REPORT
on the results of the pilot testing of the innovative solution
"RostoVIT Technology: Inexhaustible Resource for Import Substitution"
on the Site of Moscow Timiryazev Agricultural Academy Russian State Agrarian University
Federal State Educational Institution of Higher Education

(participant - innovator Agro-Recycling Group Ltd.)

November 17, 2023

1. General information.

1.1. Description of the innovative solution:

RostoVIT is an effective natural biostimulant for plant growing and aquaculture, obtained using its own patented technology from brewing industry waste of hazard class V (spent brewing yeast). RostoVIT technology allows turning waste into a valuable product. For the first time in the world, we managed to solve the problem of destroying the yeast cell biologically, which made it possible to obtain a CERTIFICATE allowing the use of the preparation in organic farming. The developed technology is a fundamentally modernized biogas technology (processing of organic waste by methanobacteria).

Innovativeness and distinctive characteristics of the innovative solution:

Innovativeness (novelty) is confirmed by Russian Federation patents No. ******* and No. *******.

Distinctive characteristics of RostoVIT technology: alternative solutions for brewing waste (spent yeast):

a) drying;
b) removal to SMW landfills together with brewer's grains;
c) removal to filtration fields.

Apart from energy-intensive drying, other options lead to environmental pollution. This technology makes it possible to obtain a useful product with a high added value from waste, and the technology is energy-generating (capable of providing the technological process with its own energy).

1.2. Timing of the stage of the innovative solution pilot testing:

The pilot testing of the innovative solution "RostoVIT Technology - an inexhaustible resource for import substitution" was carried out from March 17, 2023 to October 31, 2023 within the framework of Agreement No. 377 dated March 10, 2023, concluded between Moscow Innovation Agency State Budgetary Institution, Moscow Timiryazev Agricultural Academy - Russian State Agrarian University Federal State Budgetary Educational Institution of Higher Education and Agro-recycling Group Ltd.

1.3. Place of the innovative solution pilot testing:

The pilot testing was carried out at the address: 49 Timiryazevskaya St., Moscow (Moscow Timiryazev Agricultural Academy - Russian State Agrarian University Federal State Budgetary Educational Institution of Higher Education).

1.4. Scope of attracted resources for the innovative solution pilot testing:

In the process of the innovative solution pilot testing the Site and the Participant attracted resources in the required amount.

Resources provided on the part of the Site:

- Territory and specialists for the pilot testing: V.I. Edelshtein Horticulture and Vegetable Growing Educational, Scientific and Production Centre (open and protected ground);
- Task Leader for vegetable growing: V.I. Terekhova, Associate Professor, Candidate of Agricultural Sciences;
  Executors: M.E. Dyikanova, Associate Professor, Candidate of Agricultural Sciences, M.V. Vorobiev, Associate Professor, Candidate of Agricultural Sciences, M.A. Bocharova, Assistant, students;
- Task Leader for medicinal plants: E.L. Malankina, Professor, Doctor of Agricultural Sciences, executors: E.Yu. Zuikova, P.V. Pochuev, students. S.I. Rostovtsev Botanical Garden (protected ground);
- Task Leader: E.A. Mitkovskaya, Head of S.I. Rostovtsev Botanical Garden section;
  Executors: E.A. Kozlova, Associate Professor, Candidate of Agricultural Sciences; E.E. Orlova, Associate Professor, Candidate of Agricultural Sciences; I.N. Zubik, Associate Professor, Candidate of Agricultural Sciences; A.N. Sakhonenko, Associate Professor, Candidate of Biological Sciences; Yu.I. Kondratenko, postgraduate student, Assistant of the Chair of Ornamental Horticulture and Lawn Science, students.
- Task Leader for aquaculture: G.I. Pronina, Doctor of Biological Sciences, Professor of the Chair of Aquaculture and Beekeeping;
  Executors: I.A. Korochensky, postgraduate student; students.

Resources provided on the part of the Participant:

- Samples of the biopreparation in the quantity necessary for the testing: 5 * 0.5 L;

1.5. Methods applied in the innovative solution pilot testing.

RostoVIT innovative growth stimulant was tested on different cultures:

1. Aquaculture (cultivation of phytoplankton in an ecosystem (with zooplankton));
2. Decorative flower cultures (foliage indoor plants (Ficus benjamina), flowering indoor plants (Spathiphyllum floribundum), annual decorative flower cultures (Zinnia, Petunia, Antirrhinum);
3. Vegetable growing (early potato and medium- late- maturing white cabbage in the open ground, pepper in protected ground);
4. Medicinal plants (Mentha, Thymus vulgaris);
5. Decorative conifers (Thuja occidentalis).

List of the areas of research conducted within the frames of the pilot testing:

1. Evaluation of the effectiveness of using RostoVIT preparation as a stimulator of plant growth and development exemplified by Ficus benjamina. Triple treatment with a 10-day interval. Triple replication.

Every replication involves 10 plants. Biological material: rooted cuttings of Ficus benjamina planted in identical P9 pots. The experiment involves 120 plants.

The rate of consumption of the finished preparation when spraying habitus is 5 ml of solution/plant.

Experimental design:

A) Treatment with RostoVIT by spraying 2 ml/1 L;
B) Treatment with Zircon by spraying 1 ml/10 L;
C) Treatment with Epin by spraying 1 ml/5 L;
D) Control: no treatment.

Accounting indicators:

Green matter gain: plant height, number of lateral shoots and their length, length and width of 10 laminas/plant; assessment of the degree of vulnerability to diseases and pests in the accounting period; visual assessment of the quality of decorative products, points.

Monitoring surveys 1 time/10 days during 3 months.

2. Evaluation of the synergetic effect of using RostoVIT together with organic fertilizers exemplified by Spathiphyllum floribundum. Triple application, 14-day interval. Triple replication.

Every replication involves 10 plants. Biological material: Spathiphyllum floribundum plants, 1 plant (rosette)/pot, the pot volume is 1 L. The experiment involves 120 plants.
The rate of consumption of the finished preparation in irrigation: 100 ml/plant
Experimental design:

A) Application of RostoVIT preparation through irrigation 2 ml/1 L;
B) Application of Potassium Humate agrochemical through irrigation (application dose as recommended by the manufacturer);
C) Application of 2 ml/1 L RostoVIT preparation + Potassium Humate agrochemical (1/2 of the recommended application dose);
D) Control: no treatment.

Accounting indicators:

Above-ground green matter gain: plant height, length and width of 3 laminas/plant, number of leaves/rosette, number of daughter rosettes, starting time and duration of flowering, assessment of the degree of vulnerability to diseases and pests in the accounting period; visual assessment of the quality of the decorative products, points.
Monitoring surveys 1 time/14 days during 3 months.

3. Evaluation of the effect of RostoVIT preparation on growth, development and flowering of annual decorative flowering plants exemplified by Zinnia elegans and Petunia hybridum when the preparation was applied by irrigation (soil dressing) and spraying (top dressing) methods at different concentrations. Triple application, 10-day interval. Triple replication.

Every replication involves 10 plants. Biological material: seedlings of Zinnia elegans and Petunia hybridum planted in P9 pots after prickling-out from seed containers. The experiment involves 150 plants of each species.
The rate of consumption of the finished preparation when spraying habitus is 5 ml of solution/plant and 50 ml of solution/plant in irrigation.
Experimental design:

A) Application of RostoVIT preparation through irrigation: 2 ml/1 L;
B) Application of RostoVIT preparation through spraying: 2 ml/1 L;
C) Application of RostoVIT preparation through irrigation: 1 ml/1 L;
D) Application of RostoVIT preparation through spraying: 1 ml/1 L;
E) Control: no treatment.

Accounting indicators:

Above-ground green matter gain: plant height, length and width of 5 laminas/plant, number of side shoots, starting time of flowering, flower diameter, duration of flowering, assessment of the degree of vulnerability to diseases and pests in the accounting period; visual assessment of the quality of the decorative products, points.
Monitoring surveys: 1 time/10 days during 3 months.

4. Evaluation of the effect of RostoVIT preparation on improvement of the soil microbiological composition for the prevention of fungal and bacterial infections exemplified by Antirrhinum majus. Triple application, 10-day interval. Triple replication.

Every replication involves 10 seedlings. Biological material: seedlings of Antirrhinum majus in seedboxes. The experiment involves 90 plants.
10 ml of the solution/plant during irrigation.

