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CHEMICAL AND BIOLOGICAL PROPERTIES OF IRRIGATED SIEROZEM-MEADOW SOILS

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Abstract. The agrochemical, chemical, agrophysical, and biological activity of the irrigated sierozem-meadow soils in the conditions of the Khavas district of the Syrdarya region was comprehensively studied. Soils are of varying degrees of salinity, and their content of ammonifiers, spore formers, actinomycetes and nitrogen fixers has been determined according to the salinity level and types. In the conditions of irrigated sierozem-meadow soils, changes in biological activity were observed in winter wheat and repeated mash crop fields according to options, and the number of soil ammonifiers, nitrogen fixers, axinomycetes and spore-forming microorganisms in the mash planted area. As soil salinity increased, it was found that ammonifiers and nitrogen fixers decreased. According to the soil profile, the most amount of microorganisms was observed in 0-15 cm and 15-30 cm. The pattern of distribution of phytonematodes in irrigated sierozem-meadow soils according to the level of salinity was also determined.

Key words. Sierozem-meadow soils, salinization, biological activity, phytonematodes

INTRODUCTION

According to UN data, 12 million people in the world every year. about one hectare of fertile land is out of production due to various reasons, as well as 1 bln. It is shown that the population is malnourished. Increasing the productivity of the soil requires a rational use of land and water resources, which creates the problem of establishing the process of obtaining a high yield and high-quality product in an ecologically reasonable manner. In this case, the differentiated application of a set of agro-ameliorative, agro-technical and agro-chemical measures and the placement of crops taking into account the soil-climatic conditions are important in the sustainable development of agriculture [15,17].

One of the reasons for the decrease in soil fertility is the decrease in humus and nutrients. Nutrient elements removed to improve soil fertility: nitrogen, phosphorus, potassium, copper, molybdenum, zinc, cobalt, sulfur, calcium and such other macro- and microelements, using various organic fertilizers and composts rich in nutrients excluding toxic substances are effective methods [16].

A group of microorganisms and pedofauna play an important role in increasing soil fertility and soil formation processes.

In the stabilization, restoration and increase of soil fertility, the use of microbiological biopreparations and the planting of repeated leguminous crops improve soil humus, agrochemical properties, biological activity, soil structure and density, and optimize the supply of water and nutrients, activation of microbiological processes and soil fertility increases [1,3,13].

Research object and used methods. An experiment was conducted on irrigated sierozem-meadow soils of Khavos district of Syrdarya region with varying degrees of salinity. Scientific research, taking soil samples by genetic layers, observations, chemical and biological analyzes of UzPITI "Metody agrokhimicheskix, agrofizicheskih i mikrobilochicheskih issledovaniy v polivnyx hlopkovyx rayonakh", "Rukovodstvo po khimicheskomu analizu pochv" by E.V. Arinushkina and soil and microbiological analysis methods accepted at the Institute of Soil Science and Agrochemistry and Microbiology Institute of UzFA were carried out.

The obtained results and their analysis.

Soil salinity varies with its level, salt content, location of the saline horizon, and depth of groundwater.

The amount of physical clay (<0.01 mm) in soils is 24.2% in the arable layer and 17.6% in the sub-arable layer. Soils are mainly sandy and light sand, sometimes in the lower parts of the profile there are medium sandy layers.

The volume mass of the upper driving layer of the irrigated sierozem-meadow soils is 1.45-1.48 g/cm3 and becomes denser towards the lower layers, and accordingly, the porosity also decreases to a certain extent. According to the level of nutrient supply, it is classified into very low and low supply groups.

Irrigated sierozem-meadow soils were formed in conditions where the ground water level, which has a certain influence on the processes of soil formation, is located at a depth of 2-3 m. Their water regime is irrigation. These soils are (intermediate) soils transitioning from sierozem soils to sierozemland soils. The transition of sierozem soils to sierozem-meadow soils is associated with the rise of groundwater and strong wetting of the lower part of the soil profile. The location of mineralized ground water near the surface of the earth accelerates the salinization processes, resulting in the salinization of the ground [12,16].

Information about the salinity levels of the soil of the experimental area, the content of salts in the soil, and the amount of carbonates is given.

According to the degree of salinity, soils are divided into weakly, moderately and strongly saline groups. Chlorine takes the main place in the composition of salts that are easily soluble in water, in some cases they are found in a certain proportion with sulfates.

According to the type of salinity of the irrigated sierozem-meadow soils of the studied area, they are chloride-sulfate and sulfate-chloride. Some of the soils are characterized by plastering. According to the amount of gypsum, it is divided into groups with weak and moderate gypsum. According to the data of these tables, the amount of dry residual salts from the surface to the gypsum layer in irrigated sierozem-meadow soils is 1.920-2.588%, in the gypsum layer is 2.012-2.458%, in the sub-gypsum layer is 1.708-1.812%, and the amount of chlorine ions in the composition of salts is 0.590-0.652 %, sulfate ion is 0.693-0.710%. The carbonation of the soil section (profile) is uniform (7.0-8.9% SO2, carbonates), we can see that calcium carbonate (SaSO3) content is relatively predominant in the carbonates.

