

Use Of Complex Biofertilizers In Potato Growing Technology

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Abstract: In field experiments (2019-2020), the effect of pre-planting treatment with biofertilizers on the complex effect of associative rhizobacteria - growth stimulants on potato tubers was determined. The research was conducted in collaboration with the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan on the basis of soil-climatic zone of Khorezm region, nitrogen-fixing microorganisms in saline soils. The experiments used bacteria isolated from different soils and the rhizosphere of plants, as well as associative nitrogen fixative preparations based on growth stimulants. To determine the effectiveness of bacterization, the tubers were also treated with a chemical agent. The number of microorganisms was determined by traditional methods in solid nutrient conditions. The effectiveness of biopreparations varies depending on the type of genotype, the form of the biopreparation, the activity of nitrogen-fixing microorganisms and external conditions. The highest impact was observed in the Black Prince variety of potato with Earth ointment (Azotobacter chroococum), followed by Bist (Pseudomonas putida), Zamin-M (Bacillus subtilis, Bacillus megaterium and Pseudomonas stutzeri). The rate of root formation increased by 1.7-6.9%, under the influence of biological fertilizers, the number of microorganisms in the rhizosphere of potatoes increased by 45-93% compared to the control.

Keywords: potatoes, biofertilizers, Earth ointment, Bist, Zamin-M, growth stimulants, associative rhizobacteria.

INTRODUCTION

Most of the agricultural land in Khorezm region is located in the risk zone of salinization. Observations of climate change show that gradual change of the weather is leading to an increase in secondary salinity levels. With this in mind, it is necessary to create potato growing technologies adapted to these conditions and changes in accordance with this conditions. For the same reasons, the regular use of the same chemicals is often unreasonable. Because they often lead to serious phytosanitary and economic indicators and negative environmental consequences, as there is enough condition for the pathogens to develop resistance to them.

Therefore, one of the ways to solve this problem requires the use of a wide range of biological fertilizers, plant growth regulators and immunostimulants.

Modern crop production is characterized by low stability of phytosanitary conditions, which is confirmed by the massive increase in pests, periodic outbreaks of disease epiphytosis and the spread of weeds in the crop fields. Due to the low yield of potatoes and significant losses, up to 8% of potato tubers are lost during storage in Khorezm region.

The limited range of disease-resistant varieties, rising of air and soil temperatures during germination and end formation, early frosts, and low temperatures during harvest also reduce the efficiency.

One of the ways to increase the phytosanitary status and efficiency of the potato growing sector may be to increase the rational use of chemicals and the use of biological fertilizers through potato production. [Zavalin A.A. Biofertilizers, fertilizer and crop. - M. : VNIIA, 2005. – P. 302.]

Biological preparations are metabolic products of bacteria derived from the rhizosphere of plants, stimulate the immune system of plants, reduce the accumulation of excess nitrates and salts of heavy metals, stimulate the processes of tuber formation, increase the total number of starch in tubers, as well as leads to an increase in resistance to diseases and pests. [5]

The use of effective and environmentally friendly biological preparations that increase the productivity of plants and their resistance to adverse environmental factors and diseases has not been adequately studied in the soil climate of Khorezm region. In this regard, the feasibility of using them in the production of potatoes requires a comparative assessment.

RESEARCH OBJECTS AND METHODS

The research was conducted at 'Inoyat-Jumaniyaz' farm of Urgench district of Khorezm region. Humus, the cultivated in (0-30 cm) layer of the studied soils were 0.657, respectively; gross nitrogen and phosphorus in 0.058 and 0.136% and 7.12; 6.05; 19.01 and 60 mg / kg N-NO₃, N-NH₄, mobile P₂O₅ and exchangeable K₂O are present. Soil salinity (ES, N₂O: soil = 1: 1) is 1.43 dS / m. The average mechanical composition is sandy, groundwater is located at a depth of 1.5-2.0 meters.

Potatoes served as a previous crop. The main method of tillage was 20-22 cm plowing, which was done on March 23.

All field experiments were conducted on the basis of generally accepted technologies.

During the experiments, the biopreparation "Yer malhami" was used in the ratio of 15 / ha, the fertilizer Bist in the ratio of 15 l / ha, the biofertilizer Zamin-M in the ratio of 10 l / ha.

For comparative studies, the tubers are treated with a chemical fertilizers.