Experimental design:

A) Application of RostoVIT preparation through irrigation 1 ml/1 L;
B) Application of Baikal EM-1 preparation through irrigation 1 ml/1 L;
C) Control: no treatment.

Accounting indicators:

Quantity of seedling dyewood, above-ground green matter gain: plant height, quantity of side shoots, starting time of flowering (budding), assessment of the degree of vulnerability to diseases and pests in the accounting period; visual assessment of the quality of the decorative products, points.

Monitoring surveys: 1 time/10 days during 3 months.

5. Evaluation of the effect of RostoVIT preparation on seedlings of Thuja occidentalis. Triple application, 10-day interval. Triple replication.

Biological material: seedlings of Thuja occidentalis obtained by seeding into identical P9 pots. Every replication involves 1 pot with 10 seedlings. The experiment involves 60 plants. The rate of consumption of the working solution is 5 ml/plant or 50 ml/pot.

Experimental design:

A) Application of RostoVIT preparation through spraying of the seedlings 2 ml/1 L;
B) Control: no treatment.

Accounting indicators:

Quantity of seedling dyewood, above-ground green matter gain: plant height, quantity of nodes of the leading shoot, starting time of branching, quantity of side shoots, assessment of the degree of vulnerability to diseases and pests in the accounting period.

Monitoring surveys 1 time/10 days during 3 months.

6. Evaluation of the effect of RostoVIT preparation on the quality of vegetable produce exemplified by early potatoes and medium- late- maturing white cabbage in the open ground, pepper in protected ground.

Early potatoes:

2 varieties, (planting: 1st decade of May – harvesting on 30 July)

Experimental design:

A) Control (complex fertilizer);
B) RostoVIT (soaking of tubers, spraying (top dressing) of sprouts, budding phase);
C) Zircon or Epin (soaking of tubers, spraying (top dressing) of sprouts, budding phase);
D) Lebazol (organic fertilizer) (soaking of tubers, spraying (top dressing) of sprouts, budding phase)

Medium- late- maturing white cabbage:

1 variety of medium-maturing cabbage + 1 variety of late-maturing (April – September)

Experimental design:

A) Control;
B) RostoVIT (spraying (top dressing) of sprouts, phase of 5-6 real leaves, head-setting phase);
C) Zircon or Epin (spraying (top dressing) of sprouts, phase of 5-6 real leaves, head-setting phase);
D) Lebazol (organic fertilizer) (spraying (top dressing) of sprouts, head-setting phase)

Pepper in spring plastic-covered houses:

1 pepper hybrid (March - September)

Experimental design:

A) Control;
B) RostoVIT (spraying (top dressing) planting period: 1-2 real leaves, phase of 5-6 real leaves, start of flowering);
C) RostoVIT (by irrigation (soil dressing) planting period: 1-2 real leaves, phase of 5-6 real leaves, start of flowering);
D) Zircon or Epin (spraying (top dressing) planting period: 1-2 real leaves, phase of 5-6 real leaves, start of flowering);
E) Zircon or Epin (by irrigation (soil dressing) planting period: 1-2 real leaves, phase of 5-6 real leaves, start of flowering).

Accounting indicators:
Phenological observations (determination of plant development phases) of potatoes:
Date of planting, emergence of sprouts (beginning of sprouting, mass sprouting), budding, flowering, harvesting, duration of the growing season.

Phenological observations (determination of plant development phases) of pepper:
Date of sowing, emergence of sprouts (beginning of sprouting, mass sprouting), flowering, fruit formation, onset of technical ripeness, 1st and last harvest, harvesting, duration of the growing season.

Phenological observations (determination of plant development phases) of cabbage:
Date of sowing, emergence of sprouts (beginning of sprouting, mass sprouting), leaf rosette formation, beginning of head formation, onset of technical ripeness, harvesting, duration of the growing season.
Yield accounting by weight method; average weight of cabbage heads, average weight of potato tubers, average weight of pepper fruits.

7. Evaluation of the effect of RostoVIT preparation on improving the quality and shortening the period of growing of seedlings of medicinal crops exemplified by Mentha and Thymus vulgaris.

Experimental design:
1 – Control: treatment with water simultaneously with treatment of test variants;
2 – RostoVIT 2 and 4 pairs of real leaves, foliage treatment;
3 – RostoVIT 3 times weekly starting from 2 pairs of real leaves, foliage treatment.

Monitoring indicators: dynamics of above-ground mass growth (weekly measurements), plant height, quantity of side shoots, quantity of stolons of Mentha, volume of the root system (final measurements after 45 days). Based on the final results, evaluation of the possibility of shorter duration of seedling growing.

8. Evaluation of the effect of RostoVIT on phytoplankton and zooplankton increase.
Experimental design:
1. With addition of RostoVIT preparation at the rate of 1 ml/1 L.
2. With addition of brewer's yeast at 10 g/L.
In the experiment: a 5-liter aquarium, the duration of the experiment is 2 months.

Accounting indicators:
Quantity of cladocerans (moinas or daphnias) per unit of volume (L), zooplankton biomass increase (the standard unit according to the mass tables based on the experimental data of the zooplankton quantity before and after the experiment).

Dilution of the preparation: from 1:200 and more.

Evaluation of the efficiency of RostoVIT preparation was taken into account according to the methods developed by Moscow Timiryazev Agricultural Academy - Russian State Agrarian University.

1.6. List of the persons participating in the evaluation of the results of the innovative solution pilot testing.

V.I. Edelshtein Horticulture and Vegetable Growing Educational, Scientific and Production Centre (open and protected ground):

Task leader for vegetable growing: V.I. Terekhova, Associate Professor, Candidate of Agricultural Sciences; executors: M.E. Dyikanova, Associate Professor, Candidate of Agricultural Sciences, M.V. Vorobiev, Associate Professor, Candidate of Agricultural Sciences, M.A. Bocharova, Assistant, students;

Task Leader for medicinal plants: E.L. Malankina, Professor, Doctor of Agricultural Sciences, executors: E.Yu. Zuikova, P.V. Pochuev, students.

S.I. Rostovtsev Botanical Garden (protected ground).

Task Leader: E.A. Mitkovskaya, Head of S.I. Rostovtsev Botanical Garden section, executors; E.A. Kozlova, Associate Professor, Candidate of Agricultural Sciences; E.E. Orlova, Associate Professor, Candidate of Agricultural Sciences; I.N. Zubik, Associate Professor, Candidate of Agricultural Sciences; A.N. Sakhonenko, Associate Professor, Candidate of Biological Sciences; Yu.I. Kondratenko, postgraduate student, Assistant of the Chair of Ornamental Horticulture and Lawn Science, students.

Task Leader for aquaculture: G.I. Pronina, Doctor of Biological Sciences, Professor of the Chair of Aquaculture and Beekeeping, executors: I.A. Korochensky, postgraduate student; students.

2. Results of the innovative solution pilot testing, assessment of achievement of the criteria of effectiveness of the innovative solution pilot testing according to the Methodology.

Based on the results of the pilot testing, the criteria of the innovative solution effectiveness were verified and the following results were obtained:

2.1. Effectiveness of using RostoVIT preparation as a plant growth and development stimulant.

For information: This criterion is recognized as successfully achieved if at least one of the accounting indicators is higher than the control or close to Epin and Zircon growth regulators taken as the standard.

When studying the effect of growth regulators on the change of the plant height, it was noted that compared to the control, all tested preparations influenced the height of Ficus benjamina L plants. The tallest plants were in the variants with treatments with Zircon and RostoVIT preparations (21.5 cm and 21.1 cm, respectively). The plant height in the variant with Epin treatment was comparable to the control variant without treatment (Table 1).

Thus, the effectiveness of using RostoVIT preparation as a stimulant of growth and development of Ficus benjamina L. plants is recognized as successfully achieved, because the Plant Height indicator in the RostoVIT variant is higher than the control by 4.4 cm, which is 26%, and is close to Zircon growth regulator taken as the standard. The difference was 0.4 cm and 1.8%.

