kcal, and accordingly, depending on the starch content, the figures range from 65 to 90 kcal [2, 3, 6, 9, 10].

Potatoes in Ukraine are grown in all soil and climatic zones. The sown area under it occupies more than 1,5 million hectares, and the average yield is at the level of 100 - 130 c / ha [4, 6, 9]. However, to ensure effective management of the potato industry in Ukraine, it is necessary to obtain a harvest at the level of 250 - 300 kg / ha of tubers [2, 3, 6, 7, 9, 10].

Obtaining high and stable potato yields depends on a set of factors, namely: soil and climatic conditions of the region, biological characteristics of varieties, seed quality, application of mineral and organic fertilizers, agricultural techniques and phytosanitary condition of crops [5, 8, 9].

The application of high rates of fertilizers for sowing potatoes, with increasing cost, require the search and development of ways to improve their efficiency. One of the factors that affects the effectiveness of fertilizers is the use of growth regulators [7, 8, 10].

Actuality of theme. In Ukraine, much attention in recent years has been paid to the use of growth regulators to enhance the process of tuber formation, increase the resistance of plants to adverse conditions and pests during the growing season and tubers during storage. Different sensitivity of potato varieties to growth regulators was noted. Therefore, the introduction of growth regulators in the technology of potato production requires careful study of their impact on plants depending on the method and timing.

The purpose and objectives of research. To determine the features of growth and development of potato varieties and crop formation, depending on the methods and terms of application of the growth regulator Emistim S.

The task of research is to determine the influence of the growth regulator Emistim C on the nature of the phenological phases, growth, development, yield of potato varieties and quality indicators, depending on the methods and timing of the drug.

Subject of research - potato varieties: Dnipryanka and Polyana, growth regulator Emistim S.

Presenting main material. Studies to study the effectiveness of the growth regulator Emistim C in crops of potato varieties were conducted during 2017 - 2019 in the experimental field of the Faculty of Agronomy and Forestry of VNAU.

Studies to determine the effect of growth regulator Emistim C on the productivity of potato varieties were conducted on gray podzolic soils.

Climatic conditions during the years of field research show that they are favorable for growing crops, including potato varieties.

The technology of growing potato varieties was common for the research area.

Field and laboratory studies are conducted according to generally accepted methods [1].

Achieving this goal was carried out by conducting field and laboratory experiments according to the following scheme: 1. Control (without growth regulator); 2. Treatment of tubers with Emistim C; 3. Treatment of tubers and potatoes with Emistim C in the germination phase; 4. Treatment with Emistim C of tubers and potatoes in the phase of germination, budding; 5. Treatment of tubers and potatoes with Emistim C in the phase of germination, budding, flowering; 6. Treatment of potatoes with Emistim C in the germination phase; 7. Treatment of potatoes with Emistim C in the germination phase, budding; 8. Treatment of potatoes with Emistim C in the phase of germination, budding, flowering; 9. Treatment of potatoes with Emistim C in the budding phase; 10. Treatment of potatoes with Emistim C in the phase of budding, flowering; 11. Treatment with Emistim C of potatoes in the flowering phase.

To study the effectiveness of the response of potato varieties to the methods and timing of application of the drug Emistim C, a production experiment was conducted in 2017 - 2019 in the experimental field of VNAU.

Phenological observations carried out during the potato growing season showed that the methods and frequency of application of the growth regulator Emistim C do not affect the dates of phenological phases.

In the varieties Dnipryanka and Polyana on average for 2017-2019, the period of germination-budding lasted respectively - 17 and 20 days. Flowering occurred 60 and 64 days after planting, or 28 and 33 days after emergence. The growing season lasted an average of 95 and 107 days.

Treatment of tubers and potatoes with the growth regulator Emistim C did not change the duration of the interphase periods. They were determined by the biological characteristics of the studied varieties. Since the Dnipryanka variety belongs to the group of early and the Polyana variety to the middle-early variety, the duration of all interphase periods for the Dnipryanka variety was shorter than for the Polyana variety.

