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Air Impurity Study of Elbasani Town – Albania

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Abstract: Microbiological features given in this survey are received in Elbasani town, ancient and significant town positioned in central Albania. It is one of the largest cities of Albania, with a population of around 140000 and an area of 900 km². It lies down along Shkumbini River at elevation around 150 m above sea level. Microbiological data on air pollution are given in this study, focusing on the choice of stations to be in different areas and key points of the Elbasan city, thus attempting to contaminate microbiological areas. In recent years, mainly in the last two decades, many microbiological studies have been conducted for the Elbasan city.

The purpose of this study is to present the current state of microbiological contamination of air as an important parameter with a direct impact on the health of the population of Elbasani town. For this purpose, we have received multiple samples with representatives of M.P.A. and Czapek from three stations, during a three-month period of 2017. Laboratory sample processing as well as microscopic observation were performed in "Aleksander Xhuvani" University, Elbasan.

We think that emphasis should be placed on the fact that the Elbasani town has been dominated by a significant microbiological contamination, which comes mainly from different markets of food and industrial character. In our point of view, interesting data were found that clearly show the air microbiological quality.

Keywords: Air contamination, M.P.A., Czapek, Microbiological, Elbasan city - Albania.

INTRODUCTION

Microbiology is a discipline of biology that deals treats the study of microorganisms, functioning, construction and their impact on other living organisms [1-2]. The first microscopic lookout was of the fruiting bodies of moulds, realized by Robert Hooke in 1666 [3].

Air microorganisms studied in Aeromicrobiology which is a sub-discipline of Microbiology.

Different microorganisms can be in aerosol form in the atmosphere, including bacteria, fungi, viruses, and protozoa's [4-5]. To survive in the atmosphere, it is important that these microorganisms to adapt to the humidity and temperature [6-7]. The microorganisms play an important role to the well-being of the world's inhabitants contributing to maintain the balance of chemical compounds and living organisms in our environment [8].

Bioaerosols present in marine environments are represented by bacteria, while those found on terrestrial environments are rich in fungi, bacteria and pollen [5-9]. The survival of bioaerosols is determined by a number of biotic and abiotic factors involved: temperature and humidity, climatic conditions, ultraviolet (UV) light, etc [7,9-10]. The survival of a certain bacterium and its nutritional sources may vary by location and time [2,4,11].

In the airspace there are a large number of pathogens causing various infections in humans and animals [12]. Diseases such as flu, tuberculosis, many allergic diseases, some diseases of plant and animal fungus are spread through the air [11].

This paper gives some impressive features for the air microorganisms in areas of the Elbasani town along July - September 2017 period. The selected areas are: "Markata" Market, "Industrial Market" and "Olive Grove". Through our work by studying the distribution and presence of mosses and bacteria, we hope to arrive at a realistic evaluation of microbiological contamination of air as a necessary parameter for normal human health.

MATERIALS AND METHODS

The most useful methods for microbial air analysis are: sediment method, aspiration method and filtration method.

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We have chosen it as a suitable method for accomplishing our work that of sedimentation [13-14]. This method consists on sedimentation of air microorganisms on the terrain surface of Petri dishes [15]. The sterile Petri dishes with agar were placed in open spaces in the three predefined stations in Elbasan city.

Sedimentation method.

The sedimentation method consists on sedimentation of air microorganisms on the surface of the Petri dishes with agar. For analyzed the microorganisms two Petri dishes are needed with nourishing agar medium, while for anaerobes they need two plates with nourishing agar and iron sulphate.

Was selected MPA ground, called PCA (plate count agar) for the bacteria analyzing, while to analyze the air mosses are used Petri dishes in Czapek [14].

Placement of Sampling in the Thermostat.

Petri dishes after receiving from the three predefined stations are placing in the thermostat (37^0C) and left there for 24 hours to incubate. After 24 or 48 hours, is done the counting of colonies, turning the plate with bottom from above. The colonies look like dots, with different sizes and various shapes as a flower, drops or stars.

If on the analyzed Petri dishes are found more than 200 colonies then it means that the area on which the dishes are placed has an air contaminated by microorganisms. While on Petri dishes are less than 200 colonies, then it means that the analyzed area has a clean air [13-14,16].

RESULTS AND DISCUSSIONS

Based on the input collected during the work study, the data found for each month, respectively from July to September are together summarized. Seeing the analyzed samples taken during July - September 2017 period in Elbasan city it can be said that this city has a microbiological contamination over allowed rates.

In the Table 1 are shows the number of microorganisms in the three months for each of the three stations. The minimum number of mosses (28) is taken in Olive Grove - Station while the maximum number (711) is taken in "Markata" Market - Station.

The same phenomenon, with regard to the minimum-maximum number and observed stations, is also observed for bacteria and concretely the minimum number of 31 is taken in Olive Grove and the maximum number by 932 is taken in the station of "Markata" Market.

