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Aerobiological Investigation Over Vegetable and Fruit Market

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Abstract

Aerobiology is an interdisciplinary science of applied significance. The biological component in the atmosphere are considered to be most important bio pollutant which incite the disease to crops ,humans health fruits and vegetable deterioration and air pollution. Aerobiological investigation of **vegetable and fruit market** was conducted during July 2016 to June 2017 to identify biological component which are allergenic nature in air causing allergic diseases in human beings ,vegetable and fruit deterioration and air pollution .The atmospheric Air of vegetable and fruit market environment contains variety of biological component transported through air current are the main source of human allergic ,vegetable and fruit deterioration and air pollution. The biological component are toxic and responsible for causing serious health hazard diseases in human beings and create lot of environmental pollution in the entire surrounding of vegetable and fruit market . Total 08biological component were recorded, Fungal spores , pollen grains fungal hyphae, algae, insectparts, protozoancyst, plants parts and unclassified groups were found present in almost all seasons throughout the entire study periods which are known to be the major Allergic and causes air pollution and deterioration of food stuffs. The Present investigation proved that the presence of biological components in environment causes serious health hazards problems in them , vegetable and fruit deterioration and air pollution therefore cleanness should be maintained .

Keywords: Biological components, Fungal spores, pollen grains, Allergic diseases,Air pollution.

Introduction

Atmospheric pollution is one of the most serious problems and in recent times it has reached its climax which poses a great threat to human health that deteriorates well being of the population .Air pollution is the introduction of particulate matter, chemicals and biological materials into the atmosphere that causes discomfort, diseases or even death to humans, damage to other living organisms including food crops. Exposure to bio-aerosols, containing airborne microorganisms and their by-products, can result in respiratory disorders and other adverse health effects such as infections, hypersensitivity and toxic reactions. Microbes are the basic sources of air contamination. Microbial damage in indoor or outdoor areas is caused most frequently by

molds and bacteria. Human beings, market commodities are exposed to greater risk air environment because confined areas contained aerosols and allow them to develop an infectious level. Air of market contains a variety of microbial population. Nosocomial infection also known as market acquired infection is infection acquired in a market environment, which was not present in the visitor at the time of admission. Nosocomial infections can cause urinary tract infections, severe pneumonia and infections of other parts of the body. The microorganisms implicated can enter the body through wounds, catheters as well as by inhalation. In the tropics, researchers have identified microorganisms such as fungal spores, fungal hyphae pollen grains insect parts etcare some of the most commonly isolated biological componenets from market environments. The measurement of the quantity and aerobiology types serves as an index for cleanliness of the environment as well as profile revealing human health and nosocomial infections. The source and spread of microorganisms inside the market are of important concern.. This present study was aimed at investigating the types of airborne biological componenets of a market in Beed District Maharashtra, India.

Materials and Methods

This work was carried out at vegetable and fruit market at Beed District Maharashtra, India. Market was selected for sample collection. These sites were the vegetable shops, fruit shops and open places.

Sampler Technique

During the present investigations air sampling carried out by operating the Air sampler in vegetable and fruit market at Beed Dist. of Maharashtra. The sampling period extended from 1 July 2016 to 30th June 2017. The Air sampler was kept at a constant height of 1.5 meter above the ground level in the centre of Vegetables & Fruit market in a shop. The air was sampled on the transparent cellophane tape (Tixo tape) coated with petroleum jelly. The tape was changed after every 8 days in the morning at 7 a.m. The exposed tape was cut into 16 equal parts, each part representing 12 hours trace area for a day or night accordingly. Each part was divided in to 3 equal sections each section representing an exposed is of 4 hours duration. The cellophane tape was mounted in glycerin jelly on glass slide.

Glycerin jelly can be prepared in the laboratory, its composition is as follows

Gelatin	40 gm.
Glycerine	120 ml.
Distilled water	140 ml.
Phenol	0.5 gm.

These substance in the above proportions, Glycerine and distilled water are mixed in a glass beaker, and then heated over a water bath for about 2-3 hours. While heating this mixture gelatin is added slowly, gradually by constant string just to avoid the clumping. After complete dissociation of gelatin, phenol crystals

are added as preservative and metabolic inhibitor. After cooling, it forms a cake of 'Jellyglycerin'. This glycerin jelly was used as the mountent for preparing the permanent slides.

Scanning

The scanning of such prepared slides was regularly done. The identification of spore types and other biological materials on the exposed tape was done by direct microscopic observation of spore with reference to size, colour, shape &septation. This was confirmed by using standard literature and books of S.T. Tilak, Bilgrami ,Genera of Fungi etc. In all possible cases generic counts were made on these features. Comparison of trapped spores and biological components with parasitic & saprophytic forms collected from time to time in the market.

