# Prevalence of cladosporium spores over Sunflower fields at Rajuri (N) M. S., India

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**ABSTRACT**

To study the general airspora and impact of weather parameters on the prevalence of airborne mycosporophytes. However, total 70 airborne mycosporophytes were recorded, where in the Deuteromycotina contributed 67.11 %, Basidiomycotina 24.76 %, other types 5.46 %, Ascomycotina 2.58 % and Zygomycotina 0.09 % to the total mycosporophytes. However, mycosporophyte viz. *Cladosporium* was found to be the dominated type contributed 16.76 % to the total airspora. In the present paper special attention is given to find out the source, dispersion of the pathogenic spore type *Cladosporium* and its deposition and its subsequent impacts on the sunflower crop.

**KEYWORDS:** Sunflower field, Airspora, *Cladosporium*, Spores Concentration.

## INTRODUCTION

The study of airborne fungal flora is known as aerobiology. The study of fungal spore is of great significant due to its role in the field of human allergy, plant, Agarwal MK (1969). The content of airborne fungal spora is characteristics of each biogeographically zone depending upon the vegetation. Also fungal spores depend upon time, day, weather parameter and season. Same work has been carried out by different scientists in Marathwada region over sunflower field, which shows the prevalence of airborne fungi.

In Marathwada region, the climate is relatively moderate. Average rainfall is 650 mm in monsoon. Temperature ranges from $13^0$ C to $42^0$ C, relative humidity varies from 30 to 70 %. For effective management of crop diseases, it is desirable to study the prevalence of air spora in this region. This is achieved by aerobiological study. This would also shows aero spora of Marathwada region.

Crop diseases caused by airborne mycosporophytes constitute another important aspect of agriculture. Our agricultural crops, however continuously influences from various diseases out of which fungal diseases are dominant in this connection. Agriculture and allied sciences aim at maximum production and that needs matching of the production technology with protection technology. Like other oil seed crops, sunflower crop was subjected to airborne fungal diseases, Pande (1976), Bhalke (1981), Patil (1985), Ramchander Rao (1987), Bhadane (1991), investigated the involvement of *Cladosporium*. In view of the above facts qualitative and quantitative analysis of the airborne *Cladosporium* spores was worked out. The present paper epitomizes the dispersal of *Cladosporium* spores in the atmosphere, concentration and it's comparison with meteorological parameters.

## MATERIALS AND METHODS

The Aerobiological investigation was carried out by using volumetric Tilak air sampler (Tilak and Kulkarni, 1970) installed in the middle of the Sunflower crop fields. The variety of sunflower cultivated in the fields was (Helianthus *annus*) Mahyco at a height of 1.5 meter above the ground level at Rajuri (Navagan), Dist. Beed (M.S.).

Various methods have been proposed to trap the fungal spores, pollen grains, plant parts, protozoan cysts etc. These airborne components are trapped using the Tilak air sampler. The sampler has 75% collection efficiency, great retention capacity, and portable, economical and provides continuous data of air sampling for eight days. Its special merit lies in providing volumetric data (numbers of spores / $m^3$ of air) which enables to analyze microbial population both quantitatively and qualitatively. As it provides continuous sampling, the diurnal (circadian) periodicity studies can be carried out in greater details.

## SAMPLING METHODS

The air was sampled at the rate of 5 liters per minute and the transparent cellophane tape fixed on the drum coated uniformly with white petroleum jelly as adhesive. The drum was changed after every eight days at about 8 a.m.

The complete tape was cut into eight equal segments, again each segment into two equal parts, each representing 12 hours trace area of day and night accordingly. The cellophane tape pieces were then mounted on glass slide by using glycerine jelly as mounting. Glycerine jelly has the best optical properties for visual examination.

**SCANNING**

Scanning was done regularly after slide preparation. Before scanning the mounted slide, tape segment was divided into six equal parts by marking on the glass slide. Each portion corresponds to the two hours sampling period. Area of 9600 sq. microns of the total area of the trace obtained is scanned under 10x X 45x eye piece objective combination of binocular research microscope

**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 Slides were prepared and scanned. Diseased plant material was collected in the field for preparing the reference slide. Daily records of temperature, relative humidity & rain fall was obtained from Water & Land Management Institute, Aurangabad (WALMI).

**RESULTS AND DISCUSSION**

The present investigation in relation to general airspora studies over the sunflower fields (*Helianthus annus* L) was carried out for winter season from 20/10/2003 to 20/01/2004 using continuous volumetric Tilak Air Sampler, in order to study the correlation between airborne microbial components, weather parameters, different growth stages of the crop and their subsequent effects on disease incidence on the crop. All the trapped airborne fungi have been included under "Spore types". In addition, filaments, epidermal hairs, hyphal fragment pollen grains, insect scales, protozoan cysts etc. are included under the " Other types " group.

