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РЕСПУБЛИКИ КАЗАХСТАН
Института биологии и биотехнологии растений

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# SCREENING OF STAMMS OF MUSHROOMS OF THE SORT OF *TRICHODERMA* AND *MORTIERELLA* FOR THE DETERMINATION OF THE GROWTH STIMULATING ACTIVITY OF THE LEGUMINOUS AND FORAGE CULTURES

**Abstract.** The results of the study of the growth-stimulating action of *Trichoderma viride 22, Trichoderma album 23, Trichoderma asperellum 175, Trichoderma asperellum 1M* and *Mortierellaalpina* antigens isolated from the soils of the Almaty region on the growth and development of leguminous and forage crops. It has been established that the biologically active substances released by various species of the fungus of the genus *Trichoderma* in a certain concentration stimulate the growth and development of plants of peas, beans, alfalfa and increase their resistance to diseases. The greatest growth-stimulating activity was possessed by 3% culture fluid of the fungus *Trichoderma viride 22 and Trichoderma album 23.* Various concentrations of arachidonic acid obtained from the fungus *Mortierella sp.* Stimulated the growth of the chickpea stem, and in peas and alfalfa - except for the growth of the stem and roots. The culture liquid *Mortirella sp.* in 5% and 10% concentration had growth stimulating activity. All test crops react differently to the action of growth substances produced by the fungus *Mortierella sp.* The use of arachidonic acid reduced root growth, but stimulated stem growth in chickpeas. In alfalfa and peas, the stimulating effect of arachidonic acid on the stem and root was observed in all variants of the experiment. The purpose of the study was to study the growth-stimulating properties of the isolated fungi of the general *Trichoderma* and *Mortierella*, a producer of arachidonic acid, on legumes and fodder crops.

**Keywords:** arachidonic acid, legumes, microfunguss, influence of activity of growth.

Reduced growth in perennial and annual herbs, soybeans, peanuts, hawthorn and horticultural crops, reduction of soil fertility and reduction of crop cultivation culture, anddeclining productivity of growing crops. At the same time, the chemicals of plant protection and fertilizer application have led to a sharp reduction. In this case, one of the ways to overcome this problem is to switch from biological and ecologically safe farming through the widespread introduction of seedlings of bean, peanut butter plants with symbiotic activity [1-3].

Peanut cultures are one of the most important organic and biological sources of biological nitrogen, also an important source of vegetable protein, a good source of cereal crops, and increased soil fertility.

He is paying great attention to bean crops in world agriculture. The sown area of bean crops in the world is about 100 million tons. and it reaches 20% of the gross crop yield. Grain and leguminous crops take an important place in the raw material balance of the state among different agricultural crops, providing the production of high protein products in the direction of food and livestock resources [4-6].

In order to address the problem of the protection of grain and leguminous crops, it is necessary to use protective methods to reduce pathogenic potential (potential) in soil and seeds. Every year, there is a great interest in specific biological and environmentally sound methods of combating agricultural pests and diseases [7-9]. However, biological agents are widely used in agriculture on the basis of microb antagonists that inhibit the pathogenicity of cultural plants as an alternative to chemicals. Often, the blocking of such biological agents is based on biological control directly from the dominant principle of plant microflora in the environment [10-14].

Microscopic mushrooms of Trichoderma are biological control agents that provide essential antibiotics and hydrolase (chitinase and glucanase), which provide a set of antipathogenic factors, which are the basis of plant protection from pathogenic organisms. In order to improve the behavior of Trichoderma mushrooms, it is planned to create complex preparations with other fungal fungi that perform useful functions of plants.In recent years, *Mortierella sp.* Supposes that natural biologically active substances are based on the strengthening of plant protection mechanisms by using the ellipses, which suppose the other side effects that promote plant resistance to pathogens. a great deal of attention is paid to arachidic acid, which relates to unsaturated, unsaturated fatty acids that form with mushrooms [15-18].

The object of the research is the *Trichoderma* mushroom strains extracted from the rhizosphere of the cucumber cultivated in the «Алмалыбақ» farm in the Karasai district of the Karasai district of the Sarykand district of the Sarkand area and the Siberian Biochemistry of the Scriabin Microorganisms of the Russian Federation andInstitute of Physiology, *Mortierella sp.* mushrooms and arachidonic acid were used. In addition, seeds of "Ikarda", peat "Ambrosia" and "Cenernia" varieties of seeds were used in the study, each of which was used in 60 copies.