The area of 9600sq. microns of the total area of trace obtained in a day is scanned under 10x X 40x eyepiece and objective combination of binocular research microscope. The conversion factor of Tilak Airsampler is 14.

The number of spores actually scanned multiplied by conversion factor gave the number of spores present in 1 cubic meter of air.

Conversion factor

The conversion factor for Tilak Air sampler is 14.2, to avoid confusion and for easily calculations "14" has been used as round figure conversion factor. Assuming the trapping efficiency to be 75% with the help of conversion factor the spore concentration/m^3 of air can be calculated. This conversion factor is constant. The sampler being volumetric, the number of spores/m^3 of air can be calculated in the following way

1)	Sampled area	= 8.4 cm. x 1 cm. = 8.4 cm^2
		= 84, 000, 000 mm^2
2)	Scanned area	= 20 x 20 x 24
		= 9, 600 mm^2
3)	Volume of air sampled Per minute.	= 5 litres.
4)	Volume of air sampled In 24 hours.	= 5x24x60
5)	To convert one litre of air into cubic meter	
6)	Volume of air sampled In 24 hours in terms of Cubic meter.	= 7200 x 0.001000028

7) Volume of air sampled in the scanned area in 24 hrs. $= \frac{9600 \times 7200}{1000000}$

8) volume of air sampled in the scanned area during 24 hours $= 1000 \times 69.12$

$= 14.4\ m^3$

$= (1m^3 = 10000$ meters)

Hence, the conversion factor for this sampler is 14.4, but for convenience we use "14"

If total number of spores from catches is 17, then total number of spores per m^3 of air is 17 x 14 = 238/m^3. Assuming the trapping efficiency to be 75% with the help of conversion factor, we can easily estimate the spore concentration /m^3 of air. The conversion factor is constant irrespective of locality, season and weather. The time recorded here in the present work is Indian standard time (IST).

The fungal spore types, hyphal fragments, plant parts insect parts, pollen, algae, protozoan cysts & unidentified groups were recorded separately.

In each year season changes in daily mean concentrations for each spore type together with total air-spore have been recorded and are plotted in different panels which provide the relative frequencies of each spore type.

Percentage representation of Biological componentsovervegetable and fruit market at Beed during study period.

Sr. No.	Name of the biological components	Percentage
1	Fungal spore	80.00
2	Pollen grains	02.62
3	Fungal hyphae	08.37
4	Algae	00.86
5	Insect part	05.81
6	Protozoan cyst	00.29
7	Plant parts	00.76
8	Unclassified groups	00.12

Graphical representation of Percentage of biological components recorded

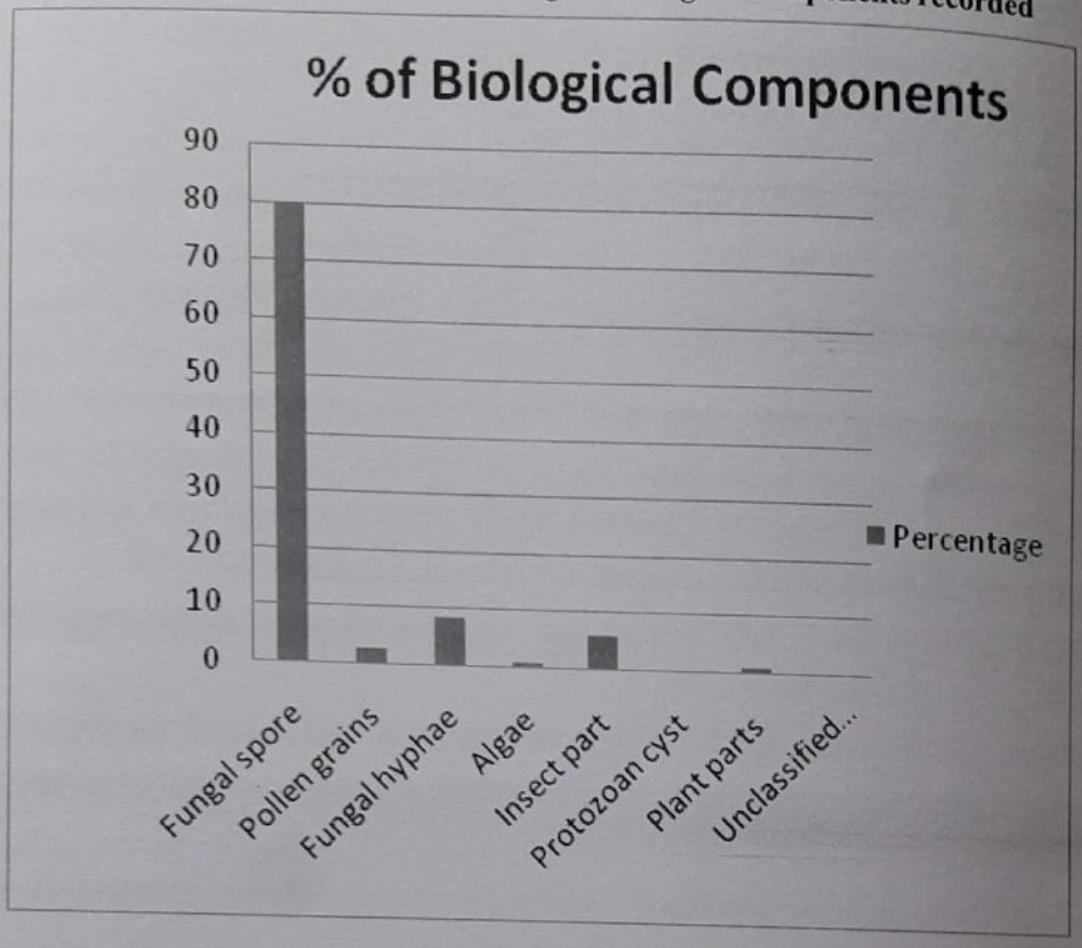
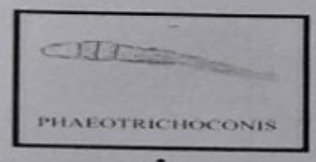
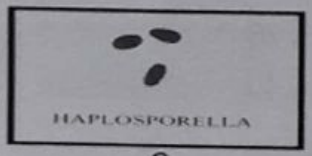


