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Influence of bacterization upon productivity of Soybean

Objective. To investigate the effect of pre-sowing bacteria of seeds with diazotrophs Vgasyugiobium iaropysit and AgovirShit Lgavnepve on the effectiveness of the symbiosis of bulb bacteria with plants and soybean productivity. Methods. Field, laboratory, statistical. Results It is shown that complex pre-sowing bacteria of soybean seeds contributes to increasing the number and weight of tubers, increasing the activity of nitrogen fixation in the root zone of plants. With the use of mixed cultures of diazotrophs, the yield of soybeans increases by 0.23 - 0.41 t / ha, or 9 - 16%, compared with inoculation by pure culture of bulbous bacteria. Conclusions The expediency of use of an inoculant on the basis of mixed cultures of microorganisms V. iaropisit and A. bogavieviev in the technology of soybean cultivation has been established.

Key words: azopyrilia, tuber bacteria, mixed bacterial cultures, soy, yield.

Currently, issues related to the use of various types of nitrogen-fixing bacteria for improving the productivity of agricultural crops [2, 8, 9]. Since in soils of Ukraine, for the most part, there are no aboriginal populations of bulb soybean bacteria, the use of bacteria can increase the yield of this crop to 50% or more [3]. The use of microbial drugs in the technology of cultivating crops helps to increase the quality of plant products. In addition, with the use of bacteritisation, the plant's disease is reduced due to the fact that the ecological niche has beneficial microorganisms, which indirectly hinder the development of pathogens and increase the immune state of plants. One of the promising directions for the creation of new highly effective biologics is the use of their active basis of mixed cultures of diazotiros. According to preliminary studies and data from other authors [12-14], it is promising to create soy medicines that contain Bradyrhizobium / aponicum tuberous bacteria and Azospirillum brasilense associative diazotrophy. The complex pre-sowing bacterialization of the seeds by these microorganisms may increase, as compared with the use of pure crops, the growth of rhizobia and the functional activity of symbiotic diazotrophs. Taking into account the above-mentioned, the study of the effectiveness of complex inoculation of soybean seeds with tuberous bacteria and azopyrilas is relevant. The purpose of the research was to investigate the effect of seed sowing bacteria of diazotrophy B. apocomium and A. brasilense on the effectiveness of the symbiosis of bulb bacteria with plants and soybean productivity. Materials and methods of research. Objects of research: B. \ aponicum M-8 [10], A. Larry, 18-2 [1], A. Lrasilense 410 [11]. All microorganisms are derived from the collection of useful soil microorganisms at the Institute of Agricultural Microbiology and Agro-Industrial Production of the National Academy of Sciences of Ukraine. The cultivation of bacteria was carried out in a vessel of 500 cm3 in a rocker with a time 240 rev / min at a temperature (28 ± 2) ° C. An optimized nutrient field was used for the combined cultivation of B. apocomium and A. lrasilense [11, 12]. Sowing material B.suponicum and A. brassilense were introduced in a ratio of 1: 1. Cultivation time - 72 hours. The Azospirillum lazylene culture culture was grown under periodic cultivation on a microbiological rocker at a rate of 220 rev / min at a temperature of 28 ° C. Use the following nutrient medium (g / dm3):

Fig. 1. Influence of pre-sowing bacteria on the overweight of soybean varieties of legend corn extract - 30; Molasses - 30; (NH4) 2 SO4 -0.10; KH2PO4 - 0.25; K2HPO43H2O - 0.25; MgSO 4 O H 2 O - 0.20; CaC03 - 0.30.

Bacteria of the genus Bradyrhizobium were cultivated under the same conditions in a liquid nutrient medium of such a composition (g / dm3): the decoction of pea seeds - 100; Glucose - i0; Sucrose - 5; (NH4) 2SO4 - 1.0; KH2PO4 - 0.5; K2HPO43H2O-0.5; MgSO 4 O H 2 O - 0.2; CaC03 - 0.3. The number of microorganisms in the bacterial suspension was determined by the cup method [5]. Influence