On average, in 2017-2019, mass seedlings for the Dnipryanka variety appeared in 32 days, and for the Polyana variety - in 31 days. The germination-budding period lasted 17 and 20 days, respectively. Flowering in Dnipryanka and Polyana varieties was observed after 60 and 64 days, respectively. Complete extinction of potatoes occurred 95 and 107 days after planting, respectively.

At the same time, it should be noted that the duration of phenological phases fluctuated somewhat over the years of research. Thus, in 2019, all phenological phases in both varieties occurred slightly earlier than in 2017 and 2018. The longest growing season studied varieties had in 2017.

The number of stems in the bush depends on the characteristics of the variety. When studying the methods and terms of application of the growth regulator Emistim C, it was found that the variety Polyana has a

slightly greater stem-forming ability. The use of growth regulator Emistim C in the years of research contributed to an increase in the number of stems and height of potato plants (Table 1). Thus, in 2017, the number of

stems per plant in the varieties Dnipryanka and Polyana in the control version was 4,1 and 4,6, respectively, and in option 6, where Emistim C was used in the germination phase, increased significantly to 4,7 and 5,7 pcs.

Table 1
Influence of methods and terms of application of growth regulator Emistim C on biometric indicators of potatoes (2017 - 2019)

Options	Number of stems per plant, pcs.				Plant height, cm				Plant leaf area, thousand m ² /ha			
	2017	2018	2019	average	2017	2018	2019	average	2017	2018	2019	average
Variety Dnipryanka												
1.	4,1	3,5	3,8	3,8	61,0	48,0	36,0	48,3	29,0	24,0	19,0	24,0
2.	4,3	3,8	3,8	4,0	63,0	51,0	37,0	50,4	31,0	25,0	21,0	25,7
3.	4,3	3,5	3,8	3,9	63,0	52,0	39,0	51,2	33,0	25,0	22,0	26,7
4.	4,4	4,0	3,8	4,1	64,0	51,0	39,0	51,2	35,0	31,0	22,0	29,3
5.	4,4	4,0	4,1	4,2	64,0	52,0	40,0	51,9	35,0	33,0	29,0	32,3
6.	4,7	4,4	4,3	4,5	66,0	54,0	41,0	53,6	38,0	33,0	32,0	34,3
7.	4,6	3,8	4,3	4,2	64,0	51,0	40,0	51,8	36,0	32,0	26,0	31,3
8.	4,3	3,6	4,3	4,1	63,0	51,0	40,0	51,3	36,0	32,0	27,0	31,7
9.	4,2	3,7	3,9	3,9	62,0	51,0	38,0	50,3	35,0	30,0	29,0	31,3
10.	4,3	3,7	4,0	4,0	64,0	51,0	39,0	51,4	36,0	32,0	29,0	32,3
11.	4,2	3,5	3,9	3,9	63,0	51,0	37,0	50,2	35,0	32,0	28,0	31,7
Variety Polyana												
1.	4,6	3,4	3,8	3,9	54,0	47,0	35,0	45,4	33,0	26,0	22,0	27,0
2.	5,0	4,1	4,2	4,4	57,0	48,0	36,0	46,9	36,0	28,0	24,0	29,3
3.	5,3	4,1	4,3	4,6	56,0	48,0	36,0	46,5	37,0	29,0	24,0	30,0
4.	5,3	4,0	4,2	4,5	56,0	48,0	37,0	46,9	36,0	31,0	26,0	31,0
5.	5,6	4,0	4,6	4,7	58,0	49,0	38,0	48,3	38,0	32,0	28,0	32,7
6.	5,7	4,1	4,6	4,8	60,0	51,0	38,0	49,5	48,0	34,0	33,0	38,3
7.	5,1	3,8	4,5	4,5	59,0	47,0	38,0	47,9	45,0	33,0	30,0	36,0
8.	5,3	3,4	4,4	4,4	59,0	49,0	36,0	48,0	40,0	32,0	31,0	34,3
9.	4,8	4,1	4,2	4,4	57,0	48,0	35,0	46,7	38,0	32,0	30,0	33,3
10.	5,0	3,9	4,4	4,4	58,0	48,0	37,0	47,6	36,0	33,0	32,0	33,7
11.	4,9	3,4	4,1	4,1	55,0	48,0	35,0	45,9	37,0	31,0	31,0	33,0

In 2018, the number of stems per plant in the control variant of the varieties Dnipryanka and Polyana was 3,5 and 3,4, respectively. For the Dnipryanka variety in variant 6, a significant increase of this indicator was observed up to 4,4 units, and for the Polyana variety no significant changes of this indicator were observed.