Plate No. 1



A

B



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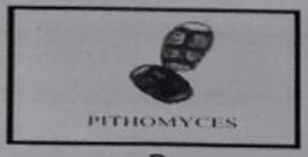
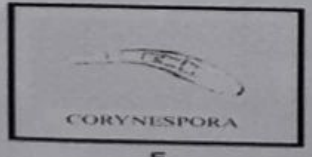


D



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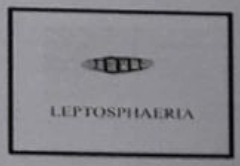
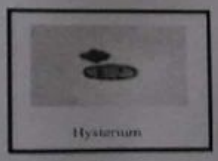
F

Plate No. 5



A



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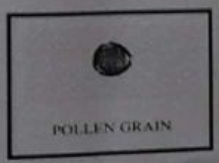

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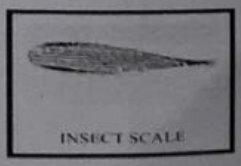

E

Results and Discussion

A total 08biological components were recorded from different sites of market as shown in table. Fungal spores , Pollen grains fungal hyphae, algae, insect parts, protozoan cyst, plants parts and unclassified groups were more dominant in all the seasons .Majority of the biological components areare of fungal spores groups. The seasonal variations in the biological components were observed. In the month of April and October the percentage of fungal spores was to much more while in the month of January and June the Percentage contribution of the fungi was low as compared to the other months .In the winter seasons all the biological components type were recorded while in the summer seasons fungal spores and fungal hyphae were maximum while in rainy season the maximum percentage was of algae and insect parts. In the present study fungal spore was observed as most dominant and frequent species similar result were found by earlier workers **Bagwan N.B. 2001 ,Verma 1992 , Aghashe 1997, Mahajan 2007 ,Pund 2007 ,Saroja 2007** and **Giri 2010 , Shafa khan and SumiaFatema 2014,Momin R.k and Jyoti Kshirsagar 2015, Muley 2006 .Giri, S.K. and Sawne, A.M. (2010).**

Conclusion

From this study it was revealed that a large number of pathogenic microorganismsor biological components are always presents in the market atmosphere that cause serious health hazards to humans ,vegetable and fruit deterioration and air pollution so it is important that the market ambient air should be continuously monitored for air-borne pathogens. Periodic cleaning operations and maintenance activities of different market environment should be taken as a preventive measure, though isolated fungi are tentatively identified by morphological and physiological it needs further identification through 16S and 18S rRNA sequencing for bacteria and fungi respectively. Because it was observed that most of shopkeepers,visitors in the market are affected with toxic biological components and showing the symptoms of some allergic diseases, vegetable and fruit deterioration and air pollution . So it is necessary to keep the market clean, daily cleaning is necessary and periodically monitoring of biological components is also necessary and control measures of the biological components is also very much essential.

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