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Microbiological Indication Of Differently Salinated Soils In Termiz District

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Abstract. Microbiology studies microorganisms that are very small, invisible to the naked eye, and visible only with the help of optical instruments - light or electron microscopes. Microbiology is a science that studies the morphology, physiology, biochemistry, genetics, ecology and systematics of microscopic fungi, bacteria, mycoplasmas, viruses, actinomycetes and microscopic algae. Microbiology is a relatively young branch of biology, which is growing and developing every day.

The modern science of soil diagnostics uses the achievements of such sections of soil science as soil morphology, soil chemistry, soil physics and mineralogy. To characterize the soil and its condition, it is closely related to biochemistry, molecular biology, biotechnology, agrochemistry, phytopathology, agriculture, industry, geology, genetics and other sciences. The world of microorganisms is incredibly rich and diverse.

Keywords. Fungi such as Pseudomonas asplenii, Pseudomonas stutzeri, Bacillus anthracis, Bacillus subtilis, Pseudomonas indica, Pseudomonas mendocina, Paenibacillus polymyxa, Bacillus subtilis, Bacillus ycoides, Staphylococcus hemolyticus Aspergillus, Mucor, Penicillium, Fusarium, Alternaria, Stachybotrys, Stemphylium, Trichoderma, Cladosporium and Candida kefir. Nocardia asteroides, Nocardia brasiliensis, Streptomyces, Streptomyces griseus.

Introduction.

Bacteria are the simplest and smallest organisms, which differ from other living organisms and are included in a separate kingdom, that is, prokaryotes. Bacteria are one of the main living organisms necessary for the development of plants and play an important role in determining the productivity of agricultural crops. According to D.I. Nikitina, M. Kolos, V.V. Novikova and N.A. Krasilnikov in their work “Soil Microbiology”, microorganisms play an important role in determining the biological properties of the soil.

The nitrogen cycle in the soil and its conversion into compounds available to plants is carried out due to the vital activity of microorganisms. Bacteria - decompose proteins and other organic nitrogen compounds to form ammonia. There are many types of spore-forming and non-spore-forming bacteria. The role of roots in the life of microorganisms in the rhizosphere is not limited only to providing them with nutrients.

The amount of carbon dioxide in the soil air fluctuates seasonally and daily, its amount ranges from 0.1% to 15%, in cultivated lands it is from 2% to 20% oxygen, depending on the state of mechanical infiltration of the soil.

The structure of soil particles improves the respiration of roots and microorganisms, moisture is well preserved, a constant temperature is maintained, and when analyzing the provision of heat to soil microorganisms, it should be noted that the main role in the processes occurring in the soil belongs to the group of mesophilic microorganisms (mesophiles), which are carried out in the range of 25-45. Psychrophilic microorganisms continue to function at temperatures up to 15-20°C and multiply very slowly. As T.K.Ortikov emphasizes in “Soil Microbiology”, when the temperature in the soil is around 5°C, carbon dioxide (CO2) practically does not accumulate, that is, the process of decomposition of organic compounds stops. At this temperature, the process of nitrogen mobilization stops, and the nitrification process slows down sharply.

If the energy of the nitrification process at a temperature of 25°C is taken as 100%, then the relative intensity of nitrate accumulation at lower temperatures corresponds to the following indicators: 25°C — 100% 20°C — 80% 15°C — 50% 10°C — 20% 5°C — 10% Depending on the climate, the optimal and maximum temperature points of most soil mesophilic microorganisms show changes. In southern soils, at a temperature of 30-35°C, the process of microbial reproduction continues intensively. The soils of the studied region also differ in the species composition of microorganisms.