In 2019, the number of stems per plant in the control version of the varieties Dnipryanka and Polyana was 3,8 pieces. For the Dnipryanka variety, a significant increase in the number of stems was observed in the variants where potatoes were treated with Emistim C in the phase of seedlings (var. 6), seedlings and budding (var. 7), seedlings-budding and flowering (var. 8) - up to 4,3 pieces. , against 3,8 pcs. on control. For the Polyana variety there was a significant increase in this indicator in all variants where the growth regulator Emistim C was used. A larger number of stems was obtained in the variants where Emistim C treated tubers and potatoes in the germination, budding, flowering phase (var. 5) and Emistim C treatment. potatoes in the germination phase (var. 6) – 4,6 pcs., against 3,8 pcs. on control.

On average in 2017-2019 for the variety Dnipryanka, the number of stems per plant increased significantly in option 6, where potatoes were treated with a regulator in the germination phase - by 0,7 pcs. at 3,8 pcs. on control. For the Polyana variety, the number of stems per plant increased

significantly in all variants of processing by the regulator, but the maximum was variant 6, where potatoes were processed in the germination phase - by 0,9 pcs. at 3,9 pcs. on control.

In our studies, the use of Emistim C had a positive effect on plant height. In 2017, the height of plants was higher than in 2018 and 2019 (Table 1). It is known that the meteorological conditions of the growing season, especially the amount of precipitation, affect the formation of vegetative mass. Therefore, the height of plants in 2017 was the largest among the years of observations. In 2017, this indicator increased significantly for the Dnipryanka variety in variant 6, where potatoes were treated with Emistim C in the germination phase - by 5 cm, against 61 cm in the control, for the Polyana variety in the corresponding variant by 6 cm, against 54 cm in the control.

In 2018, this indicator increased significantly for the Dnipryanka variety in all variants where Emistim C was used, but the highest indicator was obtained in variant 6, where potatoes were treated with Emistim C in the germination phase - by 6 cm, against 48 cm in the control, for Polyana variety. the corresponding variant on 4 cm, against 47 cm on control.

In 2019, the height of potato cultivars was the lowest among the years of research. This year, for the Dnipryanka variety, the height of potato plants increased

significantly in the variant where the tubers were treated with Emistim C, on the seedlings and in the budding phase, flowering by 4 cm (var. 5), when treated with Emistim C potatoes in the seedling phase by 5 cm (var. 6), and at processing by Emistim C of a potato in a phase of sprouts, budding (var. 7) and at processing by Emistim C of a potato in a phase of sprouts, budding, flowering (var. 8) on 4 cm.

For the Polyana variety in 2019, no significant increase in plant height was observed. On average, during three years of field research on both cultivars Dnipryanka and Polyana, plant height increased in variant 6, where potatoes were treated with a growth regulator in the germination phase by 5,3 cm vs. 48,3 cm in the control and by 4,1 cm vs. 45, respectively. 4 cm in control.

Treatment of tubers and potatoes with the growth regulator Emistim C had a positive effect on the leaf surface area of potatoes. The area of leaves of the Polyana variety on average in 2017-2019 was slightly larger than for the Dnipryanka variety (Table 1). It differed significantly over the years of research. Thus, in 2019, in the control variant, the leaf area of the Dnipryanka variety was 19 thousand m^2 / ha, and of the Polyana variety - 22 thousand m^2 / ha. In the variants where the growth regulator was treated tubers and potatoes, respectively, increased to 22-32 and 24-33 thousand m^2 / ha. In 2018, this figure was 24 and 26 thousand m^2 / ha, respectively, in the control varieties Dnipryanka and Polyana. In the variants where the growth regulator Emistim C was used for tubers and plants during the growing season - 25-33 and 28-34 thousand m^2 / ha, and in 2017, respectively - 29 and 33 thousand m^2 / ha under control, 31 -38 and 36-48 thousand m^2 / ha in the variants where the growth regulator Emistim C was used in the processing of tubers and potatoes.

