Plant Archives Vol. 18 No. 2, 2018 pp. 1851-1854 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

AEROMYCOFLORA OF FRUIT AND VEGETABLES MARKET ENVIRONMENT AND THEIR PROPER MANAGEMENT TOWARDS A SUSTAINABLE ENVIRONMENT

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Abstract

Fungal organisms are responsible agent for the weakening and degradation of natural material, diseases in plants, creatures, and individuals. Although the type of mould and degree of infestation will depend upon the particular conditions and available nutrients. Despite the fact that the kind of shape and level of pervasion will rely on the specific conditions and accessible supplements**.** An aerobiological survey of vegetable and fruit market of Gwalior, India, was led amid January to December, 2012 to decide different fungal pathogens exhibit in the climate utilizing the petriplate introduction technique. A total of 28 types of fungal species belonging to 12 genera were recorded during the present investigation period. The minimum concentration (74 fungal species) was recorded in the month of June and maximum (280 fungal species) in September. The dominant fungal types belong to *Aspergillus flavus*, *Cladosporium herbarum*, '*Aspergillus niger*, *A. ochraceus*, *Rhizopus nigricans*, *Penicillium citrinum* and several other genera. Day to day and month to month variations in the concentration of these fungal spore types were recorded. Variation were observed both qualitatively and quantitatively during different months. It was discovered that direct temperature, high relative humidity favored parasitic development of diseases. By these observations it is concluded that there is a definite relationship between the fungal spores and the market. So a perfect management of the waste is needed in the market.

Key words : Aeromycoflora, fungi, biodeterioration.

Introduction

A fungal organism plays an essential part in biodeterioration of natural material. The parasitic spore constitutes a noteworthy part of aerospora. The study of has its bearing on various aspects of human health and welfare, chief of which are allergic and plant pathogenic. The present investigation was carried out in one of the significant fruit and vegetable market of Gwalior city. In the present study, the qualitative and quantitative evaluation of fungal species was studied to decide different contagious fungal pathogens show in the such type of environment utilizing the petriplate exposure method. There is no past work on this sort of concentrate from this region. The examination was completed amid the period Jan. 2012 to Dec. 2012. The investigation of parasitic aerospora of market may have a few implications on the strength of the general population working in the market, clients, merchants and so forth. Fungal propagules in the ambient air are regularly and continuously inhaled by human beings ((Shivpuri and Singh, 1971; Chanda and Mandal, 1978). 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). Over 30% of fruit and vegetable produce is wasted during harvest, grading, packing, transport, marketing and storage (Surendranathan, 2005).

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. Considering the different dangers of bio-pressurized canned products on laborers, shoppers and merchants and also on advertise items, the present investigation was attempted in one of the significant

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organic product markets of Gwalior city. In the present investigation, the subjective and quantitative appraisal of parasitic propagules was considered. They are real ruining operators in charge of causing postharvest organic product waste, prompting critical financial misfortunes (Salunkhe, furthermore, Desai, 1984).

Materials and Methods

The investigation was led for one year from January to December 2012 at vegetable and natural product showcase condition, Morar, Gwalior, M.P., India. It is one of the major market of the city for domestic transport of fruits and vegetables to other different markets. Aeromycoflora was checked presented culture plates to guarantee the quantitative and subjective estimations of contagious spores individually. The inspecting was finished in the peak hours of market exercises *i.e.* 10 a.m. to 2 p.m. Air samples for culturable fungi were collected by uncovering culture petriplates. Two Petriplates containing Potato dextrose agar and Sabouraud dextrose agar were exposed for 10 min. at 15 days interval. The petri plates were kept at various statures (0.5– 1 m) over the ground level. After the introduction to air the petri plates were brought to the laboratory in the pre-disinfected polythene bags and incubated at 25^0C for 5–7 days. Colonies were counted by colony counter and identified. The identification of colonies was based on the color, size, and shape of the colonies and other morphological features aided by published literatures **(**Barnett and Hunter, 1998, 1965; Raper and Thom, 1968).