of B. japonicum and A. brasilense, cultivated in pure and mixed cultures, was checked in a field experiment with soya legend on the meadow-chernozem ground. Planning and conducting of field experiments, crop accounting and statistical processing of the received data is carried out in accordance with generally accepted methods [4]. Scheme of field experiments: without bacteritisation (control); Pre-sowing bacteria of soybean seeds Bradyrhizobium japonicum M-8; Pre-sowing bacteria Azospirillum brasilense 410; Pre-sowing bacteria Azospirillum brasilense 18-2; Pre-sowing bacteria Bradyrhizobium japonicum M-8 and Azospirillum brasilense 410; Pre-sowing bacteria Bradyrhizobium japonicum M-8 and Azospirillum brasilense 18-2. The nitrogen fixation activity in soybeans was determined by the acetylene method on a Chrom-4 gas chromatograph with a flame-ionization detector on a column of - - oxydipropionitrile [5]. Research results. In rhizosphere, roslin, as a rule, develop bacteria (in particular diazotrophs), which belong to different species. It should be noted the specificity of the interaction of nitrogen fixing microorganisms among themselves, which can be manifested in positive and negative influences on each other. This is reflected in the effectiveness of bacterial application in the cultivation of crops, in particular soybeans. It has been established that in all phases of development, the largest supramaxis of soybean plants was in variants with preplant complex bacterialization of seeds. The highest indices were noted in the variant with the combined application of the tuber bacteria and L. L. bacillus 410 (Figure 1): in phases of 3 leaves, this figure exceeded the variation from V. \ aponicum M-8 by 12.7%, Bloom - 20,6, bob formation - by 31,5%. Bulbs on the roots of soybean plants were formed only in variants with pre-sowing bacteriurization of seeds of V. \ aponicum M-8 in pure culture and in combination with azopyrilam (Fig. 2). It should be noted that the pre-sowing bacteria appeared to be the most effective with tuberous bacteria, along with L. lagisierus 410. Thus, the number of tubers in this variant increased the investigated index in plants bacteria B. \ aponicum M-8, in phases 3 Leaves - by 83%, flowering - 23,3, boboute-grouse - by 40,7%.

The weight of the tubers formed on the roots of soy was higher than the use of butter rice. 2. Effect of pre-sowing bacteria on the number of tubers on the root system of soybean plants of the legend variety Fig. 3. Influence of pre-sowing bacteria on the mass of tubers on the root system of soybean leaf cultivars of the Legend variety Fig. 4. Influence of pre-sowing bacteria on the nitrogen-fixing activity of soybean tubers cultured with A. brasi¬lense 410 and A. brasilense 18-2 (Fig. 3). Such a regularity was traced throughout the vegetative period of plants in all years of exploration. In addition, in variants with complex bacteriation, the mass and number of tubers were significantly higher compared to the variant where the pre-sowing inoculation of soybean seeds with pure culture of rhizobia was performed. In phases of 3 leaves, the mass of tubers in variants with the combination of tuber bacteria with A. brasilense 410 and A. brasilense 18-2 was significantly higher by 100 and 115%, flowering - by 24 and 13%, bob formation - by 30 and 26%. The obtained data testify to the positive effect of azopyril on the development of symbiotic soybean apparatus, which is also confirmed by the activity of nitrogen fixation of rhizobia in symbiosis with soybean plants. During the study of the effect of pre-sowing bacteria on the nitrogen-fixing activity (AA) of bulbous bacteria of soya, its growth was established in all phases of development of rosin in variants from V. \ aponicum M-8 in pure culture and in combination with strains of azopyril (Figure 4) . The highest activity was in the variant with the combined bacteritisation of V. \ aponicum and A. brasilense in the flowering phase - 6.06 - 6.38 g N per plant / year, which is 42-49% higher than in the version with ribosomes. The data obtained can be explained by the ability of azospirils to produce physiologically active compounds that affect the effectiveness of plant-microbial symbiosis. The integral indicator that determines the effectiveness of a particular method is the yield of crops. Studies of soybean productivity in pre-sowing seed treatment with tuberous bacteria and azo-spirilles have confirmed the high efficiency of complex bacteritisation. In 2011-2013, the average yield of soybeans in the variant of B. japonicum M-8 and A. brasilense 410 was 2.96 t / ha, which is 16% higher than in the case of inoculation with a pure culture of bulbous bacteria, In variant B. japonicum M-8 and A. brasilense 18-2 - 2.78 t / ha, which is 9% higher than in the version with pure crop rice (table).

Conclusions

It has been established by research that the complex pre-sowing bacteria of soybean seeds with tuberous bacteria and azopyrilas contributes to an increase in the number of tubers on the coliform system of plants by 22-83%, an increase in the mass of tubers by 13-115 and a nitrogen fixation activity of 42-96%. The growth of soybean weight in all phases of development was revealed by the action of bacteria by ribosomes and azospirils. The yield of soybean grain in variants with mixed crops increases by 0.23-0.41 t / ha, or 9-16%, compared with inoculation by pure culture of bulbous bacteria. The results of the research confirm the expediency of using inoculant on the basis of mixed cultures of microorganisms B. japonicum and A. brasilense in soybean cultivation technologies.

