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ATMOSPHERIC MYCOFLORA OVER SUNFLOWER FIELD

Mr. Anarse P.S.
Amolok Science College Kada
Tal – Ashti, Dist- Beed (M.S) India
panduranganarse@43gmail.com
Mob.No:9420786923

Introduction :

Sunflower (*Helianthus annus* L.) Var. Nimbkar, native of Southern United States and Mexico as an oil seed crop was introduced in India in 1969. Sunflower is photo – thermo sensitive crop. Sunflower is not season bounded as such it can be grown throughout the year with little irrigation when necessary. Another good feature of sunflower is its short span of life cycle. Well drained medium texture soil are best suited for the cultivation of sunflower. Now a days sunflower cultivation has become more popular among the farmers of Marathwada region.

Like many other crops Sunflower is subjected to various types of fungal disease which may be soil borne, seed borne, air borne etc. The most important among them are downy mildew caused by *Plasmopara halstedii* rust disease caused by *Puccinia helianthi* schw. The other important being Alternaria leaf spot caused by *Alternaria helianthi* rootrot caused by *Rhizoctonia* sp, powdery mildew caused by *Erisiphe cichoracearum Leptospharia* leaf spot caused by *Leptosphaeria* sp. An important research on the disease of sunflower was that of Siddiqui (1972), who made an intensive study on the sunflower rust caused by *Puccinia helianthi* and also reported the disease like powdery mildew. The air borne nature of pathogen over sunflower was reported by Tilak and Ramchander Rao (1987)

Materials and methods:

Continuous Volumetric Tilak air sampler (Tilak and Kulkarni 1970) was installed in the sunflower fields of a constant height of 1.5 meters above the ground level at Kada, Tal Ashti, Dist Beed (M.S). In Kharif season from 1st July 2017 to 30th September 2017 and Rabi season from 10th November 2018 to 29th February 2019. The air was sampled at the rate of 5 Liters/ minutes which leaves trace of deposition over the cellophane tape fixed over the drum. The slides were prepared every after eight days and scanned regularly. The identification of spores based on visual characteristic of spores such as shape, size, colour wall structure and ornamentation etc. The daily record of metrological data was regularly maintained.

Results And Discussion.

In Kharif crop season 45 types of airborne components were recorded of which 02 belonged to Oomycotina 12 to Ascomycotina, 13 to Basidiomycotina, 23 to Deuteromycotina and 05 to another types (Table 2) In the Kharif crop season Deuteromycotina stood first (68.26%) to the total airspora followed by Ascomycotina (11.25%) other types (10.72%) Basidiomycotina (7.47%) and Oomycotina (2.28%).

In Rabi season 67 types of airbone component were recorded of which 01 belonged to Oomycotina, 15 Ascomycotina 03 to Baidiomycotina, 43 to Deuteromycotina & 05 to other types. In the Rabi season Deuteromycotina stood first (72.08%) in other of concentration followed by Basidiomycotina (13.56%) other types (10.32%).

Table I – Total spore concentration and percentage contribution of different Fungal groups during two different seasons (Kharif season from 1st July 2017 to 30 Sept 2017 and Rabi season from 10th Nov 2018 to 29 Feb 2019)

Sr. No.	Spore Group	Spore Conc/m^3 of AIR	Spore Conc/m^3 of AIR	Percentage	Percentage
		Kharif	Rabi	Kharif	Rabi
1	Oomycotina	7770	1848	2.28	0.33
2	Ascomycotina	38274	20510	11.25	3,77
3	Basidomycotiana	25410	75138	7.47	13.56
4	Deuteromycotina	232134	399224	68.26	72,08
5	Other types	36484	57120	10,72	10.31
	Total	340072	553840	99.98	99.98

In the Kharif season airborne spores like *Cladosporium Alternaria*, Rust, Basidiospores, *Nigrospora* etc were recorded and in Rabi season also *Cladosporuium, Alternaria, Periconia,* Smut, Hyphal Fragments, Basidiospores**,** *Curvularia* & Rust spores etc contributed significantly high to the total airspora in Kharif and Rabi crop season.

Table 2

Total spore concentration and percentage contribution of during two different seasons.

Sr. No.	Spore Type	Season's total fungal spore conc/m^3 in air	Season's total fungal spore conc/m^3 in air	% contribution of fungal spores in season"s total airspora	% contribution of fungal spores in season"s total airspora
		Kharif	Rabi	Kharif	Rabi
1.	Oomycotina				
1)	*Albugo*	4214	1848	1.24	0.33

