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of the Institute of Plant Biology and Biotechnology

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СЕРИЯ БИОЛОГИЧЕСКАЯ И МЕДИЦИНСКАЯ

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RESEARCHESON THE DEVELOPMENT OF BIOADDITIVES BASED ON CONSORTIA OF SOIL MICROORGANISMS

Abstract. A new promising direction of increasing the yield and quality of agricultural products, preserving and replenishing the natural fertility of soils is the development of biologically active additives with organic and organomineral fertilizers.

The purpose of our research was to develop and optimize the technology of obtaining directional bioadditives, study the patterns and effectiveness of their effects on plants. Bioadditives based on consortia of soil microorganisms providing for accelerated growth of plants, improving their qualitative characteristics, as well as increasing the fertility of poor soils were developed and tested.

The technology of fermentation of aerobic cultivation of the following bioadditives based on consortia of soil microorganisms Azotobactervinelandii, Beijerinckiafluminensis, Bacillus cereus and Bacillus maceranshas been worked out. In our researches, we used a less complex mineral composition, which ensures a good growth of cultures and accumulation of the necessary amount of active biomass of bacteria.Cultivation of consortia was carried out in a laboratory fermenter. Sowing of cultures in a nutrient medium was carried out simultaneously. During cultivation samples of a cultural liquid were selected and the quantity of each kind of bacteria of the consortium was determined in them. The determination was carried out by dilution and seeding on a solid nutrient medium (Koch method). A consortium of nitrogen-fixing bacteria was plated on a nitrogen-free medium (Ashby), a consortium of a mineral of dissolving bacteria on MPA + CA = 1: 1.

The results of the experiment showed that the concentration of cells in the resulting preparation was 10^{13} cells/ml. Of these, 25% was attributed*to Azotobactervinelandii*, 30% to *Beijerinckiafluminensis*, 20% to *Bacillus macerans*, and 25% to *Bacillus cereus.*

Keywords: biofertilizers, bacterial biomass, mold fungi, a consortium of microorganisms, a liquid nutrient medium, mineral fertilizers, *Azotobactervinelandii, Beijerinckiafluminensis, Bacilluscereus, Bacillusmacerans*.

Introduction. As the development of agricultural ecosystems created to maximize production, the impact on nature caused by the redistribution of energy and matter on the surface of the Earth is constantly increasing. The perfection of labor tools, the introduction of high-yielding crops and varieties that require a large number of nutrients, began to violate the natural processes[1-5].

Unreasonable methods of protecting crops and the system of land are devastating, soil erosion and loss of fertility due to irrational use and non-compliance with preventive measures and technology of soil protection, contamination of surface and groundwater with residues of pesticides and nitrates coming from agricultural lands; and much more [6-10].

To regulate and solve these problems, scientifically based techniques and methods are needed that, in certain cases, can only partially prevent or reduce the undesirable effects that arise in the production of primary biological products under various management conditions [11-15].

One of the most promising approaches to this task is the development of bioadditives based on consortia of soil microorganisms and plant growth regulators for the intensification of plant growing. Since ancient times, people have used soil microorganisms to increase crop yields. Prior to the appearance of chemically bound nitrogen in the cultivation of bread or the use of pastures, people could rely on

replenishing the soil with nitrogen only as a result of the activity of microorganisms. Based on soil bacteria in the XX century, such fertilizers as azotobacterin and phosphorobacterinwere created [16-19].

The aim of the research work is to study and develop biotechnology of bioadditives based on a consortium of soil microorganisms and plant growth regulators

Research methods

Study the growth kinetics of bacterial cultures. To determine the growth parameters of the micro-organismsbioadditives and the optimal fermentation time of *Azotobactervinelandii, Beijerinckiafluminensis, Bacillus cereus and Bacillus macerans*, the kinetics of their cultivation was studied in laboratory experiments.