Results and Discussion

There was no spore free season amid the investigation time frame**.** In the present examination it is accounted for that fungal population is firmly connected with season and climatic condition. An aggregate of 28 kinds of contagious species having a place with 12 genera were recorded amid the examination time frame (table 1). The fungal population was not homogenous during the investigation of period and showed a marked variation in counts. The minimum concentration (74 fungal species) was recorded in the month of June and maximum (280 fungal species) in September. The dominant fungal types belong to *Aspergillus flavus*, *Cladosporium herbarum*, *Aspergillus niger*, *A. ochraceus*, *Rhizopus nigricans*, *Penicillium citrinum* and several other genera. *Aspergillus* has a large contribution to the air-spora in tropical regions (Santra and Chanda, 1989; Rosas *et al*., 1992; Vermani *et al.*, 2014). *Aspergillus* spores are majorly found in organic materials like plant debris (Mullins *et al*., 1976). The dominance of *Cladosporium* spore has been reported in the majority of airborne data in the temperate and tropical zones (Davies, 1969; Shaheen, 1992). Day to day and month to month variations in the concentration of these fungal spore types were recorded**.** Spoiling fungi are severely toxigenic or pathogenic, amongst which moulds are of importance in food because of potential mycotoxin production, include members of the genera *Aspergillus*, *Trichothecium, Fusarium* (Kakde and Kakde, 2012). Variations were observed both qualitatively and quantitatively during different months. By these observations it is concluded that there is a proper relationship between the fungal spores and the market disease.

Peak concentration was recorded in the period of July, August and September 2012, second peak focus was recorded in the long stretch of February and March, it was discovered that high relative humidity and moderate temperature favored contagious development of fungi. The base fixation was recorded in the period of May and June. From the present examination it is recommended that high temperature does not support parasitic development in the environment. The major fungal types encountered during study were *Aspergillus flavus* (7.70%), *Cladosporium herbarum* (6.99%), *Aspergillus ochraceous* (6.15%), *Aspergillus niger* (6.02%) *Rhizopus nigricance* (5.75%) and *Penicillium citrinum* (5.04%). Major types of spores with their percentage contribution are listed in table 2. These species were likewise recorded as normal in different markets from various parts. During the present investigation it was found that Aspergillus population growth is firmly associated with the season, climatic condition, rain and moistness in the soil. The dominance of *Cladosporium* spore has been reported in the majority of airborne data in the temperate and tropical zones (Davies, 1969; Shaheen, 1992). Day to day and month to month variations in the concentration of these fungal spore types were recorded**.** Besides, spoiling fungi are potentially toxigenic or pathogenic. Molds, which are of importance in food because of potential mycotoxin production, include members of the genera *Aspergillus*, *Trichothecium*, *Fusarium* (Kakde and Kakde, 2012). Variations were observed both qualitatively and quantitatively during different months. By these observations, it is concluded that there is a definite relationship between the fungal spores and the market disease.

Conclusion

From the present examination, it is presumed that fungal population growth is firmly connected with season, climatic condition, rain and moistness these aspects plays a vital part in the concentration of aeromycoflora. Among

Table 1 : Seasonal variation of fungal propagules in a vegetable and fruit market at Gwalior between Januarys 2012 to December 2012.

S.no.	Name of the Fungi	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Percentage contribution
1.	*Alternaria alternata*	10	8	10	8	6	4	12	-	15	8	10	8	99	4.38
2.	*A. brassicae*	10	6	4	-	-	-	6	-	-	8	8	10	52	2.30
3.	*A. humicola*	8	8	6	4	-	-	8	8	10	6	8	4	70	3.10
4.	*A .tenuis*	10	12	8	6	2	-	8	10	8	8	6	6	84	3.72
5.	*A. solani*	4	10	8	8	-	-	14	8	8	6	6	6	78	3.45
6.	*Aspergillus flavus*	10	8	10	15	14	12	20	15	28	15	12	15	174	7.70
7.	*A. fumigatus*	-	6	6	-	4	-	9	15	12	10	8	8	78	3.45
8.	*A. japonicus*	-	4	3	2	2	-	-	6	6	4	4	3	34	1.50
9.	*A. nidulans*	2	4	4	2	-	-	8	6	8	5	3	4	46	2.03
10.	*A .niger*	6	8	8	10	10	6	20	25	15	10	8	10	136	6.02
11.	*A. ochraceus*	12	14	10	8	12	10	18	10	15	12	10	8	139	6.15
12.	*A. sydowii*	-	4	-	6	-	-	8	10	6	8	4	-	40	1.77
13.	*A. sulphureus*	-	6	4	6	-	-	-	8	8	6	4	-	42	1.86
14.	*A. versicolar*	-	4	2	2	-	-	4	-	6	6	-	-	24	1.06
15.	*Botrytis cineria*	-	4	2	2	-	-	4	-	6	6	-	-	24	1.06
16.	*Chaetomium globosum*	-	6	4	2	-	-	4	8	4	-	-	-	28	1.24
17	*Cladosporium herbarum*	8	12	14	8	10	8	25	20	22	15	10	6	158	6.99
18.	*Curvularia lunata*	-	-	8	4	6	-	4	6	6	8	10	6	58	2.57
19.	*Fusarium graminearum*	3	6	8	10	4	6	8	6	4	4	6	6	71	3.14
20.	*F. moniliforme*	6	10	8	8	6	4	15	10	14	8	6	4	99	4.38
21.	*F. roseum*	10	12	6	8	-	-	3	6	10	6	4	8	73	3.23
22.	*Helminthosporium* sp.	6	5	12	10	8	6	15	10	12	10	8	6	108	4.78
23.	*Mucor racemosus*	8	8	6	8	6	-	4	6	8	10	6	8	78	3.45
24.	*P. chrysogenum*	-	-	6	4	4	-	8	10	6	8	6	6	58	2.57
25.	*Penicillium citrinum*	8	8	12	10	-	-	14	9	8	20	15	10	114	5.04
26.	*P. funiculosum*	6	6	4	4	-	-	10	8	12	10	8	8	73	3.23
27.	*Rhizoctonia solani*	4	6	6	10	8	12	8	6	8	6	9	10	93	4.11
28.	*Rhizopus nigricans*	8	8	10	8	6	6	15	20	15	12	10	12	130	5.75
	Total no. fungi	139	193	189	173	108	74	259	256	280	235	189	172	2261	