Bibliography

1. Ac.1796603 USSR, MKI C05F11 / 08, C12 № 1/12 Azospirillum brasilense bacterial strain for the production of bacterial fertilizer under the carpal tunnel bezvosty / V.V. Volkogon, NN Maltseva, L.I. Onishchenko, VG Minyailo, T.V. Kharchenko, SV Lemeshko, E.N. Shevchuk; Published February 23, 1993 Bull № 7.

2. Bioloaic nitrogen / [V. P. Patik, S. Ya. Kots, 01B. V. Volkogon et al.]; Ed. VP Patches - K .: World, 2003. - 424 pp.

3. Volkogon V.V. Biological reclamation of soils. Traditional and new / V.V. Volkogon // Agricultural-economic microbiology: intersection. Those Sciences Save - 2011. - Vip. 13. - p. 7 -22.

4. Armor BA Field experiment technique / BA Armor - M .: Kolos, 1985. - 376 pp.

5. Experimental Soil Microbiology / [VV Volkogon, O.V. Nadkernichna, S.F. Kozar and others.]; Ed. VV Volkogon - K .: Agrar. Science, 2010. - 464 pp.

6. Kozar S.F. Influence of sources of biogenic elements on the growth of Bradyrhizobium japonicum and Azospirillum brasilense for their co-cultivating / S.F. Kozar // Agricultural Microbiology: Intermediate. Topic Sciences Save - Chernigov: Sever-Print, 2013. - Vip. 18. - P. 75-86.

7. Kozar S.F. Optimization of the medium for the cultivation of Bradyrhizobium japonicum and Azospirillum brasilense / S.F. Kozar // Ibid. - Chernigov: Sevre-Druk, 2014. - Vip. 19. - P. 27 - 32.

8. Methodology and practice of use of microbial preparations in technologies of cultivation of crops / [VV. Volkogon, AS Zarishnyak, IV Grinick, etc.]. - K .: Agrar. Science, 2011. - 156 p.

9. Microbial drugs in agriculture. Theory and practice / [V.V. Volkogon, O.V. Nadkernichna, T.M. Co-Walewski et al.]. - K .: Agrar. Science, 2006. - 312 p.

10. Pat. 39545 A Ukraine IPC6 C12N 1/20, C12R 1/41, C05F 11/08, A01N 63/00, A01P 21/00, A01C 1/06. Bulb bacteria strain Bradyrhizobium japonicum M-8 kirchner, which is used to prepare a bacterial drug that increases soy yield / M.z. Tolkachov, VP Patika, IO Kamenev, L.Yu. Gritschina; Applicant And patents. Southern Branch of the Institute of Agricultural Microbiology of the Ukrainian Academy of Agrarian Sciences. - No. 2000105680; Stated. 06.10.2000; Published June 15, 2001 Bull No. 5.

11. Pat. 40542 Ukraine MPK C05F11 / 08, C12 No. 1/20 Azospirillum brasilense bacteria strain for the production of bacterial fertilizers under buckwheat / VI Lohova, O.V. Superior; Applicant And patents. Ukrainian Research Institute of Agricultural Microbiology of UAAS. - No. 4323845 / SU; Stated. 11.2.1987; Published July 16, 2001 Bull No. 6.

12. Benintende S. Comparative Practice for Bondyrhizobium japonicum and Azospirillum brasilense and inoculation with simple Bradyrhizobium japonicum en la nodulaci n, crecimiento y acumulacion de Nilo cultivo de soja / S. Benintende, W. Uhrich, M. Herrera et al.//AgriScientia. - 2010. - V. 27, No. 2. - P. 71 - 77.

13. Galu Y.G.M. Dual inoculation with strains of Bradyrhizobium japonicum and Azospirillum brasilense to improve growth and biological nitrogen fixation of soybeans (Glycine max L) /Y.G.M. Galal / Biology and Fertility of Soils. - 1997. - V. 24, No. 3. - P. 317- 322.

14. Thi Thi Aung. Enhanced soybean biomass by co-inoculation of Bradyrhizobium japonicum and plant growth promoting rhizobacteria and its effects on microbial community structures / T. Aung, B. Buranabanyat, P. Piromyou et al .//Afr. J. Microbiol. Res - 2013. - V. 7 (29). - P. 3858 - 3873.

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