In 2018 and 2019, the leaf area of Dnipryanka and Polyana varieties was slightly lower compared to 2017, which seemed to be the wettest. In the varieties Dnipryanka and Polyana during all years of research the highest indicators of leaf area were obtained in variant 6, where potatoes were treated with growth regulator Emistim C in the germination phase, and on average for 2017-2019 this indicator was 34,3 and 38, respectively. 3 thousand m^2 / ha, with 24,0 and 27,0 thousand

m^2 / ha under control.

Thus, the obtained results allow us to conclude that in the years of field research, the treatment of potato plants by the growth regulator Emistim C was more effective during the growing season than directly on the tubers. For the Dnipryanka variety, in the variant where potatoes were treated with Emistim C in the germination phase, the maximum values of biometric indicators of potatoes were obtained: number of stems per plant – 4,5 pcs., Plant height – 53,6 cm, leaf area – 34,3 thousand m^2 /ha. For the Polyana variety, similarly, this variant also received a significant increase in the biometric indicators of potatoes: the number of stems per plant – 4,8 pieces, plant height – 49,5 cm, leaf area – 38,3 thousand m^2 / ha.

Among the factors influencing the level of potato yield - is the use of growth regulators. One of the important issues for all groups of growth regulators is to identify the specifics of their action depending on the species and variety of plants, as well as the method of application.

Methods and timing of application of the growth regulator Emistim C significantly affected the yield of potatoes (Table 2). In 2017, studies showed that in both varieties Dnipryanka and Polyana on option 6, where potatoes were treated with Emistim C in the germination phase, there was a higher yield of 31,2 and 34,2 t / ha, respectively, with a yield increase of 6,0 and 5,7 t / ha.

In 2018, the Dnipryanka variety also received a significant increase in potato yield in variants where potatoes were treated three times with Emistim C in the phase of germination, budding, flowering (var. 8) and double treatment with Emistim C in the phase of budding, flowering (var. 10) to 27,6 t / ha and 27,3 t / ha. The increase in yield was 6,8 t / ha, 6,5 t / ha, respectively. For the Polyana variety in 2018, the potato yield increased significantly in the variants where potatoes were treated with Emistim C in the germination phase (var. 6) - up to 31,3 t / ha, with Emistim C treatment of potatoes in the budding phase (var. 9) - up to 31,7 t / ha and with double treatment with Emistim C in the phases of budding and flowering (var. 10) - up to 31,7 t / ha. The increase in yield was 6,5 and 6,9 t / ha, respectively.

Table 2

Yield of potato varieties depending on the methods and terms of application of the growth regulator Emistim C, t / ha (2017-2019)