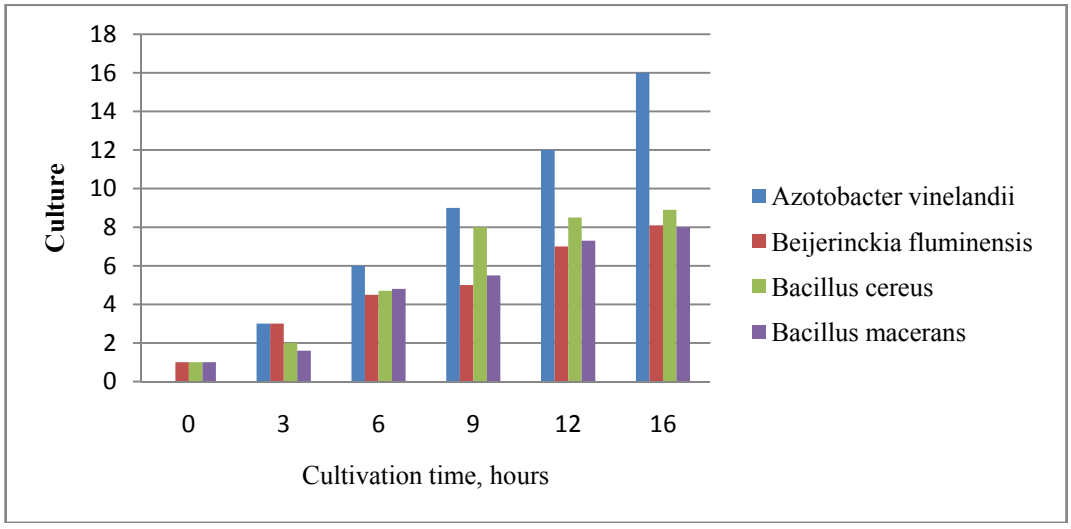
In the study of the growth dynamics of *Azotobactervinelandii, Beijerinckiafluminensis, Bacillus cereus, and Bacillus macerans,* a series of shaker experiments and a laboratory unit with a volume of 1 liter were performed with aeration and medium stirring at a mass exchange level of 4.0 kg O_2/m^3h. The composition of the mineral medium was used the same as for analyzing the effect of the carbonaceous substrate on the cultivation process. As the carbon source for all four cultures, sucrose was used at a concentration of 3 g/l.

Results and discussion

When sampling, microscopy of samples with drug staining was performed, which showed the presence of at least 90% of living cells in them. All growth curves of bacterial cultures, obtained from experimental data (table 1, figure), have a typical S-shape.

Table 1 – Dynamics of biomass accumulation (g/l) of bacteria when cultivated on a liquid nutrient medium

Culture	Cultivation time, hours							
Azotobactervinelandii	0	3	6	9	12	16	20	25
Beijerinckiafluminensis	1	3	4,5	5	7	8,1	8,3	8,4
Bacilluscereus	1	2	4,7	8	8,5	8,9	9,5	9,8
Bacillusmacerans	1	1,6	4,8	5,5	7,3	8	8,8	10



Bacterial biomass accumulation in cultivation in a liquid medium

However, due to the complexity of the composition and the absence of such a component as the juice of soybean seedlings, which is used in significant quantities (10%), it is not advisable to recommend this compound for industrial production in our region.

In our studies, we used a less complex mineral composition, which ensures a good growth of cultures and accumulation of the necessary amount of active biomass of bacteria.

Cultivation of consortia was carried out in a laboratory fermenter. Sowing of cultures in a nutrient medium was carried out simultaneously. During cultivation samples of a cultural liquid were selected and the quantity of each kind of bacteria of the consortium was determined in them. The determination was carried out by dilution and seeding on a solid nutrient medium (Koch method). A consortium of nitrogen-fixing bacteria was plated on a nitrogen-free medium (Ashby), a consortium of a mineral of dissolving bacteria on MPA + CA = 1: 1. The repetition of the experiment is threefold. The averaged results are presented in tables 2 and 3.

Table 2 – Dynamics of nitrogen-fixing bacteria in cultivation in a consortium on a liquid nutrient medium (Cl/ml)

Option	Cultivation time, hours							
Consortium: *Beijerinckia fluminensis Azotobactervinelandii*	0	3	3	9	12	16	20	25
	$1{,}2\cdot10^{3}$	$2\cdot10^{s}$	$10\cdot10^{5}$	$7\cdot10^{6}$	$6{,}5\cdot10^{s}$	$2\cdot10^{8}$	$7\cdot10^{11}$	$7\cdot10^{13}$
	$6\cdot10^{4}$	$1\cdot10^{5}$	$5\cdot10^{5}$	$4\cdot10^{6}$	$4\cdot10^{8}$	$1\cdot10^{11}$	$4\cdot10^{11}$	$4\cdot10^{13}$
	$8\cdot10^{4}$	$1\cdot10^{5}$	$4\cdot10^{5}$	$2\cdot10^{6}$	$2\cdot10^{8}$	$10\cdot10^{10}$	$3\cdot10^{11}$	$3\cdot10^{13}$

