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Study of Airborne Bio-Components from Vegetable Market

Rajkumar Thorat and Shanta G. Pillai
Department of Botany, Yogeshwari College Ambajogai, Maharashtra, India
Department of Botany, Shri Shivaji College Parbhani, Maharashtra, India

Abstract - Airspora includes much more things like fungal spores, bacteria, insect's parts, scales, pollens, hyphal fragments, mycelium etc. Many of them are problematic for human being and cause many diseases and also create environmental pollution when more in concentration. Out of these components, fungal components, areconsidered for study about their effect on vegetables and health of workers and other people in vegetable market. Rotorod sampler was used for study of biocomponents from vegetable market. Investigation was carried during July 2012 to December 2012. Total 50 spore types were recorded from vegetable market during the investigation from which *Aspergillus* (15.98%) was the most frequent and predominant, *Alternaria* (9.13%), *Cladosporium* (9.03%), *Rhizopus*(8.27%), *and Nigrospora* (8.06%), spores also abundant. The main of this investigation was to find out concentration of air borne fungal spores and their relation with damage of vegetables from vegetable market of Ambajogai Dist Beed, Maharashtra (India)

Keywords: Air-borne, fungal spores, Rotorod Air Sampler, Vegetable Market.

I. Introduction

Air is important media to transfer spores from one place to another which may cause disease in various organisms. Air may contain millions of spores, fungal mycelia and pollens.

Indoor aerobiology or intermural aerobiology means study of contamination in a closed environment like hospitals, glasshouses, godown with reference to airborne microbial contaminants.

Air contains many components organic as well as inorganic components like pollengrains, fungal spores, hyphal fragments, plant hairs and other components. This was referred as 'Air spora' by Gregory (1952).

By the source of contamination number and types of spores, mycelia of fungi and pollen grains get determined major source of contamination is plant in bloom, animal excreta, infected plants and their parts. Microbes growing on decaying of drying plant parts

saprophytically, coughing and sneezing of diseased persons generate aerosol which also contaminated.

Many workers have undertaken the researches in outdoor aerobiology however much less attention has been paid towards the study of indoor aerobiology. The contamination of indoor environment with presence of microbial population other contaminates is certainly a major health problem from the hygienic point of view.

Indoor aerobiology was completely on back foot as compared to outdoor aerobiology because so many researches were conducted work on outdoor aerobiology.

Indoor aerobiology can be studied inside the buildings, schools, hospitals, colleges, library, vegetable markets, poultry farms, cowshed, goat farm, sheep farm caves, jail etc.

Indoor microbial population is main reason of so many allergic diseases and health problems. When houses are under repairing concentration of microbes may increase (Mounsell1954).

The present investigation were under taken in order to

1. Correlate the occurrence of biocomponents and workers health in the vegetable markets

2. Compare the concentration of airspora of vegetable market.

3. Correlate the seasonal variations in the spora with meteorological condition.

4. To attract new researchers for intermural studies as most of the researchers in aerobiology are reluctant to this field.

II. Material and method

The airspora inside the vegetable market was studied from 1Juluy 2012 to 30 December 2012. The sampler was run daily twice in the morning from 10:00 to 10:30 hrs. and 05:30 to 06:00 hrs. at evening. The time was fixed throughout the investigations

Air sampler is the apparatus used for trapping purpose or to obtain air sample.

For investigations inside vegetable market was carried out by using Roto-rod Air Sampler.

ROTO-ROD AIR SAMPLER

Roto-rod Air Sampler operated by battery with constant rotational speed. Perkins (1957) developed this sampler. The device relies upon high efficiency with which small airborne particles are deposited on narrow rods oriented at right angles to high velocity winds. A small motor which is operated by battery with constant speed is used to whirl thin sticky brass rods about its axis at a constant high speed. It is well fitted for use in indoor investigation. In Roto-rod Sampler the surface is rotated so that it strikes the spores instead of

moving the spores to the impacting surface in a current of air. The volume of air swept can be calculated from the frontal area of the rod, the diameter through which it is turned and the number of revolutions for which it is turn. The collecting arms of this model are made up of brass having 0.159 cm. across sectional area. It is square in shape and slightly bent inwards. The vertical arms are 6 cm. long and 4 cm. from the axis.