Options	Crop capacity			average	± to control
	2017	2018	2019		
Variety Dnipyryanka					
1. Control (without growth regulator)	25,2	20,8	19,7	21,9	
2. Treatment with Emistim C tubers	27,7	22,4	23,6	24,6	2,7
3. Emistim C treatment of tubers and potatoes in the germination phase	31,0	21,4	23,7	25,4	3,5
4. Emistim C treatment of tubers and potatoes in the germination phase, budding	30,4	23,7	21,9	25,3	3,4
5. Emistim C treatment of tubers and potatoes in the phase of germination, budding, flowering	31,5	21,9	22,4	25,3	3,4
6. Emistim C treatment of potatoes in the germination phase	31,2	25,2	25,2	27,2	5,3
7. Emistim C treatment of potatoes in the germination phase, budding	29,7	22,1	22,0	24,6	2,7
8. Emistim C treatment of potatoes in the phase of germination, budding, flowering	27,3	27,6	23,0	26,0	4,1
9. Emistim C treatment of potatoes in the budding phase	27,2	26,7	23,2	25,7	3,8
10. Emistim C treatment of potatoes in the phase of budding, flowering	27,8	27,3	24,2	26,4	4,6
11. Emistim C treatment of potatoes in the flowering phase	27,0	23,2	21,9	24,0	2,1
Variety Polyana					
1. Control (without growth regulator)	28,5	24,8	23,1	25,5	
2. Treatment with Emistim C tubers	30,3	27,7	26,9	28,3	2,8
3. Emistim C treatment of tubers and potatoes in the germination phase	34,0	27,1	27,4	29,5	4,0
4. Emistim C treatment of tubers and potatoes in the germination phase, budding	32,6	28,0	25,3	28,6	3,2
5. Emistim C treatment of tubers and potatoes in the phase of germination, budding, flowering	34,0	29,3	25,4	29,6	4,1
6. Emistim C treatment of potatoes in the germination phase	34,2	31,3	28,4	31,3	5,8
7. Emistim C treatment of potatoes in the germination phase, budding	33,2	31,2	27,2	30,5	5,1
8. Emistim C treatment of potatoes in the phase of germination, budding, flowering	33,5	30,9	26,1	30,2	4,7
9. Emistim C treatment of potatoes in the budding phase	33,3	31,7	26,8	30,6	5,1
10. Emistim C treatment of potatoes in the phase of budding, flowering	33,7	31,7	27,1	30,8	5,4
11. Emistim C treatment of potatoes in the flowering phase	33,1	29,7	27,7	30,2	4,7
NIR₀₅	2,3	3,0	3,6	3,2	1,3

In 2019, in Dnipyryanka and Polyana varieties, potato treatment with Emistim C in the germination phase (var. 6) led to a significant increase in potato yield, respectively 25,2 and 28,4 t / ha, the increase in yield was 5,5-5,3 tons / ha.

The results of the research are given in table 2, allowing us to conclude that on average for three years of field research the most effective treatment is the growth regulator Emistim C potato plants on potatoes in the germination phase.

The middle-early cultivar Polyana obtained a higher effect from the use of growth regulator than the early-ripening Dnipyryanka.

In Dnipyryanka and Polyana varieties, on average, the highest increments were obtained in variant 6 in three years, where the growth regulator Emistim C treated potatoes in the germination phase, respectively – 5,3 and 5,8 t / ha.

On average for 2017-2019 in the varieties

Dnipyryanka and Polyana, the yield of potato tubers under control was 21,9 and 25,5 t / ha, respectively. When using the growth regulator Emistim C, the yield increased in the varieties Dnipyryanka and Polyana on variants 8 and 6, where the growth regulator was used for double spraying of potatoes in the budding-flowering phase and in the germination phase by 20 and 24 % and 21 and 23 %, respectively.

Thus, it was found that the treatment with the growth regulator Emistim C of potatoes was more effective than seed tubers. The maximum yield of tubers was obtained by treatment with the growth regulator Emistim C of potatoes in the germination phase, respectively – 27,2 t / ha for the variety Dnipyryanka, and 31,1 t / ha for the variety Polyana. The increase in yield was 5,3 and 5,8 t / ha, respectively. The increase in the multiplicity of treatment with the growth regulator did not significantly affect these indicators.

Data on the influence of methods and terms of application of the growth regulator on the marketability of potato tubers are presented in table 3.

The main components of the potato crop are the number of tubers under the bush and the average weight of the tuber.

In 2017, both varieties of potatoes Dniprolyanka and Polyana saw a significant increase in the number of tubers under the bush in option 6, where Emistim C treated potatoes in the germination phase, respectively, 16 and 24 pcs. In 2018, there was a significant increase in the number of tubers under the bush on both varieties.

In 2018, for the Dniprolyanka variety, this figure increased to 6 to 13 units. For Polyana this year, the number of tubers under the bush increased significantly in variants 6, 7, 8, 10, where potatoes were treated with

Emistim C in the germination phase, twice in the germination phase, budding, three times in the germination phase, budding, flowering and when treated with Emistim C in the budding phase, flowering in accordance with 17, 18, 20, 20 pcs.

When using the growth regulator Emistim C in varieties Dniprolyanka and Polyana in 2019 there was a significant increase in the number of tubers under the bush in option 6, where potatoes were treated with Emistim C in the germination phase and were 10 and 15 pieces, respectively.

