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CHARACTERISTICS OF THE MICROBIOTA OF THE ABSHERON CONTAMINATED TERRITORIES

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Abstract. The presented research work is devoted to the study of the microbiota of the oil-polluted territories of Absheron. Samples were taken from different areas depending on the degree and duration of contamination and analyzed by mycological methods. It has been established that the composition and amount of microbiota changes in oil-contaminated soils.

Keywords: *microbiota, oil pollution, physical-chemical factors.*

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1. Introduction

Oil and oil products contamination in the oil-rich industrial areas is a coincidental phenomenon that greatly destroys those areas, causing the deformation of natural ecosystems by changing the properties of the soil cover and the decline or total destruction of living beings there (Khalilov *et al.*, 2018).

As you know, fungi are in the first place one of the most important components of the microbial community settled in ecosystems and plays a key role in the destruction of organic matter in different types of soils. However, the role of mushroom in the oil contaminated lands of Absheron has not been properly clarified. Taking into account that oil contamination results in quantitative and qualitative changes of micro-complexes specific to these soils, then the study of the change of species and composition of microbiota, primarily in the identification of microbiota, of the phytosanitary properties of soil, becomes an urgent issue.

Changes in the structure of microbiota from the high dosage of oil begins to recover after a certain period of time, and the resettlement of new species that are not characteristic for oil polluted lands is observed in those lands (Rodriguez *et al.*, 2015; Jakobsson *et al.*, 2014).

47.5% of these mushrooms belong to facultative saprotrophs, 37.5% to biotrophs, and only 15% to true saprotrophs. Most of the mushroom included in the mycobyta of oil polluted soils belong to mesophils for temperature, but among them thermotolerants are also found. As a logical consequence of the fact that mushroom belongs to heterotrophic organisms, the synthesis of nutrients needed for life activity and the source of nutrition can be the remains of living creatures that lost their lives or their own.

In addition, it is also possible for the mushroom to obtain the energy and nutritional value that they need for the livelihoods and the number of such mushroom is not less. Thus, mushrooms generally have three directions of nutritional supplements and the distribution of mushroom by trophic interactions is based on these directions (biotrophs, saprotrophs, simbiotrophs). It should be noted that this approach which is used in the according to trophic relationships of microorganisms, microchips and macrochips is not considered ideal (Belomesyatseva, 2004; Zimitrovich *et. al.*, 2003; Nasibova *et. al.*, 2016) and gives unanswered questions for the absolute character of the problem.

Nevertheless, almost all researchers when characterizing their mushroom according to trophic connections are use this division. True, this division has been subject to certain changes and improvements from time to time. But most of them at the next stages did not get a "license card". The only exception here is the use of terms such as "facultative saprotroph", "real saprotroph", "facultative biotoph," and "real biotroph" currently.

The necessity of using these terms, on the one hand, serves to overcome the shortfall in the region, on the other hand, in our opinion, can also be evaluated as an attempt to respond to the views of sapivorphous, especially biological or ecological or physiological. So, some researchers are in the characteristic of mushroom by grouping trophic connections mixing them into ecological groups and use caprothrophos, xylotrophos, mycotrophes terms. As a result of the above, it was advisable to carry out the characteristics of the mushroom found on the oil-contaminated soil of Absheron during the research. The results show that, among the mushroom found in oil contaminated areas of Absheron, predominantly saprotrofs prevail. Thus, 47.5% of the registered mushrooms is the carrier of such traits due to trophic connections. It was determined that the biotrophs of the second place and 37.5% of the registered mushroom belong to them. In contrast to genuine biotrophs, there is also a small number of representatives of genetic pollutants in oil pollutants (15%).

The land types, specific to Absheron, have different areas (Khalilov *et al.*, 2015; Mamedov, 2000). The Absheron flora is not so rich in comparison with other zones and 22% of the flora in Azerbaijan is found here. Nevertheless, Absheron's natural climatic conditions also allow for the development of vegetarianism, viniculture, and even subtropical fruits (Mamedov, 2000).

2. Materials and methods

Mycological researches were conducted in different regions of Absheron in 2000-2006. The main research object in the studied area was mushrooms taken from clean and technogenically affected soils. During sampling, planned routes and stationary observations were carried out according to the type of soil methods for selecting the same areas for researches were used. More than 1000 soil samples were taken during the research and analyzed by modern microbiological and microbiological methods (Levitin *et al.*, 2003; Khalilov *et al.*, 2010). The samples were taken from different areas according to the degree and duration of contamination, soil polluted with various oils, and pure earth in all cases, such as control. Particular attention was paid to the fact that the samples taken were mainly of the same type of soil, that is, gray-brown soil type.

During the creation of artificially contaminated areas, the crude oil is added in different dosages (1.15 and 25 liter / m^2) to the 1.5 m^2 area of gray-brown soil type. Sampling and analysis of samples from those lands implemented after 3, 30, 150 and 360 days, as well as after 2, 3 years.

Suspensions prepared from soil samples (1:10 and 1:100) at least 4 replicates were planted in the Chapek nutrient environments. During the introduction of mushrooms into clean culture how the culture medium was used as nutritional environment from juice of malted, rice agar (RA), potato agar (PA), Chapek and Chapek-Doks (CH-D). Mushroom mycelium in the specified environments after several (2-4) days of development re-planted and this process continues until the mycelium is visually clean. The cleanliness of the culture is finally controlled by the microscope. During the identification of mushrooms, culturally-morphological and biological features were used to identify assignment-based designers.