*Trichoderma* and *Mortierella sp.* In order to investigate the growth activity of the plants by the action of mushrooms, three methods were performed.

In the first experiment, seeds *22, 23, 175, 1M* strains of *Trichoderma* mushrooms with different biologically active ingredients grown in 7 days were fertilized for 2 hours in 50% and 3% culture fluids.

In the second practice, *Mortierella sp.* The main biologically active ingredient of the mushroom is the lipid nature of arachidonic acid. We cultivated seeds of seeds: in 10 liters of water we have processed 1.2 mg of arachidon acids, 0.6 mg and 0.3 mg.

In the third experiment - *Mortierella sp.,* Grown on day 11, in a water-treated environment at a concentration of 5 and 10%. We have determined the growth activity of the fungus cultured fluid.

Initially, the seeds were put into the Petri dish and the containers to the sterile soil, which was put into solid feeding medium by Kovrovsev, and then cultivated in a thermostat at 25 °C for two days and then for 7 days. We took distilled water as a controller [19].

We have determined the effects of the culture of fungicidal and the effect of arachidic acid on the growth of seeds, the length of sprouts and the growth of the seeds. On the 7th day, we measured the germination, biometric sightings and mass of sprouts. We used standard methods of mathematical processing of the obtained results. [20, 21].

Results and Discussion: In practice, the following results were obtained from seeds grown in the soil: The varieties of "Ambrosia" and "Oregon" were not grown, as the cultured liquids of *Trichoderma mushrooms 22, 175, 30, 1M* were poisonous at 1: 2 concentration in the water.The 1: 2 crushed concentration of the culture fluids of the *175* and *30* strains of Trichoderma mushrooms was toxic for the "Ikarda" grade of chick. However, at such concentrations, *Trichoderma viride 22* and *Trichoderma asperellum* were not very toxic to peat seeds treated by *1M* strains, because the growth of the shoots was weak.

*Trichoderma viride 22, Trichoderma album 23*, has been active in improving the growth of fungus when cultivating seeds with 3% culture fluid from Trichoderma mushroom. However, the strains *Trichoderma asperellum 175* only increased the root growth (table 1).

In practice, *Trichoderma asperellum* was less toxic to *1M* than the strains of *Trichoderma album 23* for root vein growth and growth. For cultivation of clover, 50% of the culture fluid of the *175, 1M, 30* and *22* strains of *Trichoderma* mushroom was not poisonous (table 1).

Significant growth activity was detected when cultivating the "Ambrosia" bean type with 3% culture fluid of *Trichoderma 22, 23, 1M* strains. These strains have improved the growth of the growth of bean veins and roots.

Table 1 – Indicators of growth activity of cultured aquatic fungi Trichoderma (chickpeas, cloves and peas)

| Crop | Stamp name | Calculation of laboratory germination of seeds | | Length, cm | |
|---|---|---|---|---|---|
| | | a piece | % | seeds | grow up |
| 50% culture fluid | | | | | |
| To Lucerne «The most beautiful» | Control | 57 | 95 | 1,6±0,1 | 4,3±0,2 |
| | *Trichodermaviride 22* | 60 | 100 | 1,8±0,1 | 5,4±0,2 |
| | *Trichoderma asperellum 175* | 33 | 55 | 1,7±0,1 | 3,1±0,2 |
| | *Trichoderma asperellum 1M* | 45 | 75 | 1,6±0,1 | 4,2±0,2 |
| | *Trichoderma asperellum30* | 39 | 65 | 1,9±0,1 | 4,1±0,2 |
| 3% culture fluid | | | | | |
| Noah «Ickarda» | Control | 57 | 95 | 10,0±0,4 | 12,9±0,8 |
| | *Trichoderma viride 22* | 60 | 100 | 11,7±0,8 | 17,2±1,0 |
| | *Trichoderma album 23* | 57 | 95 | 8,0±0,9 | 8,1±1,4 |
| | *Trichoderma asperellum 1M* | 51 | 85 | 6,3±0,5 | 21,6±1,2 |
| | *Trichoderma asperellum 175* | 57 | 95 | 6,4±0,9 | 15,7±1,2 |
| The «Greatest» in Lucerne | Control | 60 | 100 | 3,7±0,2 | 3,7±0,2 |
| | *Trichoderma viride 22* | 60 | 100 | 4,0±0,1 | 3,9±0,1 |
| | *Trichoderma album 23* | 60 | 100 | 4,1±0,2 | 4,3±0,1 |
| | *Trichoderma asperellum 1M* | 60 | 100 | 3,6±0,1 | 3,3±0,1 |
| Butcher «Ambrosia» | Control | 39 | 65 | 4,1±0,1 | 3,9±0,2 |
| | *Trichoderma viride 22* | 45 | 75 | 5,3±0,1 | 5,4±0,1 |
| | *Trichoderma album 23* | 48 | 80 | 4,6±0,1 | 6,4±0,2 |
| | *Trichoderma asperellum 1M* | 42 | 70 | 3,3±0,5 | 5,8±1,0 |

