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BIOLOGICAL METHOD TO INCREASE YIELD OF RADISH

Biological preparation Korneplus has been developed on the basis of rhizosphere bacteria Pseudomonas putida K-9. Preparation intended to accelerate root formation, stimulate plant growth and increase plant productivity. Treatment of radish plants (Raphanus sativus var. sativus) with the preparation Korneplus leads to a significant increase in yield by 30.3 %.

На основе ризосферных бактерий Pseudomonas putida K-9 разработан биологический препарат Корнеплюс, предназначенный для ускорения корнеобразования, стимуляции роста растений и повышения их урожайности. Обработка препаратом Корнеплюс растений редиса (Raphanus sativus var. sativus) приводит к достоверной прибавке урожайности на 30,3 %.

Keywords: Korneplus; plant growth stimulation; radish plants; plant productivity; biopreparation.

Ключевые слова: Корнеплюс; стимуляция роста растений; редис; урожайность; биопрепарат.

Introduction

It is known that the degree of development of the root system of plants plays a significant role in the formation of the yield. The introduction of preparations containing PGPR bacteria into the soil can lead to a change in the architecture of the entire root system as a result of the impact on plant metabolism of hormones such as auxin, cytokinin, ethylene, synthesized by bacteria in the external environment [1]. In the agricultural practice of many countries, attempts to use bacteria producing hormones that stimulate plant growth, as well as pure phytohormones - products of microbiological synthesis, are being made. The use of natural phytohormones of microbial origin in plant growing is very promising due to the simplicity of their production, their cheapness, their high ability to detoxify in the plant organism, as well as their ability to bind easily in the cell and catabolize. In addition, using microorganisms, it is possible to obtain phytohormonal compounds with a structure different from the structure of commercial drugs, but with a higher biological activity, which are difficult to obtain by chemical synthesis.

Vitamins also play an important role in the life of plants, some of vitamins come from soil microorganisms. It has been shown that vitamin K, for example, is able to initiate the differentiation of plant cells towards root formation, and the use of vitamins simultaneously with auxins is much more effective than the use of these substances separately [2].

Associative nitrogen fixation, provision of easily assimilable forms of iron, phosphorus and / or their absorption from the soil and delivery to plants are also referred to as a direct methods of stimulating plant root growth by microorganisms. It should be noted that according to a number of researchers, growth stimulating microorganisms are not an alternative to mineral fertilizers, including nitrogen and phosphorus fertilizers, but they allow the latter to be used in much smaller amounts. Thus, the inoculation of vegetable crops with rhizosphere pseudomonads did not completely replace nitrogen fertilization, but it made possible to reduce the doses of mineral fertilizers by 1.5–2 times without a significant decrease in yield [3].

This study presents the results of the application of the preparation Korneplus on plants of the "Rubin" radish variety.

Research methods

The experiments were carried out in 2019. The soil at the experimental site is sod-podzolic, medium-cultivated. A full dressing with mineral and organic fertilizers was introduced under the predecessor: manure - 80 t / ha, NPK - 70/40/80 kg / ha, (by active substance). For the autumn tillage, nitrogen was introduced at a dose of 20 kg / ha, phosphorus 30 kg / ha and potassium 45 kg / ha (by active substance). In the spring of 2019, an organic fertilizer was applied before the fall plowing (manure - 60 t / ha). Plant protection from weeds was organized according to the generally accepted technology using herbicides.

The area of each experimental plot was 25 m², the area of the registration plot was 20 m², the replication was fourfold, the arrangement of the plots was sequential. The experimental plants were treated with 1% working solution of the Korneplus preparation. Method of application - watering at the root. The consumption of the working fluid is 20 liters per 100 m². Control plots were treated with an appropriate amount of water.

Measures for the cultivation of radish, variety "Rubin": planting seeds (20/05/2019), which were planted to a depth of 2 cm using a mechanical manual seeder. The distance between the seeds in a row is 3 cm, the distance between the rows is 20 cm. The appearance of the first shoots (May 28, 2019). Thinning (05/06/2019). The distance between the plants is 5 cm. Watering of the plants with subsequent loosening was carried out every 2-3 days (depending on weather conditions); harvesting.

Results and its discussion

Characteristics of the Rubin radish: semi-spreading rosette, loose, 15–18 cm high, 22–25 cm in diameter, 5–7 leaves. The leaf is green, lyre-shaped, dissected into 2–3 pairs of lateral rounded-oval, downward - triangular lobes. The upper lobe is large, elongated-oval. The petiole is 4–6 cm long, 0.6 cm thick, green, with red anthocyanin pigmentation, almost without pubescence. The leaf blade has sparse, hard, short pubescence on both sides. The root crop is rounded, 3.8–4.2 cm long, 3.2–4.5 cm in diameter, red-crimson in color. The surface is smooth. The pulp is white or white-pink, dense, juicy, prone to rapid flabbiness. Root weight 11–28 g. Early maturing variety. The period from full germination to the start of technical ripeness is 26–28 days. Marketable yield 1.2–2.3 kg / m².

The results of the experiment of studying the effect of the developed preparation on the "Rubin" radish are presented in the table.

Influence of the preparation Korneplus on the yield of radish, variety "Rubin", 2019

Accountable parameter	Control (water treatment)	Experiment (treatment with Korneplus)
Planted plants, pcs / m ²	126	126
Collected plants, pcs / m ²	67,2±11,2	88,2±13,3
Survival, %	53,3	70,0
Productivity, kg / m ²	1,52±0,19	1,98±0,22
Weight of one root crop, g	22,48±3,85	22,39±3,02

A single application of a 1 % working solution of the Korneplus preparation made it possible to increase the survival rate of radish plants by 16.7 % (from 53.3 % in the control to 70.0 % in the experiment). Treatment with the preparation had no effect on the average weight of root crops: 22.48 ± 3.85 g in the control and 22.39 ± 3.02 g in the experiment. At the same time, due to the

increase in plant survival, the yield of radish in the experiment (1.98 ± 0.22 kg) was significantly higher than in the control (1.52 ± 0.19 kg). The yield increase was 0.46 kg / m² (30.3 %).

Conclusions

As a result of field tests, it was shown that the treatment of radish plants with the biological preparation Korneplus led to an increase in yield by 30.3 %: from 1.98 kg / m² in the control to 1.98 kg / m² in the experiment.

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