International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-8 Issue-3, September 2019

The General Characteristic of Anamorphic Fungi Spread In Azerbaijan

Konul F. Bakhshaliyeva, Sabiya M. Cabrayılzadə, Zenfira B. İslamova, Nizami R. Namazov, Arzu R.Hasanova

Abstract. 142 species of fungi taken from the soil, water, plant and atmosphere in the territory of large geomorphological units(Greater Caucasus, Kur-Araz lowland, Small Caucasian and Talish Mountains) of Azerbaijan as samples were taken to the pure cultures and identified. Became clear that, most of the registered fungi belong to the anamorphs of sack fungi, which register of species such as Aspergillus oryzae, Fusarium culmorum, Gloeosporium tiliae, Penicillium kojigenum and Spahaceloma fawsettii in nature of Azerbaijani it is the first time. Aspergillus niger, Fusarium oxysporium, Penicilium chrysogenum and Trichoderma hamatum fungi have been shown to be dominant for the nature of Azerbaijan and all of them belong to anamorphs

.

Keywords: geomorphic units, mycobiota, anamorphic fungi, ecology-trophic relationship, frequency of rate.

I. INTRODUCTION

As known, biodiversity creatures consist of various taxa such as akaryotes, prokaryotes, eukaryotes, among which the fungus is one of the most important research objects[1]. Thus, due to their high adaptability fungi are found everywhere where life is present, and carries a number of important functions(for example, degradation of organic matter, the cycle of biogenic elements, in the soil formation process, regulation of species composition and functional activity of other organisms inhabiting in ecosystem, etc.) in ecosystems. Besides, at least 50% of the total biomass(this figure can sometimes be up to 90%) formed in ecosystems falls to the share of fungi[12]. Such a wide range of functions in nature leads to increased interest in them. Thus, fungi, as the main agent of biodeterioration create dangerous diseases in different living things, including in humans[13].On the other side, fungi can synthesize biologically active ingredients with varying composition and effects, which among them there are also enough fungi that have pharmacological activity[2, 15].

Manuscript published on 30 September 2019
* Correspondence Author
Konul F. Bakhshaliyeva*, Doctor of Biological Sciences, Head of Laboratories, Institute of Microbiology of the NAS of Azerbaijan, Baku (konul.baxsh@mail.ru)
Sabiya M. Cabrayılzadə, PhD, Associate Professor, Azerbaijan State Pedagogical University, Baku
Zenfira B. İslamova, PhD, Leading Researcher, Central Botanical Garden of NAS of Azerbaijan, Baku
Nizami R. Namazov, PhD, Associate Professor, Sumgait State University, Azerbaijan, c. Sumgait
Arzu R.Hasanova, PhD, Senior Lecturer, Sumgait State University, Azerbaijan, c. Sumgait

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC-BY-NC-ND license http://creativecommons.org/licenses/by-nc-nd/4.0/

It's no coincidence that fungi are now widely used in industry as producers of biologically active substances (BAS), widely used for feed, food, medical and technical purposes, also both the production and application areas are expanding day by day. Despite the fact that fungi play an important role both in nature and in the community, they are one of those groups that need extensive research on this day. This is primarily due to the complexity of a methodology for direct observation of fungi in their habitat.

Each year, hundreds of new fungi species are described, many of which are related to the soil-related ecosystems. Nevertheless, even in soil mycology, there are many questions that have not yet been explored. It should be noted only that, each region has its own natural climatic conditions, which from their influence mycobiota formed in a concrete region have specific sign i.e. the principle of individual approach to a particular ecosystem retains its importance.

Although the fungi(Mycota) do not have serious differentiated organisms, they are characterized by a wide variety of differential aspects, including their reproduction. Fungi, divided into macro- and micro- mycetes reproduction by both sexual and asexual forms. These fungi, which were once referred to as indefinite fungi, are now called anamorphs and from the taxonomic point of view, are characterized as anamorphs of sack fungi[12]. The level of learning of the number of species and the ecological functions of this creature, which has a high specific proportion among fungi are not satisfactory today. This is due to the fact that many biotopes have not yet been explored, as well as insufficient clarification of the nature of changes in the anthropogenic and technogenic load on the environment. This allows to be noted that their study is an actual issue from the scientific and practical needs of the modern era.

Despite, in the territory of the Republic of Azerbaijan with rich and colorful nature, mycological researches are carried out in the middle of the since the second half of the 19th century, but the results are not at the level that will allow the unambiguous characterization of the mycobiota of the Azerbaijani nature today. Although many of the studies are systematic, but today there are also biotopes that are not considered comprehensive explored in the nature of Azerbaijan and the unidentified sides are not also enough to determine changes of character occurring in the environment from anthropogenic and technogenic effects. Additionally, it should be added that the anamorphs which include to the specific mycobiota of the Azerbaijani nature have not been the subject of special investigations and mainly to them was touched during the overall characterization of the microbiota. Therefore, there is no doubt that research in this direction is topical.