From the data of table 3 it is seen that on average in 2017-2019, there was a significant increase in the number of tubers under the bush in varieties Dniprolyanka and Polyana in the case of processing potatoes in the germination phase to 13 and 18,5 pcs., respectively, compared to 9,9 and 14,3 pcs. on control.

Table 3
Influence of methods and terms of application of growth regulator Emistim C on the number under the bush, weight and marketability of potato tubers (2017-2019)

Options	The number of tubers under the bush, pcs.				Weight of marketable tubers, g				Marketability, %			
	2017	2018	2019	average	2017	2018	2019	average	2017	2018	2019	average
Variety Dniprolyanka												
1.	13	10	7	9,9	69	71	58	66,1	81	81	81	81,1
2.	13	16	9	12,7	70	76	60	68,7	85	86	86	85,7
3.	15	15	9	12,8	74	76	64	71,3	89	84	84	85,6
4.	15	12	9	12,0	75	79	65	73,2	89	89	86	88,1
5.	15	13	10	12,8	79	84	60	74,3	91	83	83	85,6
6.	16	13	10	13,0	82	85	66	77,6	92	86	90	89,3
7.	16	13	9	12,6	79	79	64	74,1	89	84	87	86,7
8.	16	11	11	12,5	73	79	69	73,7	90	87	86	87,5
9.	15	11	9	11,7	79	86	68	77,6	89	84	90	87,7
10.	16	11	9	12,1	79	83	68	76,7	91	84	86	87,0
11.	14	11	9	11,5	72	76	66	71,5	88	83	88	86,2
Variety Polyana												
1.	18	14	11	14,3	63	77	56	65,3	80	76	74	76,8
2.	20	15	12	15,7	64	84	69	72,4	80	82	78	80,1
3.	20	16	11	15,8	66	93	66	74,9	82	86	86	84,6
4.	22	14	11	15,8	66	93	76	78,3	82	86	80	82,6
5.	22	17	13	17,4	72	94	60	75,2	84	88	86	86,1
6.	24	17	15	18,5	91	102	70	87,6	89	86	86	87,1
7.	22	18	14	18,0	79	87	65	77,1	87	80	83	83,5
8.	22	20	12	18,0	78	111	72	87,0	85	86	89	86,8
9.	21	16	11	15,8	75	123	63	86,8	87	86	81	84,5
10.	22	20	11	17,8	77	88	65	76,7	87	78	88	84,3
11.	20	18	13	16,9	72	87	64	74,4	86	82	83	83,5

In 2017, the varieties Dniprolyanka and Polyana received a significant increase in the weight of marketable tubers on option 6, respectively, 82 and 91 g.

In 2018, the Dniprolyanka variety showed only a tendency to increase the weight of marketable tubers. For the Polyana variety, a significant increase in this indicator was observed in variants 6,8 and 9, where potatoes were treated with Emistim C in the germination phase, when processing potatoes in the germination phase, budding, flowering and when processing in the budding phase, respectively, 102, 111, 123 g.

In 2019, there was only a tendency to increase the weight of marketable tubers for the variety Dniprolyanka on option 6 to 66 g, for the variety Polyana there is a significant increase in this indicator on option 8, where treatment with Emistim C was carried out in the phase of germination, budding, flowering - up to 72 g.

In Dniprolyanka and Polyana varieties, on average in 2017-2019, the average weight of marketable tubers was higher when treated with the growth regulator Emistim C in the germination phase (var. 6) and was – 77,6 and 87,6 g, respectively, which is 17,4 and 34,1 g

more than in the control.

In 2017, on the Dnipyryanka variety, the marketability of tubers on option 6 significantly increased by 11% compared to the control, and amounted to 92%. For the Polyana variety in 2017, a similar increase in the marketability of tubers was observed in option 6 to 89%.

In 2018, the control for the variety Dnipyryanka marketability was 81%, significantly increased in option 8, where treatment with Emistim C was carried out three times in the phase of germination, budding, flowering - 87%. In 2018, for the Polyana variety, a significant increase in the marketability of tubers occurred in option 5, where Emistim C treated tubers, potatoes on the seedlings and in the budding phase, flowering - 88%.

