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ACTINOMYCETES AS BIOSTIMULANTS

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ABSTRACT

The article discusses the dynamics of biosynthesis of antibiotic substances of protein nature by local strains isolated from acreage intended for cotton cultivation. Data on the selection of nutrient media of various variations, conditions of cultivation of strains of soil actinomycete Streptomycessp, the dynamics of crop growth and optimization processes in nutrient media for maximum protein formation in the cultivated medium are presented. Highly active representatives of actinomycetes - protein producers have been identified.

KEYWORDS: *Actinomycetes, Nutrient Medium, Cultivation, Growth Dynamics, Development, Enzymes, Optimization, Proteins, Mycorrhiza, Arbuscular Mycorrhiza, Inoculator, Bioproducts, Actinomycetin, Streptomycin.*

INTRODUCTION

In recent years, the need for food products has increased and this, in turn, poses great challenges for breeders and microbiologists. The economic situation of the country determines the welfare of the people. The President of the country called our Republic an agrarian zone, the economic development of Uzbekistan, as an agrarian Republic, largely depends on agricultural production, high yields of sown areas on which strategically important crops such as cotton, wheat, corn, sunflower are cultivated. To obtain a good harvest from the above plants, of course, soil fertility and its chemical saturation are of great importance. The main role here is played by scientific research in the field of biotechnology, ecology, soil science. Fungi and actinomycetes were used for the study.

Materials and methods of research

To study the abilities of actinomycetes as biostimulants, the chemical state of the soil where cotton was planned was studied and investigated at the beginning. Since in order to achieve high yields, the farms of the Bukhara district of the Bukhara region, where scientific research and experiments were conducted, use artificial mineral fertilizers such as potassium and sodium nitrate, which kills the microflora of the soil, worsens the absorption of water and organic formations of its composition. For example, pesticides, herbicides and acaricides are often

used.Insecticides from latin. *insectum* "insect", *caedo* "killing"- chemicals designed to destroy harmful insects.

Acaricides from ancient Greek. ακαρι - tick and latin *caedo* - kill, these are various chemical preparations for the fight against ticks of agricultural crops, products, with parasites of domestic animals and poultry [9].

Acaricidal preparations for plants are special biological or chemical agents designed to destroy spider and other types of mites.

Чрезмерное их использование уничтожает живые образование почвы, ухудшается состояние почвы и плодородие растений. Excessive use of them destroys the living formation of the soil, the condition of the soil and the fertility of plants deteriorates. The production of cultural biocenoses, yield and quality of agricultural products is directly related to the biological activity of the soil, which is determined by the number and quality of the total microflora, which in total includes both beneficial and pathogenic [1.2]. Productivity and its increase are directly related to the high content of bio-synthetically active microorganisms, including enzymes, proteins, low-molecular carbohydrates, etc., products of microbial synthesis. Among them, a special place is given to antibiotic synthesizing microorganisms that inhibit the growth and development of soil phytopathogens, protect plants from root rot, homosis, verticellosis, fusariosis, etc., and sometimes from the action of insect pests [3.4].

However, not all soil microorganisms form antibiotic and other physiologically active substances. Inactive strains of actinomycetes, under appropriate conditions, are able to form antibiotic substances to varying degrees [5,6]. Considering this characteristic feature of actinomycetes, researchers have mastered the technology of preparing drugs used in agriculture as direct activators of growth, development and fertility of agricultural plants [7,8.9].

Based on the above, the purpose of our research was to study the ability of some strains of actinomycetes isolated from the soil under cotton to form protein on various nutrient media. Scientists have discovered fungi that can stimulate plant growth even in conditions of moisture deficiency. Scientists from Bharatpur University, India, studying the ecology of soil microbes that colonize plant roots, have isolated a fungus that can enhance plant growth even in conditions of water scarcity.

Numerous types of soil microbes colonize plant roots. Arbuscular mycorrhiza, which promotes the mobilization of nutrients in the soil, especially phosphorus, is widely known among them. Of the many soil microorganisms associated with plant roots, some may also be pathogens. Sometimes two groups of soil microorganisms can be found in the same plant roots. The researchers investigated this phenomenon in the roots of tomato plants, which contained both arbuscular mycorrhiza and a dark septate endophytic fungus.

In our scientific research, we used actinomycetes as biostimulants for cotton, treated cotton seeds with antibiotics of actinomycete streptomycin. Cultures were used to study the ability of actinomycetes to produce proteins *Streptomycessp.*:124, Streptomycessp.:113, and the name of streptomycin is also from here.

Cultivation was carried out in depth at a temperature of 28o-32oC in conical Erlenmeyr flasks with a volume of 1 liter containing 300 ml of nutrient medium of various compositions, at a pH

of 7.0-7.5 on circular rockers, with a rotation speed of 240 rpm. for 72 - 240 hours, depending on the appearance of the maximum amount of protein.In order to optimize the nutrient medium for growth, development, and protein formation, media of the following compositions were used:.

1. Peptonic medium – peptone – 1,0 %, glucose – 0,2 %, $NaNO_3$ – 0,3 %, $MgSO_4$ - 0,05%, K_2HPO_4 – 0,1%, KCl – 0,05%, $FeSO_4$ – footprints;
2. Organic environment – glucose 1,0 %, peptone 1,0 %, hydrolyzed casein – 0,2 %, yeast extract – 0,2 %, NaCl – 0,6 %;
3. Starch-ammonia medium – vegetable starch – 1,0%, K_2HPO_4 – 0,1 %, $MgSO_4$ –0,1 %, NaCl – 0,1 %, $(NH_4)_2SO_4$ – 0,2 %, the rest is tap water;
4. Flour medium – flour – 2,0 %, post - alcohol bard – 10%, $CaCO_3$ – 0,1 %, the rest is tap water.

Research results and their discussion

Actinomycete, which produces streptomycin, multiplies with the help of spores or individual sections of mycelium. Cultures are highly variable. Their variability is influenced by the conditions of cultivation, especially the composition of the medium; on richer media, faster variability is also observed. Preservation of the desired trait in a particular strain is carried out by selecting optimal storage conditions, cultivation conditions and maintenance of the strain. To stabilize the signs associated with antibiotic formation, sometimes antimutagens (purine nucleotides, manganese ions, histidine, polyamines, caffeine, etc.) are added to the media on which the antibiotic producer is stored and maintained. Sowing was carried out at the experimental station of the Bukhara district of the Bukhara region on 3 hectares of land, 1 hectare of land was sown with processed active substances of actinomycetes cotton seeds saturated with actinomycetes, and the remaining area was sown with seeds imported from seed farms.

After eight weeks, the research team measured plant height, stem thickness, leaf area, biomass and proline content at both sites and compared the results. The level of proline content directly corresponds to the level of resistance to abiotic stress. The team recorded better growth rates and a higher concentration of proline, which was observed in the treated culture. Then they examined the roots under a microscope. The root system, especially the hairs developed perfectly, were abundant. Actinomycetes play an important role in the processes of soil formation and the creation of soil fertility. They are credited with various functions in the improvement of soils. Actinomycetes transform and destroy complex organic compounds (cellulose, humus, chitin, lignin, and others) that are inaccessible to many other microorganisms.

Actinomycetes are of the greatest interest for biotechnology as producers of antibiotic substances. Many valuable drugs used in chemotherapy, in agricultural practice and in the food industry have been obtained.

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