Banglavision
ISSN: 2079-567X
Vol. 17 • No. 1 • April 2017

The Effect of Airborne Mycoflora in Urban Plantation : An Analytical Study

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Abstract

Mankind has changed a lot since his emergence. When they reached a certain level of his dwelling has been shifted from rural to urban setting. And urbanization is expanding at a faster pace than any other time. But this phenomenon has cost the planet earth a lot. It's enough to cite for an example that befor the 18th cebtury 80% of the European Land was forest, but nowadays its only 20%. This devastating climate change has resulted in great loss to the earth and economy of the mass people. Recently experts who are involved in urban planning is emphasing on the role of plantation in the development of urban setting. This article deals with this issue in light of the recent urban development trends especially the Effect of Airborne Mycoflora in Urban Plantation.

Keywords: *Plantation, Mycoflora, airborn*

Introduction

After the industrial revolution in 1780, due to the dense production and increasing the consumption of energy resources specially coal, air pollution phenomenon and enhancement of greenhouse emerged. Finally in 1905, the first conference on air pollution was established in London, and attention was drawn to the consequences of air pollution.

Until 1960, coal was accounted as the main resource of industrial fuel. After that, using the oil product in supplying energy in industry, the rapid development of industry, population growth of the world and high consumption of industrial goods led to increasing the fuel consumption either in production units for heating and equilibrating the temperature, cars consumption fuel and also rapid tree cutting of the forests as well as the destruction of ranges and finally increasing the concentration of greenhouse gases in the atmosphere. The rise of atmospheric concentrations of greenhouse gases creates the increase in global temperature.

In fact, energy consumption results in increasing the greenhouse gases production. It means that by expansion of industry in the countries, the emission of greenhouse gases is ever increasing and release the various gases will be created the greenhouse phenomenon,

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population growth in developing countries, and will generally, therefore, bring about the destruction of forests and ranges. This causes the disappearance of absorbing resources of CO_2 and finally burning of these resources cause increases in production of greenhouse gases.

Due to the optimum consumption of energy in industrial and developing countries, the rate of productivity is very high. On the other hand, lack of population growth in these countries controls their role in the production of greenhouse gases.

In 1990, six (6) billion tons carbon equivalent to CO_2 has entered to the atmosphere. An average of 1 to 2 P.P.M of atmospheric concentration of CO_2 has been increased per year, so that this rate will be reached to 400 P.P.M by 2020. This is to explain that before the industrial revolution in 1994, atmospheric concentration of CO_2 has been estimated 28 P.P.M and 356 P.P.M respectively.

The main producer of CO_2 in industrial countries is America and China, that America alone enters 1.5 billion tons to atmosphere.

The functional results of the above mentioned gases increase the global warming through returning the high heat wave of the sun to the earth and enter to atmosphere. Since 1980, according to the existing statistic, an average of 0.3 - 0.6 have been increased annually.

On the basis of Rio conference, the countries by signing the climate change's Convention committed themselves to returning CO_2 emission to 1990's levels by the year 2000. But some of the countries have done activity in this field successfully including:

- Czech Republic
- The Netherlands
- Switzerland
- Denmark
- England

Chosen index in the field of production of greenhouse gases for each person and/or for each production unit is (G.D.P).

To reduce the greenhouse gases to 1990's level, the following ones should be done:

1- Controlling the emission resources.

2- Increasing the absorption and storation resources.

Forests and seas are considered as the best absorbent of CO_2. There are numerous statistic and figures on absorption of the greenhouse gases by plantations. This study has been conducted to quantify and mention the actual figures on absorption of Co2 by plantations.

In this study, to determine the volume and weight of the stored CO_2 by trees, the annual produced biomass was measured. Measuring the stored carbon in the soil of this region and comparison with sample regions without trees, the carbon dioxide equivalent to stored CO_2 in the soil was calculated. Thus, it is possible to calculate the absorbed CO_2 by urban plantation.