In 2019, for the Dnipyryanka variety, the marketability of tubers under control was 81%, in variants 6 and 9, where Emistim C treated potatoes in the germination phase and in the budding phase increased to 90%. For the Polyana variety in 2019, a significant increase in this indicator occurred in all variants, where the treatment with Emistim C was carried out on potatoes. The highest marketability of tubers was in option 8, where potatoes were treated with Emistim C three times in the phase of germination, budding, flowering - 89% (Table 3).

In Dnipyryanka and Polyana varieties, the weight of marketable tubers increased by 17 and 34% on average during the years of research in the case of potato processing in the germination phase, respectively, against 66,1 and 65,3 g in the control; the average weight of marketable tubers at 11,5 and 22,3 g (at 66,1 and 65,3 g in the control); marketability - by 10 and 13%, against 81,1 and 76,8% in control.

In 2017, there was a slightly lower content of dry

matter and starch over the years of research in both varieties of potatoes, which is associated with excessive moisture during the growing season of potatoes (Table 4). For the variety Dnipyryanka on control the dry matter was 19,4%, significantly increased on option 6, where treatment with Emistim C was carried out in the germination phase up to 21,1%, starch content up to 15,0% vs. 13,8% under control, starch yield up to 46 c / ha, against 34.6 c / ha in the control.

In 2017, for the variety Polyana there was a significant increase in dry matter content in options 6 and 10, where Emistim C potatoes were treated in the germination phase, and twice in the budding phase, flowering up to 17,7% with 15,8% in control, starch in appropriate options up to 11,9% vs. 10,2% in the control. The highest starch yield from 1 ha was observed in variant 6, where potatoes were treated in the germination phase and amounted to 40,7 c / ha against 29,1 c / ha in the control.

The Dnipyryanka variety is characterized by higher indicators of dry matter and starch than Polyana.

In 2018, for the Dnipyryanka variety, the dry matter content of the control was 21,3%, and in variant 6, where Emistim C sprayed potatoes in the germination phase, it increased significantly to 24,3%. Since there is a direct correlation between the dry matter and starch content in potato tubers, the starch content increased to 17,8% in this variant. The yield of starch increased from 31,4 c / ha to 44,9 c / ha in option 6 and to 45,6 c / ha in option 10, where the potatoes were treated in the budding and flowering phases. For the Polyana variety in 2019, as in the previous year, there was a tendency to reduce the quality of potatoes while increasing the frequency of cultivation by the growth regulator Emistim C.

Table 4

Influence of methods and terms of application of growth regulator Emistim C on the quality of potato tubers (2017-2019)