Therefore, the purpose of the present study was dedicated to the characterization of anamorphic fungi spread in various biotopes of Azerbaijan by species composition, eco-trophic relationship, and frequency of rate.

II. MATERIAL AND METODS

The research has been started in 2008 and has been completed by the end of 2018. Sampling for researches was taken from on large geomorphological units of Azerbaijan - Great Caucasus, Small Caucasus, Kura-Araz lowland and Talish Mountains. Sample taking was to cover wider substrates. Thus, from relative clean and anthropogenic affected land, from wild and cultivated plants (including tropical and subtropical plants cultivated in the covered condition in Azerbaijan) different by that of life forms(trees, shrubs and herbs), from atmosphere, construction materials and water ecosystems were taken more than 3000 samples and analyzed based on the methods and approaches[9-11] used in similar studies.

In all cases, for the taking fungi to the pure cultures were used from standard nutrient environments, namely from malt juice agar (MJA), Chapek agar(CA), rice agar(RA), potato agar(PA). This nutrient environment was also used for the storage of worker cultures.

During the identification of fungi taken from all the senozes and taken to the pure culture were used determinants[4, 6-7, 13-14] compiled on the basis of morphological and physiological symptoms. During the systematization and naming of fungi was used the information given on the official website of the International Mycological Association[5] and works of some authors[3].

In accordance with the principles adopted in analogous cases all experiments were performed at least 4 times, and the results were statistically processed and were used only those information that does not cause doubt.

III. THE RESULTS AND DISCUSSION

İn any mycology research firstly is characterized micocomplex of researched area and substrate by species composition, which in our research also first place solved this issue. As a result of research became clear that in the formation of mycobiota generally were involved 142 species of fungi, that their taxonomic structure is summarized in Table 1. As can be seen, of the registered fungi, 83,8% belong to ascomycetes, and 16,2% to basidiomycetes.

Table 1.Taxonomic structure of registered fungi

Division	Class	Order	Family	Genus/species
Ascomycota	4	9	12	23/119
Basidiomycota	3	6	8	15/23
Total	7	15	20	38/142

It should be noted that the vast majority of the 142 species, more than 137 species, have been found in studies conducted in Azerbaijan so farThere are no literature information about distribution of the remaining 5 species of fungi (tab.2) in Azerbaijan, that is, for the Azerbaijani nature those fungi, can be noted as a new species. As seen, all newly recorded fungi belong to the sack fungi.

Table 2. The general characteristics of fungi species recorded in Azerbaijan for the first time

№	Species	Systematic affiliation	The sample taken area and the substrate
1	*Aspergillus oryzae*	Ascomycota	Talysh mountains, rice plant
2	*Fusarium culmorum*	Ascomycota	Kur-Araz lowland, wheat
3	*Gloeosporium tiliae*	Ascomycota	Small Caucasus, lime plant
4	*Penicillium kojigenum*	Ascomycota	The Greater Caucasus, soil
5	*Spahaceloma fawsettii*	Ascomycota	Talysh mountains, tangerine plant

As mentioned above, there is a certain group of fungi that their sexual reproduction is unknown and they currently belong to the anamorphs of sack fungi[12]. When describing common fungi that are recorded in the study, in this aspect it became clear that 101 species from 142 (71,1% of total fungi) have these properties(Tab. 3).

Table 3.Distribution of registered fungi on samples taken from the substrates and geomorphological units

Substrates	The Greater Caucasus	Kur-Araz lowland	The small Caucasus	Talysh mountains	Total
Soil	71	82	63	78	91
Plant	51	54	45	56	74
Water	24	15	12	17	28
Weather	20	18	15	19	23
Construction materials	17	12	9	11	19
Total	82	93	72	89	101

Bearing in mind that the samples taken from the research are differing both by taken area and substrates they settled, the fungi were also characterized by this aspect too. As seen, as in most studies the soil is based on the ecosystem which most populated by fungi. The next places consistently take plants, atmosphere, water and construction materials(tab. 3). From the distribution of fungi on geomorphological units became clear that the most common spread regions of anamorphic fungi are Kur-Araz lowland. The next place takes the Talish Mountains, the Greater Caucasus and the Small Caucasus(tab. 3).

As it is known, mushrooms are heterotrophic organisms, so the nutrients necessary for life support they take in ready form, and for this purpose they use materials specific to living things different from the biological state[1, 12].