I believe that trees have capabilities to absorb and store the carbon dioxide, in long-term. Other green spaces can do this but after short-term, large portion of the stored CO_2 return to the Nature cycle. Moreover, using the high animal fertilizer consumption, regarding to CH_4 and N_2O emission, lead to increase the greenhouse gases production.

The existing figures in the declared statistic show that an average of 76% of the surface parks of Tehran city is covered by green areas and 30% of which is covered by tree planted surface. An area of 67% of Local Park is green space and 50% of which is covered by tree planted surface.

Therefore, to control the greenhouse gases cannot be rely on the existing area statistic of parks and green spaces? With rely on the studies done and identify the product resources of CO_2 and estimate the capabilities of absorption of it by green spaces and plantations, can be found the solution to problems. It is impossible to control the greenhouse gases through absorb it but will be led to compile a planning in order to limit the rate of production and its resources.

The Effect of Airborne Mycoflora in Urban Plantation: Bangladesh Perspective:

We have to believe that atmosphere is consist of full of airborne microbes. Such as Virus, Bacteria, fungal spores and others. These microorganisms shows significant correlation with air pollution and weather. The air we breathe in is full of thousands of fungal spores which is certain compositing environment can easily exceed $10^9/m^3$. (Aimaniandaetal 2010). Most of the airborne microbes originate from natural sources like soil, water bodies and animals including man (Proctor, 1935, Zobell 1964). Not only the spores of fungi, myxomycetes, bryophytes, pteridophytes but also pollen grain, moss gemmae, propagules of lichen, cells of algae, vegetative cells of plants constitute the air spores. The study of aerobiology is that important in understanding the distribution and ecology of fungi and also to relate their interaction with plants, human and their products. Some may be harmless to other forms of life. Fungal spores in the air markedly seasonal because of their sensivity to weather changes (Hyelmroos 1993, Kurkela 1997, corden and Millington 2001, Stepalska and Jerez 2005)

Airborne fungal counts increased with temperature and decreased with rainfall and relative humidity (Kasprzyk, 2008) heavy and have many implications in the spread of human and plant disease.

Hinuled study on aerobiology has been done in Bangladesh (khan and Ali 1984; Pasha and Hossain 2011 and Ahmed ct al 2013). However, no aermycologicel investigation of external air particularly of Dhaka Metropolitan city has been made in Bangladesh. The air mycoflora of a place varies with season, temperature, humidity and activity of people and this need to be revised every year. Before doing plantation in any places we have to observe and monitor the quality of the atmosphere for a long time.

For the last three years, the air quality in Dhaka has remained consistently unhealthy during the dry season according to the Department of Environment (DoE). On February 17, 2014, Dhaka's air quality was measured 172 AQI which is considered unhealthy and on January

25, 2017 it was measured 361 AQI, that is deemed extremely unhealthy according to the standards for Bangladesh (NAAQS).