Study of Ficus benjamina L. plants height, cm

Variant	11 July	01 Sep	11 Sep	21 Sep	01 Oct	11 Oct	21 Oct	31 Oct	11Nov

Control	8.0	15.4	15.6	15.7	16.4	16.4	16.5	16.6	16.7
RostoVIT	9.0	19.4	20.1	20.3	20.4	20.7	20.9	21.0	21.1
Zircon	8.5	20.6	21.0	21.1	21.2	21.3	21.3	21.4	21.5
Epin	8.7	16.4	16.4	16.8	16.9	17.0	17.1	17.2	17.2

Studying the dynamics of the height growth of Ficus benjamina L plants, one observed a stable growth of the plant height, which evidenced the favorable conditions of the plant cultivation. The observations of the plants showed that under the influence of RostoVIT preparation the quantity of side shoots formed significantly more than in other variants (4.4 pcs). On average, under the influence of RostoVIT, 1.4 more shoots were formed on one plant compared to the control, 1.1 more than in the variant with Zircon and 1.6 more than in the variant with Epin.

Effect of growth regulators on growth and development of Ficus benjamina L. plants

No.	Indicator	Control	RostoVIT	Zircon	Epin
1.	Plant height	16.7	21.1	21.5	17.2
2.	Quantity of side shoots	3.0	4.4	3.3	2.8
3.	Length of side shoots	3.5	3.5	3.5	2.1
4.	Length of laminas	5.5	5.9	5.8	5.6
5.	Width of laminas	2.4	2.5	2.5	2.8

In terms of the length of the side shoots, the tested preparation was at the same level with the control and standard Zircon preparation. Under the influence of Epin preparation the length of the shoots was the lowest.

Under the influence of RostoVIT the length of the laminas was bigger than under the influence of all tested preparations and the control.

In terms of the width, the laminas differed little from the control ones; however, they were narrower than the laminas formed in the Epin variant.

During the accounting period of the experiments, the plants were not affected by diseases and pests.

The visual assessment of the quality of the decorative products (in points) was not carried out separately, as the decorativeness index of habitus in foliage plants is directly related to the quantity of side shoots and lamina parameters, and these biometric records are given in the tables

above. The lamina coloration intensity in all variants of the experiment had no visible differences.

Conclusion:
Based on the conducted research, we believe that the effectiveness of using RostoVIT preparation as a plant growth and development stimulant is proved, the criterion is considered achieved.

2.2. Synergetic effect from using RostoVIT preparation together with organic fertilizers.
For information: This criterion is recognized as successfully achieved if the variant of simultaneous use of RostoVIT preparation and Potassium Humate is not lower than the experiment variant with the use of Potassium Humate agrochemical in at least one of the accounting indicators.

The following results were obtained during the tests of RostoVIT preparation together with organic fertilizers.

Dynamics of growth of Spathiphyllum floribundum

Plant height	11.05. 2023	25.05. 2023	08.06. 2023	22.06. 2023	06.07. 2023	20.07. 2023	03.08. 2023
Control	14	15	15	16	16	18	18
RostoVIT	13	14	15	15	16	19	19
Humate	14	14	14	14	16	17	17
RostoVIT and Humate	14	14	16	16	17	18	18

The analysis of the research results shows that practically on all dates of the measurements the positive effect of faster plant growth in case of joint application of RostoVIT and Humate was noted. Detailed analysis of the plant growth reveals that the height of plants on control and joint application of RostoVIT and Humate increased by 20% (by 4 cm), by 21% (by 3 cm) upon Humate application, and by 46% (by 6 cm) upon RostoVIT application. That is, the effectiveness of RostoVIT application equal to 26% is confirmed.

Dynamics of change of the leaves quantity of Spathiphyllum floribundum

Leaves quantity	11.05. 2023	25.05. 2023	08.06.2 023	22.06. 2023	06.07. 2023	20.07. 2023	03.08. 2023
Control	3	3	3	4	4	5	5
RostoVIT	3	3	3	4	4	5	5
Humate	3	3	3	4	4	5	5

RostoVIT and Humate	3	3	3	4	4	5	5

Spathiphyllum does not refer to fast-growing plants; therefore, the research results show no effect of leaves increase.

Dynamics of change of the petiole length of Spathiphyllum floribundum.

Petiole length	11.05. 2023	25.05. 2023	08.06. 2023	22.06. 2023	06.07. 2023	20.07. 2023	03.08. 2023
Control	6.71	6.88	7.43	7.68	8.06	8.07	8.09
RostoVIT	6.83	7.13	7.55	7.65	7.70	8.13	8.24
Humate	6.68	6.82	7.25	7.29	7.33	7.50	7.81
RostoVIT and Humate	6.89	7.08	7.52	7.84	8.20	9.28	9.42

The petiole length is positively influenced by the joint application of RostoVIT and Humate compared to the control, the petiole length gain is 16% (20% increase on the control by 1.38 cm, 36% gain in case of the joint action of RostoVIT and Humate - by 2.53 cm. Separately, RostoVIT and Humate do not have a positive effect on the gain of the petiole length of the leaf of Spathiphyllum flowering.

Dynamics of change of the leaf length of Spathiphyllum floribundum

Leaf length	11.05. 2023	25.05. 2023	08.06. 2023	22.06. 2023	06.07. 2023	20.07. 2023	03.08. 2023
Control	9.43	10.73	10.82	10.98	11.92	12.52	12.56
RostoVIT	10.87	11.05	11.65	12.05	12.32	13.10	13.42
Humate	8.11	8.68	10.3	10.84	11.17	12.48	12.93
RostoVIT and Humate	10.27	10.83	10.98	11.09	11.35	13.00	13.67

The leaf length increase is influenced by Humate, under its action the leaf length increases by 4.82 cm, which is 59% gain. The leaf length growth in the control variant was 3.13 cm (33%), when treated with RostoVIT, the leaf length increased by 2.55 cm (23%) and by 3.4 cm (33%) under the combined action of RostoVIT and Humate. The maximum effect was obtained as a result of the action of Humate, in which the leaf length gain was 4.82 cm or 59%. Thus, the

effectiveness of Humate is 26% compared to the control, and RostoVIT has no effect on the leaf length of Spathiphyllum.

Dynamics of change of the leaf width of Spathiphyllum floribundum

Leaf width	11.05. 2023	25.05. 2023	08.06. 2023	22.06. 2023	06.07. 2023	20.07. 2023	03.08. 2023
Control	3.32	3.57	3.82	3.87	4.42	4.47	4.48
RostoVIT	3.78	3.9	4.1	4.33	4.60	4.63	4.81
Humate	3.21	3.5	3.87	4.13	4.40	4.90	5.21
RostoVIT and Humate	3.65	3.98	4.6	4.67	4.72	4.97	5.23

The leaf width increase is positively influenced by the combined action of RostoVIT and Humate preparations; the leaf width increase was 1.58 cm or 43%. In control plants the leaf width increased by 1.16 cm or 34%, in plants treated with RostoVIT the increase was the least - by 1.03 cm or 27%. As in the case of the leaf length, the maximum effect of Humate application was 62% (1.58 cm gain). Thus, the effectiveness of Humate is 28%.

Dynamics of change of the daughter rosettes of Spathiphyllum floribundum.

Quantity of daughter rosettes	11.05. 2023	25.05. 2023	08.06. 2023	22.06. 2023	06.07. 2023	20.07. 2023	03.08. 2023
Control	0	0	0	1	1	1	1
RostoVIT	0	0	0	1	1	2	2
Humate	0	0	0	1	2	2	2
RostoVIT and Humate	0	0	0	1	1	1	2

Daughter rosettes started growing only a month and a half after planting and treatment of Spathiphyllum plants, the Humate action dominated at the initial stages, then the effect of both Humate and RostoVIT revealed itself, by the end of the research the combined effect of Humate and RostoVIT showed itself providing 200% effectiveness.

Over the period of the research none of the plants blossomed.

Conclusion:
The set criterion was successfully achieved on the culture of Spathiphyllum floribundum in terms of the “plant height” characteristic: the effectiveness of RostoVIT application is 26%; in terms of the “petiole length” characteristic the joint application of RostoVIT and Humate has a

positive effect, the petiole length gain is 16%; in terms of "the quantity of daughter rosettes" the results appeared a month and a half after planting and treatment of Spathiphyllum plants, the effect of RostoVIT and the joint action of Humate and RostoVIT provided 200% effectiveness.

2.3. Comparative assessment of the effectiveness of the soil and top dressing with RostoVIT preparation.

For information: This criterion is recognized as successfully achieved if the effect of the preparation on at least one value feature is confirmed and the indicator is higher than the control by 5% or more.

To evaluate the effectiveness of RostoVIT as a soil and top dressing, two plants were used: zinnia and petunia.

