INFLUENCE OF FUNGAL SPORES BELONGING TO DEUTEROMYCOTINA OVER GROUNDNUT FIELDS IN THE NASHIK DISTRICT OF MAHARASHTRA, INDIA

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ABSTRACT

The present aerobiological investigation was carried out in groundnut fields at Makar and Wadi near Deola Tahsil of Nashik District by using volumetric Tilak air sampler kept at a constant height of 2 feet in the center of the groundnut field for two continuous Kharif season during 23-6-13 to 20-9-13 (First Kharif Season) and 11-6-14 to 22-9-14 (Second Kharif Season). Airborne catches trapped over groundnut field include 45 fungal spores, hyphal fragments, insect parts, pollen grains, etc. The spore group Deuteromycotina was found to be dominant and contributed maximum 28 fungal spores followed by Ascomycotina with 10 spore types Zycomycotina with 5 spore types and Basidiomycotina with 2 spore types.

KEYWORDS: *Groundnut, Kharif, Deuteromycotina & Nashik*

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INTRODUCTION

Air contains different particles in it; fungal spores, pollen grains, insect parts, bacteria, viruses, dust particles etc. Diversity of organisms depends on environmental conditions. The environment is always dynamic but not static and changes are observed. Aerobiology is the study of dispersion of airborne microorganisms or in other words.

Aerobiology means study of airborne bio-particles (Singh & Mathur, 2012). Aerobiology is a scientific discipline that, deals with the transport of organisms and biologically significant materials through the atmosphere (Isard and Gage, 2000). The availability and concentration of macro organisms in the air mainly depend on climatic factors such as rainfall, humidity, temperature, wind, velocity, etc. The concentration of air spora may differ according to the availability of substrate (Helfman et al, 2012). The wind velocity is very important for dispersion of spores. Different spores float in wind and travel over long distance. The dispersion of pollutants as well as aerobiological agents is studied in environmental science which becomes a new emerging interdisciplinary branch of science (Tilak et al, 1983; Subba Reddy and Janakibai, 1977).

In the present study, forty five fungal spores, hyphal fragments, insect parts, pollen grains, etc. trapped over the groundnut (*Arachis hypogea* L.) fields. Deuteromycotina was dominated by the airspora. An aerobiological survey was conducted by employing volumetric Tilak air sampler kept at a constant height of 2 feet in the centre of the groundnut field to find out pathogenic spores, their correlation with the metrological parameters and the growth stages of the crop.

MATERIALS AND METHODS

Deola is taluka of Nashik District in Maharashtra, India. It is situated on the confluence of the rivers Kolati and Bhawadi. It comes under Dindori Lok Sabha Constituency and Chandwad Vidhan Sabha Constituency. The site for the

study was a groundnut situated at a distance of 7 kms from Deola. The present study was carried out during the period 23-6-13 to 20-9-13 (First Kharif season) and 11-6-14 to 22-9-14 (Second Kharif season) by using Tilak air sampler (Tilak and Kulkarni, 1970).

The air sampler was operated continuously for every week for the entire study period. In the present study, aerobiological investigation involved qualitative and quantitative analysis of airspora over groundnut field at Nashik Dist. In Maharashtra state, air monitoring survey was carried out by using Volumetric Tilak Air Sampler (Tilak and Kulkarni, 1970). Tilak Air Sampler was installed in the centre of 1.62-hectare area of a groundnut field and placed on the stool with its orifice facing west and at constant height of 2 feet above the ground level. Tilak Air Sampler is an electrically operated device which has a rotatory drum. The drum completes one rotation in eight days. A cellophane tape has one surface sticky wrapped around the drum while the other surface was smeared with petroleum jelly as adhesive so as to stick spores. Continuous air was sampled at the rate of five (5) liters per minute for a year. After each eight days when the drum completed one rotation, previous cellophane tape was removed and replaced by a new cellophane tape. A cellophane tape was brought to the laboratory and cut into 16 (sixteen) pieces of equal length. Each division provides a qualitative and quantitative data of airborne bio-components of day and night. The slides were prepared and scanned.