2)	*Rhizopus*	3556	-	1.05	
2.	Ascomycotina				
1)	*Chaetomium*	2814	630	0.83	0.11
2)	*Claviceps*	-	350		0.06
3)	*Didymospharia*	5726	1414	1.68	0.26
4)	*Hypoxylon*	3332	2296	0.98	0.41
5)	*Hysterium*	3472	1484	1.02	0.27
6)	*Lecanidion*	756	42	0.22	0.01
7)	*Leptoshaeria*	8396	10654	2.47	1.92
8)	*Massarina*	-	140	-	0.03
9)	*Melanospora*	3880	1218	1.14	0.22
10)	*Parodiella*	-	280	-	0.05
11)	*Pleospora*	2282	1106	0.67	0.020
12)	*Passerinella*	2226	-	0.65	-
13)	*Rossellinia*	-	28	-	0.01
14)	*Sordaria*	406	-	0.12	-
15)	*Sporomia*	2254	28	0.66	0.01
16)	*Teichospora*	2730	154	0.8	0.03
17)	*Valsaria*	-	686	-	0.12
3.	Basidiomycotina				
1)	*Basidiospores*	10094	24094	2.97	4.35
2)	*Rust spores*	11214	17836	3.3	3.22
3)	*Smut spores*	4102	33208	1.21	6.00
4.	Deuteromycotina				
1)	*Alternariaa*	16688	38794	4.91	7.00
2)	*Beltrania*	518	1792	0.15	0.32
3)	*Beltraniella*	238	1680	0.07	0.30
4)	*Bispora*	518	924	0.15	0.17
5)	*Botrydiplodia*	-	434	-	0.08
6)	*Cercospora*	2604	4144	0.77	0.75
7)	*Chaetomella*	-	112	-	0.02
8)	*Cladosporium*	114002	136360	33.52	24.62
9)	*Cordana*	-	2478	-	0.45
10)	*Corynespora*	-	966	-	0.17
11)	*Curvularia*	1524	18648	4.47	3.37
12)	*Dendrographium*	-	182	-	0.03
13)	*Dictyoarthrinuum*	84	7266	0.02	1.31
14)	*Drechslera*	6230	9716	1.83	1.75
15)	*Epicoccum*	5992	9534	1.76	1.72
16)	*Exosporium*	-	14	-	0.00

17)	*Fusariella*	2870	10668	0.84	1.93
18)	*Haplosporella*	1960	210	0.58	0.04
19)	*Harknessia*	-	266	-	0.05
20)	*Helminthosporium*	15794	13566	4.64	2.45
21)	*Hetrosporium*	6888	2118	2.03	0.38
22)	*Hirudinaria*	-	42	-	0.01
23)	*Lacellinia*	-	3976	-	0.72
24)	*Lacellinospsis*	-	11648	-	2.10
25)	*Memoniella*	2282	7644	0.67	1.38
26)	*Nigrospora*	11270	26726	3.31	4.83
27)	*Periconia*	7602	38066	2.24	6.85
28)	*Pithomyces*	1960	6244	0.58	1.13
29)	*Pestolotia*	-	126	-	0.02
30)	*Phaeotrichoconis*	-	602	-	0.11
31)	*Pseudotorula*	9170	13734	2.7	2.48
32)	*Pyricularia*	714	28	0.21	0.01
33)	*Sirodesmium*	-	294	-	0.05
34)	*Spegazzinia*	490	2156	0.14	0.39
35)	*Spicaria*	-	42	-	0.01
36)	*Sporodesmium*	-	2524	-	0.05
37)	*Stemphylium*	-	6762	-	1.22
38)	*Stigmina*	812	1120	0.24	0.20
39)	*Tetracoccosporium*	-	70	-	0.01
40)	*Tetraploa*	-	168	-	0.03
41)	*Torula*	8246	12810	2.42	2.31
42)	*Zygosporium*	-	1484	-	0.27
43)	*Sclerotium*	-	5348	-	0.97
5.	Other Types				
1)	Hyphal fragment	20034	30660	5.89	5.54
2)	Insect parts	2058	4172	0.61	0.75
3)	Plant parts	1988	2646	0.58	0.48
4)	Pollen grains	10500	12012	3.09	2.17
5)	Protozoancyst	1904	7630	0.56	1.38
	Total	340072	553840	99.98	99.98

In Kharif season total airspora was found to be rich in concentration in total catches. (340072/M^3 of air). In Rabi season concentration of air spora was found to be more as compared to the Kharif crop season (553840/m^3 of air) In the Kharif season from the total airspora maximum number of spores (140442/$m^3$of air) was observed in the

month of September (2017) followed by August and July. This could be due to the continues variation in relative Humidity percentage and Rainfall during these months. It is evident that temperature showed its marked effect on the enhancement in concentration of fungal spores types in the air.

In Rabi season, from the total air spora, maximum monthly concentration (189336/m^3 of air) was observed in the month of December, 2018 followed by Nov 2018, Feb 2019 & Jan2019. In the month of December low temperature & high relative humidity percentage showed profound effect on growth and envelopment of fungal population. In Rabi season, the lowest incidence was recorded during Jan 2019(104118m^3 of air) these results are similar to the results reported by earlier works viz. Gregory (1961) Tilak & Kulkarni (1970), Kamal & Singh (1975) Shashtri (1996) & Aher et al (2002).

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