Study of RostoVIT preparation on Zinnia elegans.

Effect of RostoVIT preparation on the gain of the leading shoot of Zinnia elegans

Experiment variant	Repeatability-mean gain of the leading shoot length, cm										Mean	delta, %
Irrigation 1 ml/1 L	111.4	111.0	109.3	111.8	112.7	112.1	113.9	113.3	111.3	110.0	111.7	6.9
Irrigation 2 ml/1 L	115.4	119.7	114.4	113.2	114.8	112.9	115.2	117.4	117.9	119.9	116.1	10.4
Spraying 1 ml/1 L	131.3	128.2	128.2	127.9	128.6	127.8	126.9	128.1	128.9	130.1	128.6	19.2
Spraying 2 ml/1 L	135.8	134.4	134.9	132.6	135.0	136.1	134.5	135.7	138.3	135.2	135.2	23.1
Control	104.4	102.8	105.4	100.9	104.2	104.7	105.6	103.6	103.6	103.7	103.9	-

According to the accounting results of the gain of the leading shoot of Zinnia elegans, it can be concluded that RostoVIT preparation had a greater effect on the plant gain (height) when treated by spraying, the best effect was achieved when treated with 2 ml/1 L, when irrigating with RostoVIT preparation the best effect was achieved by applying 2 ml/1 L under the root.

This indicator is recognized as achieved, since all the data obtained for the experiment variants exceed the control by more than 5 %.

Effect of RostoVIT preparation on the quantity of side shoots of Zinnia elegans

Experiment variant	Repeatability-mean quantity of the side shoots, pcs										Mean
Irrigation 1 ml/1 L	4.7	4.7	4.7	4.7	5.3	5.0	4.7	6.0	4.7	5.0	4.9
Irrigation 2 ml/1 L	4.0	4.0	5.0	5.0	5.0	6.0	5.0	4.3	4.7	5.3	4.8

Spraying 1 ml/1 L	5.0	4.7	5.0	4.7	4.7	5.7	6.0	5.0	4.3	4.3	4.9
Spraying 2 ml/1 L	4.3	4.7	5.0	5.0	5.3	4.7	5.0	4.7	5.0	4.3	4.8
Control	6,0	4,7	5,0	4,7	5,0	4,7	4,7	4,7	5,0	5,3	5,0

Based on the monitoring results the effect of RostoVIT preparation on the formation of side shoots in Zinnia elegans, it can be noted that the preparation under study did not have a stimulating effect on the formation of a greater number of side shoots on the plant, because none of the treatment options showed exceeded control values.

This indicator is recognized as not achieved, because all the data obtained for the variants of the experiment do not exceed the control by 5%.

Effect of RostoVIT preparation on the width of the laminas of Zinnia elegans

Experiment variant	Repeatability-mean lamina width, cm										Mean	delta, %
Irrigation 1 ml/1 L	5.6	5.2	5.5	5.3	5.7	5.5	5.6	5.6	5.8	5.6	5.5	16.7
Irrigation 2 ml/1 L	6.0	6.0	5.7	5.9	6.2	6.1	5.9	6.0	5.9	5.5	5.9	22.1
Spraying 1 ml/1 L	6.4	6.7	6.7	6.4	6.1	6.5	6.6	6.5	6.6	6.6	6.5	29.1
Spraying 2 ml/1 L	6.7	6.7	6.7	7.0	7.0	7.5	6.7	7.0	6.9	6.9	6.9	33.3
Control	4.6	4.6	4.9	4.7	4.5	4.5	4.3	4.7	4.7	4.8	4.6	-

Based on the accounting results, the width of the laminas of Zinnia elegans, we can make the conclusion about the effect of RostoVIT preparation on this accounting indicator, because each of the variants of the experiment exceeded the control indicator by more than 5 %, with the highest result being in the variant of treatment by spraying at a concentration of 2 ml/1L.

This indicator is recognized as achieved, as all the data obtained for the experiment variants exceeded the control by more than 5 %.

Effect of RostoVIT preparation on the length of the laminas of Zinnia elegans

Experiment variant	Repeatability-mean lamina length, cm										Mean	delta, %
Irrigation 1 ml/1 L	13.1	13.1	13.5	12.8	13.2	13.1	13.3	13.2	13.1	13.1	13.1	33.6
Irrigation 2 ml/1 L	11.2	11.4	11.4	10.7	10.7	11.1	10.8	10.5	11.0	10.4	10.9	20.1
Spraying 1 ml/1 L	13.8	13.9	13.9	13.9	13.9	14.3	14.2	13.8	21.7	13.5	14.7	40.6
Spraying 2 ml/1 L	15.3	15.2	15.5	15.3	15.6	15.2	15.8	14.7	14.9	15.7	15.3	43.0
Control	8.7	8.4	8.4	8.6	8.8	8.7	8.9	9.1	8.9	8.8	8.7	-

Based on the accounting results, the length of the laminas of Zinnia elegans, we can make the conclusion about the effect of RostoVIT preparation on this accounting indicator, because each of the variants of the experiment exceeded the control indicator by more than 5 %, with the highest result being in the variant of treatment by spraying at a concentration of 2 ml/1L.

This indicator is recognized as achieved, as all the data obtained for the experiment variants exceeded the control by more than 5 %.

Effect of RostoVIT preparation on the diameter of the flower of Zinnia elegans

Experiment variant	Repeatability-mean diameter of the leading shoot flower, cm										Mean	delta, %
Irrigation 1 ml/1 L	11.7	11.8	11.7	11.9	11.7	11.1	11.8	11.4	11.6	11.8	11.7	13.2
Irrigation 2 ml/1 L	13.4	12.3	11.9	11.9	11.7	11.7	11.8	12.0	12.1	11.8	12.1	16.2
Spraying 1 ml/1 L	11.7	11.8	11.7	12.0	11.7	11.7	11.8	11.4	11.7	11.8	11.7	13.8
Spraying 2 ml/1 L	12.0	12.2	11.7	12.3	11.7	11.7	11.8	12.0	11.8	11.8	11.9	15.0

Control	10.3	10.5	9.8	10.3	10.9	10.1	9.5	9.7	9.9	10.0	10.1	-

Based on the accounting results, the diameter of the flower on the leading shoot of Zinnia elegans, we can make the conclusion about the effect of RostoVIT preparation on this accounting indicator, because each of the variants of the experiment exceeded the control indicator by more than 5 %, with the highest result being in the variant of treatment by irrigation at a concentration of 2 ml/1L.

This indicator is recognized as achieved, as all the data obtained for the experiment variants exceeded the control by more than 5 %.

Effect of RostoVIT preparation on the starting time of flowering of Zinnia elegans, %

Experiment variant	06.06.2023	16.06.2023	26.06.2023
Irrigation 1 ml/1 L	13.33	70.00	16.67
Irrigation 2 ml/1 L	20.0	66.6	13.3
Spraying 1 ml/1 L	3.3	86.7	10.0
Spraying 2 ml/1 L	0.0	83.3	16.7
Control	6.7	50	43.3

The beginning of flowering of Zinnia elegans falls on average on the middle of June, so June was taken for monitoring the control starting dates of flowering. Based on the records, it can be concluded that RostoVIT preparation influences the flowering starting dates when applied through irrigation under the root. The best effect was observed at the concentration of 2 ml/1 L. It can also be noted that treatment with RostoVIT preparation can contribute to a more simultaneous and intensive flowering start compared to the control indicators, while in the control the flowering start time is more extended.

This indicator is recognized as achieved, as the data obtained for variants with irrigation exceed the control by more than 5 %. During mass flowering (mid-June), the data of all variants of the preparation use exceed the control by more than 5%.

It should be noted that after the beginning of flowering Zinnia elegans continued forming generative shoots until the onset of frosts, that is, extended flowering during 3 monitoring months was observed in all variants of the experiment, including the control.

No disease and pest damage to the plants was observed during the accounting period of 3 months. Preventive treatments against diseases and pests were carried out only on seedlings and before the start of the experiments on all plants of the population.

Visual assessment of the decorativeness of the Zinnia elegans plants was carried out according to 3 indicators: flowering intensity, compactness of habitus and coloration intensity of flowers. Each indicator was evaluated on a 5-point scale.