Rotation speed of approximately 2600 rpm, given by operating motor with 6 volts battery. With sampling rod it is reduced to approximately 200rpm. Efficiency of Roto-rod air sampler is 85%.\

III. Sampling method

Trapping of bioparticles was done by operating Roto-rod air Sampler inside the vegetable market at Ambajogai. Sampling was carried out daily. Sampler was run for 30 minutes twice in a day at morning from 10:00 to 10:30 hrs. and at evening 05:30 to06:00 hrs. During rush hours of vegetable market. Transparent cellotape was stuck on the impacting side of both arms of the rod, for sampling purpose. The margins of the tape are heated to the width of the rod with sharp razor blade. Transparent petroleum jelly coated over tape. Tape was removed carefully after completion and placed along the side one another on the glass slide and mounted in the glycerine jelly.

Slides were regularly scanned under 10x × 45 x eyepieces and objective combination of the microscope. Microscopic characters, reference slides and books were used identification of bio-particles.

Spores/m3 of air can be calculated by multiplying total number of spore catches by 5, which is conversion factor for Roto-rod Air Sampler.

SAMPLING PERIOD

Sampling was carried out for 6 months from 1July 2012 to 31 December 2012.

WEATHER

The meteorological data was obtained from Tehsil Office and School of Agriculture Ambajogai for the period from 1st July to 31st December 2012 about rainfall, humidity, temperature.

IV. Result

Fifty fungal spores are found over vegetable market from Ambajogai. They belongs to various groups of fungi Out of which Myxomycetes contain many type Of spore , Zygomycetes contain three types of spores, Ascomycetes contain sixteen, Basidiomycetes contain three and rest of spore types were Dueteromycets. Few other components are also found with these spores like unidentified particles, pollengrains, and insect parts.

Out of all these, Deuteromycotina shows highest (75.51%), followed by Ascomycotina (9.25%), Zygomycotina (8.80%), Basidiomycotina (2.73%), and very less spores observed of Myxomycotina (0.15%) of total aerospora. The major fungal types

trapped during study were Aspergillus (15.98%), Alternaria (9.12%), Cladosporium (9.03%), and Rhizopus (8.17%), Nigrospora (7.16%), and other given spores in Table 1.

Only one member of Myxomycotina was recorded which is Stemonitis (0.14%), Zygomycotina members (8.80%), Ascomycotina (9.25%) , Basidiomycotina (2.74%), Deuteromycotina (75.51%) and other (3.54%)as shown in table 2.

Occurrence of fungal population is related with seasons and climatic condition. Moderate temperature, high humidity and mild rains responsible for growth of fungal spores were found during this investigation. Fungal spores concentration reduces by absence of rain, high humidity as well as high temperature and heavy rainfall.

V. Conclusion

Aspergillus, Alternaria, Cladosporium, Rhizopus, Nigrospora, Curvularia Cercospora and *Torulla* , these are found most frequent fungi thorough out the investigation and also responsible to damage more vegetables from vegetable market and also responsible to cause health hazards of human beings related with vegetable markets**.**

Table 1: Total spore count and percentage contribution of each spore type, morning, evening and average from vegetable market.