Mechanism of obtaining organic matter needed for life activity, more accurately characterization of fungi according to ecological-trophic relationships is also an essential part of mycology research. Similarly, though is also possible to say about the frequency of rate of fungi spread in these or other biotopes or substrates, so that, frequency of rate is an important indicator to determine the role of fungi in ecosystems. Taking all this into account was considered expedient characterizing in this aspect of fungi recorded in the next phase of the research. From the results became clear that among of anamorphic fungi recorded in studies are not encountered true biotrophs and the vast majority of them contain to polytrophic, where biotrophy and saprotrophy are not bearing true character(tab. 4). The majority of polytropic fungi is related with both high adaptability and active involvement in ecosystem processes of anamorphic fungi.

Table 4. Characterization of fungi recorded in researches by ecology-trophic relationships and frequency of rate.

Parameter	The Greater Caucasus	Kur-Araz lowland	The small Caucasus	Talysh mountains
Ecology-trophic relationships (species)				
Biotrophs	0	0	0	0
Saprotrophs	12	12	10	10
Polytrophs	70	81	62	79
Frequency of rate(species)				
Dominants	5	6	4	5
Frequently encountered	40	43	32	40
Random and Rare Species	37	44	36	44

With regard to the frequency of rate of fungi can say that the number of dominants on geomorphological units ranges about 4-6 species which contain 4.0-5.9% of the total mycobiota. Frequency of rate of dominant species varies between 48,9-69,5%. Interestingly, in the formation of mycobiota from dominant species at the various geomorphological units, only 2 species remain constant and it consists of species such as *Aspergillus niger* and *Trichoderma hamatum*. More precisely, the number of common species characterized as dominant is 14. If to summarize the obtained results in the Republic, in addition with Aspergillus niger and Trichoderma hamatum which are specific to the nature of Azerbaijan, there would be noted other 3 species: *Alternaria alternata*, *Fusarium oxysporium*, and *Penicilium chrysogenum*. Frequency of rate for general dominant species varies between 50,1-58,9%.

Thus, from the carried out of research became clear that fungi, including anamorphs of sack fungi, are actively involved in the formation of the mycobiota which specific to the nature of Azerbaijan and characterized by a wide variety of eco-trophic relationships and frequency of rate. For some of them(*Aspergillus oryzae*, *Fusarium culmorum,Gloeosporium tiliae,Penicillium kojigenum* and *Spahaceloma fawsettii*) the territory of Azerbaijan is new.

REFERENCE

1. Bakhshaliyeva K.F. 2017. Ecobiological features of toxic fungi spread in Azerbaijan. Doctor of Biological Sciences.....The abstract of the dissertation. Baku, 43.
2. Grienke U., Zoll M., Peintner U., Rollinger J.M. 2014. European medicinal polypores – a modern view on traditional uses . J. Ethnopharmacol, 154,3:564-583.
3. Hawksworth D. 2014. Possible house-keeping and other draft proposals to clarify or enhance the naming of fungi within the International Code of Nomenclature for algae, fungi, and plants (ICN). IMA Fungus, 5,1:31–37
4. Horst K. R. 2013. Westcott's Plant Disease Handbook. Eighth Edition. New York: Springer Science, 826.
5. http://www.mycobank.org/MycoTaxo.aspx
6. Kirk P. M., Stalpers J.A. 2008. Dictionary of the fungi, 10th edn. CABI publishing / P. M. Kirk, P. F. Cannon, D. W. Minter.– Wallingford(UK), 600.
7. Klich M.A. 2002. Identification of common Aspergillus species. Utrecht: CBS, 116.
8. Kobzar A. İ. 2006. Applied mathematical statistics. M.: PHYSMATHLIT, 816.
9. Methods of soil microbiology and biochemistry.1991. / Ed. Zvyagintsev D.G. M .: MSU, 302.
10. Methods of experimental mycology 1982. / Ed. Bilai V.I. Kiev: Naukova dumka, 500.
11. Netrusov A.İ., Egorov M.A., Zakharchuk L.M. and oth. 2005. Practical work on microbiology. M.: Publishing Center "Academy", 608.
12. Perevedentseva L.Q. 2012. Mycology: fungi and fungi-like organisms. SPb.: Publishing house "Lan", 272.
13. Sutton D., Fothergill A., Rinaldi M. 2001. The determinant of pathogenic and conditionally pathogenic fungi. M: World, 486
14. Samson R.A., Pitt J.I. 2000. Integration of modern taxonomic methods for Penicillium and Aspergillus classification. Amsterdam: Harwood Publishers, 510.
15. Wu H.T., Lu F.H., Su Y.C. et. al. 2014. In vivo and in vitroanti-tumor effects of fungal extracts// Molecules, 19,2:2546-2556.