Getting started from Table 1 we construct Table 2, which represents the total number of bacteria and mosses for the three-month period. Based to the average values on the table 2 it is clearly appearing that, the minimum number of bacteria and mosses (81) is taken in Olive Grove – Station, while the biggest number (1535) is taken in "Markata" Market - Station.

Started by the data of Table 2, Figure 1 is built which indicates the level of air microbiological contamination for three analyzed stations. Figure 1 clearly shows a large increase of the microorganisms' number in July, in which temperatures are on average the highest.

Table 1. Microorganisms Number According to the Analyzed Period

Czapek (Moses)	**1st Station "Markata" Market**	**2nd Station Industrial Market**	**3rd Station Olive Grove**
July	711	503	39
August	652	472	59
September	573	365	28
MPA (Bacteria)	**1st Station "Markata" Market**	**2nd Station Industrial Market**	**3rd Station Olive Grove**
July	884	865	38
August	932	736	47
September	853	645	31

Started from the data presented in Table 1 and 2 the total microorganisms' number is impressive (Figure 3). From the data of Table 2 was built the Figure 2, which shows the level of air microbial contamination by microorganisms' in each of the three analyzed stations.

Table 2. Total Microorganisms Number According to the Analyzed Period

Date	**1st Station "Markata" Market**	**2nd Station Industrial Market**	**3rd Station Olive Grove**
July	1595	1368	77
August	1584	1208	106
September	1426	1010	59
Average	1535	1195	81

Figure 2 is clearly shows a great presence of microorganisms in "Markata" Market - Station, exactly 55% of the total.

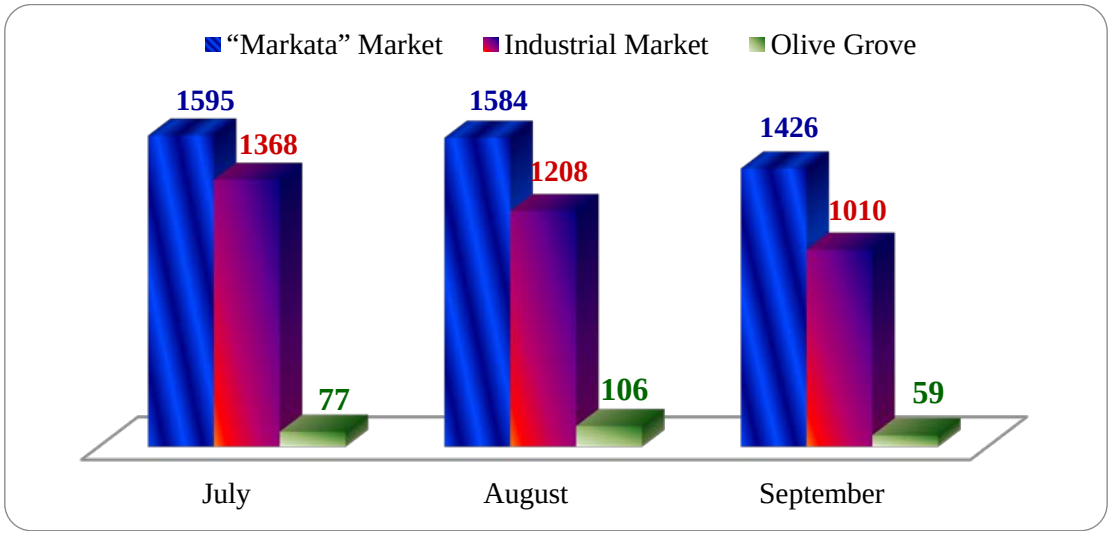

Figure 1. Level of Air Contamination in the Analyzed Stations

The presented data in Figure 2 show the presence of 42% of the microorganisms in the Industrial Market - Station and the smallest microorganism's presence is noted in Olive Grove - Station with the 3% of the total.