Options	Content on raw weight											
	dry matter, %				starch, %				starch yield, c / ha			
	2017	2018	2019	average	2017	2018	2019	average	2017	2018	2019	average
Variety Dnipro												
1.	22,7	21,3	19,4	21,1	16,4	15,1	13,8	15,1	32,3	31,4	34,6	32,8
2.	22,3	22,7	19,8	21,6	16,0	16,4	14,4	15,6	37,8	36,7	39,7	38,1
3.	22,3	23,2	20,4	22,0	16,0	16,8	14,0	15,6	37,9	36,0	43,2	39,0
4.	22,5	23,5	20,0	22,0	16,2	17,1	14,0	15,8	35,5	40,5	42,5	39,5
5.	21,9	23,4	20,1	21,8	15,7	17,0	14,6	15,8	35,2	37,2	46,0	39,5
6.	22,3	24,3	21,1	22,6	16,0	17,8	15,0	16,3	40,3	44,9	46,6	43,9
7.	23,2	22,8	20,7	22,2	16,8	16,5	14,5	15,9	37,0	36,5	43,1	38,9
8.	21,7	22,9	21,0	21,9	15,5	16,6	14,1	15,4	35,7	45,8	38,5	40,0
9.	23,9	22,8	20,6	22,4	17,5	16,4	14,7	16,2	40,6	43,8	40,0	41,5
10.	23,1	23,1	20,2	22,1	16,7	16,7	14,9	16,1	40,4	45,6	41,3	42,4
11.	22,3	23,7	20,8	22,3	16,0	17,3	14,0	15,8	35	40,1	37,6	37,6
Variety Polyana												
1.	20,1	20,0	15,8	18,6	14,0	14,0	10,2	12,7	32,3	49,7	29,1	37,0
2.	20,1	19,9	16,4	18,8	14,0	13,9	10,8	12,9	37,7	55,6	32,6	42,0
3.	18,3	19,4	17,4	18,4	12,4	13,4	11,6	12,5	34	49,5	39,4	41,0
4.	19,5	19,2	16,3	18,3	13,5	13,2	10,6	12,4	34,2	54,6	34,6	41,1
5.	19,3	20,4	16,8	18,8	13,3	14,3	11,1	12,9	33,8	56,5	37,6	42,6
6.	18,9	18,5	17,7	18,4	13,0	12,6	11,9	12,5	36,9	59,3	40,7	45,6
7.	17,4	19,8	17,5	18,2	11,6	13,7	11,7	12,3	31,6	54,3	38,8	41,6
8.	20,4	19,6	16,9	19,0	14,3	13,6	11,2	13,0	37,3	63	37,4	45,9
9.	18,3	19,6	17,6	18,5	12,4	13,6	11,8	12,6	33,2	57,9	39,3	43,5
10.	19,3	18,8	17,7	18,6	13,3	12,9	11,9	12,7	36,0	61,1	39,9	45,7
11.	18,7	18,2	16,2	17,7	12,8	12,3	10,6	11,9	35,5	55,6	34,9	42,0

In 2019, the studied methods did not significantly affect the dry matter and starch content in tubers of Dnipro variety, and for Polyana variety there was a tendency to reduce the dry matter and starch content with increasing number of treatments by the growth regulator.

On average for 2017-2019 for the variety Dnipro the maximum dry matter content was established during the processing of potatoes by Emistim C in the phase of full germination and was 22,6% against 21,1% in the control, and starch – 16,3%, against 15,1% on control.

For Polyana variety, on average over the years of research, the maximum content of dry matter and starch was noted in option 8, where potatoes were treated three times in the phase of germination-budding-flowering and was 12,5 and 13,0%, respectively.

The yield of starch per hectare increased significantly for all variants of the experiment, but for the variety Dnipro had a higher rate for the variant where potatoes were treated with Emistim C in the germination phase, and was – 43,9 c / ha, which is 1,3 times more than control, for the variety Polyana – 45,6 c / ha, which is 1,2 times more than in the control.

Conclusions

1. On average, in 2017-2019, the treatment of potatoes with the growth regulator Emistim C was more effective than immediately before planting tubers. In the varieties Dnipro and Polyana, the highest yield

was obtained in variant 6, where the growth regulator Emistim C potatoes were cultivated in the germination phase, respectively – 27,2 and 31,3 t / ha.

2. It is established that on average for 2017-2019, there was a significant increase in the number of tubers under the bush in varieties Dnipro and Polyana, when processing potatoes in the germination phase, respectively, 13 and 18,5 pcs., Against 9,9 and 14, 3 pcs. on control; the weight of marketable tubers increased to 77, and 87,6 g, respectively, against 66,1 and 65,3 g in the control; marketability respectively 89,3 and 87,1%, against 81,1 and 76,8% under control.

3. Methods and terms of processing by the growth regulator had a greater effect on the content of dry matter and starch in the tubers of potatoes of the Dnipro variety. On the Polyana variety, the methods did not significantly affect these indicators. The Dnipro variety was characterized by higher indicators of dry matter and starch than Polyana. The greatest effect was obtained for the Dnipro variety in variant 6, where potatoes were treated with the growth regulator Emistim C in the phase of full germination, the dry matter and starch content was 22,6 and 16,3%, respectively. For the Polyana variety, there is a tendency to increase these indicators in option 8 with three-time treatment of potatoes with Emistim C in the phase of germination, budding, flowering, respectively, dry matter and starch – 19,0 and 13,0%.

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