Table 3 – Dynamics of the numbers of *Bacillus cereus* and *Bacillus macerans* in a consortium on a liquid nutrient medium (Cl/mL)

Option	Cultivation time, hours							
Option	Cultivation time, hours	3	3	9	12	16	20	25
	0	3	5	7	13	21	24	30
	$1\cdot10^{5}$	$2\cdot10^{s}$	$2\cdot10^{6}$	$7\cdot10^{6}$	$3\cdot10^{8}$	$8\cdot10^{10}$	$2\cdot10^{11}$	$2\cdot10^{13}$
Consortium: *Bacillus cereus*	$7\cdot10^{4}$	$1\cdot10^{5}$	$4\cdot10^{5}$	$1\cdot10^{7}$	$2\cdot10^{6}$	$4\cdot10^{10}$	$1\cdot10^{11}$	$1\cdot10^{13}$
Bacillus macerans	$9\cdot10^{3}$	$1\cdot10^{5}$	$5\cdot10^{8}$	$2\cdot10^{6}$	$1\cdot10^{7}$	$3\cdot10^{10}$	$1\cdot10^{11}$	$1\cdot10^{13}$

Previously, for the joint cultivation of *Azotobactervinelandii* and *Bacillus mucilaginosus*, a nutrient medium composition was proposed that includes %: soybean-10 seed juice, 0.5 sucrose, 0.5 starch, yeast extract -0.005, MgSO4 -0.02, K2HPO4 -0.1, NaCl-0.02, CaCO3 -0.3, a solution of microelements-0.3, vitamin-B1-3 ppm, vitamin B12-3 ppm.

The solution of microelements includes,%: Na2MoO4-0.5, H3BO3-0.5, FeCl3 -0.5.

In our studies, we used a less complex mineral composition, which ensures a good growth of cultures and the accumulation of the necessary amount of active biomass of bacteria. Cultivation of consortia was carried out in a laboratory fermenter. Sowing of cultures in a nutrient medium was carried out simultaneously. During cultivation samples of a cultural liquid were selected and the quantity of each kind of bacteria of the consortium was determined in them. The determination was carried out by dilution and seeding on a solid nutrient medium (Koch method). A consortium of nitrogen-fixing bacteria was plated on a nitrogen-free medium(Ashby), a consortium of mineral dissolving bacteria on MPA + CA = 1: 1 (figure 1).

The repetition of the experiment is threefold. The averaged results, dynamics of nitrogen-fixing bacteria in cultivation in a consortium on a liquid nutrient medium are presented in tables 2 and 3.

Conclusion. The experiment was carried out without growing the plants. Before applying the bioadditives, the soil was moistened to a humidity of 70-75% and kept at room temperature (20-22 °C) for 24 hours. Bioadditive for the experiment was developed in the laboratory. The concentration of cells in the resulting preparation was 10^{13}cells/ml. Of these, 25 % were *Azotobactervinelandii*, 30% - *Beijerinckiafluminensis*, 20% - *Bacillus macerans*, 25 % - *Bacillus cereus*.

The seventh day in the control conditions, the number of fungi and bacteria was practically the same and amounted to 1·10 cells/g of soil, respectively, with one bacterium dominated by one species of rod-shaped bacteria with dilapidated colonies.

The introduction of bioadditives into the soil caused a decrease in the fungal microflorasoil (0.4·10 cells/g) and an increase in the number of bacteria (20·10 cells/g), and the species diversity of bacteria also increased.

The introduction of compost in the soil led to an increase in the number of microflora and, to a greater extent, mushroom. The number of fungi and bacteria in

This variant was 4·10 and 6·10 cells/g.

The joint application of bioadditives and compost to the soil promoted the increase in the number of bacteria in comparison with the control, compost andbioadditive. The number of bacteria in variants No. 4 and No. 5 was 64·10 cells/g and 84 cells/g, respectively, of fungi -2·10 and 3·10 cells/g, respectively.

REFERENCES

[1] Vinarov A.Yu., Ipatova T.V., Dirina E.H., Sementsov A.Yu. Bioadditives and microfertilizers of new generation // Agrochemical bulletin. 2003. N 2. P. 38-40.

[2] Vinarov A.Yu., Kukharenko A.A., Sementsov A.Yu., Ipatova T.V., Dirina E.H. Microfertilizers and bioadditives for plant growth and development. Moscow: Rosselkhozakademiya, 2002. 86 p.