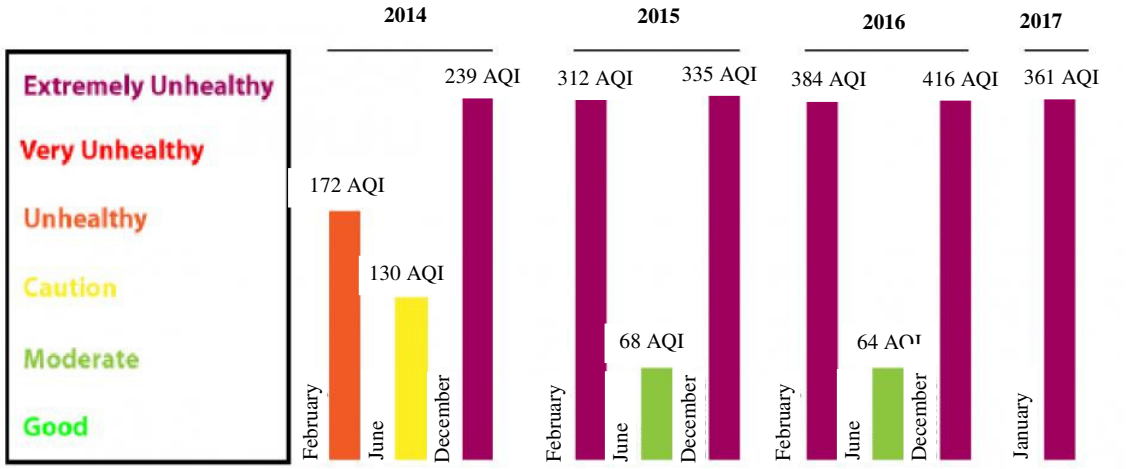

Figure: Daily Air Quality Index (AQI), Report 1st Feb, 2017

Air quality of Dhaka from 2014 to 2017.

In a report prepared by the World Health Organization (WHO) in 2014, Dhaka took the 23rd place in terms of worst air quality among 1,600 cities of the world.

A public notice by DoE in December of last year states that 58% of the particulate pollutants responsible for the smog in the air of Dhaka city comes from the orthodox brick kilns around and inside Dhaka, 18% from road dust and soil dust, 10% from vehicles, 8% from burning of biomass and 6% from other sources.

People develop diseases like Asthma, COPD, Bronchitis, and Bronchiectasis due to long time exposure to dust.

"Currently Bangladesh has 85 lakh patients suffering from Asthma, and almost 75 lakh patients suffering from Bronchitis and COPD." Dr. Biswas told The Daily Star.

The Department of Environment of Bangladesh acknowledges the threat and is working to keep air pollution in check under the CASE (Clean Air and Sustainable Environment) project. To abate air pollution risks CASE monitors and publishes the air quality charts on monthly basis.

According to the WHO, chronic exposure to such particles increases the risks of developing cardiovascular and respiratory diseases and even cancer in the lung and the urinary tract or bladder in human body.

The presence of gaseous pollutants, like Carbon Monoxide (CO), Sulphur Dioxide (SO_2), Nitrogen Oxide (NOx), Ozone (O_3) and Methane (CH_4) has been found by the DoE in the air of Dhaka city in alarming quantity.

The DoE director thinks awareness among the general people is also necessary to attain its objective of clean air. In its notice in the leading newspaper of the country, DoE requests citizens to abide by some suggestions.

We can control pollution to a huge extent by using good quality lubricant and fuel for our vehicles, examining their fitness regularly, keeping construction materials covered, planting more and more trees around our homes, checking the continuous digging of roads on both personal and government level, use environment friendly ways in mills and factories.

Other cities:

Sadly, the quality of air in the other major cities of the country is also not healthy. Apart from Dhaka, Narayanganj and Gazipur, the air quality in the port city of Chittagong and Barishal is also extremely unhealthy according to the DoE's latest report published in January, 2017. And the air in Rajshahi and Sylhet have been categorized as unhealthy.

Table: Clean Air and Sustainable Environment (CASE)- Project, Department of Environment, GoB. Daily Air Quality Index (AQI), Report 1st Feb, 2017

Location	AQI	Category	Range
Dhaka (a)	312	Extremly Unhealthy	290-330
Chittagong (b)	323	Extremly Unhealthy	
Gazipur (c)	332	Extremly Unhealthy	
Narayanganj (c)	360	Extremly Unhealthy	
Sylhet (c)	277	Very Unhealthy	
Khulna (c)	DNA	DNA	
Rajshahi (c)	196	Unhealthy	
Barisal (c)	343	Extremly Unhealthy	

Note (a), (b) and (c) Refer to the AQI Average in one city based on three, two and one CAMS respectly.

DNA: DATA NOT AVAILABLE.

Discussion and Conclusion:

These figures are only a presentation for a part of 22% of major cities of Bangladesh energy consumption and the imagination that plantation and green area would be able to control CO_2 production and other fuel pollutants which is not considered in this calculation, is inaccessible. However, the following recommendations is suggested for controlling all pollutants and greenhouse gases which would partially resolve the Tehran air pollution issue along with policy making the government and public training:

1- Developing green areas through possible methods specially a forestation and tree planting.

