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AEROBIOLOGICAL SURVEY OF INDUSTRIAL AREA OF DOMBIVLI, DIST- THANE

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ABSTRACT:

A number of air- borne particles including pollen and fungal spores are responsible for respiratory disease. The atmosphere contains an array of bio- particulate materials such as bacteria, viruses, fungal spores, pollen grains, hyphal fragments, mold spores, epidermal hairs, vegetable cells, animal danders, dust mites, insect scales and other air borne micro- organisms which are passively transported by air.

The health and well being of the public is affected by physical, chemical and biological properties of the indoor environment. These days more challenging problem to human being in his relation with environment, especially immediate surroundings. It is then recognized that exposure of the airways to micro organisms in environment is associated with wide range of adverse health effects and major public health impact. Recent research's carried out in different parts of the world have amply emphasized the need for monitoring of indoor as well as outdoor air for effective management of allergic disorders of various origins. Air pollution with many contaminants is actually or potentially injurious to human health. It can cause health problems and can cause irreversible damage to environment. However impact of biological pollutants on indoor and outdoor air quality and impact on human health remains poorly understood. Wide range of biological pollution is mainly due to the organic constituents like pollen, fungal spores, algae, mites, protozoan cysts, hyphal fragments, body fragments of insects, feathers etc.

Dombivli is a suburban city of Mumbai located in Thane district. It has multiple number of residential areas and also industrial areas around city. The atmosphere consist of biological particulates such as pollen grains, fungal spores, algal spores, plant parts, hyphal fragments etc. Few part of Dombivli area is full of vegetation that is source of pollen, plant parts, decaying leaves and other plant materials which all collectively releasing biopollutants, growth of different mycospora and vehicular smoke takes place.

It is also likely that vehicular and industrial pollutants may interact with the biopollutants resulting in increasing health hazards.

Quite a large number of respiratory allergens, plant and animal pathogens are daily carried over by wind and distributed over distant areas. The air- born inoculum is the most dangerous causing plant diseases and allergic reactions in human and domestic animals. The present investigation is aimed at study of aerobiological survey of residential and industrial area of Dombivli, Dist- Thane was conducted from January 2017 to January 2018. Techniques used for identification were Gravity slide Technique and culture



plate count technique. Most dominant fungal types observed were *Aspergillus*, *Cladosporium*, *curvularia*, *Nigrospora*, *Rhizopus* etc.

KEYWORDS: Aerobiology, residential and Industrial area, health hazards.

INTRODUCTION

Aerobiology is branch of biology that studies organic particles such as bacteria, fungal spores, very small insects, pollen grains and viruses which are passively transported by the air. Agrobiologists have traditionally been involved in measurement and reporting of airborne pollen and fungal spores as a service to allergy sufferers.

Present study and investigation will give the information about qualitative and quantitative variations of biological component's of Dombivli area, their seasonal variation and impact on the living world.

The aerobiology pathway gives different stages in the movement of particles such as spores or pollen from the source to the effect they cause when they land. A combination of more than one process is often studied rather than each processes individually. Sampling the air for certain particles (spores, pollens) is useful for monitoring climate changes estimating of forecasting dispersal of pathogens or allergens and risk assessment of GM pollen spread or cross pollination of plant varieties.

History of aerobiology is an interesting aspect. It can be traced up to the period of Hippocrates, the father of medical sciences, who was aware of the fact that, men were affected by epidemic fever when they inhaled air, infected with

such pollutants as are hostile to the human race probably, it was the first instance that gave an idea that atmosphere is corridor, if not home for micro-organisms. Lucretius,(55 B.C) held quite modern view and suggested that particles are carried by wind and concluded that influenza and cold viruses diseases spread due to inhalation. After Lucretius more than 1500 years passed before man ever began to aware that the air teams with microscopic living organisms. The discovery had to wait almost until the invention of microscope.

Air pollution is the presence in the atmosphere one or more contaminants in such quantities, characteristics and duration as to make them actually or potentially injurious to human, plant or animal life of which interfere with the normal enjoyment of life(Chanda, 1981). The contaminants may be biotic or abiotic contaminants i.e. gases containing floating dusty particulates are called aerosols.

MATERIALS & METHODS:

The methodological details of the experiment, detail of sites , Tables, graphs of different locations are presented in this chapter. It has been also supplemented with meteorological details. Two techniques have been used for the said survey.