Table 2 : Prevalence of airborne fungi in vegetable and fruit market of Gwalior between Januarys 2012 to December 2012.

S. no.	Name of the fungi	Percentage contribution	% Frequency	Density
1.	*Alternaria alternata*	4.38	91.67	8.25
2.	*A. brassicae*	2.30	58.33	4.33
3.	*A. humicola*	3.10	83.33	5.83
4.	*A .tenuis*	3.72	91.67	7.00
5.	*A. solani*	3.45	83.33	6.50
6.	*Aspergillus flavus*	7.70	100.00	14.50
7.	*A. fumigatus*	3.45	58.33	6.50
8.	*A. japonicus*	1.50	58.33	2.83
9.	*A. nidulans*	2.03	83.33	3.83
10.	*A .niger*	6.02	100.0	11.33
11.	*A. ochraceus*	6.15	100.0	11.58
12.	*A. sydowii*	1.77	58.33	3.33
13.	*A. sulphureus*	1.86	58.33	3.50
14.	*A. versicolar*	1.06	50.00	2.00
15.	*Botrytis cineria*	1.06	50.00	2.00
16.	*Chaetomium globosum*	1.24	50.00	2.33
17	*Cladosporium herbarum*	6.99	100.00	13.16
18.	*Curvularia lunata*	2.57	75.00	4.83
19.	*Fusarium graminearum*	3.14	100.00	5.91
20.	*F. moniliforme*	4.38	100.00	8.25
21.	*F. roseum*	3.23	83.33	6.08
22.	*Helminthosporium* sp.	4.78	100.00	9.00
23.	*Mucor racemosus*	3.45	91.67	6.50
24.	*P. chrysogenum*	2.57	75.00	4.83
25.	*Penicillium citrinum*	5.04	83.33	9.50
26.	*P. funiculosum*	3.23	83.33	6.08
27.	*Rhizoctonia solani*	4.11	100.00	7.75
28.	*Rhizopus nigricans*	5.75	100.00	10.83

the recorded parasitic species *Aspergillus* took after by *Cladosporium* was prevailing commitment of aeromycoflora display in such sort of condition. In addition, these organisms were likewise connected with postharvest natural product decay. The data of predominant organisms in natural product showcase situations may help in developing anticipating framework for effective control of postharvest and capacity infections of fruits and vegetables. Air checking is basic and must be performed constantly with a specific end goal to discover the status of different sorts of unfavorably susceptible and pathogenic spores at different spots and their part in causing wellbeing risks to vegetables, foods grown from the ground creatures. It was discovered that direct temperature, high relative moistness favored parasitic development. So a perfect management of the waste is needed in the market. Normally proper dumb section of waste, biogas plant, making of vermicompost by the market waste can be easily done. We also studied about the sources of different market waste, which are related to organic material their causes of loss and how they can be properly use towards a sustainable management.

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