2- Optimum preserving and improving of green areas specially trees and forestations and investigating on fast-growing and adapted species.

3- Converting assembly line of manufacturing of cars with high rate of consumption to reach international standards.

4- Improving public transporting network.

5- Preventing unnecessary transportation, honesty answering of the governmental organizations towards people by telephone and developing of mail and Email.

6- Establishing of bicycle riding lines and encouraging the people to walk rather than in a vehicle.

7- Monitoring of cars speed to optimize fuel consumption.

8- Substituting clean energies for fossil fuels.

9- Encouraging people and training them for using less energy especially through insolating and optimizing buildings

10- Developing of green architecture for optimum productivity of sun light, the direction of buildings and establishing green area to reduce energy consumption for heating and chilling.

References:

1. ACGIH Bioaerosols. 1999. *Bioaerosols assessment and control.* American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.

2. Chao, H. J., J. Schwartz, D. K. Milton, and H. A. Burge. 2003. *The work environment and workers' health in four large office buildings*. Environ. Health Perspect. 111**:**1242-1248. [PMC free article] [PubMed]

3. Dillon, H. K., P. A. Heinsohn, and J. D. Miller. 1996. *Field guide for the determination of biological contaminants in environmental samples*. American Industrial Hygiene Association, Fairfax, Va.

4. Domsch, K. H., W. Gams, and T. H. Anderson. 1980. *Compendium of soil fungi. IHW-Verlag*,, Eching, Germany.

5. Flannigan, B., and J. D. Miller. 2001. *Microbial growth in indoor environments*, p. 35-67. *In* B. Flannigan, R. A. Samson, and J. D. Miller (ed.), *Microorganisms in home and indoor work environments*. Taylor & Francis, New York, N.Y.

6. Gots, R. E., N. J. Layton, and S. W. Pirages. 2003. *Indoor health: background levels of fungi*. Am. Ind. Hyg. Assoc. J. 64**:**427-438. [PubMed]

7. Grant, C., C. A. Hunter, B. Flannigan, and A. F. Bravery. 1989. The moisture requirements of moulds isolated from domestic dwellings. Int. Biodeterior. 25**:**259-284.

8. Gravesen, S. 1978. *Identification and prevalence of culturable mesophilic microfungi in house dust from 100 Danish homes*. Allergy 33**:**268-272. [PubMed]

9. Haselwandter, K., M. R. Ebner, and A. Frank. 1989. *Seasonal fluctuations of airborne fungal allergens*. Mycol. Res. 28**:**170-176.

10. Hocking, A. D., and J. I. Pitt. 1980. *Dichloran-glycerol medium for enumeration of xerophilic fungi from low-moisture food*s. Appl. Environ. Microbiol. 39**:**488-492. [PMC free article] [PubMed]

11. Klich, M. A. 2001. *Identification of common* Aspegillus *species. United States Department of Agriculture Agricultural Research Service*, Southern Regional Research Center, New Orleans, La.

12. Li, D. W., and B. Kendrick. 1995. *A year-round comparison of fungal spores in indoor and outdoor air.* Mycologia 87**:**190-195.

13. Macher, J. M., F. C. Tsai, L. E. Burton, K-S. Liu, and J. M. Waldman. 2001. *Prevalence of culturable airborne fungi in 100 U.S. office buildings in the Building Assessment Survey and Evaluation (BASE)* Study, p. 1-9. *In* Moisture, microbes, and health effects: indoor air quality and moisture in buildings. Proceedings of IAQ 2001. American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc., Atlanta, Ga.

14. Miller, J. D. 1993. *Fungi and the building engineer,* p. 147-162. *In* M. Geshwiler (ed.), Environments for people. Proceedings of IAQ '92. American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc., Atlanta, Ga.

15. Miller, J. D., P. D. Haisley, and J. H. Reinhardt. 2000. *Air sampling results in relation to extent of fungal colonization of building materials in some water-damaged buildings.* Indoor Air 10**:**146-151. [PubMed]

16. Published “The Daily Star” on 3rd February 2017 by Sifat Shams.