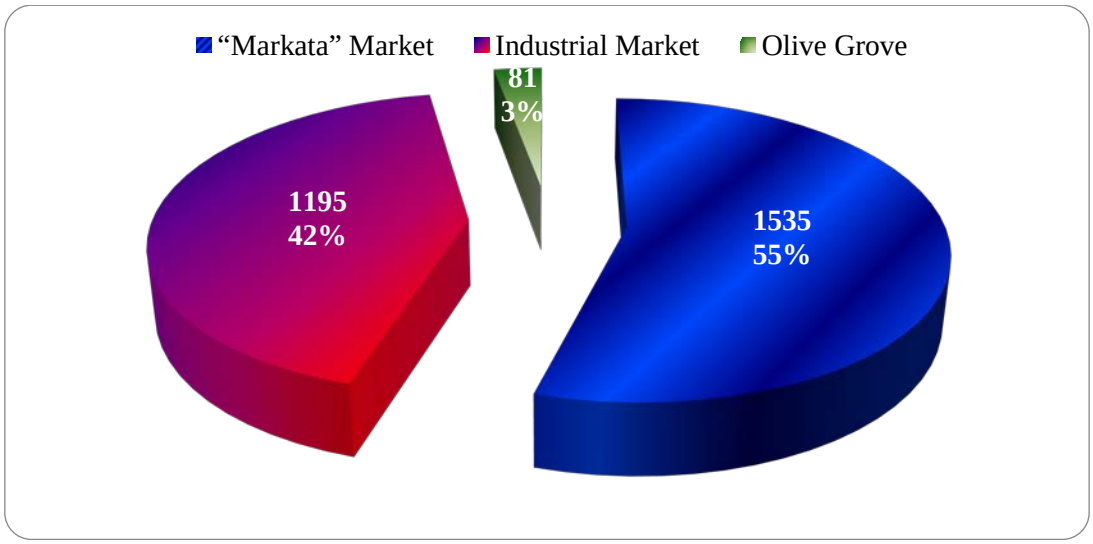

Figure 2. Microbial Pollution in Each Stations

Based on the data presented in Table 1 and 2, the level of air contamination in Elbasani town is growing and especially the total increase of microorganisms, seen in two stations "Markata" and Industrial Market. Based on the received data results that: the "Markata" Market area has a biggest microorganism's number, while the Olive Grove area has a smaller microorganism's number.

Concerning to the "Industrial Market" concluded an intermediate microorganism's number between two extreme points; but this station is also regarded contaminated, as the microorganism's number on a Petri dish exceeds allowed rates (over 200 colonies).

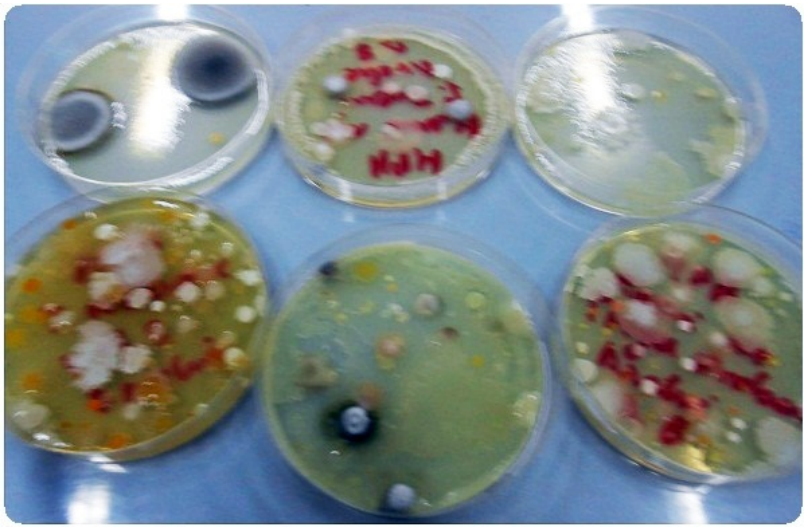

Figure 3. Bacteria and Mosses (Source: Jançe 2017).

Microbial air pollution beyond the norms consists of the "Markata" Market and we think that this was expected as a result of heavy traffic, overcrowding and the residuals of marketed products.

High impact on this result has the geographical position of this area positioned in the center of the city, characterized by heavy traffic of cars and people, as well as the presence of a market of food products that contain high microbial contamination.

The number of microorganisms in the Industrial Market is the lowest compared to the "Markata" station, as it does not have its overcrowding and is positioned on the outskirts of the city, having a slight ease in the circulation of motor vehicles but the number of air microbes is still very high and above the permissible levels of pollution.

While the Olive Grove area is considered pure by microbial contamination since the above factors, such as the circulation of vehicles and people as well as the different markets are not present. Moreover, the most important factor is the dense vegetation rich in olives and fruit trees, representing the green crown of the city and thus results in cleaner airspace, rightly calling this area of the City's Lungs. Elbasani town has always been located among the most polluted cities in Albania.

Data from the Public Health Institute show that the number of people affected by cancer and lung disease is very high. Among the main causes of these diseases as well as environmental pollution in the Elbasan city, we mention the smog which is mainly due to the heavy traffic of the vehicles but more from the heavy industry of the city, without leaving behind urban waste.

As a conclusion we can say that the air of Elbasani town is very microbiologically polluted, given that there are a number of microorganisms above allowed norms and the only clean air area is Olive Grove (with less than 200 microorganisms for Petri dish).

CONCLUSIONS

• "Markata" Market – Station has the largest microorganism's number followed by the "Industrial Market" with a significant microorganism's number and the "Olive Grove" area has the smallest microorganism's number.

• "Markata" Market and Industrial Market are classified to be highly polluted, as the microorganism's number on a Petri dish is much higher than the permissible norms and the Olive Grove is a microbiologically clean area, represented by a number of bacteria and mosses within allowed and almost paperless norms.

• It is clearly seen a greater presence of microorganisms in July, months in which temperatures are highest and in September the lowest presence.

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