(I) Gravity slide technique:

Slides (75 x 25) smeared with a thin film of safranin stained

glycerin jelly were exposed daily, in the Dombivli at all locations from January, 2017 to January 2018, for a period of one year . The trapped pollen and were identified with the help of reference slides, standard text books, and monograph pertaining to different genera.

(II) Culture Plate technique:

For different fungi having morphological similarities, Petri plates containing 20ml. of RBS Agar were exposed once in every fortnight for 03 minutes at every location, and incubated in an inverted position at room temperate till the number of colonies occurring and sporulating. The colonies developed were identified with the help of reference slides, standard textbooks and monographs etc. Damaged books were identified with the help of reference slides, standard textbooks and monographs etc.

RESULT AND DISCUSSION

The aerobiological investigation were done at four different sites in Dombivli for the period of one year from January 2017 to January 2018 by Gravity slide technique and culture plate technique.

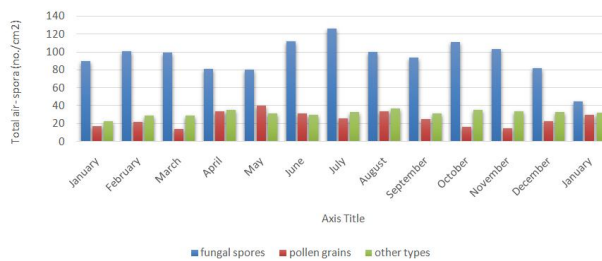
The exposed slides were regularly scanned under the high power of a research microscope. A constant quadrant area of 3.24 cm² was thoroughly combed for airspora trapped. The number of pollens, fungal spores and other bioparticles were counted to get the number per cm²

The study is aimed to monitor concentration of various biocomponents in the atmosphere of Dombivli city. The city surrounded by industrial area as well as area with full of vegetation. The study aims to correlate the biocomponents especially pollen grains and fungal spores present in the atmosphere with that of meteorological parameters during the entire period of investigations.

Table (I.B) Monthly frequency of various aerial pollen atmosphere trapped on gravity slides from January 2017 to January 2018

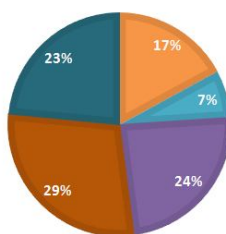
	Pollen Type	Jan -17	Feb -17	Mar -17	Apr -17	May -17	Jun -17	Jul- 17	Aug -17	Sep -17	Oct -17	Nov -17	Dec -17	Jan -18	To tal	% of Polyno spora	% total airs pora
1	<i>Acacia auriculiformis</i>	--	--	1	1	1	1	--	--	--	--	--	--	--	4	1.22	0.203
2	<i>Annona</i>	--	--	--	--	--	1	1	--	--	--	--	--	--	2	0.61	0.101
3	<i>Azadirachtain dica</i>	--	--	--	1	--	1	--	--	--	--	--	--	--	2	0.61	0.101
4	<i>Bougainvillea spectabilis</i>	1	1	--	--	--	--	--	1	1	1	--	--	--	5	1.52	0.254
5	<i>Celosia argentea</i>	1	1	--	--	--	--	1	1	--	--	1	1	--	6	1.84	0.305
6	<i>Caesalpinia pul cherima</i>	--	--	--	--	--	--	1	1	--	--	--	--	--	2	0.61	0.101
7	<i>Clerodendroni nerme</i>	--	--	1	1	1	--	--	--	--	--	--	--	--	3	0.91	0.152
8	<i>Cocos nucifera</i>	1	1	--	--	1	1	--	--	1	1	--	--	1	7	2.14	0.356
9	<i>Delonixregia</i>	--	--	--	2	1	2	1	2	--	--	--	--	--	8	2.44	0.407
10	<i>Eucalyptus globulus</i>	--	--	--	--	--	--	--	--	--	--	--	1	1	2	0.61	0.101
11	<i>Grass</i>	10	15	8	25	30	20	15	22	20	10	12	20	25	232	70.94	11.82
12	<i>Hibiscus rosasinensis</i>	--	--	--	--	--	--	1	2	1	--	--	--	--	4	1.22	0.203
13	<i>Lantana camara</i>	1	--	--	--	--	--	--	--	--	--	--	1	1	3	0.91	0.152
14	<i>Leucaenagluca</i>	--	--	--	--	1	1	--	--	--	--	--	--	--	2	0.61	0.101
15	<i>Mangiferaindica</i>	--	--	--	1	2	1	--	--	--	--	--	--	--	4	1.22	0.203
16	<i>Peltophorumpetrocarpum</i>	--	--	--	--	1	1	2	2	--	--	--	--	--	6	1.84	0.305
17	<i>Moringa oleifera</i>	2	2	1	1	--	2	4	2		3	2	--	2	21	6.42	1.07
18	<i>Polyalthialongifolia</i>	--	--	2	1	1	--	--	--	--	--	--	--	--	4	1.22	0.203
19	<i>Ricinus communis</i>	1	1	--	--	1	--	--	1	1	--	--	--	--	5	1.52	0.254
20	<i>Unidentified pollen</i>	--	2	1	1	1	--	--	--	1	1	--	--	--	7	2.14	0.356
	TOTAL	17	23	14	34	41	31	26	34	25	16	15	23	30	329	100.	16.748