3. Result and discussion

It is known that most mushroom belong to mesophyll organisms and it is desirable that the ambient temperature for their normal life activity is between 15 and 30°C (Mamedov *et al.,* 2002; Mirchnik *et al.,* 1988).

However, the presence of thermophiles (over 45°C) and psychofilms (below 15-20°C) among mushrooms is a fact that has been confirmed.

Considering the dry subtropical climate at Absheron and the predominance of sunny days, it can be noted that the natural and climatic conditions of this place can be considered favorable for the mesophyll. However, the temperature of the air, especially in the summer (excess of 40°C), creates prerequisites for the development of thermophilic. It is therefore advisable to determine the temperature dependence of the mushroom recorded in Absheron. As a result of researches it became clear that, the majority of spread mushrooms reflect the signs of mesophils and for their normal growth the ambient temperature is 26-30°C (table1).

Table 1. Temperature dependence of the growth of fungi

The fungus used	normal temperature range for growth (°C)	The highest indication of temperature to stop the growth (°C)	Growth rate at optimal temperature (mm/day)
1	2	3	4
Alternaria solani, A. tenuis, Aspergillus terreus, A.repens, A.sydowii, Botrytis cinerea, Cladosporium cladosporioides, Fuzarium avenaseum, F. solani, F. moniliforme, F.oxysporum, P. biforme, P. cuclopium, P. janthinellum, P. lanosum, P. martensii, P. variabile, P.funiculosum, P.vermiculatum, T.galsum, T.koningii, T.lignorum, T.viride, Verticillium dahliae	24-30	35-40	1,2-6,7
A.niger, Ch. Globossum, P.variotti	25-35	40-50	3,7-4,6
Chaetomium cellulolitucum	25-40	50-55	5,4

As a result of the researches it was found out that most of the registered fungi are signs of mesophyll, which means that the temperature of the environment is 26-30°

C for their normal growth (table 1). Apparently, 35-40°C is the most extreme temperature to stop the life activity of most of these fungi. But here are some exceptions. Thus, although *A. niger, Ch. globossum* and *P. variotti* fungi are not considered thermophilic, the temperature should be 45-50° C to stop their life activity, even for *this Ch. cellulolitucum* fungus, it does not even have a lethal effect, as its temperature is 54° C. Apparently, the term "facultative" or "thermotolerant" used in the distribution of fungi by the trophic relationships is also important in this aspect of the fungus. True, the term "facultative thermophilus" is used by researchers, but in our opinion, the high temperature limit for the growth of fungus used there in can therefore be regarded as an unclear approach to the characteristic thermophilic characteristic, as it is relatively low (40°C) compared to the fungus investigated in this case.

Thermotolerance, which are considered as transitional forms between mesophiles and thermophiles, there is no such form among mesophylls and psychophiles among the fungus spread in the oil-polluted territories of Absheron.

Clarification of how oil pollution affects the acidity of the soil, as well as the acidity of the environment affecting the processes involving fungus involvement therein. First of all, selected areas of Absheron's pure gray- brown soils (Sumgait massif, Garadagh region) were artificially contaminated with oil and occasionally (after 1, 10, 30, 60, 120, 240, 360, 720, 1080 days) the acidity of the place has been determined. Low degree of oil pollution does not have a significant impact on the change of soil acidity as a factor. It is almost identical to the soil that has been added to the pure earth soils with a liter of 1 liter / m^2 oil.

This can be explained by the fact that the soil itself has some natural buffer properties, as well as close to the pH of the crude oil. However, one should not overlook the fact that, as can be seen from the table, the pH of the soil is sometimes diminished. Apparently, this is due to the effects of microorganisms on the production of organic acids among oil splitting products.

However, the increase in the amount of oil makes it possible to create a different situation. As seen, the increase in the amount of oil in the soil does not cause a serious change in acidity determined in the first case. However, the situation changes over time and the tendency to increase the characteristic of soil erosion is noticeable, which is noticeable when adding 15 kg/m^2 of oil to the soil. The reason for this situation is that, due to the effects of microorganisms, including fungus, the formation of metabolites that can cause the environmental acidity among decompose products of the oil and reduce its soil pH.

In the course of the research, oil contamination has been acknowledged as a factor that a little affects the acidity of the soil, although the impact of the cultivation environment acidity on the growth of the fungi is noticeable. It has been established that the sour environment is more suitable for the growth of the fungi, but the fungus react differently and similar to the change in the acidity of the environment. Thus, increasing the pH of the environment from 3.0 to 5.0 in all fungi makes the growth intensity more intense. For example, changing the ambient pH from 3.0 to 5.0 will cause the biomass of *F. Venaseum* to increase 40 times the weight of the fungus, with the change from 5.0 to 7.0, , Causing a reduction 1.08 times the weight of the fungus,. Although this figure is 9.25 times in the *P.funiculosum* fungi, the second case is not observed, which leads to the fact that it also has a number of other fungi (*P. cuclopium, P.funiculosum, P. janthinellum, P. variabile, P. vermiculatum)* is that the environment has less acidic growth.

Taking into account the highest level of oil contamination (25 liters/m^2), the acidity of the environment is between 6.0-6.5, which should be considered as one of the factors that affect the change in the microcomplex of oil contaminated soils. Thus, there is a tendency to increase the acidity of the soil as a result of oil contamination, which can stimulate the creation of favorable conditions for further intensive development of phytopathogens, which can lead to deterioration of fungi, including the phyto-sanitary state of the soil.

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