



Survey of aeromycoflora present in vegetable and fruit market

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ABSTRACT

Airspora constitutes fungal spores, pollen, bacteria, hyphal fragments, insect's scales, etc. Some of them are toxic and causing serious health hazards in human being, as well due to their higher concentration in the air creates environmental pollution. Among them fungal forms were taken into consideration to find out the status of various types of allergic and pathogenic spores at various places and their role in causing health hazards to plants and human beings. In vegetables and fruit market, airspora contain mostly fungal spores which are known to cause the diseases to vegetables and fruits and various allergies to human beings. The present aerobiological investigation was carried out by using Rotorod air Sampler for the period of one year. Total 17 fungal forms were recorded during the study period. *Aspergillus* (12.2%), *Rhizopus* (8.3%), *Exosporium* (7.7%), *Sporidesmium* (6.8%) and *Curvularia* (5.7%) were recorded as the predominant forms whereas *Alternaria*, *Bispora*, *Heterosporium*, etc. were found with comparatively less concentration. It was observed the concentration of the spores in the air varies from season to season probably due to variation in meteorological parameters. The dominance of name of the fungi in the air of vegetables and fruit market indicates their possible role in the damage of vegetables and fruits. The vegetables and fruit market environment had higher population of *Aspergillus* and *Penicillium* indicating possible source of contamination. Fungal spores are one of the chief components of aeromycoflora known to induce various allergic disorders in human beings.

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Introduction

Environmental aeromycology constitutes one of the major aspects mainly because of the dominance of fungal spores in the airspora (Tilak 1991). The spores are often liberated in the air in massive concentration and can remain airborne for a long time. The study of aerobiology has its bearing on various aspects of human health and welfare, chief of which are allergic and plant pathogenic. The fungal spore constitutes a major component of airspora. Some spores of the fungi are responsible for allergy, since the spores are inhaled and deposited on sensitive mucosa (Tilak 1991). 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 (Shivpuri and Singh 1971; Chanda and Mandal 1978). Extramural aerobiological research includes aeromicrobial survey at various places like College campus, Bus stand, Railway station, Garbage depot, Crop fields etc. The present study was carried out to identify fungi forms in vegetable and fruit market in Pimpri area and to study their variation in concentration. The study of fungal aerospora of market may have some implications on the health of the people working in the market, customers, sellers etc. Fungal propagules in the ambient air are regularly and continuously inhaled by human beings. Consequently, it is understandable that the high concentration of most of the fungal spores present in the market environments may be causative agents of respiratory diseases in humans and infections to various perishable commodities (Chandel, 2002). In the vegetable markets of metropolitan cities, rotten vegetables and fruits, gunny bags, paper bags, packing materials, straw, discarded leaves and stems are the main substrates for the growth of airborne fungi hence were

conducted in Pimpri vegetable market area for a period of one years. In view of the common occurrence of allergic disorders, it is worthwhile to conduct long term survey of airborne spores with clinical studies in different parts of India. The results of present study would be helpful to the clinicians for better diagnosis and treatment of inhalant allergy.

Although extensive work has been done on the qualitative and quantitative incidence of fungal spores in the extramural environment of various vegetable market in India and abroad, but as literature of survey suggests that scanty work was done from aerobiological point of view in Pimpri Chinchwad region, hence the present investigation was undertaken.

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 (Perkin 1957). 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 (Tilak and Srinivasulu 1967). The spore load on slides was converted as number of spores/ m³ by multiplying conversion factor 5 for Rotorod sampler.

Result and discussion

Altogether 17 types of fungal spore types were recorded, of which Deuteromycotina shows the highest (62.80 %) concentration followed by Zygomycotina (8.38%), and Basidiomycotina (4.66%).