Potato tubers were processed immediately before planting. Low-dose nitrogen fertilizers - ammonium nitrate - 100 kg / ha and ammophos - 30-40 kg / ha were applied to the soil in accordance with generally accepted traditional methods.

Statistical analysis of the experimental results was performed on the basis of dispersion and variation analysis.

Potato cultivation technology is based on the northern method. Plowing depth was 20-22 cm, after spring cultivation, milling the soil with a dominator, the potato tubers at the rate of 50 per hectare was planted in mid-April.

Harvesting was done by hand manually on July 6 (in a tiered digging machine). The total area was 30 m², the calculation area was 15 m², and the number of returns was four.

During the growing season, the temperature varied from perennials. In general, the rainfall during the growing season was 200-250 mm, the humidity was 50-60%, and the annual rates were slightly higher than the perennials. Temperatures above 35° C in June had a negative effect on the tuber formation process.

The 2019-2020 survey was characterized by low humidity, with 27% of the total norm raining. The average temperature in spring was 28°C and in autumn 18° C.

RESEARCH RESULTS AND THEIR DISCUSSION

Treatment of seed potato tubers with “Yer malhami”, “Zamin-M” and “Bist” biofertilizers gave positive results in the first 1 stages of growth, reduced the incidence of tubers and had an effective effect on growth intensity.

The use of biofertilizers presented the following results in Table 1

Table 1

Impact of biological preparations on potato crop yield (average 2019-2020)

Options	Tubers weight, kg / seedlings		Number of tubers, pieces / seedlings		Productivity	Fertility
	Large	Seed	Large	Seed	Quantity	Kg
Control	26	7,5	156	90	246	33,5
Yer malhami	15	13	90	130	220	28
Bist	2,5	0,5	15	6	21	3
Zamin-M	15	11	90	110	200	36

As can be seen from Table 1, when treated with ‘Yer malhami’, the weight of the tubers was 15 kg / seedling, the number of tubers was 90 pieces / seedling, the yield was 220, the yield was 28, and the large tubers were 43% less than the control. weight, and the number of ends was 42.3%, productivity was 10.5%, and fertility was 16.41%.

When using Bist biofertilizer, the weight of the tubers was g / seedling, the number of tubers was 15 pieces / seedling, the yield was 21 kg, the yield was 3 kg, and the weight of the large tubers was 90.38% / kg compared to the control, the weight of seed pods was 99.3%, the number of pods was 90.38%, and the number of seed pods was 93.3% less.

Similar indicators were observed with the use of Zamin-M biopreparation, the weight of seedlings was 15 kg / seedling, the number of seedlings was 90 pieces / seedling, the yield was 200, the weight of large seedlings compared to the control Kg/seedlings by 42.3%, weight of seed pods by 146.6%, ha, number of tubers by 42.3%, number of seed pods by 22.2%, yield decreased by 18.7%, but It was noted that the yield was 9,1% higher.

Table 2

Impact of biological products on potato crop productivity during storage (average 2019-2020)

Options	The Number of Diseased potatoes	Diseased potatoes %
Control	246	24,6

Yer malhami	218	21,8
Vist	20	20
Zamin-M	198	19,8

Table 2 indicates that during the storage period, the diseased incidence was 21.8% in potatoes treated with Yer malhami, 20% when treated with Vist, and 19.8% when treated with Zamin-M.

After that, in order to prolong the storage period of potatoes, the fertilizer "Zamin-M" was selected and its different concentrations were used for processing during storage (Table 3).

Table 3. The Effect of different concentrations of Zamin-M biopreparation on the storage period of potato tubers:

Options in Experiment	The quantity of diseased tubers %	The fertility %
1:100	3,3	96,7
1:500	2,7	97,3
1:1000	-	100
Control	6,03	93,7

When the effect of different concentrations of Zamin-M biopreparation on the storage period of potato tubers was studied, the pre-storage treatment with concentrations in the ratio 1: 100, 1: 500 and 1: 1000 resulted in productivity of 96.7%, 97.3 and 100%, respectively.

CONCLUSION

In summary, among the studied fertilizers in experiment, Zamin-M of all fertilizers is suitable for soil climatic conditions during storage of potato crop in Khorezm soil condition and climate, which is explained by the storage of microorganisms that activate the synthesis of phytohormones operating under difficult climate and soil conditions.

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