[3] Voronin A.M. Biotechnology of soil remediation based on microbial -plant interaction // Materials of the 1st international 125 Congress "Biotechnology - the state and development prospects." Moscow, 14-18 October 2002. P. 98-100.

[4] Sveshnikova E.V., Chetverikov S.P., Loginov O.N. Biological control agents of the genus Pseudomonas possessing nitrogenase activity // The 2 nd international congress "Biotechnology - state and prospects of development". Moscow, November 10-14, 2003.

[5] Fatykhova Yu.N., Minaeva O.M., Bondarenko A.A. Development of a biofungicide based on bacteria of the genus Azotobacter and Pseudomonas // Regional problems of ecology and nature management. Tomsk, November 25-26. 2000.

[6] Alekseeva T.P., Perfilieva V.D. Organomineral fertilizer prolonged action on the basis of peat // Proceedings of the Sh-th International Scientific and Practical Conference. Novosibirsk, 2000.

[7] Panikov N.S. Kinetika rosta mikroorganizmov. M.: Nauka, 1992. 311 p.

[8] Sushkova V.I., Vorob'jova G.I. Bezothodnaja konversija rastitel'nogo syr'ja v biologicheski aktivnye veshhestva. Kirov, 2007. 204 p.

[9] Sushkova V.N. Bezothodnaja konversija rastitel'nogo syr'ja v biologicheski aktivnye veshhestva / V.N. Sushkova, G.I. Vorob'eva. M.: DeLiPrint, 2008. 216 p.

[10] Zhukov N.A. Teoreticheskie osnovy i tehnologicheskie principy nepreryvnoj konversii rastitel'nogo syr'ja: Avtoref. dis. … d-ra tehn. nauk. Kirov, 2001. 63 p.

[11] Luht H. Poluchenie pitatel'nogo korma nabaze solomy // Kombikorma. 2000. N 8.

[12] Ibragimova S.A. i dr. Morfologicheskie i fiziologicheskie osobennosti griba pri kul'tivirovanii s cel'ju poluchenija kormovogo belka // «Biotehnologija na rubezhe dvuhtysjacheletij»: sb. materialov na uchno-tehn. konf. Saransk, 2001. 85 p.

[13] Evdokimova O.A. Tehnologicheskie aspekty proizvodstva i primenenija s#edobnyh gribov // Tr. Vtorogo s#ezda Obshhestva biotehnologov Rossii. M.: Del'ta, 2005. 45 p.

[14] Kubahov A.V. Biotehnologicheskij centr v Voronezhe // Tr. Vtorogo s#ezda Obshhestva biotehnologov Rossii. M.: Del'ta, 2005. 63 p.

[15] Sushkova V.I. Jeffektivnost' rostadrozhzhej S. cerevisiae (diastaticus) VKPM-3124 pri vyrashhivanii na osvetljonnyh krahmalsoderzhashhih sredah // «Nauka - proizvodstvo - tehnologii - jekologija»: sb. Materialov Vserossijskoj nauchno-tehn. konf. Kirov, 2006. Vol. 3.

[16] Panfilov V.I. Biotehnologicheskaja konversija uglevodsoderzhashhego rastitel'nogo syr'ja dlja poluchenija produktov pishhevogo i kormovogo naznachenija. Kirov, 2004. 10 p.

[17] Leshhinskaja I.B. Vvedenie v biotehnologiju. Sovremennoe estestvoznanie: Jenciklopedija: V 10 t. Gl. red. V. N. Sojfer. T. 10. M.: Izdatel'skij Dom MAGISTR-Press, 2001. P. 187–201.

[18] Krasnoshtanova A.A., Krylov I.A., Babusenko E.S. Osnovy biotehnologii. M.: RHTU im. D. I. Mendeleeva, 2001. 84 p.

[19] Jagafarova G.G. Tehnologija bioorganicheskogo sinteza. Ufa: Izd-vo UGNTU, 2000. 105 p.

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ТОПЫРАҚ МИКРОАҒЗАЛАР КОНСОРЦИУМЫНА НЕГІЗДЕЛГЕН БИОҚОСПАЛАР ЖАСАУ НЕГІЗІН ЗЕРТТЕУ

Аннотация. Биологиялық белсенді қоспаларды және органикалық және органикалық минералды тыңайтқыштарды дамыту ауылшаруашылық өнімдерінің сапасын арттыру, топырақтың табиғи құнарлылығын сақтау және толтыру үшін жаңа перспективалық бағыт болып табылады.