Effect of RostoVIT preparation on decorativeness of Zinnia elegans

Experiment variant	Mean score of decorativeness by indicators:			Decorativeness (overall mean score by 3 indicators)
	Flowering intensity	Habitus compactness	Flower coloration	
Irrigation 1 ml/1 L	4.6	4.7	4.8	4.7
Irrigation 2 ml/1 L	4.8	4.6	4.8	4.8
Spraying 1 ml/1 L	4.5	4.6	4.6	4.6
Spraying 2 ml/1 L	4.7	4.7	4.8	4.7
Control	4.1	4.3	4.3	4.2

Based on the results of the assessment of decorativeness of the Zinnia elegans plants, it can be noted that the greatest influence on the flowering intensity was achieved by the application of RostoVIT preparation through irrigation at a concentration of 2 ml / L, the most compact habitus of the plants was observed after treatment with RostoVIT through irrigation at 1 ml /1 L and spraying at 2 ml /1 L, and the most intense coloration on the zinnia flowers was after treatment with RostoVIT in 3 variants (with irrigation and spraying at 2 ml / L).

This indicator is recognized as achieved, as the mean scores of decorativeness exceed the control by more than 5%.

Conclusion:
The criterion for evaluating the effectiveness of root and top dressing with RostoVIT preparation on Zinnia elegans is recognized as achieved. According to a number of indicators, higher effectiveness of RostoVIT was observed after application through irrigation (flower diameter, flowering start, visual decorativeness of the plants), and according to other indicators (height gain of the leading shoot, lamina width and length) through spraying. Thus, it can be concluded that both methods of RostoVIT application affect value features of the plants and can be used for dressing. According to the results of the experiment, the most effective concentration of the preparation with all treatment methods is 2 ml/1 L.

Study of the effectiveness of RostoVIT preparation on Petunia hybridum.

In all treatment variants the beginning of flowering was noted in the period of 10.05-20.05.2023. The flowering duration was noted until 04.09.2023 in the variant of spraying 1 ml/L experiment. In other variants of the experiment the flowering duration was less long, till 07.08.2023.

The research results analysis showed that in all variants of the experiment a positive effect of the preparation on growth was observed. The most noticeable effect was in the spraying 1 ml/L and spraying 2 ml/L variants of the experiment: 30.4 and 31.8 cm, respectively (9%). However, in the irrigation 1 ml/L and irrigation 2 ml/L variants of the experiment, the growth was less than the control values.

Dates of measurements	Plant height, cm				
	Variants of the experiment				
	Control	Irrigation 1 ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
19.04.2023 (prior to treatment with the preparation)	2.7	2.3	3.4	2.7	3.1
01.05.2023	4.8	3.8	4.4	4.8	5.2
10.05.2023	5.5	4.5	5.0	5.6	5.7
20.05.2023	12.6	9.6	10.0	12.5	12.0
30.05.2023	16.2	13.9	12.9	16.2	16.2
10.06.2023	22.1	18.5	18.3	20.8	22.6
20.06.2023	24.4	21.8	21.3	25.7	25.8
30.06.2023	27.6	23.1	23.5	28.6	29.2

10.07.2023	30.6	25.4	24.8	31.4	32.4
20.07.2023	32.8	27.5	26.5	33.1	34.9
Gain, cm	30.1	25.2	23.1	30.4	31.8
Gain, %	---	---	---	9	9

The most noticeable gain in the shoots quantity was noted in the Spraying 1 ml/L and Spraying 2 ml/L variants of the experiment, with 11 shoots on the plants on average.

Dates of measurements	Quantity of shoots, pcs.				
	Variants of the experiment				
	Control	Irrigation 1 ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
01.05.2023	4	4	3	4	4
10.05.2023	5	5	4	6	5
20.05.2023	8	6	7	7	7
30.05.2023	9	7	8	10	9
10.06.2023	10	9	9	11	10
20.06.2023	10	9	10	11	11
30.06.2023	10	9	10	11	11
10.07.2023	10	9	10	11	11
20.07.2023	10	9	10	11	11

For most crops, the flower size is a stable characteristic, which is reflected in the data obtained. In all studied plants in all variants of the experiment this indicator was 7.1 cm.

Dates of measurements	Size of flowers, cm				
	Variants of the experiment				
	Control	Irrigation 1ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
10.07.2023	7.1	7.1	7.1	7.1	7.2
HCP05	0.1				

The dynamics of the increase of the lamina length and width shows that it was more active in the Spraying 1 ml/L and Spraying 2 ml/L variants of the experiment. This indicator was 0.6 cm and 1.0 cm for the lamina length, respectively, and 0.2 cm and 0.3 cm for the width, respectively.

Dates of measurements	Lamina length, cm				
	Variants of the experiment				
	Control	Irrigation 1ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
19.04.2023 (prior to treatment with the preparation)	2.4	2.4	2.4	2.4	2.2
01.05.2023	4.1	3.6	3.4	4.4	4.1
10.05.2023	4.5	3.9	3.7	4.6	4.5
20.05.2023	5.0	4.5	4.4	5.3	5.3
30.05.2023	5.3	4.9	4.8	5.6	5.8

10.06.2023	5.1	4.8	4.7	5.4	5.6
20.06.2023	5.1	4.7	4.7	5.4	5.5
30.06.2023	5.0	4.7	4.6	5.5	5.5
10.07.2023	4.6	4.4	4.4	5.0	5.1
20.07.2023	3.8	3.8	4.0	4.4	4.8
HCP05	0.3				
Gain, cm	---	---	0,2	0,6	1,0
Dates of measurements	Lamina width, cm				
	Variants of the experiment				
	Control	Irrigation 1 ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
19.04.2023 (prior to treatment with the preparation)	1.5	1.5	1.5	1.6	1.4
01.05.2023	2.3	2.1	2.0	2.3	2.3
10.05.2023	2.4	2.1	2.0	2.4	2.4
20.05.2023	2.7	2.4	2.4	2.8	2.8
30.05.2023	2.8	2.5	2.5	2.9	2.8
10.06.2023	2.5	2.3	2.2	2.5	2.5
20.06.2023	2.3	2.2	2.2	2.5	2.5

30.06.2023	2.5	2.2	2.1	2.6	2.4
10.07.2023	2.1	1.8	1.9	2.1	2.1
20.07.2023	1.6	1.5	1.6	1.8	1.9
HCP05	0.2				
Gain, cm	---	---	---	0.2	0.3

Noted degree of vulnerability to diseases and pests according to a 5-point scale of assessment:
1 point – completely affected
2 points – affected up to 75 %
3 points - affected up to 50 %
4 points - affected up to 25 %
5 points – completely healthy

Insignificant damage was noted on all plants being tested.

Assessment of the degree of vulnerability to diseases and pests over the accounting period				
Variants of the experiment				
Control	Irrigation 1ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
4.3	4.2	4.3	4.3	4.2

It was noted during the visual assessment of the decorativeness that a bit greater score was in the Spraying 1 ml/L, Spraying 2 ml/L variant of the experiments: 4.5 points:
1 point – low decorativeness
2 points – medium decorativeness
3 points - decorativeness
4 points – high decorativeness
5 points – maximum decorativeness

Assessment of the degree of decorativeness over the accounting period, points
Variants of the experiment

Control	Irrigation 1 ml/L	Irrigation 2 ml/L	Spraying 1 ml/L	Spraying 2 ml/L
4.2	4.2	4.1	4.5	4.5

Conclusion:
The variant with applying RostoVIT preparation through spraying was recognized to be the most successful and effective.

2.4. Evaluation of the effectiveness of using RostoVIT preparation for improving the quality of flower and vegetable produce.
For information: This criterion is recognized as successfully achieved if the effect of the preparation on at least one value feature is confirmed, and the indicator is higher than the control by 5% and more.

Evaluation of the effectiveness of using RostoVIT preparation for improving the quality of the flower produce exemplified by Antirrhinum majus.

Gain of the length of the leading shoot of Antirrhinum majus by the experiment variants

Variant	Repeatability-mean gain of the shoot length, cm										Σxi.	ni.	xi.
RostoVIT	47.0	47.4	46.5	44.4	46.1	49.6	46.4	47.3	44.9	48.2	467.8	10	46.78
Baikal-EM	44.7	41.4	43.5	45.6	46.0	45.0	43.3	45.7	46.1	45.4	446.7	10	44.67
Control	40.9	37.7	38.1	35.4	38.7	37.4	36.9	39.6	40.6	39.7	385.0	10	38.5

Upon treatment with RostoVIT preparation the mean shoot length exceeds the indicators in the control variant by 21.51%.