In order to improve soil fertility, it is specially noted that the land areas should be alternated and replanted. As a result of the cultivation of leguminous plant species, a fine-grained and granular water-retaining structure is formed in the soil layer. In this case, the root system of the main crop and leguminous crops penetrates to different depths in the soil layer, and in turn, after harvesting, it is observed that different amounts of root residues remain in the soil [3,6,7,14].

Under the influence of plant residues, different amounts of organic matter remain in the soil layer, and in turn, there is an opportunity to maintain the value of soil fertility and get a higher yield from agricultural crops during the next year even without significant expenses. It is known that the biological activity of soils is one of the relatively accurate indicators of fertility and also plays an important role in the assessment of the ecological status of soils. According to the results obtained in

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the conducted studies, the indicator of the amount of microorganisms is also determined by the change in the number of microorganisms in the soil layer after the autumn wheat and leguminous crops.

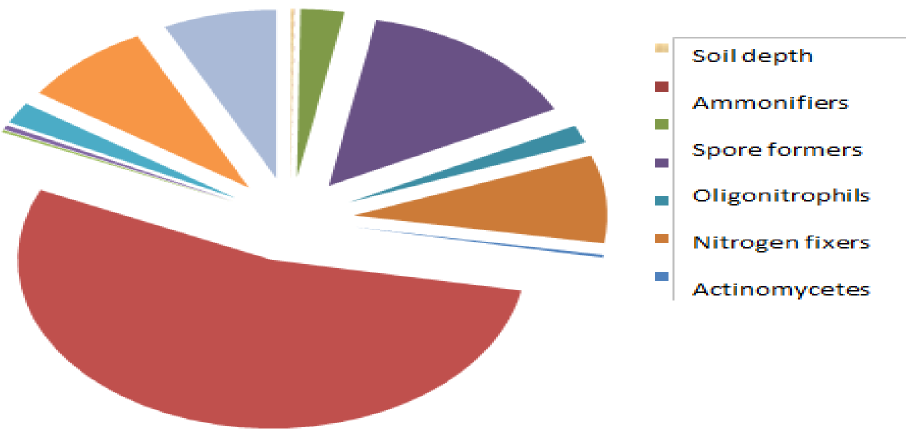

Figure.1 Quantification of microorganisms in irrigated sierozemland soils

In the control variant, ammonifiers, oligonitrophiles, nitrogen fixers, actinomycetes and fungi were determined in the count of 1000 cells in 1 g of soil. The number of ammonifiers (0-15cm) is 30x104 thousand colony-forming units (KHB) cells, (15-30cm) 33x104 thousand (30-50cm) is 25x104 thousand, oligonitrophils (0-15cm) 39x104 thousand, (15-30 cm) 24x104 thousand, (30-50 cm) 19x104 thousand, nitrogen fixers (0-15 cm) 2x103 thousand, (15-30) 3x104 thousand, (30-50 cm) 3x104 thousand, actinomycetes (0-15 cm) 2x104 thousand, (15-30 cm) 3x104 thousand, (30-50 cm) 4x104 spore formers (0-15 cm)13 x103 thousand, (15-30 cm) 18x103 thousand, (30-50 cm) 6x103 thousand colony forming unit (KHB) cell number was determined.

After a repeated crop of mash plants, these indicators are as follows; the number of ammonifiers (0-15cm), 91x104 thousand colony-forming units (KHB) cells, (15-30cm) 96x104 thousand (30-50cm) 69x104 thousand, oligonitrophils (0-15cm) 37x104 thousand, (15-30cm) 38x105 thousand, (30-50cm) 12x105 thousand, nitrogen fixers (0-15cm) 12x104 thousand, (15-30) 6x104 thousand, (30-50cm) 6x104 thousand, actinomycetes (0-15cm) 3x104 thousand, (15-30 cm) 6x104 thousand, (30-50 cm) 4x104 thousand, spore-forming units (0-15 cm) 16x103 thousand, (15-30 cm) 27x103 thousand, (30-50 cm) 7x103 thousand colony-forming unit (KHB) cells was determined. According to the results of the experiment, it was observed that the amount of ammonifiers in 1 gram of the soil of the area planted with mash was 61x104 thousand at 0-15 cm, 63x104 thousand at 15-30 cm, and 44x104 thousand at 30-50 cm. Accordingly, the number of oligonitrophils, nitrogen fixers, actinomycetes, spore-forming microorganisms also increased.

As a result of the study of the fauna of phytonematodes in wheat agrocenoses with varying degrees of salinity, irrigated sierozem-meadow soils, 33 species and 1173 individuals of phytonematodes were identified. Identified phytonematodes belong to 2 subclasses, 7 genera, 16 families, and 21 genera [4,8,10].

The analysis of phytonematodes identified in irrigated sierozem-meadow soils with varying degrees of salinity by genera showed that Tylenchida, Dorylaimida, Aphelenchida genera are diverse in terms of nematode types and numbers. Representatives of the Tylenchida family were especially abundant in our samples. The genera Enoplida, Rhabditida, Plestida and Mononchida were very rare compared to other genera.

