"AN AEROMYCOLOGICAL APPROACH OF SOME PATHOGENIC FUNGAL SPORES IN ONION STORAGE AT NASHIK"

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ABSTRACT : Present Paper deals with the survey of airborne fungal spores in onion storage at Nashik (M. S.). The intramural aeromycological study was carried out in onion storage for six months starting from 1st May 2014 to 30th October 2014. The total number of fungal spores and other types trapped during the investigation were 995764/m3 of air. The fungal spores thus showed biodiversity. During the period of investigation 41 different fungal spore types were recorded. Dominant and pathogenic spore types recorded were - *Alternaria*, *Aspergillus*, *Cladosporium*, *Fusarium*, *Diplodia*, *Helminthosporium Nigrospora* etc

Keywords: Aeromycology, Pathogenic Fungal spore, Dominant spore types.

INTRODUCTION:

The Aeromycological study of airborne fungal spores is important in understanding the distribution of fungi and incidence of fungal diseases. Such study may help to the plant pathologist in diagnosis of fungal diseases and their management.Study of the airspora of onion storage in Nashik gives valuable information regarding the composition and component of airspora. Nashik is one of the important districts of Maharashtra states. The climate of Nashik city is generally cool with the exception of a month or two in summer. The environmental parameters show clear fluctuation in relative humidity, temperature and rainfalls during the three seasons of the year. May is the hottest month of the year and December is the coolest month. Hence the study of airspora in onion storage is of great importance. The present paper gives information of dominant airspora in the onion storage and its correlation with the metrological parameters. The studies on the airspora in general and onion storage are very few, Cunningham D.D. (1873), Tilak S.T.et.al (1967), Raha et.al (1994), Sawane A.M. et.al.(2002), Rane, A.M. et.al (2005), K.Raju and M.K.Naik (2006), Pathak A.K. (2012), Ahire Y.R. and Sangale M.K. (2012), Patel (2012-2013) and Jagap J.D. and Suryawanshi N.S. (2016).

MATERIAL AND METHOD :

An attempt has been made in this review to analyse important aerobiological survey with reference to fungal spore in the onion storage. The trapping of the fungal spores and other microbial population in the onion storage was done by the Tilak's air sampler (Tilak and Kulkarni, 1970). The present intramural aeromycological study was carried out in onion storage starting from 1st May 2014 to 30th October 2014.In the present investigation the method of sampling as suggested by Gregory and Lacey (1963) has been followed.

The slides were scanned under Binocular research microscope. The fungal spores and other components were identified by referring published literature (Tilak, 1989) and reference slide prepared. The counting of spores was done by using 'short transverse' method of Hirst (1959). The total exposed area was scanned under the microscope with 10X-45 X eyepiece objective combinations. During the present investigation, Day to day Meteorological data viz. Temperature, humidity and Rainfall of investigation period were obtained from Agricultural research station Kundewadi, Niphad, Nashik. This data is graphically represented for the six months. During the present investigation maximum humidity was 95% and minimum 47.5%. The maximum temperature during the investigation was 40.5°C and minimum temperature was 12.75°C.

RESULTS AND DISCUSSION :

During the present aerobiological investigation 41 fungal spore types including 5 other types-hyphal fragments, insect scales, protozoan cysts, pollen grains and unidentified spores were recorded. Out of the 41 fungal spores recorded, 3 belonged to Phycomycotina, 10 to Ascomycotina, 4 to Basidiomycotina and 19 to Deuteromycotina. Fungal spores belonging to Deuteromycotina contributed highest percentage i.e. 78.84% to the total air spora followed by Ascomycotina 4.49%, Basidiomycotina 4.69 %, other types 9.21% and Phycomycotina contributes 2.68% to the total air spora.

The present intramural aerobiological investigation was carried out for six months. Maximum concentration of the fungal spores was recorded in the month of August and minimum in the month of May. Common fungal spore types recorded were *Alternaria, Aspergillus, Cladosporium, Curvularia, Dictyosporium, Diplodia, Haplosporella, Helminthosporium, Nigrospora, Odium, Papularia,* smut spore etc. The rare occurrence of *Albugo, Cucurbitaria, Parodiella, Sordaria, Heterosporium, Pithomyces* etc was also recorded.

Phycomycotina group contributed 2.68% to the total air spora. The spores of Ascomycotina occurred in the environment when the conditions are favorable for their formation and release. During the present investigation the group Ascomycotina contributed 4.59% to the total air spora. The present studies showed the occurrence of spores belonging to Basidiomycotina were common in the air. Basidiomycotina as a whole group contributed 4.69% to the total air spora. During the period of investigation maximum spore load and spore types was represented by the class Deuteromycotina. Deuteromycotina was represented by of

19-spore types and contributed 78.84% to the total airspora. These spores occurred throughout the period of investigation. These spores have been referred to "airspora dominant".

Thus the present investigation has highlighted the biodiversity of the airborne bioparticles present in the air of the onion storage. The investigation has also highlighted the presence of pathogenic and potential pathogenic bioparticles and has a close correlation with metrological parameters. Out of this Alternaria, Aspergillus, Cladosporium,Fusarium, Rhizopus, Curvularia, Diplodia, Helminthosporium, Nigrospora etc. are frequently abundant. They are known as the pathogenic fungal spores, which caused various plant diseases.