Monthwise variations in the total air-spores by gravity slide technique from January 2017 to January 2018



OTHER TYPES

- 1 Plant fragments
- 2 Hyphal fragments
- 3 Insect parts/insects
- 4 Protozoan cyst
- 5 Unclassified spores



Monthly frequency of various aerial Fungal spore type of atmosphere trapped On gravity slide from Jan 2017 to Jan 2018.																	
Sr. No	Fungal spores	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Total	% of Myco spora	% total airspora
1	<i>Alternaria</i>	8	10	6	5	8	9	11	4	7	11	9	10	8	106	8.64	5.4
2	<i>Beltrania</i>	2	1	3	1	2	5	0	0	0	0	8	5	7	134	2.77	6.82
3	<i>Biospora</i>	4	4	0	0	8	5	4	4	6	2	2	4	1	44	3.58	2.24
4	<i>Cercospora</i>	2	0	0	0	0	0	0	4	0	0	0	6	3	15	1.22	0.76
5	<i>Chaetomium</i>	2	0	0	0	0	0	0	2	1	4	0	2	1	12	0.97	0.61
6	<i>Cladosporium</i>	5	20	12	17	12	8	15	8	16	8	4	4	6	135	11.01	6.88
7	<i>Corynespora</i>	2	1	0	0	0	0	0	0	2	3	0	0	1	9	0.73	0.45
8	<i>Curvularia</i>	5	8	10	11	7	5	15	3	2	1	0	2	1	70	5.7	3.56
9	<i>Didymosphaeria</i>	2	0	0	0	4	10	0	0	2	4	4	0	0	28	2.28	1.42
10	<i>Drechstera</i>	2	0	8	0	4	4	0	0	2	0	0	0	0	20	1.63	1.01
11	<i>Epicoccum</i>	0	0	0	0	4	8	8	6	4	0	0	0	0	30	2.44	1.52
12	<i>Exosporium</i>	2	0	0	6	4	0	0	0	0	0	6	4	2	24	1.95	1.22
13	<i>Fusarium</i>	2	0	8	6	0	8	0	0	2	0	0	0	0	26	2.12	1.32
14	<i>Haplosporella</i>	0	0	0	6	0	0	6	6	4	0	0	0	0	22	1.79	1.12
15	<i>Helminthosporium</i>	4	10	0	4	0	4	14	8	6	12	10	14	0	86	7.01	4.38
16	<i>Heterosporium</i>	4	6	0	0	0	4	8	6	0	0	0	0	0	28	2.28	1.42

	<i>m</i>																
17	<i>Humicola</i>	4	4	6	0	10	4	10	8	4	10	16	0	0	76	6.19	3.87
18	<i>Memnoniella</i>	0	0	0	0	0	6	4	5	4	4	2	0	2	27	2.2	1.37
19	<i>Nigrospora</i>	6	6	5	0	0	4	4	5	3	7	4	0	0	44	3.58	2.24
20	<i>Periconia</i>	6	4	6	6	5	5	3	0	0	6	6	2	1	50	4.07	2.54
21	<i>Pithomyces</i>	4	4	0	0	0	4	5	5	0	0	0	0	0	22	1.79	1.12
22	<i>Pleospora</i>	0	0	2	4	0	0	0	3	2	0	4	4	0	19	1.54	0.96
23	Rust spores	3	4	5	6	4	3	2	4	5	5	3	4	2	50	4.07	2.54
24	Sporomia	1	3	1	0	0	6	0	3	4	0	0	0	0	18	1.46	0.91
25	Smut spores	2	3	2	1	1	1	3	4	7	8	4	4	2	42	3.42	2.14
26	<i>Tetraploa</i>	2	0	0	0	0	0	0	4	0	0	6	4	0	16	1.3	0.81
27	<i>Torula</i>	4	4	10	0	0	0	0	2	6	10	0	0	4	40	3.26	2.03
28	<i>Trichothecium</i>	4	4	6	0	0	0	2	0	0	8	6	4	0	34	2.77	1.73
29	Unidentified	8	5	9	8	7	9	12	6	5	8	9	9	4	99	8.07	5.04
	Total Fungal spore	90	101	99	81	80	112	126	100	94	111	103	82	45	1326		67.43

