

Influence of The Bacterial Preparation on Productivity of Soy

Bakteriyal Preparatın Soya Verimine Etkisi

Research Article

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ABSTRACT

The skilled and laboratory regulations of receiving various forms of a bacterial preparation on the basis of phosphate-mobilizing bacteria are developed. For studying of their efficiency on fields of Bayserke-Agro LLP located in the territory of Almaty area in the settlement of Panfilovo large-scale field experiment with application of the developed biological products on the area of 5 hectares was made.

Key words

A bacterial preparation, phosphate - mobilizing bacteria, productivity, bentonite, zeolite, bioreactor.

ÖZET

Fosfatları toplayabilen bakteriler temelinde hazırlanan bakteriyel preparatların çeşitli şekilleri ve üretme yöntemleri geliştirilmiştir. Bu ilaçların etkinliğini incelemek için Almatı Eyaleti Panfilovo köyünde bulunan Bayserke-Agro Ltd. Şirketi arazilerinde kapsamlı deneyler yapılmıştır. Hazırlanan preparatlar 5 hektar alanında kullanılmış ve elde edilen sonuçlar bu çalışmada sunulmuştur.

Anahtar Sözcükler

Bakteriyal preparat, fosfattopalyıcı bakteriler, (alan birim başına) verim, bentonit, zeolit, biyoreaktör.

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INTRODUCTION

In phosphorus circulation the soil microflora plays an important role, carrying out dissolution of mineral and organic compounds of phosphorus with elements of calcium, magnesium, iron and aluminum; decomposition of organic phosphoric compounds; consumption and phosphorus fixing in a microbial biomass which contains 1,5 - 2,5% of phosphorus [1].

It should be noted that where there is a gradient of movement of nutrients from the soil in a root, microbiological mobilization of phosphorus by microorganisms, in connection with exclusive ease of their binding of phosphorus in the soil has huge value.

Mobilization activity of soil microorganisms is stirred up under the influence of different types of organic substances (starch, peat, manure, etc.), having beneficial impact on a phosphoric food of plants [2].

As a part of various types of soils the microorganisms dissolving phosphorus make from 5,0 - 95,0% from the total number of microflora, and it isn't revealed their quantitative dependence in the soil from mechanical structure of the soil, its acidity and the content of a humus, nitrogen and phosphorus.

Many microorganisms possess ability to dissolve calcium phosphates. Bacteria of *Pseudomonas*, *Arthrobacter*, *Achromobacter*, *Azotomonas* and *Aspergillus*, *Penicillium* fungi [3] are most widespread.

The work purpose is the development of skilled and laboratory regulations of receiving various forms of a biological product on a basis phosphate - mobilizing bacteria and studying of their efficiency in field conditions.

METHODS

Cultivation mode: Temperature 25-28°C, Turns of a mixer of 450 rpm, Consumption of technological air of 50 L/min. pressure in the device of 0.02-0.04 MPas. time of cultivation 20-24 hours. caption of cages not less than 4-5 billion C/ml.

Cultural liquid after fermentation, centrifuged at 3000 rpm within 1 hour. After a centrate decantation determined the gross weight of final weight. The biomass exit phosphate - mobilizing bacteria averages 500-600 g at humidity of 80-85%. The caption in Goryaev's camera makes not less than 250 billion C/g (Figure 1).

Prepared 50% clay solution of bentonite (bentonite - a supernatant) in the ratio 1:1. Product structure: Bentonite-42.9 kg, a supernatant - 56,6 L. biomass of cultures-0.5 kg. Total-100 kg.

The specified mix was mixed by 3 hours on a mechanical mixer. Caption in a ready-made product not less than 6.0 billion C/g. Ready preparation packed up in plastic packages. Stored at +4°C. Hectare dose of a preparation of 200 g with a tyre not less than 1.2 billion cages.

RESULTS

Various forms of a preparation received on the basis of the most active phosphate - the mobilizing bacteria immobilized on sorbents - bentonite and zeolite.

The researchers conducted earlier allowed offering the following skilled and laboratory regulations of production of biological products which include a number of stages:

- cultivation of a sowing material in flasks on 750 mL from 100 mL of the environment at 28°C on a rocking chair at 220 rpm. Having sat down flasks make suspension washout from two slip-ups of RPA on a flask. In the course of fermentation measure the optical density and a caption of cages in Goryaev's camera.
- cultivation of sowing material FMB make in 7 L inoculator with a caption of 2.3-5.2 billion cages/mL within 25 hours.
- cultivation during 24 h in a fermenter on 100 L with a mixer,
- centrifugation of cultural liquid with receiving a concentrate of cages of phosphate - mobilizing bacteria in the form of paste humidity of 80-85%,
- mixing of a biomass of bacteria with a filler bentonite and preparation standardization.

Statement of a large-scale field experiment was carried out on Baysyerke-Agro LLP fields on the area of 5,0 hectares, located in the territory of Almaty area in Panfilovo Settlement.

The preliminary microbiological analysis of the soil of a field experiment showed lack of bacteria identical to contents of a target biological product that guaranteed purity of results of alleged experiment. Check experiment, with seeds sowing of a similar plant without biological product addition was in parallel put. Conditions of watering were identical. For experiment the operating time of biologically active preparation, with use of the bioreactor was carried out. Lump of a preparation made 2 liters. Norm of a preparation is 200-250 g/hectare of the soil.

Apparently from Table 1 productivity in experimental fields where the soil is processed by biological products on a basis phosphate - mobilizing bacteria of 3,5 c/hectare was higher, than in control that made an increase of a crop of 12,6%. Making active action of a biological product positively influences not only viability, but also further development of plants.

Table 1 Yields of agricultural crops.

Experience options	Productivity, c/hectare	addition	
		c/hectare	%
Control	24,2	-	-
Experience	27,7	3,5	12,6

Depending on conditions they can accelerate passing of almost all phases of development. When studying efficiency of a biological product in a field experiment it was noted that at identical norm of sowing of seeds all processed crops were much denser, than control options (Table 2).

Under the influence of processing the increase in quantity of plants at 1 sq.m, weight of one plants and amount of grains is noted, the crop of plants of a experimental field to 25,3 c/hectare respectively increases.

CONCLUSION

Thus, during our research the experimental and laboratory regulations of receiving various forms of a biological product on a basis phosphate - mobilizing bacteria are developed and their biological efficiency in field conditions is studied. Thus productivity of plants of soy in experimental option was higher, than in the control one.

Table 2 Biometric analysis of plants.

Experience options	Quantity plants piece/ sq.m	Height of a plant, cm	Weight of one plants, g	Quantity pods on a plant, piece	Length of one pod, cm	Weight of grain of one plant, g	Quantity grains/ 1 plant	Productivity, c/hectare
Control	77.7	58.7	3.2	5.8	27.2	4.1	20.3	23.5
Experience	81.2	69.3	4.5	8.1	36.9	5.8	24.9	25.3



Figure 1. Formation of nodules on the roots of plants in the period of nitrogen fixation.

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