Among the all spore types, Aspergillus contributed the maximum i.e. 16.57% to the total airspora. Cladosporium was recorded throughout the period of investigation and contributed 15.20% to the total airspora. *Fusarium* spore contributed 9.18% to the total airspora. *Alternaria* spore contributed 10.05% to the total air-spora. *Helminthosporium* spore contributed 2.32% contribution of this spore to the total air-spora. *Curvularia* spore contributed 2.01% to the total air-spora. *Nigrospora* spore contributed 1.47% to the total air-spora. *Diplodia* spore contributed 1.19% to the total air-spora. A distinct seasonal variation was observed during the period of investigation. The spore load in the onion storage was high during the rainy season. High humidity and low temperature are reported to trigger the liberation and distribution of fungal spores in the atmosphere and thus the concentration of spores was high in the month of August. Minimum number of spore concentration was recorded in the month of May because of low humidity and high temperature. The concentration of some dominant spore types like *Cladosporium. Alternaria, Aspergillus, Curvularia, Drechslera, Periconia* sp. and rust spores was found as dominant, which correlates the earlier work . During the rainy season, the spore concentration was higher which may be due to their high saprophytic ability and passive mode of spore liberation.

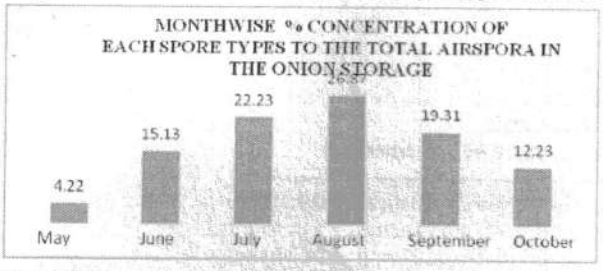
Thus from the present investigation it can be concluded that the fungal spore predominate the other bioparticles in the airspora. Air monitoring of indoor fungal spore has helped to locate the source, concentration and seasonal variation. Presence of pathogenic and allergic fungal spore type has been confirmed from the data. It shows that fungal spore composition and concentration is affected by metrological parameter, which is responsible for the dispersal and distribution.

Table1.-Total % Contribution of Different spore type to the total airspora in onion storage

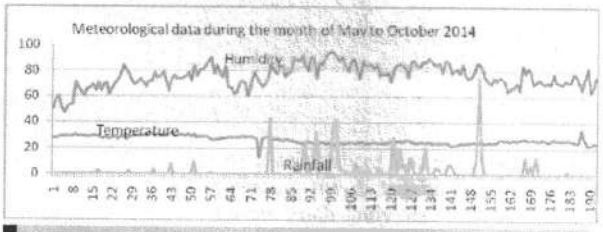
SR.NO	SPORE TYPE	% Conc.
	PHYCOMYCOTINA	
1	*Albugo Pers.Ex.SF.Gray*	0.35
2	*Cunninghamella Matr.*	1.22
3	*Rhizopus Enrenberg.*	1.11
	ASCOMYCOTINA	
4	*Chaetomium Kunz. Ex. Fr.*	0.50
5	*Cucurbitaria Gray.ex Grev.*	0.22
6	*Didymosphaeria Fuck.*	0.40
7	*Hypoxylon Bull.Ex.Fr.*	0.43
8	*Lophiostoma Ces de Not.*	0.25
9	*Melanospora Corda.*	0.20
10	*Parodiella.(Speg) Theiss & syd.*	0.67
11	*Pleospora. Rabh.*	0.73
12	*Sordaria.Ces & de. Not*	0.49
13	*Tiechospora. Fuck.*	0.70
	BASIDIOMYCOTINA	
14	Basidiospores	1.35
15	*GanodermaKaitz.*	0.26
16	Smut Spores.	1.75
17	Uredospores.	1.33
	DEUTEROMYCOTINA.	
18	*Alternaria Nees.*	10.05
19	*Aspergillus Michel.ex.Link.*	16.57
20	*Biospora Corda*	0.79
21	*Botritis Pers.*	1.03
22	*Cercospora Fr.*	8.19
23	*Cladosporium Link.*	15.20
24	*ColletotrichumCorda.*	5.01
25	*Curvularia.Boed.*	2.01
26	*Diplodia Fr.*	1.19
27	*Epicoccum Link.*	0.74
28	*Fusarium Link..*	9.18
29	*Haplosporella Speg.*	0.84
30	*Helminthosporium Link.*	2.32
31	*Heterosporium Koltz. Sch.*	0.45
32	*Nigrospora Zimm.*	1.47
33	*Periconia Tode .Ex.Schw.*	1.21
34	*Pithomyces Berk.*	0.08
35	*Stemphyllum Wallr.*	1.97
36	*Torula (Pers) Link.*	0.54
	OTHER TYPES	
37	Hyphal fragment	1.93
38	Insect scales	1.14
39	Pollengrain	2.29
40	Protozoan cyst.	1.78
41	Unidentified spores.	2.06
	GRAND TOTAL	100.00

GRAPHS

Graph1. Month wise % concentration of each spore type to the total



Graph2.Meteorological parameter during the month May to October 2014 onion storage



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