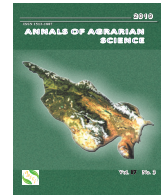




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In Urboecosystems (in Example of Baku City)

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ABSTRACT

The present work is devoted to the assessment of mycological safety according to conditional pathogenic fungus urboecosystem. It was determined that the composition of dominant nucleus of aeromycobiotic system directly formed in urban ecosystems depends on the humidity of the urban environment. It was revealed that if the humidity in the urban environment is more than 70%, the number of conditional pathogen fungi inside the aeromycobiota is rising and the risk factor among the population is increasing.

Keywords: urboecosystem, aeromycobiota, conditional pathogenic, mycological safety, dominant nucleus, humidity, risk factor.

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Introduction

Recently the central cities of the world are characterized by the increasing dynamic of population. The increase in the number of urban population and their negative anthropogenic impact on the environment has led an increase in the strengthening of the risk factor. In other words, the rapid development of urbanization also became a source of “the infection of civilization” [1;2]. Microscopic fungi caused serious global medical and social problems in modern age. It must be noted that destruction of the state of equilibrium between different components of urban ecosystem has led to an increase of biological activity of microscopic fungi, especially opportunistic and allergen ones. Therefore a tendency of increasing allergic diseases of different origin is being observed [3;4]. It is known that in committing allergic diseases mold also take place, this is associated with the role of humidity factor in the development of opportunistic or allergic fungus.

It must be noted that even if the humidity is not manifested in open systems or urban environment in water vapor form, in closed systems or on the walls of housing buildings it appears on the form of rot. So the majority of micromycetes spread either in open or in closed condition show pathogenic features under the influence of humidity factor. Therefore, those become agents of different mycot-

ic diseases in human like exogenous allergens or endogenous opportunists [5;6]. It must be determined that the composition of aeromycocomplexes formed by microscopic fungi of urban areas is still learned in closed spaces, in other words in the interior air of buildings. However, the composition of mycobiota formed in open urban ecosystems, in other words in the city air is practically almost not studied [7;8].

The aim of the presented study is to assess micromycetes in the air of Baku city scoring by conditional pathogen fungus.

Material and methods

The studies were carried out in the territory of Yasamal and Sabail districts of Baku city. As the object of the research samples taken from the different atmospheric air. Examples were taken from the air at 0,2m above the land and from a height corresponding to the average height of human beings, in other words from 1,5m height which is close to the respiratory system of people. In this case, aspiration and sedimentation techniques were used. In aspiration method sampling was carried out with the help of ПИY-1Б aspirators. In sedimentation method Petri dishes are held open in 1,5m height atmosphere from the land for 30 minutes and micromycetes spontaneously settle on medium malt agar. Tak-

en samples were incubated in 22-25°C for 7 days. After that the colonies were identified by being analyzed due to the cultural morphological features using microscope [9;10].

Results and discussion

It was determined that ecological factors in urban ecosystem, in other words humidity and temperature regimes if characterized by optimal parameters, species appear which belong to the first group of conditional pathogenic fungi according the BSL (Biological Safety Levels) scale. The studies held in different micro districts and residential areas, as well as parks and gardens of Baku were carried out in open air. It was revealed that if humidity in the urboecosystem is less 70% in this case the climatic conditions of the urban environment considered to be favorable then and the generated aeromycobiota has species diversity.

The analyses of the species composition of aeromycobiota show that micromycetes having dark-colored melanin containing spores take dominant position. From this fungus species of *Alternaria* genus -*A.alternata*, *A.tenuissima*, *A.chartarum*, *A.longipes*, *A.consortiale*, *A.radicina* and species of

Cladosporium genus - *C.cladosporioides*, *C.herbarum*, *C.sphaerospermum*, *C.elatum*, *C.variable* are represented more (Fig. 1 and 2)

It must be noted that spores of these fungi are nearly equal to 75 µm. Studies carried out at different times of the year show that in summer and autumn the urban environment is characterized by richer aeromycobiota. In this period the density of opportunist and allergen fungi included at BSL-1 group in the air is not so great, equal to 600 CFU/m³ this case shows that infection sources are potential in the urban environment and proves the relative stability of mycological safety.

But environmental disruption in urboecosystem or the increasing indicators of humidity and temperature causes major qualitative changes in aeromycobiota. It was determined that when humidity level in the city is more 70% the number of micromycetes spread in the atmosphere air increase differential to 1500 CFU/m³ and conventional pathogenic fungi of BSL-2 group appear inside mycobiota. It must be noted that in such the number of fungi belonging to *Alternaria* and *Cladosporium* genus is not decreasing and in aeromycobiota moisture-loving fungi, including species of *Paecilomyces* genus- *P.inflatus*, *P.carneus*, *P.aeruginus*, *P.variotii* dominate.