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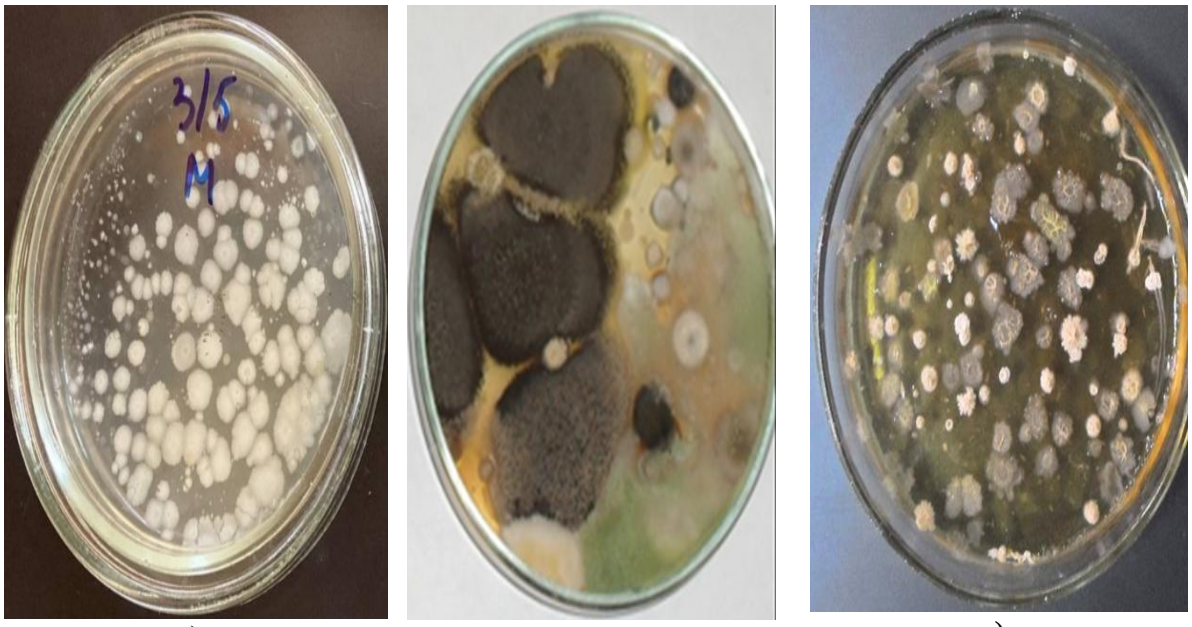
Research results and discussion.

The amount of CO_2 and oxygen in the soil air varies depending on the season. The highest amount of carbon dioxide is released in the soil in the spring. From April to mid-October, and in the summer, the amount of carbon dioxide decreases significantly. Also, observations show that the activity of microorganisms in the soil does not stop in the winter months, that is, they continue their activity during this period.

With increasing soil salinity, the number of taxonomic groups of microorganisms in the soil - bacteria, fungi and actinomycetes - decreases. Their number was minimal in moderately and strongly saline soils.

Among the bacteria, the following bacteria were identified: Pseudomonas asplenii, Pseudomonas stutzeri, Bacillus anthracis, Bacillus subtilis, Pseudomonas indica, Pseudomonas mendocina, Paenibacillus polymyxa, Bacillus subtilis, Bacillus ycoides, Staphylococcus hemolyticus.

Among the fungi, Aspergillus, Mucor, Penicillium, Fusarium, Alternaria, Stachybotrys, Stemphylium, Trichoderma, Cladosporium, and Candida kefyr have been identified. Among the actinomycetes, Nocardia asteroids, Nocardia brasiliensis, Streptomyces, and Streptomyces griseus have been identified.



a) b) v)

Figure 1. Appearance of colonies of microorganisms in the studied soils:

In non-saline, weakly, moderately and strongly saline soils, the decreasing number of bacteria is as follows: Bacillus subtilis > Paenibacillus polymyxa, Bacillus subtilis groups in bacteria; Aspergillus > Penicillium > Fusarium > Trichoderma > Alternaria groups in fungi; Nocardia asteroids > Nocardia brasiliensis > Streptomyces groups in actinomycetes. It was found that the activity of microorganisms in the chloride-sulfate type of salinity chemistry is higher than that in the sulfate type.

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Activity of groups of microorganisms in terms of salinity levels of sulfate and chloride-sulfate type salinity chemistry in irrigated soils of Termez district

INDICATION DIAGNOSIS

№	Groups of microorganisms	Sulphate type salinity chemistry (by salinity levels)					Chloride-sulfate type salinity chemistry (by salinity levels)				
		Unsalted	Weak	Average	Strong	very strong [x]	Unsalted	Weak	Average	Strong	very strong [x]
Bacteria											
1	*Bacillus subtilis*	+	+	+	+		+	+	+	+	
2	Bacillus anthracic	+	+	+	-		+	+	+	-	
3	*Bacillus polymyxa*	+	+	+			+	+	+	-	
4	*Bacillus megaterium*	+	+	+	-		+	+	+	-	
5	*Bacillus pumilus*	+	+	+	-		+	+	+	-	
6	*Staphylococcus hemolyticus*	+	+	+			+	+	+	+	
7	*Paenibacillus polymyxa*	+	+	+	+		+	+	+	+	
8	*Pseudomonas mendocina*	+	+	+			+	+	+	-	
9	*Pseudomonas asplenii*	+	+	+			+	+	+	-	
10	*Pseudomonas stutzeri*	+	+	+			+	+	+	-	
Fungi											
1	*Aspergillus*	+	+	+	+		+	+	+	+	
2	*Mucor*	+	+	+	-		+	+	+	-	
3	*Penicillium*	+	+	+	+		+	+	+	+	
4	*Fusarium*	+	+	+	+		+	+	+	+	
5	*Alternaria*	+	+	+	-		+	+	+	+	
6	*Stachybotrys*	+	+	+	-		+	+	+	-	
7	*Stemphylium*	+	+	+	-		+	+	+	-	
8	*Trichoderma*	+	+	+	+		+	+	+	+	
9	*Cladosporium*	+	+	+	-		+	+	+	-	
10	*Candida kefyr*	+	+	+	-		+	+	+	-	
Actinomycetes											
1	*Nocardia asteroids*	+	+	+	+		+	+	+	+	
2	*Nocardia brasiliensis*	+	+	+	+		+	+	+	+	
3	*Streptomyces*	+	+	+	-		+	+	+	+	
4	*Streptomyces griseus*	+	+	+	-		+	+	+	-	