Table 2 – Indicators of growth of arachidon acids (chickpeas, cloves and peas)

| Arachidonic acid concentration, unit of mg | The growing number of seeds | | Length, cm | |
|---|---|---|---|---|
| | a piece | % | root | grow up |
| Noah «Ickarda» | | | | |
| Control | 60 | 100 | 11,4±0,4 | 4,3±0,4 |
| 1,2 | 60 | 100 | 7,1±0,6 | 6,1±0,6 |
| 0,6 | 60 | 100 | 8,4±0,6 | 6,5±0,7 |
| 0,3 | 60 | 100 | 4,6±0,3 | 3,6±0,2 |
| The "Greatest" in Lucerne | | | | |
| Control | 60 | 100 | 2,9±0,1 | 3,0±0,1 |
| 1,2 | 60 | 100 | 3,7±0,2 | 3,5±0,1 |
| 0,6 | 60 | 100 | 4,3±0,2 | 3,9±0,1 |
| 0,3 | 60 | 100 | 3,1±0,1 | 3,9±0,1 |
| Butcher "Ambrosia" | | | | |
| Control | 51 | 85 | 6,4±0,2 | 5,0±0,1 |
| 1,2 | 51 | 85 | 7,2±0,1 | 5,5±0,2 |
| 0,6 | 51 | 85 | 7,1±0,1 | 5,2±0,1 |
| 0,3 | 45 | 75 | 5,9±0,2 | 4,2±0,1 |

After 24 hours, when the peanut and lucerne were pushed with different concentrations of arachidonic acid, all seeds grew in volume and grown.

*Mortierella sp*. After treatment with arachidonic acid extracted from the mushroom, growth activity was observed in the concentration of 1.2 mg and 0.6 mg (table 2).

From table 3, 1.2 mg of arachidic acid; When using the concentration of 0.6 mg and 0.3 mg, the root growth activity of the "Ikarda" grade of the Knot decreased, but the growth of growth of the spleen in two concentrations (1.2 mg and 0.6 mg) increased by 1.8 - 2.2 cm controlled. In the variant of Cucumber seedlings, the activity of arachidic acid has been demonstrated in all tested concentrations.

Clover, pea and clover plants *Mortierella sp.* as a result of the study of the effects of the culture fluid, showed that plants tested significantly increased the growth of sprouts and roots in the treatment of 5% and 10% culture fluid (table 3).

Table 3 – *Mortierella sp.* Indicators of growth of fungal growth (beech, clover and peanut butter)

| Crop | Strain name | The number of | | Length, cm | |
|---|---|---|---|---|---|
| | | germination, a piece | growing plants, % | root | grow up |
| Noah «Ickarda» | Control | 10 | 100% | 7,6±0,1 | 12,1±0,2 |
| | *Mortierellasp.* 5% | 10 | 100% | 7,1±0,1 | 12,8±0,2 |
| | *Mortierella sp.* 10% | 10 | 100% | 14,2±0,1 | 25,5±0,2 |
| Butcher «Ambrosia» | Control | 5 | 50% | 2,1±0,1 | 10,0±0,1 |
| | *Mortierellasp.* 5% | 10 | 100% | 7,2±0,1 | 14,6±0,1 |
| | *Mortierellasp.* 10% | 10 | 100% | 6,7±0,1 | 16,4±0,1 |
| To Lucerne «The most beautiful» | Control | 20 | 100% | 3,0±0,1 | 2,7±0,1 |
| | *Mortierellasp.* 5% | 20 | 100% | 4,8±0,1 | 3,8±0,1 |
| | *Mortierellasp.* 10% | 20 | 100% | 5,2±0,1 | 4,1±0,1 |