Table. Taxonomic structure of aeromycobiota of Baku

№	Genus	Species
1.	<i>Alternaria</i>	<i>Alternaria alternata</i> (Fr.)Keissl; <i>A.consortiale</i> (J.W.Groves) <i>A.chartarum</i> Preuss <i>A.longipes</i> E.W. Mason <i>A.radicina</i> Meier <i>A.tenuissima</i> (Kinze:Fr)Wilt..
2.	<i>Aspergillus</i>	<i>Aspergillus glaucus</i> Link, <i>A.candidus</i> Link.: Fr, <i>A.flavus</i> Link:Fr; <i>A.fumigatus</i> Fresen; <i>A.niger</i> Tiegh;; <i>A.ochraceus</i> K.Wilh, <i>A.terreus</i> Thom, <i>A.versicolor</i> (Vuill.)Tirab
3.	<i>Aureobasidium</i>	<i>Aureobasidium pullulans</i> Arnaud
4.	<i>Botrytis</i>	<i>Botrytis cinerea</i> Pens:Fr.,
5.	<i>Cladosporium</i>	<i>Cladosporium cladosporioides</i> G.A. de Vries, <i>C.elatum</i> Nannf, <i>C.herbarum</i> (Pers) Link, <i>C.sphaerospermum</i> Penz, <i>C.variable</i> G.A. de Vries
6.	<i>Fusarium</i>	<i>Fusarium moniliforme</i> Sheld; <i>F.sambucinum</i> Fuckel; <i>F.heterosporum</i> Nees
7.	<i>Phoma</i>	<i>Phoma lingam</i> (Tode) Desm
8.	<i>Monilia</i>	<i>Monilia digitata</i> Pers
9.	<i>Mucor</i>	<i>Mucor circinelloides</i> Tiegh., <i>M.hiemalis</i> Wehmer., <i>M.racemosus</i> Fresen
10.	<i>Paecilomyces</i>	<i>Paecilomyces aerugenus</i> Samson; <i>P.carneus</i> (Duche & R.Heim), <i>P.inflatus</i> (Burnside); <i>P.variotii</i> Bainier;
11.	<i>Stachybotrys</i>	<i>Stachybotrys atra</i> ; <i>St.cylindrospora</i> C.N.Jensen; <i>S.chartarum</i> Hughes.
12.	<i>Verticillium</i>	<i>Verticillium cephalosporium</i> W.Gams; <i>V.tenerum</i> Nees.
13.	<i>Ulocladium</i>	<i>Ulocladium atrum</i> Preuss; <i>U.chartarum</i> (Preuss) Simmons.



Fig. 1. Colonies (a) and conidia (b) of *Alternaria*

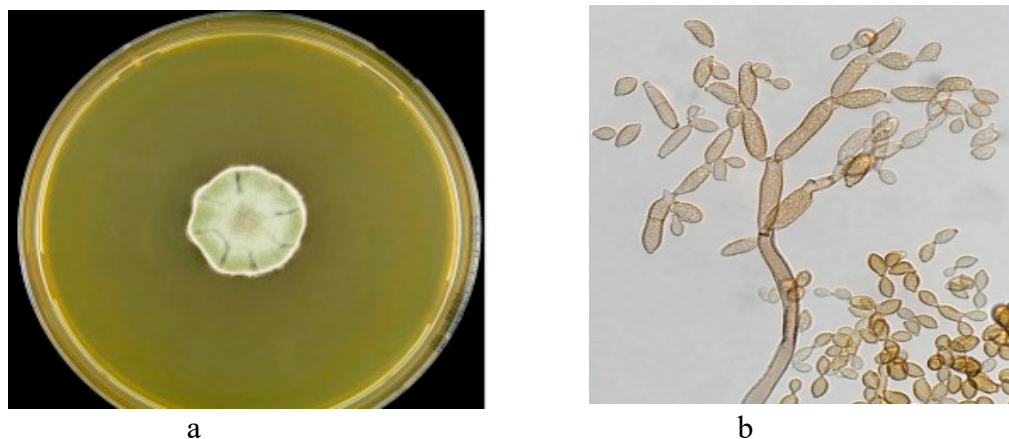


Fig. 2. Colonia (a) and conidia (b) of *Cladosporium*

Occurrence these fungi in urboecosystem variates between 40,5- 63,2% which once again confirms that they dominate in humid period of the city. At the same time the increase of other species of mycocomplex formed in urban ecosystem including *F.moniliforme*, *F.sambucinum*, *F.heterosporum* of Fusarium genus, *C.cladosporioides*, *C.herbarum* species of Cladosporium genus, *A.glaucus*, *A.niger*, *A.candidus*, *A.flavus*, *A.fumigatus*, *A.ochraceus*, *A.terreus*, *A.versicolor* species of Aspergillus genus, *A.pullulans* of Aerobasidium genus, *V.cephalaspodium*, *V.tenerum* species of Verticillium genus prevalence rate increases up to 40,2%.

In addition, in the wet autumn of 2015 as a result of research conducted in an urban environment *B.cinerea* species of Botrytis genus, *M.digitata* species of Monilia genus and *Ph.lingam* of Phoma genus have been found which are considered to be rare to urban ecosystems this fungi occurrence was equal to 10,3% respectively. It should be noted that the increase of ecological factors, especially humidity in environment has resulted in appearing of all the categories of fungi including dominant, often found and rare species, as well as their opportunist and allergen types.

Mycological analyses were held in the air of “Old city”, antral part of Baku built in special historical and architectural style and characterized by high rates of ecological factors. It was revealed that “Old city” has a special aeromycobiota and it has such potential pathogen species of Mucor genus like *M.circinelloides*, *M.hiemalis*, *M.racemosus*, from Stachybotrys genus *S.atra*, *S.cylindrospora*, *S.chartarum*, from Ulocladium genus *U.atrium*, *U.chartarum*.

Conclusion

A result of held researches it was revealed that depending on how the year was the humidity in the urban environment is considered to be the main factor in the formation of aeromycobiota in urban ecosystem. As a result of researches it was revealed that there exist close correlation between humidity level of urban environment and dominant nucleus of aeromycobiota formed in ubroecosystem. Note that the entrance of opportunist or allergen species of microscopic fungi to the dominant nucleus of aeromycobiota formed in ubroecosystem causes

the increase of risk among population and leads to breach of mycological security. This is considered to be potentially dangerous situation the population having low immune status and children.

It was revealed that aeromycobiota formed in the urban environment is completely different from mycocomplexes in environment natural biocenosis. In terms of composition and to the number of opportunistic fungi.

It was also determined that depending on the ecological situation of urboecosystems the registration of opportunist and allergen fungi species in the air is closely connected to the humidity level of aeromycobiota formed in city environment.

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