Note: [x] – All soil types studied do not contain highly saline (saline) soils.

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Conclusion.

Reducing soil salinity plays an important role in the intensive development of agriculture, the effective use of each hectare of arable land, and obtaining abundant and high-quality crops.

In order to increase the income of peasants and farmers by at least two times, and to increase the annual growth rate of agriculture by at least 5%, it is necessary to consistently develop agricultural production. For this, it is necessary to conduct a thorough study of the composition and properties of the soils of the Republic, conduct diagnostic analysis of soils on this basis and compile cartograms. Effective use of land is one of the main tasks for every landowner.

It is necessary to note the great importance of microorganisms in managing soil fertility. Also, constant changes and additions are observed in the taxonomy of bacteria. According to V.V. Dokuchaev, a person can manage soil fertility and continuously increase it. For example, different types of soil contain different types of microorganisms, and according to Bergey's "Handbook of Systematic Bacteriology," new bacterial species (phyla) in soils play an important role in increasing the biological activity of the soil and improving its productivity.

References

1. Qodirova D.A., Allayarov X.N., and others “The importance of physical properties of soils in the effective use of land in the conditions of climate change” “global ecological problems, desertification and food security” May 24, 2024 47-50 b
2. Qodirova D.A., Allayarov X.N., Ammonifikatsiyalovchi bakteriyalar miqdorining tuproqekologik omillari ta’sirida o‘zgarishi// Chorvachilik sohasida biotexnologiyaning dolzarb muammolari mavzusida respublika ilmiy-amaliy konferintsiya Toshkent-2024 y B. [186;187]
3. Allayarov X.N. Cho‘l qumli tuproqlarda yashovchi mikroorganizmlarning muhim ekologik funktsiyalari/“Chorvachilik va sohalarida biotexnologiyaning dolzarb muammolari” mavzusida o‘tgazilgan Respubilka ilmiy-amaliy konferensya to‘plamlari (2024-yil 28-29-noyabr). – Toshkent, 2024. – B. 439-442
4. Qodirova D.A., Allayarov X.N. Web of Scientist: International Scientific Research Journal (January, 2025). – Indonesia, 2025. – Volume 6. – Issue 1. – P. 26-32 (ISSN: 2776-0979)
5. Qodirova D.A., Allayarov X.N. Iqlim o‘zgarishi sharoitida yerlardan samarai foydalanishda tuproqlarning fizikaviy xossaliri ning ahamiyati / “Global ekologik muammolar, cho‘llanish va oziq-ovqat xavfsizligi” mavzusidagi Xalqaro ilmiy-a’maliy anjumani to‘plami (2024-yil 24-may). – Toshkent, 2024. – B. 47-51
6. Звягинцев Д.Г., Умаров М.М., Чернов И.Ю. Микробные ообществ тва и их функционирование в процессах деградации и самовосстановления почв //Деградация и охрана почв. – М: Наука, 2002. – С. 404 – 454.
7. Красивъников Н.А.,Микроокганизмы почвы и высшие растения Наука,1958. I-II 137 с.
8. Никитина Д. И. Почвенная микробиология М: Наука, 1979 М: С.38-188.
9. Xalmanov N. Samarqand viloyatining sug‘oriladigan o‘tloqi bo‘z tuproqlarda mikrobiologik jarayonlarning sidrat o‘g‘itlari tasirida boshqarilishi // Agro ilim 4 (60) son 2019 75 b
10. Ortikov T. K. “Tuproq mikrobiologiyasi” Monografiyasi Samarqand-2021