Table -1: Concentration of airborne components in Play Ground from Oct-2010 to Sep-2011.			
Sr.No	Spore Type	Spores / cubic meter of air	% Of individual airspora
A	Zygomycotina		
1	<i>Rhizopus</i>	575	8.388
B	Basidiomycotina		
2	<i>Smut Spores</i>	180	2.625
3	<i>Rust Spores</i>	140	2.042
C	Deuteromycotina		
4	<i>Alternaria</i>	340	4.959
5	<i>Aspergillus</i>	840	12.25
6	<i>Bispora</i>	365	5.324
7	<i>Cladosporium</i>	165	2.407
8	<i>Curvularia</i>	395	5.762
9	<i>Exosporium</i>	530	7.731
10	<i>Fusarium</i>	60	0.875
11	<i>Fusariella</i>	210	3.063
12	<i>Heterosporium</i>	280	4.084
13	<i>Memmoniella</i>	165	2.407
14	<i>Nigrospora</i>	40	0.583
15	<i>Penicillium</i>	220	3.209
16	<i>Pithomyces</i>	225	3.282
17	<i>Sporidesmium</i>	470	6.856
D	Other Type		
18	<i>Epidermal hairs</i>	40	0.583
19	<i>Hyphal fragments</i>	345	5.032
E	Unidentified group	1270	18.52
	Total	6855	100

Table – 2: Total No. of spores found in each group					
Sr. No	Spore Type	Total no of spore types	No. of spores in each	Spores/m ³	% Contribution
1	Zygomycotina	1	115	575	8.388
2	Basidiomycotina	2	64	320	4.668
3	Deuteromycotina	14	861	4305	62.80
4	Other Types	2	77	385	5.616
5	Unidentified	1	254	1270	18.526
	Total	20	1371	6855	100

An average 6855 spores/m³ in air was recorded. The major fungal types encountered during study were *Aspergillus* (12.2%), *Rhizopus* (8.3%), *Exosporium* (7.7%), *Sporidesmium* (6.85%) and *Curvularia* (5.7%). Major types of spores with their percentage contribution are listed in Table 1.

Rhizopus, the only member of Group Zygomycotina was reported during the investigation with 8.3% contribution. Whereas *Smut spores* (2.62%) and *Rust spores* (2.04%) were the major contributors from class Basidiomycotina. Other type formed 5.62% part of the total airspora. It comprises of hyphal fragments (5.03%), epidermal hairs (0.58%). A major fraction of unidentified type was also reported with 18.52% contribution may be due to lifting of ground dust during morning hours.

Incidence of fungal population is closely linked with seasons, and climatic conditions. Peak concentration was recorded in October and November 2010; Second peak was noticed in the month August and September 2011. It was found that moderate temperature, high relative humidity and mild rains

favoured, fungal growth. The minimum concentration was recorded in the month of March it was due to the absence of rains and high humidity. The observation suggests the fact that, higher temperatures do not favour fungal growth in the atmosphere. During the period of heavy rains drastic decrease in spore load was recorded. The observation was in conformity with the observation made Tilak, 1989.

The Basidiomycotina contributed (4.66%) to the total airspora. The spore population comprised of Rust spores and Smut spores. The frequency of rust and smut spores was recorded higher in the beginning of November. This may be due to high humidity, which is favourable for release of spores.

From group Deuteromycotina, 14 spore types were recorded. Out of which *Aspergillus* (12.25%), *Exosporium* (7.73%), *Sporidesmium* (6.85%), *Curvularia* (5.76%) were the major contributors. These spores were frequently observed during the investigation period, as they are dry and can be easily

blown away by wind while *Fusarium* is retained in a sticky liquid and is discharged by water or strong winds (Ingold 1953). *Aspergillus* being the most common genus occupied the first position followed by *Rhizopus* (8.38%) and *Exosporium* (7.73%). Highest concentration of *Aspergillus* was also observed by Wankhade, 1983 at Aurangabad and Rajan, 1952 at Kanpur.

Conclusion

Amongst the recorded fungal spore types *Aspergillus* followed by *Rhizopus* and *Exosporium* 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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