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THE DYNAMICS DEVELOPMENT OF NITROGEN-BACKING BACTERIA ON THE SOIL OF THE GANJA-GAZAKH NATURAL ECONOMIC ZONE (AZERBAIJAN)

*©**Aslanova Ye.,** Ganja State University, Ganja, Azerbaijan, yeganeaslanova@mail.ru*

ДИНАМИКА РАЗВИТИЯ АЗОТОБЕСПЕЧИВАЮЩИХ БАКТЕРИЙ НА ПОЧВАХ ГЯНДЖА-КАЗАХСКОЙ ПРИРОДНО-ЭКОНОМИЧЕСКОЙ ЗОНЫ (АЗЕРБАЙДЖАН)

*©**Асланова Е.,** Гянджинский государственный университет, г. Гянджа, Азербайджан, yeganeaslanova@mail.ru*

Abstract. The study of the nitrogen cycle in nature is of great importance, because as a result of anthropogenic impacts the small changes cause the chemical pollution of the soil. The effect of anthropogenic and environmental factors to the productivity of azotobacter cultures on the soils of the Ganja-Gazakh natural economic zone has been described in the article.

Аннотация. Изучение круговорота азота в природе имеет большое значение, так как в результате антропогенных воздействий малые изменения вызывают химическое загрязнение почвы. В статье описано влияние антропогенных и экологических факторов на продуктивность культур азотобактера на почвах Гянджа-Казахской природно-экономической зоны.

Keywords: microorganisms, *Azotobacter*, nitrogen fixation, culture, productivity.

Ключевые слова: микроорганизмы, азотобактер, азотфиксация, культура, продуктивность.

Introduction

Recently, the study of microorganisms is of great interest. Thus, the role of microorganisms in the formation and fertility of the soil, its structure is irreplaceable.

The amount of microorganisms in the soil is variable. Depending on the factors, the dynamics of their development also varies [10]. Various climatic factors, seasonal changes, pH, nutrient content, temperature changes are influenced to the activity of microorganisms [6].

As we know, the nitrogen cycle has a great impact on the physiological and biochemical processes in the soil and plants [5]. Although there is a lot of nitrogen in the atmosphere, it cannot be used by plants. Only some soil microorganisms use free nitrogen, which enriches the soil by adding nitrogen compounds, which are of great importance in agriculture [2].

As can be seen, the nitrogen cycle in the soil is mainly takes place in the presence of microorganisms. According to the influence of various factors small changes in the nitrogen cycle in the biocenoses cause chemical pollution of the soil. As a result of anthropogenic impact, the composition of the microflora also changes. For this reason, the study of changes in soil microflora

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is of great importance. The study of the mechanism of nitrogen circulation in the presence of microorganisms in different soil types is an urgent problem [8].

The purpose of the research is to study nitrogen bacteria in the soils of the Ganja-Gazakh zone.

Research object and methods

The land cover of Ganja-Gazakh zone was determined as the object of research. The soil samples were taken from different areas at different times of the year and it is based on the "average soil sample" principle. (The average soil sample was obtained by mixing different soil samples taken from 3 points per 100m2). The soil samples were mainly taken from both the natural environment and anthropogenically affected areas, including arable land. The 8 samples, 4 of them, were taken from these areas and this experiment was repeated in different seasons of the year.

The cultures of azotobacter which is studied for morphological, cultural and physiological research are grown in agar and liquid media. To determine the nitrogen fixation properties, the culture of the nitrogen bacterium was grown in a liquid Ashby medium. At this time, 22% glucose was taken. During the study, sugars were determined by the Bertrant method, and the amount of fixed nitrogen was determined by the Keldal method [3].

The results of the study

Microorganisms are an integral part of the soil. The formation, structure and fertility of the soil depend on these organisms. The amount and diversity of microorganisms in the soil is closely related to soil conditions. The presence of nutrients that can be used in this condition depends on the humidity, aeration, environmental reaction, temperature, etc. can be attributed. According to the research, it has been determined that one gram of soil at a depth of 2-15 cm in humus soil contains about 1-10 billion bacteria. As we know, the amount of microorganisms in the soil depends on temperature and humidity [3].

According to the research, the amount of microorganisms in the sown areas varies to some extent in March-October. It is known that there is a certain amount of nitrogen in the soil layer (from 6 t to 18 t), but in order to get a high yield, it is necessary to have about 150–200 kg of nitrogen compounds per hectare of soil. In this case, the nitrogen in the soil had to ensure the productivity of plants for 50-60 years without giving any nitrogenous substances. However, 99% of the nitrogen in the soil is organic nitrogen compounds in soil humus, 1% mineral nitrogen compounds, which plants can use only the latter. This means that only 60 kg of 6 tons of nitrogen per hectare can be used. Naturally, this amount of nitrogen is too low for normal plant nutrition. As a result of the activity of microorganisms, nitrogenous substances can be absorbed by plants in the soil.

According to the literature, structural, humus-rich soils (1 gram) contain more than 50 billion microorganisms. In spring and autumn, their number reaches a maximum. In summer, on the contrary, it decreases. Because the sun's hot rays have a lethal effect on microorganisms. Drought slows their development. In winter, their number is minimal.

The dark gray-brown and the light chestnut soils are typical for the studied area. These soils are less humus-rich than the black soils. These lands are the fertile lands. However, in summer, due to the lack of moisture the productivity decreases in some areas. Depending on the type of soil, the species composition of microorganisms are varies. Thus, the species in that area azotobacteria, spore bacteria, fungi, cellulose breakers, etc. are included. For example, Azotobacter chroococcum is predominant in gray-brown soils. In those soils, Nitrogen. agila and Nitrogen. nigricans are also

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less spread in this soil. The amount of humus in light chestnut (gray-brown) soils varies between 2-3%. This figure fluctuates between 3.5-5% in dark chestnut soils and 3-4% in chestnut soils. Nitrogen content is highest in dark chestnut soils [1].

In June, the gray-brown soils are dominated by ammonifying bacteria. This is due to the normal level of temperature and humidity. The bacteria and bacilli without spores are also predominant. According to the literature, they are involved in the final stage of mineralization of organic matter [9].

During the research the differences in the morphological and the cultural characteristics of nitrogen-fixing bacteria in the environment have also revealed. The strains of the genus Azotobacter chroococcum were identified on the basis of N.A. Krasilnikov [6]. Azotobacter chroococcum colonies from different soils of the research area also differ in color and developmental characteristics. Also, during the experiments have also shown that the attitudes of Azotobacter chroococcum colonies to different nutrient media are differ.

On days 7, 14, 21, 27 and 35 of the experiment, the productivity of nitrogen fixation was determined based on the ratio of nitrogen (mg) assimilated to sugar used (1g). The amount of fixed nitrogen was determined by the Keldal method, and the amount of sugar in the medium was determined by the Bertrand method.

As a result of the research, the amount of ammonifiers in the soils of the studied areas were not differ much. This indicates a weak buffer system in those lands. In the moist soils, azotobacteria are more prevalent. This shows that they need a lot of moisture. Reason:

1. The study of different types of soils in the Ganja-Gazakh zone shows that the development of nitrogen bacteria in these soils depends mainly on environmental factors. Azotobacter grows faster in humid conditions.

2. Azotobacter chroococcum colonies isolated from different soils are differ in color and growth cycle.

3. It has been found that the attitude of Azotobacterins to the food media is also different.

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