



HORIZONTAL STRATIFICATION OF THE FUNGAL AEROSPORA OF GARBAGE DEPOT IN KALYAN CITY, THANE (INDIA)

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ABSTRACT

Bioaerosols are mainly constituted by bacteria, actinomycetes, fungi and pollen grains. Allergy is the most common problem in India. The respiratory allergy affects about 70% of the population in India. Airborne bioparticles like fungal spores, fungal hyphae, pollen grains etc. are chief causative agents of allergic disorders such as allergic rhinitis, bronchial asthma. The people living in the proximity of garbage depot face the risk of exposure to the airborne fungal spora leading to allergic disorders.

The airborne fungal spores over the garbage depot of Kalyan city were monitored over one year period (2015-2016) using gravity sampling method. Air sampling was done daily at three spots over the garbage depot. Altogether 19 fungal types were identified. Fungal colonies were recorded throughout the year. Dominant spore types were *Cladosporium*, *Alternaria*, *Aspergillus*, *Penicillium*, *Curvularia* etc. The spores of *Cladosporium* contributed the highest percentage (24.4 %) to the airspora followed by *Alternaria* (11.9%). Therefore the present study was undertaken to obtain the quantitative analysis of fungal spores over the garbage depot of Kalyan city and their concentration at different horizontal strata.

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INTRODUCTION

Environmental pollution has been defined as the unfavorable alternation of our surrounding partly or largely as an impact of increasing industrialization and related human activities and also due to the activities of plants and animals.

The continuous growth of industries in this century speeded up greater control of the environment by man but on the other hand it accelerated pollution of air, land and water.

India is inhabited by one fifth of the World's population with multicultural, multilingual and multiethnic groups. However, 30% of them are estimated to suffer from one or the other respiratory allergy [1]

Environmental aeromycology constitutes one of the major aspects mainly because of the dominance of fungal spores in the airspora (2). Many allergic human diseases such as asthma, rhinitis and a range of cardio-respiratory diseases are attributed to inhalation of airborne fungal spores and pollen grains (3 & 4). Bioaerosols are mainly constituted by bacteria, actinomycetes, fungi and pollen grains. Allergy is the most common problem in India. The respiratory allergy affects about 70% of the population in India.

Kalyan is a city in the Thane District of Maharashtra state. It is also known for being the Mumbai region's exit station to North India and South India. The city is heavily populated with a population of 1.7 million. as per the census 2016. The expanding population generates an estimated 1500 to 2000 tones of garbage every day.

The population adjoining the garbage disposal area has been complaining of foul odour, smoke, flies, mosquitoes and health hazards of various types. Among the health hazards sneezing and coughing, skin rash, respiratory diseases, asthma, eye irritation, infection of skin etc are more predominant. Considering the severity of the problem and its relevance to public health a study was undertaken during the year 2015-2016.

MATERIAL AND METHODS

The monitoring of atmospheric fungal spores was carried out for 12 months. The fungal spores were trapped by using Rotorod air sampler (5). The sampler was operated in morning, for 15 to 20 minutes twice in a week. The sampler was installed at a height of 2 meters from the ground level. After sampling the air, the cello tape was mounted on a 24 X 60 mm glass slide and mounted with glycerine jelly. The stripes were then scanned under binocular microscope Identification of spore was done on the basis of morphological characters and with the help of available literature (6). The spore load on

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slides was converted as number of spores/ m3 by multiplying conversion factor 5 for Rotorod sampler.

Sites

Garbage dumping depot of Kalyan city was selected and a total of 3 sites was marked. The sites were marked at a horizontal distance of 10 m (Site A), 100 m (Site B) and 1000 m (Site C) away from the dumping ground.

RESULT AND DISCUSSION

About 19 types of fungal spore have been isolated and identified. The spore of *Cladosporium* contributed the highest percentage to the total air-spores at all the three selected sites. The other major fungal types identified were *Curvularia*, *Alternaria*, *Helminthosporium*, *Bispora*, *Fusarium*, *Nitrospora*, small round spores etc. The peak period of fungal spore count in Kalyan city was from August to October.

Table 1 Annual percentage contribution of fungal airspora at three different horizontal sites

S.N.	Fungal Spores	A	B	C
1	<i>Alternaria</i>	11.9	10.84	12.36
2	<i>Beltrania</i>	0.19	0.19	0
3	<i>Bispora</i>	4.42	4.31	3.94
4	<i>Cladosporium</i>	24.4	24.21	23.52
5	<i>Curvularia</i>	18.8	16.32	18.19
6	<i>Epicoccum</i>	1.8	1.26	1.28
7	<i>Exosporium</i>	0.16	0.24	0.22
8	<i>Fusarium</i>	0.95	0.98	0.56
9	<i>Helminthospori</i>	3.01	3.6	3.92
10	<i>Heterosporium</i>	1.9	2.33	1.08
11	<i>Nigrospora</i>	2.29	3.11	2.8
12	<i>Papularia</i>	101	1.09	0.64
13	<i>Periconia</i>	2.09	2.18	2.4
14	<i>Pithomyces</i>	0.64	1.28	1.28
15	Rust-spores	2.35	2.94	3.77
16	Smut-spores	1.88	2.23	2.29
17	Teleutospores	1.22	0.93	1.28
18	Small roundspores	20.7	21.09	2025
19	Miscellaneous spores	0.17	0.77	0.18

Similarly *Cladosporium* were predominant and most frequent airspora at different places reported by Kakde *et al* (1999) at Nagpur, Tiwari (2006) at Raipur, Devi *et al* (2002) at Guwahati, Sahni and Purwar (2002) at Allahbad, Dahia and Gupta (2003), Kochar (2011) at Rohtak, Mishra *et al* (2008) in Sonbhadra (U.P.) Hazarika *et al* (2008) at Assam, Giri and Sawane (2010) at Nagpur, Khan and Shrivastava (2011) at Bilaspur.

CONCLUSION

Amongst the recorded fungal spore types *Cladosporium* followed by *Curvularia*, *Alternaria* and *Helminthosporium* was the dominant contributor of the airspora. Air monitoring is essential and must be performed continuously in order to find out the status of various types of allergic and pathogenic spores at various places and their role in causing health hazards to vegetables, fruits and human beings.

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