Sr. No.	Spore Type	Total Concentration of Biocomponents (spores/m^3) of air		Percentage contribution to the total of aerospora		Mean
		Morning	Evening	Morning	Evening	
1	*Albugo*	750	625	00.39	00.33	00.36
2	*Alternaria*	17525	17210	09.14	09.12	09.13
3	*Aspergillus*	30500	30300	15.90	16.06	15.98
4	*Basidiospores*	1225	1830	00.64	00.97	00.81
5	*Beltrania*	220	160	00.11	00.08	00.10
6	*Beltraniella*	205	230	00.11	00.12	00.12
7	*Bispora*	2700	2200	01.41	01.17	01.29
8	*Cercospora*	8255	10210	04.30	05.41	04.86
9	*Cunnighamella*	280	240	00.15	00.13	00.14
10	*Chaetomium*	1800	3000	00.94	01.59	01.27
11	*Cladosporium*	18240	16120	09.51	08.55	09.03
12	*Curvularia*	9960	9350	05.20	04.96	05.08
13	*Cucurbitaria*	300	260	00.16	00.14	00.15
14	*Claviceps*	610	420	00.32	00.22	00.27
15	*Didymospharia*	700	810	00.37	00.43	00.40
16	*Diplodia*	1420	820	00.74	00.43	00.59
17	*Epicoccum*	810	910	00.42	00.48	00.45
18	*Exosporium*	450	530	00.23	00.28	00.26
19	*Fusarium*	1050	1215	00.55	00.64	00.60
20	*Harknessia*	930	830	00.48	00.44	00.46
21	*Helminthosporium*	13800	12125	07.20	06.43	06.82
22	*Heterosporium*	1560	1025	00.81	00.54	00.68
23	*Hirudanaria*	220	235	00.11	00.12	00.12
24	*Hypoxylon*	2085	1895	01.09	01.00	01.05

25	*Leptospharia*	3150	2815	01.64	01.49	01.57
26	*Massarina*	325	415	00.17	00.22	00.19
27	*Memnoniella*	700	550	00.37	00.29	00.33
28	*Nigrospora*	12015	15210	06.27	08.06	07.16
29	*Penicillium*	4705	6215	02.45	03.30	02.87
30	*Periconia*	10215	8240	05.33	04.37	04.85
31	*Perodiella*	465	325	00.24	00.17	00.21
32	*Piricularia*	630	520	00.33	00.28	00.30
33	*Pringshemia*	230	310	00.12	00.16	00.14
34	*Pleospora*	290	520	00.15	00.28	00.21
35	*Pithomyces*	2010	1290	01.05	00.68	00.86
36	*Pseudotorula*	720	520	00.37	00.28	00.32
37	*Rhizopus*	15210	16250	07.93	08.62	08. 27
38	*Rosiellina*	215	320	00.11	00.17	00.14
40	*Sordaria*	505	715	00.26	00.38	00.32
39	*Rust spore*	750	860	00.39	00.46	00.42
41	*Smut spores*	2640	3125	01.38	01.66	01.52
42	*Sclerotium*	110	95	00.06	00.05	00.05
43	*Spegazzinia*	395	285	00.21	00.15	00.18
44	*Sporidesmium*	290	300	00.15	00.16	00.15
45	*Sporomia*	300	200	00.16	00.11	00.14
46	*Stemonitis*	250	300	00.13	00.16	00.14
47	*Tetracoccosporium*	210	245	00.11	00.13	00.12
48	*Tetraploa*	220	250	00.11	00.13	00.12
49	*Torulla*	11800	9250	06.15	04.90	05.52
50	*Teichosporium*	640	625	00.33	00.33	00.33
	Other					
51	Insect parts	2870	2400	01.50	01.27	01.38
52	Pollen grains	3780	3210	01.97	01.70	01.83
53	Unidentified	550	700	00.29	00.37	00.33
	Total	191775	188610	100	100	100

Table 2. The total spore count and percentage contribution of each group during morning and evening from vegetable market.

Sr.No.	Spore Type	Total Concentration of Biocomponents (spores/m3) of air		Percentage contribution to the total of aerospora		Mean
		Morning	Evening	Morning	Evening	
1	Myxomycotina	250	300	00.13	00.16	00.15
2	Zygomycotina	16,240	17,225	08.47	09.13	08.80
3	Ascomycotina	16,300	18,845	08.51	09.99	09.25
4	Basidiomycotina	4615	5815	02.41	03.06	02.73
5	Deuteromycotina	1,47,150	1,40,125	76.73	74.29	75.51
6	Other types	7200	6310	03.74	03.34	03.54
	Total	1,91,775	1,88,610	99.99	99.97	99.98

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