Based on the results of the monitoring surveys of the leading shoot length gain, a one-way analysis of variance was carried out, which showed that the difference between RostoVIT and Baikal-EM variants of the experiment against the Control was significant at the 5% level, with RostoVIT preparation having a greater effect on the leading shoot length gain than Baikal-EM.

Results of the one-way analysis of variance of the data on variability of the gains of the seedlings of Antirrhinum majus depending on treatment with the preparation									
Source of variation	SS	df	Ms	σ2	F	F05	F01	Pin,%	HCP05

Overall	438.181 667	29	-	20.78	73.60	3.33	5.42	-	1,454
Treatment (factor A)	370.26	2	185.13	18.26				88	
Random	67.92	27	2.52	2.52				12	

This indicator is recognized as successfully achieved because the effect of RostoVIT preparation on the plant height was reliably confirmed, with this indicator being 5% higher than the control.

Quantity of the side shoots of Antirrhinum majus by variants of the experiment

Variant	Repeatability-mean quantity of side shoots, pcs.										Σxi.	ni.	xi.
RostoVIT	7	5.3	7	6	7	9	7.3	6.3	7.3	7.7	69.9	10	6.99
Baikal-EM	7.7	8	7	8	6	7.3	8	6	8	7.7	73.7	10	7.37
Control	6.7	7	7.7	7	6	6	4.7	7.3	7.7	6	66.1	10	6.61

Upon treatment with RostoVIT preparation the mean quantity of the side shoots exceeds the same indicator in the control variant by 5.75%.

Based on the results of the monitoring surveys of the quantity of the side shoots of Antirrhinum majus, a one-way analysis of variance was carried out, which showed that the lack of the difference between RostoVIT and Baikal variants of the experiment against the Control was significant at the 5% level, with RostoVIT preparation having higher indicators in terms of the quantity of the side shoots than on the control, and this difference exceeds 5%.

Results of the one-way analysis of variance of the data on variability of the quantity of the side shoots of the seedlings of Antirrhinum majus depending on treatment with the preparation

Source of variation	SS	df	ms	σ2	F	F05	F01	Pin,%	HCP05
Overall	25.57	29	-	0.90	1.72	3.33	5.42	-	0.840
Treatment	2.89	2	1.44	0.06				7	

(factor A)									
Random	22.68	27	0.84	0.84				93	

This indicator is recognized as successfully achieved because the quantity of the side shoots upon treatment with RostoVIT preparation exceeds the control by over 5%.

Beginning of flowering of the population of Antirrhinum majus under study by variants, %

Experiment variant	Dates of records of the beginning of the plant flowering,%:			
	06.06	16.06	26.06	06.07
RostoVIT	0.0	23.3	60.0	16.7
Baikal-EM	6.7	40.0	50.0	3.3
Control	0.0	20.0	70.0	10.0

As a result of evaluation of the effect of the preparations on the timing of flowering of Antirrhinum majus, it can be concluded that RostoVIT does not affect the acceleration of flowering, but at the peak of flowering exceeds this indicator by 5% compared to the control (16.06.23). Given this factor, we can say that this indicator was partially achieved.

During the experiment, the degree of plant damage by diseases and pests was subject to a visual assessment. As a result of the monitoring of the population under study, the percentage of the plants affected by fungal infections was taken into account.

Percentage of damage of the monitoring plants by fungal infections by variants of the experiment.

Control	Baikal-EM	RostoVIT
Damaged plants 13.3 %	Damaged plants 3.3 %	Damaged plants 6.7 %
Healthy plants 86.7 %	Healthy plants 96.7%	Healthy plants 93.3%

The greatest damage of plants by fungal diseases was observed in the control variant, while the least damage by diseases was observed in the variant with treatment with Baikal EM preparation. No damage of the plants by pests was recorded during the period of the experiment.

This indicator is recognized as successfully achieved, as the effect of RostoVIT preparation on reducing the percentage of the damage by fungal infections by more than 5% compared to the control was confirmed.

Visual assessment of the quality of the decorative produce in points was carried out according to 5 criteria, respectively; the maximum decorativeness score corresponded to 5 points. The criteria for the visual assessment of the decorativeness of Antirrhinum majus included: compactness, resistance to lodging, flowering intensity, intensive shades of flowers and shoots, leaf coverage.

Mean score of assessment of the decorativeness of Antirrhinum majus

Variant	Compactness, points	Resistance to lodging, points	Flowering intensity, points	Intensity of shades, points	Leaf coverage, points	Mean score
RostoVIT	4.1	4.2	4.5	4.6	4.8	4.44
Baikal-EM	4.3	4.4	4.6	4.5	4.9	4.54
Control	3.9	4.0	4.2	4.4	4.0	4.1

Based on the conducted assessment of the decorativeness of Antirrhinum majus, it can be noted that RostoVIT and Baikal EM preparations practically did not differ in terms of the visual assessment, but had a slightly more decorative appearance than the control samples.

This indicator is recognized as successfully achieved, since the effect of RostoVIT preparation on the plant decorativeness upon visual assessment was confirmed, with the indicators being higher than the control ones by 5%.

Conclusion:

The conducted study to evaluate the effect of RostoVIT preparation on the improvement of flower produce quality exemplified by Antirrhinum majus is considered to be successfully achieved, as the effect of the preparation on the value characters is confirmed, with RostoVIT exceeding the control indicators by more than 5%.

Evaluation of the effectiveness of using RostoVIT preparation to improve the quality of vegetable produce.

Mass sprouts of early potato of Riviera variety appeared on the 25th day after planting at the same time in all variants. Plants treated with RostoVIT and Aminozol entered the budding and flowering phase 3 days earlier than the control. With Colombo variety, sprouts were observed on the 27th day, and the plants entered the budding and flowering phase within two days of the control. Plants treated with Zircon did not differ from the control in phenological phases.

The yield was determined by the weight method, for this purpose plants were dug out from each accounting plot and weighed, tubers were counted, and then the data were converted into tons per hectare. In our research, the yield of early potato varieties was 22.6...30.0 tons/ha depending on the variety and variant.

The maximum yield was observed in the RostoVIT preparation variant and was 30 t/ha for Riviera variety, which is 12% higher than the control.

Upon treatment with RostoVIT preparation, the productivity increase is observed due to the weight of tubers and their quantity.

Apart from climatic conditions, the plant development and yield formation of white cabbage is also influenced by the use of organic fertilizers.

In the variant with RostoVIT application the plants formed a stronger root system, which increased the absorption capacity and contributed to the yield increase. The minimum yields were observed in the control variants of Podarok variety and Otlichnik hybrid, which corresponds to 89.2 and 96.3 t/ha.

The maximum yield was observed in Podarok variety in the variant with RostoVIT and is 105.8 t/ha, which is 18% more relative to the control. The maximum yield of the hybrid of late-maturing white cabbage Otlichnik F1 was 117.8 t/ha in the variant with RostoVIT, which is 22% higher relative to the control variant. The yield increase was due to an increase of an average weight of the head and corresponds to 3.3 kg in RostoVIT variant.

As a result of the conducted phenological observations of Temp hybrid paprika, it was noted that mass sprouts emerged on the 7^{th} day from the sowing date; planting in spring plastic greenhouse conditions was carried out on 26 May 2023. The first variant to enter the flowering phase was the variant treated with RostoVIT (soil dressing) with a 3-day difference in relation to the control. The variant treated with RostoVIT (top dressing) entered the flowering phase with a 2-day difference compared to the control. The variants treated with Zircon had no differences with the control, on average, the plants entered the flowering phase from 15 to 18 June (on the 98^{th} ...100^{th} day from the emergence). The first fruit harvest was carried out in all variants simultaneously on the 121^{st} day from the emergence. The complete vegetation period was 174 days.