*Mortierella sp.* One of the better options for the active growth of the fungal cultivation of the fungus was the Ambrionia grade of the bean cultivated by 5% cultured fluid. This concentration showed triple the growth of the rootstock of beetles, and 50% of the growth of the sprouts. *Mortierella sp.* The 10-year-old cultured mushroom culture had an effect on 40% growth of bean sprouts and 24% of the root length. There was a concentration of 5% of the culture fluid to treat the seeds of the seeds of "Ambrionia".

Mortar spinning seeds of "Ikarda" peppers are obtained by *Mortierella sp.* 5% culture fungus fungus, the intensity of growth of sprouts and veins was within the control version, and the 10-point culture fluid showed 68.3% and 50% vascular growth activity.

*Mortierella sp.,* Grown in nutrient medium with oatmeal, sodium citrate and zinc sulphate. when cultivating 5% and 10% fungal culture of the fungus, the spleen and roots of cranberry «the Green Quarter» showed the worst growth activity.

*Mortierella sp.* In the 10-point concentration of culinary fluid, cervical roots have shown increased activity by 42%, and the length of the spleen increased by 19% when cultured by a 5-well culture concentration. When cultivating 5% of the culture fluid concentration, the length of the sprout was approximately the same when the root length was 26% and 10% was treated with culture fluid.

When using arachidon acid it reduced the growth of the "Ikarda" peat's root growth, but showed an increase in growth rates of sprouting. In alfalfa and asparagus, the activity of arachidic acid has been observed in all varieties with intense activity of growth and root growth.

In this regard, as a result of the research, four *Morterella sp.* mushroom, which has a different effect on growth intensity. In fact, biologically active substances that form different types of Trichoderma mushrooms activate the growth of beans, chickpeas and cucumber plants in specific concentrations and increase the resistance to the disease. As a result of research, mushroom strains of *Trichoderma viride 22, Trichoderma album 23* and *Trichoderma asperellum 1M* (concentration of 3% culture fluid) showed considerable efficiency in growth activity. Meanwhile, arachidic acid (1.2% and 0.6%) has increased the growth of noxious beans by 72%, peanut and peppers by 30-35% and roots by 48.2-70%. *Mortierella sp.*

The concentration of 10% fungal culture of fungus has increased significantly. Therefore *Trichoderma* and *Mortierella sp.* can be used to increase the productive potential of plants in crop production and to obtain ecologically clean products, based on the culture fluid of the fungus.

The results of the study of the growth-stimulating effect of *Trichoderma viride 22, Trichoderma album 23, Trichoderma asperellum 175, Trichoderma asperellum 1M* and *Mortierella alpine* antigens isolated from light chestnut soils of the Almaty region on growth and development of leguminous and forage crops are presented. It is established that the biologically active substances released by various species of the fungus of the genus *Trichoderma* in a certain concentration stimulate the growth and development of plants of peas, beans, alfalfa and increase their resistance to diseases. The greatest growth-stimulating activity was possessed by 3% culture liquid of the fungus *Trichoderma viride 22* and *Trichoderma album 23.* . Different concentrations of arachidonic acid obtained from the fungus *Mortierella sp*. stimulated the growth of the chickpea stalk, and in peas and alfalfa - except for the growth of the stem and roots. The culture liquid *Mortirella sp*. in 5% and 10% concentration had growth stimulating activity. The use of arachidonic acid reduced root growth, but stimulated stem growth in chickpea. In alfalfa and peas, the stimulating effect of arachidonic acid on the stem and root was observed in all variants of the experiment. All test crops react differently to the action of growth substances produced by the fungus *Mortierella sp.*