A.A. phytonematodes found in soils with different levels of salinity. It was divided into 5 ecological groups according to the classification of Paramonov (1962). pararhizobionts, eusaprobionts, devisaprobionts, non-specialized phytohelminths and specialized phytohelminths.

It is known that pararhizobionts are soil nematodes living around roots. Pararhizobionts feed on plant sap. Representatives of this group have a spear or stylet in their stoma (mouth cavity) and suck the sap of plant tissue with the spear or stylet. Nematodes found around the roots can also move into the plant tissue. Parasitic species are also inoculators that infect plant tissue. There are 13 species of pararhizobionts in our samples - *Prizmatolaimis dolichurus, Prizmatolaimis primitivus, Ironus ignavis, Mylonchylus solus, Eudoraylaimus elegans, Eudoraylaimus monohustera, Eudoraylaimus obtusicaudatus, Eudoraylaimus pratensis, Eudoraylaimus parvis, E. sulphasae, Eudoraylaimus sp., Mesodoraylaimus bastian, Drepanodorus laetificanus.* species met. The total number of individuals of pararhizobionts (136) was 11.6% compared to the number of other nematodes. Numerically *Eudoraylaimus parvis, Eudoraylaimus elegans* types were the majority. Pararhizobionts are abundant in highly saline soils.

Eusaprobionts - true saprobiotic nematodes were found in the studied soils and they are found in plant residues and various decaying organic matter and feed on detritus. Saprozoa reproduce very quickly, their life span is limited to a few days, for example, they develop and lay eggs in 3-4 days. Although these nematodes do not cause disease in the plant, they are of great importance in the process of rotting organic matter. 2 species from this group in soil samples - *Mesorhabditis monhystera, Rhabditis brevispina* met.

Eusaprobionts were mostly found in the upper layers of the soil, 0-10 cm, but were almost absent in the 10-20 cm layers. Representatives of this group were found in moderately saline soils.

Devisaprobionts are immature or semi-saprobionts, they live in the humus environment, feed like saprobionts, so these nematodes can also enter healthy plant tissue. Representatives of this group have a rough cuticle, strong growths on the head, with the help of which they have the ability to tear plant tissue. There are 3 types of representatives of this group - *Cephalobus persegnis, Eucephalobus laevis, Plectus parietinus* met Devisaprobionts constantly migrate in the soil, expanding the range of decay. The total number of individuals (48) of foreign species was 4.1%. They are more common in weak and moderately saline soils than in strongly saline soils.

Unspecialized phytohelminths are ectoparasites that eat plant cell membranes and feed on plant sap, but do not cause disease in the plant, but cause disease in plant tissues along with other organisms. Non-specialized phytohelminths - 12 species make up 304 25.9%, this group *Aphelenchus avenae, Aphelenchoides limberi, Aphelenchoides parietinus, Aphelenchoides xyloplilus, Cryptaphelenchus latus, Aglenchus agricola, Tylenchus davaini, Filenchus filiformus, Tylenchus clavicaudatus, Fylenchus leptosome, Tylenchus sp, Ditylenchus tulaganovi* types include. Unspecialized phytohelminths are more common in weakly saline soils.

Phytohelminths specialized in research - 3 types make up 652 55.6% of this group *Bitylenchus dubius, Ditylenchus dipsaci, Helicotylenchus multicinctus* It was found that the species met. Unspecialized phytohelminths are uniformly distributed in all soil layers in weakly saline soils. It was observed that phytonematodes differ in ecological-trophic composition in irrigated sierozem-meadow soils. Saprophages form the biocenotic complex of nematodes in humus soils. As a result of studying the fauna of phytonematodes in irrigated sierozem-meadow soils with varying degrees of salinity, it is explained that the composition of their species and ecological-trophic groups depends on the types of soil, its chemical composition of humus and salinity [2,5,9,11].

On the basis of the obtained results, the results of the studies carried out on the studied soil biological properties and the optimization of the activity of phytonematodes were noted in the fields planted with a repeated leguminous crop (mosh) after winter wheat.

CONCLUSION

Irrigated sierozemland soils Microorganisms play an important role in increasing soil fertility and stability and in soil formation processes. According to the agrochemical and agrophysical properties of the soil in the studied area, according to the degree and type of salinity, it was noted that the number of microorganisms increased several times in the area planted with mash. Among the groups of microorganisms, the dominance of oligonitrophilic bacteria was observed. The second place in terms of quantity was occupied by ammonifiers and nitrogen fixers. It was noted that the relatively low number of microorganisms in the soil is positively influenced by the lack of temperature value or the lack of moisture, the low amount of organic matter in the soil depends on the salinity of the soil and the location of the soil.

In irrigated sierozem-meadow soils, phytonematodes have been found to differ in species diversity and quantity, which depends on the chemical composition of the soil and the level of humus. Saprophages formed the biocenotic complex of nematodes in humus soils. A comparative analysis of the qualitative and quantitative indicators of phytonematodes in soils with different levels of salinity revealed that phytonematodes are not uniformly distributed in the soils. Depending on the salinity level, the number of nematodes and the total number of phytonematodes decreased with increasing soil salinity.

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