Effect of organic fertilizers on the structure and yield of early potato of Riviera variety

Variant	yield structure, pcs/g			weight of tubers from 1 bush, g	yield, t/ha	addition to the control	
	small (<30g), g	medium (30…80 g),g	large (>80g),g			т/га	%
Riviera (control)	1/10	3/160	4/390	560	26.6	-	100
Riviera + RostoVIT	2/50	3/170	5/410	630	30.0	3.4	12

Riviera + Zircon	1/20	4/160	5/390	570	27.1	0.5	1
Riviera + Aminozol	1/20	3/170	5/415	605	28.7	2.1	7
HCP05	-	-	-	-	0.4	-	-

Effect of organic fertilizers on the yield of early potato of Colombo variety

Variant	yield structure, pcs/g			weight of tubers from 1 bush, g	yield, t/ha	addition to the control	
	small (<30g),g	medium (30…80 g),g	large (>80g),g			t/ha	%
Colombo (control)	3/40	2/80	3/310	430	20.4	-	100
Colombo+ RostoVIT	3/40	2/85	5/460	585	27.8	7.4	36
Colombo + Zircon	3/45	3/75	4/355	475	22.6	2.2	10
Colombo + Aminozol	3/45	3/85	4/370	500	23.8	3.4	16
HCP05	-	-	-	-	2.1	-	-

Effect of organic fertilizers on the yield of white cabbage of Podarok variety

Variant	weight of a head, kg	yield, t/ha	addition to the control	
			t/ha	%
Podarok (control)	2.5	89.2	-	100
Podarok + RostoVIT	2.9	105.8	16.6	18

Podarok + Zircon	2.6	94.0	4.8	5
Podarok + Aminozol	2.7	98.1	8.9	9
HCP05	-	4.7	-	-

Effect of organic fertilizers on the yield of white cabbage of Otlichnik F1 variety

Variant	weight of a head, kg	yield, t/ha	addition to the control	
			t/ha	%
Otlichnik (control)	2.7	96.3	-	100
Otlichnik + RostoVIT	3.3	117.8	21.5	22
Otlichnik + Zircon	2.9	103.5	7.2	7
Otlichnik + Aminozol	3.2	114.2	17.9	18
HCP05	-	7.1	-	-

RostoVIT preparation has a broad spectrum of action and influences the development and yield of the studied vegetable crops: intensive development of the root system, early head setting and increase in the yield of the studied crops were observed.

The yield of early potato of Riviera and Colombo varieties increased by 12 and 36% in the open ground conditions of Moscow region.

The yield of white cabbage of Podarok variety and Otlichnik hybrid increased by 18 and 22% relative to the control.

Effect of organic fertilizers on the early and overall yield of paprika plants (kg/sq. m)

Indicator	Variants of the experiment				
	Control	RostoVIT (top dressing)	RostoVIT (soil dressing)	Zircon or Epin (top dressing)	Zircon or Epin (soil dressing)

Early yield	0.3	0.5	0.6	0.5	0.5
Overall yield	6.0	6.3	6.4	6.2	6.1
HCP05 (Early yield) 0.24					
HCP05 (Overall yield) 1.2					

6% increased yield of paprika was observed in RostoVIT variant (top dressing) and 7% increase (soil dressing) relative to the control variant. Zircon preparation increased the overall yield by 2% and 3% relative to the control.

Conclusion:
In the pilot test, mass sprouts of white cabbage of Podarok variety and Otlichnik hybrid appeared on the 5^{th} day after seeding simultaneously in all variants. The heading phase was entered by Podarok variety plants with a 7-day difference compared to Otlichnik hybrid. In terms of the variants, Podarok variety in the variant with RostoVIT and Aminozol had a 2-day difference in the beginning of leaf rosette formation and heading relative to the control variant. The plants treated with Zircon did not differ from the control in phenological phases. Seeding and harvesting were carried out on the same dates; accordingly, no difference in the vegetation period was observed.

With Otlichnik hybrid in the variants treated with RostoVIT and Aminozol the heading was noted 4 days earlier than in the control.

The variant of paprika plants treated with RostoVIT (soil dressing) was the first to enter the flowering phase with a 3-day difference relative to the control. RostoVIT variant (top dressing) entered the flowering phase with a 2-day difference relative to the control. The variants treated with Zircon had no differences from the control; on average, the plants entered the flowering phase from 15 to 18 June (on the 98^{th} ...100^{th} day from the emergence).

Thus, the set criterion was successfully achieved in white cabbage in the heading phase with a difference of 2...4 days relative to the control and treated with Zircon. In Temp hybrid pepper plants, a 2-3-day difference in the flowering phase was noted relative to the control and treated with Zircon.

The tests revealed that RostoVIT organic fertilizer has a broad spectrum and influences the development and yield of the studied vegetable crops: intensive development of the root system, early heading and increased yield of the studied crops were noted.

The yield of early potato of Riviera and Colombo varieties increased by 12 and 36% in the open ground conditions of Moscow region.

The yield of white cabbage of Podarok variety and Otlichnik hybrid increased by 18 and 22% relative to the control.

Thus, the set criterion was successfully achieved.

2.5. Evaluation of the effectiveness of using RostoVIT to improve the quality of the seedling material.

For information: This criterion is recognized as successfully achieved if the effect of the preparation on at least one value feature is confirmed and the indicator is higher than the control by 5% or more.

Evaluation of the effectiveness of RostoVIT preparation to improve the quality of the seedling material exemplified by Thymus vulgaris and Mentha.

Effect of the preparation on rooting of cuttings, %

Variant	Thymus vulgaris, Lemon variety	Mentha piperíta, Orange variety
Control	79	94
RostoVIT, twice	82	96
RostoVIT, in triplicate	86	96

The application of the preparation right after planting of the cuttings influenced the rooting of Thymus vulgaris.

Effect of RostoVIT preparation on the effectiveness of propagation by herbaceous cuttings of Thymus vulgaris and Mentha piperíta

Crop	Variant	Height, cm	Leaf length, cm	Leaf width, cm	Length of the root system, cm	Mass of the root system, ml
Thymus vulgaris	Control	12.3±0.4	1.1±0.1	0.5±0.04	10.9±0.8	3.8±0.6
	RostoVIT, twice	12.1±0.6	1.0±0.1	0.4±0.03	10.2±0.9	4.2±0.4
	RostoVIT in triplicate	14.6±0.6	1.1±0.1	0.5±0.04	10.3±0.7	4.4±0.2
Mentha piperíta	Control	12.1±0.8	5.0±0.3	2.3±0.2	15.8±1.4	6.4±0.4
	RostoVIT, twice	16.4±1.3	5.2±0.2	2.7±0.3	14.6±1.3	7.8±0.5
	RostoVIT in triplicate	17.5±1.2	5.6±0.2	2.9±0.6	14.5±1.6	7.9±0.5

The preparation had a positive effect on rooting of mentha and thymus cuttings, increasing such morphometric parameters as the root mass, leaf size and height. At the same time, the differences

between the variants with double and triple treatment were small, which evidences the inexpediency of three treatments. Accordingly, for propagation of mentha and thymus by herbaceous cuttings it is possible to recommend treatment with RostoVIT solution at planting and in two weeks afterwards. In this case, in 45 days it is possible to obtain seedlings of these crops for mechanized planting in the field conditions.

During the tests, the rooting capacity of thymus vulgaris cuttings increased by 6% and 7% with double and triple treatment, respectively. Mentha and thymus showed an increase of the biometric parameters compared to the control, which allowed obtaining container seedlings suitable for planting a week earlier and reducing the growing time.

Thus, the set criterion was successfully achieved.

Evaluation of the effectiveness of RostoVIT preparation to improve the quality of the seedling material exemplified by Thuja occidentalis.

Quantity of side shoots of Thuja occidentalis by variants of the experiment

Variant	Repeatability-mean quantity of side shoots of Thuja occidentalis, pcs.										Σxi.	ni.	xi.
RostoVIT	6.3	6.7	8.0	7.3	6.3	7.0	8.0	6.3	7.7	6.0	69.67	10.00	6.97
Control	5.0	6.0	7.3	5.9	7.2	8.1	6.8	5.9	7.0	6.4	65.60	10.00	6.56

Results of the one-way analysis of variance of the data on variability of the quantity of side shoots of Thuja occidentalis depending on treatment with the preparation

Source of variation	SS	df	ms	σ2	F	F05	F01	Pin,%	HCP05
Overall	13,04	19	-	0,69	1,22	4,38	3,71	-	0,781
Treatment (factor A)	0,83	1	0,83	0,01				2	
Random	12,21	18	0,68	0,68				98	

Based on the results of the monitoring surveys of the quantity of the side shoots of Thuja occidentalis, a one-way analysis of variance was carried out, which showed that the lack of the difference between RostoVIT preparation and the Control was significant at the 5% level. However, some effect of treatments on the quantity of the side shoots of thuja was observed. The average quantity of the side shoots in RostoVIT treatment exceeds the average quantity of the side shoots in the control by 6.25%. Hence, the indicator is recognized as successfully achieved, as the quantity of the side shoots is higher than the control indicators by more than 5%.