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## БҰРШАҚТЫ ЖӘНЕ МАЛАЗЫҚТЫҚ ДАҚЫЛДАРДЫҢ ӨСУ БЕЛСЕНДІЛІГІН АРТТЫРУ ҮШІН *TRICHODERMA* ЖӘНЕ *MORTIERELLA* САҢЫРАУҚҰЛАҚТАРДЫҢ ШТАММДАРЫН ІРІКТЕП АЛУ

**Аннотация.** Бұршақты және малазықтық дақылдардың дамуына және өсуіне Алматы облысының топырағынан бөлініп алынған *Trichoderma* және *Mortierella* саңырауқұлақтар-антагонистерінің өсу белсенділігі зерттелді. *Trichoderma* саңырауқұлақтарының әр түрлі түрлерімен бөлінетін биологиялық белсенді заттар нақты концентрацияда бұршақ, асбұршақ және жоңышқа өсімдіктерінің өсуін және дамуын жақсартты және олардың ауруға төзімділігін жоғарлатты. *Trichoderma viride 22* және *Trichoderma album23* саңырауқұлақтарының культуралды сұйықтығының 3%-ы өсімдіктің өсу белсенділігін арттырды. *Mortierella sp.* Саңырауқұлағынан бөлініп алынған арахидон қышқылының әр түрлі концентрациялары ноқат өсімдігінің сабағының өсуін, ал бұршақ және жоңышқа өсімдіктерінің сабағы мен тамырларының өсуін жақсартты. *Mortierella sp.* культуралды сұйықтығының 5% және 10% концентрациясы өсімдіктердің өсу белсенділігіне ие болды. Сыналған ауыл шаруашылық дақылдар Mortierella sp. саңырауқұлағымен түзетін, арахидон қышқылы өсу қарқындылығына әр түрлі әсерін тигізді. Ал *Trichoderma viride 22*, *Trichoderma album 23* және *Trichoderma asperellum 1M* (3%-дық культуралды сұйықтығының концентрациясы) саңырауқұлақтардың штаммдары өсу белсенділігі бойынша тиімділік көрсетті. *Trichoderma 22, 23* және *Trichoderma asperellum 1M* саңырауқұлақтардың штамдарында тежеу спектрі байқалды, олар барлық сыналған патогендердің өсуін баяулатты, өсудің баяулау зонасы 40-45 мм болды.

**Түйін сөздер:** арахидон қышқылы, бұршақты және малазықтық дақылдар, микроскопиялық саңырауқұлақтар, өсу белсенділігінің әсері.

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# СКРИНИНГ ШТАММОВ ГРИБОВ РОДА *TRICHODERMA* И *MORTIERELLA* ДЛЯ ОПРЕДЕЛЕНИЯ РОСТСТИМУЛИРУЮЩЕЙ АКТИВНОСТИ БОБОВЫХ И КОРМОВЫХ КУЛЬТУР

**Аннотация.** Приведены результаты исследования ростстимулирующего действия штаммов – антагонистов *Trichoderma viride 22, Trichoderma album 23, Trichoderma asperellum 175, Trichoderma asperellum 1M* и *Mortierella alpine*, выделенных из светло-каштановых почв Алматинской области, на рост и развитие бобовых и кормовых культур. Установлено, что биологически активные вещества выделяемые, различными видами гриба рода *Trichoderma*в определенной концентрации стимулируют рост и развитие растений гороха, бобов, люцерны и повышают их устойчивость к болезням. Наибольшей ростостимулирующей активностью обладала 3% культуральная жидкость гриба *Trichodermaviride 22* и *Trichodermaalbum 23*. Различные концентрации арахидоновой кислоты, полученной из *гриба Mortierellasp.* стимулировали рост стебля нута, а у гороха и люцерны – кроме роста стебля и корни. Культуральная жидкость *Mortirellasp.* в 5%-ной и 10%-ной концентрации обладала ростстимулирующей активностью. Применение арахидоновой кислоты снижала прирост корня, но стимулировала рост стебля у нута. У люцерны и гороха наблюдалось стимулирующее действие арахидоновой кислоты на стебель и корень во всех вариантах опыта. Все испытуемые сельскохозяйственные культуры по-разному реагируют на действие ростовых веществ, продуцируемых грибом *Mortierellasp.*

**Ключевые слова:** арахидоновая кислота, бобовые и кормовые культуры, микроскопические грибы, влияние активности роста.

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