Зерттеудің мақсаты - әсері бар биоқосымшаларды алу технологиясын әзірлеу және оңтайландыру, өсімдіктерге олардың тиімді әсерін және заңдылықтарын зерттеу болып келеді.Биоқосымшалар өсімдіктердің тез өсуін қамтамасыз ететін топырақ микроорганизмдерінің консорциумы негізінде әзірленді және сыналды, олардың сапалық сипаттамаларын жақсартты, сондай-ақ нашар топырақтардың құнарлылығын жоғарылатты.

Топырақ микроорганизмдерінің Azotobacter vinelandii, Beijerinckia fluminensis, Bacillus cereus и Bacillus macerans концорциумдарына негізделген келесі биобиоқосымшаларды аэробты өсіру ашыту технологиясы әзірленді.Жүргізілген зерттеуге сәйкес, минералды қоспаның күрделі қоспасын қолдану ұсынылды, ал бұл бактерия биомассасының жақсы өсіп-дамуына көп мөлшерде жинақталуына мүмкіндік береді. Консорциумды өсіру лабораториялық ферментерде жүргізілді. Қоректік ортаға культураны егу бір мезгілде өтті. Өсіру барысында үлгі дақылдық сұйықтықтан алынып, бактериялар консорциумының әрбір жекелеген түріне олардың мөлшеріне зерттеулер жүргізілді. Анықтау барысы сұйылту әдісіне сай, қатты ортаға қайта егу арқылы жүзеге асырылады (Кох әдісі). Азот фиксирлеуші бактериялардың консорциумын азоты жоқ Эшби ортасына егу МПА-СА = 1:1 минералды ыдырату бактериялары консорциумына сай жүргізілді.

Қорытынды тәжірибелер көрсеткендей, алынған бактерия жасушаларының концентрациясы 10^{13} кл/мл артты. Оның ішінде 25% Azotobactervinelandii, 30% - Beijerinckiafluminensis, 20%- Bacillus macerans, 25% - Bacillus cereus тұрады.

Түйін сөздер: биотыңайтқыштар, бактерия биомассасы, саңырауқұлақтар, микроағза консорциумы, сұйық қоректік орта, минералды тыңайтқыштар, Azotobactervinelandii, Beijerinckiafluminensis, Bacilluscereus, Bacillusmacerans.

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ИЗУЧЕНИЯ РАЗРАБОТКИ БИОДОБАВКИ НА ОСНОВЕ КОНСОРЦИУМОВ ПОЧВЕННЫХ МИКРООРГАНИЗМОВ

Аннотация. Новым перспективным направлением повышения урожайности и качество сельскохозяйственной продукции, сохранения и восполнения естественного плодородия почв является разработка биологически активных добавок и органическим и органо- минеральным удобрениям.

Целью наших исследований была разработка и оптимизация технологии получения биодобавок направленного действия, изучение закономерностей и эффективностиих воздействия на растения. Были разработаны и испытаны биодобавки на основе консорциумов почвенных микроорганизмов обеспечивающие ускоренный рост растений, улучшения их качественных характеристик, а также повыщающие плодородия бедных почв.

Отработано технология ферментации аэробного культивирования следующих биодобавок на основе консорциумов почвенных микроорганизмов Azotobactervinelandii, Beijerinckiafluminensis, Bacilluscereusi Bacillusmacerans.Согласно исследованию, было предложено использовать сложную смесь минеральных удобрений, которая позволяла бактерии биомассы накапливаться в больших количествах.Разведение консорциума проводили в лабораторных ферментах.Одновременно проводили посев культуры в питательных средах. Во время культивирования образец извлекали из культивируемой жидкости и исследовали для каждого отдельного вида бактериальных консорциумов и их размера.Процесс обнаружения проводили путем рециркуляции в твердую среду (метод Кох) в соответствии с методом разбавления.Концентрат бактерий азота, закрепляющий азот, сделан посев в среде Эшби без азота в соответствии с бактериальным консорциумом для разложения минерального разложения МРА-Са 1: 1.

Результаты эксперимента показали, что концентрация клеток в полученном препарате составляла 10^{13} кл/мл. Из них 25% приходилось на Azotobactervinelandii, 30% - Beijerinckiafluminensis, 20% - Bacillus macerans, 25% - Bacillus cereus.

Ключевые слова: биоудобрения, бактериальная биомасса, плесневые грибы, консорциум микроорганизмов, жидкая питательная среда, минеральные удобрения, Azotobactervinelandii, Beijerinckiafluminensis, Bacilluscereus, Bacillusmacerans.

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