Quantity of nodes of the leading shoot of Thuja occidentalis by variants of the experiment

Variant	Repeatability-mean quantity of nodes of the leading shoot of Thuja occidentalis, pcs										Σxi.	ni.	xi.
RostoVIT	47.8	47.2	48.1	43.4	43.3	34.1	50.1	46.0	46.7	42.2	448.83	10.00	44.88
Control	42.4	38.1	44.5	41.2	39.3	37.1	37.9	44.4	35.2	36.7	396.82	10.00	39.68

Based on the results of accounting of the quantity of nodes of the leading shoot of Thuja occidentalis, a one-way analysis of variance was carried out, which showed that at 5% level of significance the treatment with the preparation significantly influences the increase of the quantity of nodes of the leading shoot. The significant difference between RostoVIT and Control variants of the experiment was also confirmed.

Results of the one-way analysis of variance of the data on variability of the quantity of nodes of the leading shoot of Thuja occidentalis depending on treatment with the preparation

Source of variation	SS	Df	Ms	σ2	F	F05	F01	Pin,%	HCP05
Overall	417.04	19	-	15.65	8.64	4.38	3.71	-	3.75
Treatment (factor A)	135.29	1	135.29	11.96				43	
Random	281.75	18	15.65	27.62				57	

The average quantity of nodes of the leading shoot upon treatment with RostoVIT exceeds the same indicator in the control variant by 13.1%.

This indicator is recognized as achieved, since the effect of RostoVIT on the quantity of the side shoots of Thuja occidentalis was significantly confirmed, and the average quantity of nodes of the leading shoot, when treated with RostoVIT, exceeds the control indicators by more than 5%.

Gain of the leading shoot of Thuja occidentalis by variants of the experiment

Variant	Repeatability-mean gain of the leading shoot of Thuja occidentalis, cm										Σxi.	ni.	xi.
RostoV	18.1	18.7	21.9	16.9	14.0	9.5	22.3	17.8	18.9	19.9	177.	10.0	17.7

IT											93	0	9
Control	15.6	19.1	16.6	13.6	11.5	13.2	14.9	15.6	13.5	9.1	142.77	10.00	14.28

Based on the results of accounting of the gain of the leading shoot of Thuja occidentalis, a one-way analysis of variance was carried out, which showed that the difference between RostoVIT and the Control variants of the experiment was significant at the 5% level.

Results of the one-way analysis of variance of the data on variability of the seedlings gain of Thuja occidentalis depending on treatment with the preparation									
Source of variation	SS	Df	ms	σ2	F	F05	F01	Pin,%	HCP05
Overall	260.23	19		16.10	5.61	4.38	8.18		3.15
Treatment (factor A)	61.83	1	61.83	5.08				32	
Random	198.39	18	11.02	11.02				68	

The average gain upon treatment with RostoVIT preparation exceeds the average gain in the control variant by 24.58%.

This indicator is recognized as achieved, since the effect of RostoVIT on the gain of the leading shoot of Thuja occidentalis and the gain of the leading shoot upon treatment with RostoVIT exceeds the control variant by more than 5%.

Over the accounting period the studied population of Thuja occidentalis seedlings was not affected by diseases and pests.

Conclusion:
The criterion of the effectiveness of using RostoVIT preparation to improve the quality of the seedling material was successfully achieved, as the effect of the preparation on more than one value character was confirmed, with indicators being higher than the control by 5%.

2.6. Evaluation of the effectiveness of RostoVIT preparation on increasing phyto- and zooplankton.
For information: This criterion is recognized as successfully achieved if the amount of phyto- and zooplankton is not less than in the control variant.

Our experiment on zooplankton cultivation theoretically and empirically revealed that the addition of plant growth-enhancing preparations being the product of yeast processing, to the container during feeding with yeast has no effect on the objects of the study (copepods) and their yeast nutritive base (Saccharomyces cerevisiae). Therefore, after the first series of pilot studies, the conditions of the experiment were modified.

The object of the research was Daphnia magna cladocerans. For each variant (experiment and control) glass containers with 3 liters of water were used, the planting density was 2,000 pcs/L. The water temperature was maintained at 19-21°C. Artificial light 14 hours a day. The water was changed every two days at 70% of the initial volume. The duration of the experiment was 14 days.

RostoVIT in the recommended dose (lower limit) caused death of daphnia on the next day. The preparation probably contains compounds toxic for copepods. Therefore, the dose was reduced until the positive effect occurred. As a result, the optimal dose of RostoVIT was 0.01 ml/L. In this case, chlorella was not added for 7 days, and the number of daphnia was maintained. Whereas in the control, chlorella was almost completely eaten by the copepods and had to be added after 2-3 days.

Conditions of the experiment of growing Daphnia magna by variants of the experiment

Indicators	Variants of the experiment		
	Control Chlorella	Control 2 Chlorella + RostoVIT	Experiment Chlorella + RostoVIT
Dose of the added feed	20 mln/L	Chlorella 20 mln/L + RostoVIT 0.01ml/L	Chlorella 20 mln/L + RostoVIT 0.01ml/L
Frequency of adding	every 3 days	Chlorella every 3 days RostoVIT once	Chlorella every 7 days RostoVIT once

The survival rate of the copepods was assessed by counting in the Bogarov chamber under a binocular magnifier. The mobility of the copepods was determined visually by the speed of their movement.

The results showed that the survival rate in control 1 was higher than in control 2 and the experiment. However, the differences were small. The best effect among the experimental groups was observed in the experiment, as there was an increase of the amount of chlorella due to RostoVIT.

Indicators of growing Daphnia magna

Indicators	Control 1	Control 2	Experiment
Concentration of Daphnia magna, pcs/L	1,780	1,620	1,640
Survival rate, %	89	81	82

Since chlorella was eaten by daphnia, its content in the containers did not increase during the experiment. Nevertheless, the frequency of chlorella addition in this variant could be reduced (experiment). In control 2, daphnia were concentrated near the bottom by the end of the experiment. This was probably due to the immersion of the Chlorella mass on the bottom. In the experiment, young forms of daphnia (lighter color) appeared within 10 days, which evidences that RostoVIT has no negative effect on the reproduction of this crustacean species.

Conclusion:

1. At the recommended dose of 1:200 RostoVIT caused zooplankton death within 2 hours. The planned dose of 1 ml/L of RostoVIT also caused death of the zooplankton.

2. At a dose of 0.01 ml/L (1:105), RostoVIT has a favorable effect on the growth and reproduction of Chlorella vulgaris and does not reduce the abundance of the zooplankton, Daphnia magna.
3. RostoVIT can and should be added at a dose of not more than 0.01ml/L when growing Daphnia magna and feeding it with Chlorella.

Conclusion:
Thus, the set criterion was successfully achieved by changing the dose of RostoVIT preparation (reducing the concentration to 0,01 ml/L). That is, at a dose of 0.01 ml/L the preparation does not cause a decrease in the amount of phyto- and zooplankton.

3. Evaluation of the possibility of further use of the innovative solution at the Pilot Testing Site, recommendations on the application of the innovative solution in Moscow.

The pilot testing confirmed the functionality of the innovative solution as:

- a plant growth and development stimulator influencing the economically valuable and decorative characteristics of plants;
- a root and top dressing influencing the economically valuable and decorative characteristics of plants;
- a catalyst of the effectiveness of organic fertilizers from joint application;
- a stimulator for phyto- and zooplankton growth.

The innovative solution was recommended for introduction into the educational infrastructure in Moscow.

The results were assessed on the basis of evaluation of the effectiveness criteria set in item 5 of the Pilot Testing Methodology (Appendix 2 to Agreement No. 377 dated March 10, 2023 concluded between Moscow Innovation Agency State Budgetary Institution, Moscow Timiryazev Agricultural Academy - Russian State Agrarian University Federal State Budgetary Educational Institution of Higher Education and Agro-recycling Group Ltd.), the results of their verification are stated in item 2 of this Report.

4. Comments and proposals for finalization of the innovative solution.

We recommend continuing the research on evaluation of the effectiveness of RostoVIT preparation on other crops.

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signature, L.S.