RESULT AND DISCUSSION

Table 1: Yearly Average Mean Concentration and Percent Mean Concentration of Spore Types 23-6-13 to 20-9-13 & 11-06-14 to 22-09-14 (Total Period of Investigation)

Sr. No.	Spore Type	Concentration No. of Spore m ³		Concentration No. of Spore m ³	
		23-6-13 to 20-9-13	11-06-14 to 22-09-14	23-6-13 to 20-9-13	11-06-14 to 22-09-14
1	Alternaria	34452	47544	5.92	3.41
2	Aspergillus	6974	22568	1.19	1.60
3	Beltrania	17733	28798	3.05	2.04
4	Bispora	31436	39284	5.40	2.79
5	Ceratophorum	2943	16296	0.50	1.16
6	Cercospora	16196	32102	2.78	2.28
7	Cladosporium	14140	21336	2.43	1.51
8	Curvularia	27734	26824	4.77	1.90
9	Clasterosporium	1358	11466	0.23	0.81
10	Dictyoarthrinium	42	18774	0.007	1.33
11	Dictyosporium	294	13902	0.05	0.99
12	Diplodia	17850	14126	3.07	1.00
13	Epicoccum	12166	25536	2.09	1.81
14	Exosporium	6972	23030	1.19	1.64
15	Fusarium	20776	24402	3.57	1.73
16	Helminthosporium	27020	46578	4.64	3.31
17	Heterosporium	11900	22022	2.04	1.56
18	Hirudinaria	-	18004	-	1.28
19	Harknessia	3444	9576	0.59	0.68
20	Memnonniella	9842	37786	1.69	2.68
21	Nigrospora	15778	22918	2.71	1.63
22	Pestalotia	10290	21616	1.76	1.53
23	Pithomyces	17192	20258	2.95	1.44
24	Pyricularia	1652	12488	0.28	0.89
25	Sirodesmium	6762	25438	1.16	1.81
26	Sporothrix	616	23310	0.10	1.66
27	Tetraploa	462	10052	1.07	0.71
28	Trichocladium	532	16772	0.09	1.19
	Total	316556	652806	54.327	46.39

Table 2: Maximum Number of Spore Types of Deuteromycotina during the Investigation Period

Sr.No.	Deuteromycotina Spore Type	Concentration No. of spore per m ³		Percent mean Contribution		Total spore conc. Per m ³ of air	Percentage Contribution to the total airspora
		23-6-13 to 20-9-13	11-6-14 to 22-09-14	23-6-13 to 20-9-13	11-06-14 to 22-09-14		
1	Alternaria	34452	47544	5.92	3.41	81996	4.15
2	Beltrania	17733	28798	3.05	2.04	46531	2.35
3	Bispora	31436	39284	5.40	2.79	70720	3.58
4	Cercospora	16196	32102	2.78	2.28	48298	2.44
5	Curvularia	27734	26824	4.77	1.90	54558	2.76
6	Fusarium	20776	24402	3.57	1.73	45178	2.28
7	Helminthosporium	27020	46578	4.64	3.31	73598	3.72
8	Memmoniella	9842	37786	1.69	2.68	47628	2.41

Table 3: Percent Mean and Average Percent Mean Concentration of Spore Groups for the Total Period of the Investigation

Sr. No.	Spore Type	Concentration no. of Spore per m ³			
		23-06-13 to 20-09-13		11-06-14 to 22-09-14	
1	Deuteromycotina	316556	54.327	652806	46.39%
2	Zygomycotina	22778	3.89%	140700	10.01%
3	Ascomycotina	98293	16.85%	253344	17.99%
4	Basidiomycotina	21822	3.75%	92694	6.58%
5	Other types	581333	99.767%	1393560	99.00%

In aerobiological investigation over the groundnut crop (*Arachys hypogea* L.), JL-24 and SB-11 was carried out during two Kharif seasons 23-06-13 to 20-09-13 and 11-06-14 to 22-09-14 by using Tilak air sampler. In the present study, a total of 45 airborne components are recorded and classified into four groups such as Zygomycotina including five spore types, Ascomycotina contributes ten spore types, Basidiomycotina contributes two spore types and Deuteromycotina contributes twenty eight spore types. It is observed that temperature, humidity, growth and age of plant favour the spread of disease during the months of investigation that is from July to September, humid conditions are present in the air, which are favourable for the spread of disease, but the crop variety grown in the field was found to be highly resistance to the spread of disease.

Deuteromycotina contributed to the maximum percentage during the period of investigation than the other fungal spore groups. It contains a total of 28 fungal spore types to the total airspora. Throughout the period of investigation, percentage contribution to the total airspora of *Alternaria* was 4.15%, *Beltrania* 2.35%, *Bispora* 3.58%, *Cercospora* 2.44%, *Curvularia* 2.76%, *Fusarium* 2.28%, *Helminthosporium* 3.72%, *Memnoniella* 2.41%. The incidence of pathogenic spores noted in the present study is helpful to farmers and cultivators as an alarming situation to them for likely occurrence of fungal diseases, so they can use preventive measures to protect their crops.

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