CONCLUSION

After the study of various residential and Industrial sites it was observed Fungal segments are responsible for variety of respiratory disease in human, plants and animals. Air quality of inside residential area has become an crucial factor, which is partly related to fungal contamination. It was also observed that the fungal species in residential area exhibit seasonal fluctuations and supported by moderate temperature and high humidity. Impact of airborne fungal spores including their release, dissemination, deposition and effect is of great significance to identify health hazards and physiological disorders in living beings. The analysis of gravity slide revealed 29 fungal spore types and 20 pollen. It also revealed five other types also. Viz. Plant fragments, hyphal fragments, Algal components, Insects/ insect parts and unclassified spores. By culture plate technique about 20 fungal types have been identified. The spores of *Alternaria* and *Cladosporium* contributed highest percentage to the airspora at all the selected sites by gravity slide technique. With this technique the other major fungal types identified were *Curvularia*, *Biospora*, *Epicoccum*, *Helminthosporium*, *Nigrospora*, small round spores etc.

Out of 20 pollen types highest percentage contributed by pollens of Grass from the four selected sites. Pollen of *Moringa oleifera* L., *Ricinus*, *Cocos* were reported as major dominant pollen types at all four selected sites. Peltophorum trees are grown on different sites for their ornamental value. The flowering period is from February to April and from September to December. The tree is tall and flowers drop on the ground forming yellow carpet. Pollen of some species were absent even though the plants are present in the locality. This may be due to the washing off of the pollen by rains or blown away to far off places by wind.

There was a spore free period at times especially during summer. It is likely that the spore may not get caught due to the climatic factors like winds, rains, humidity, temperature etc. Bhati and Gaur [1979] at Modinagar reported more than 10% of exposed gravity slides devoid of fungal spores.

Fungal spore constituted about 67.4% of total air spora at Dombivli city. The average percentage contribution of the pollen grains were 16.74%. The Other types contributed an average of 25.82% of the total air-spore at Dombivli city.

The spores of *Aspergillus*, *Penicillium*, *Rhizopus* etc. formed identifiable colonies on the culture plates, but it couldn't identified to their generic levels on the exposed slides. Therefore all of them with almost similar shape and size were included under the small round spore category. By both gravity slide and culture plate technique used in identifying these spores to their generic level. The analysis of culture plate revealed a total of 35 fungal forms from Dombivli city. The most common colonies found were those of *Cladosporium*, *Aspergillus*, *Curvularia*, *Alternaria*, *Penicillium*, *Biospora*, *Nigrospora*, *Yeast*, *Candida* etc. Study of this aspect is highly interdisciplinary in nature and has tremendous scope to find the significance application in human health.

REFERENCE

- Agarwal, M.K. Mukerji, K.G. & Shivpuri; D.N. 1969.** Studies of the allergenic fungal spores of Delhi; India, Metropolitan area Botanical aspects. J. Allergy; 44:193-203
- Agarwal, M.K. 1970.** Studies on allergenic fungal spores of Delhi Atmosphere. PhD Thesis. University of Delhi.
- Agarwal, M.K., Chanda, S; Nair; P.K.K & Baldwa, V.S. 1973.** Methods of research on allergy and allergens. tech. Bull.1 Pollen, Mold and insects committee of Indian college of Allergy and applied Immunology. Archana Publishers; Delhi.
- Harvey. R. 1970.** Air spora studies at Cardiff. 111 Hyphal fragments. Trans. Brit. Mycol. Soc. 54.
- Hirst, J.M. 1991.** Aerobiology in plant pathology. Grana. 30:25-29.
- Jadhav. D.S. 1990.** Aerobiology of groundnut at Kallam. PhD. Thesis, Marathwada Univ. Aurangabad.
- Jain . A.K., Patel. P. & Dutta. T.R. 1992.** Production, dispersion and sensitivity of some allergic pollen grains at Gwalior. Ind. J. Aerobiol. Sp. 1:95-98.
- Tilak, S.T 1989.** Environmental ecology and Aerobiology. Pp.312. Today and tomorrow printers and publishers, New Delhi.



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