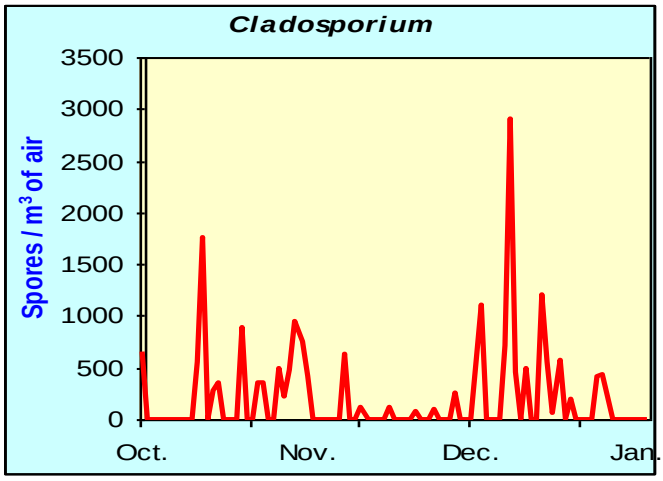


**Fig. 1: Reveals the day to day variation in the concentration of the *Cladosporium* spores.**

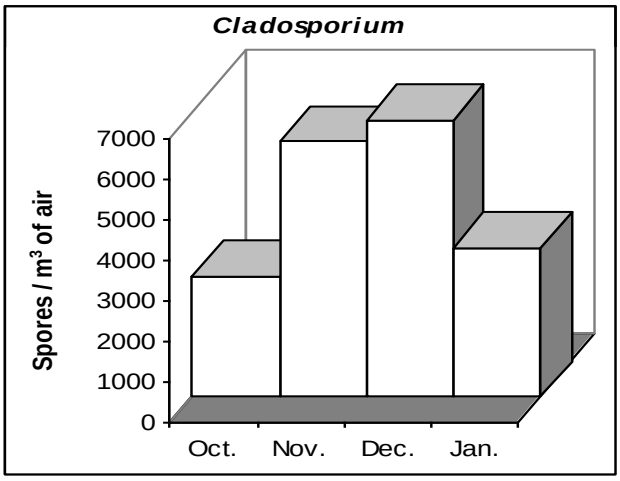


**Fig. 2: Reveals the monthly variation in the concentration of spores of *Cladosporium***

In all, on an average during the period of the present investigation, 70 types of airborne components were reported, of which 38 types belonged to Deuteromycotina, 21 to Ascomycotina,5 to Other types, 4 to Basidiomycotina and 2 to Zygomycotina. During winter season of 2003 – 2004 Deuteromycotina contributed with highest percentage of 67.11 % to the total airspora followed by Basidiomycotina 24.76 %, other types 5.46 %, Ascomycotina 2.58 % and Zyogomycotina 0.09 %.

The airborne components like *Alternaria, Curvularia, Nigrospora, Smut spores, Uredospores, Cladosporium*, Hyphal fragments, *Helminthosporium, Periconia, Fusierella* and Bispora contributed significantly to the total airspora. The maximum concentration of *Alternaria, Cladosporium, Curvularia, Nigrospora, Periconia, Pithomyces, Helminthosporium* etc. in the air was simply because of their saprobic habit, their high degree of vegetative reproduction by fragmentation, budding etc., asexual reproduction by developing conidia

directly on fruiting with passive spore liberation. The gentle wind currents, natural or mechanical disturbances have been found directly or indirectly involved in liberating amorous amount of spore load in the air, Gregory (1961) also stated that the mist-pick up mechanism was rather more effective in the dispersal of *Cladosporium* spores. The obtained results are in agreement with the statement of Gregory (1961).

The high frequency of occurrence and predominance during wet and dry period was observed by Cammack (1955). He also stated that variation in the number of spores found dependent largely on availability of host as well as climatic factors. Reddy (1978) recorded *Cladosporium* as the dominant spore type and observed in maximum numbers in all months with its seasonal maxima occurring in the period between November and January. Thus it can be concluded that the maximum concentration of *cladosporium* spores could be correlated with the flowering and seed forming stages in this season. The rain preceding days, irrigation in the season and leaf shedding might have served as pre- requisites for the copious growth and dispersal of spores in the atmosphere

The prevalence of the spores of *Cladosporium* in the air over the sunflower fields was seen ever. The spores existing continuously in the atmosphere. The maximum monthly concentration (6790/$m^3$ of air, fig.2) was recorded in the month of December 2003, when there was a record of moderate temperature 12.1 $^{O}$C to 28.80 $^{O}$C, relative humidity 35.8 to 64.5 % , wind velocity 4.3 km/hrs. and rain fall 2 mm. The highest daily mean concentration of *Cladosporium* spore ( 2912/$m^3$ of air, fig. 1 ) was observed on 26$^{th}$ December 2003, when daily mean temperature 11.5 $^{O}$C to 29 $^{O}$C, relative humidity 52 to 56 %, wind velocity 4.6 km/hrs. and no rainfall was no recorded.

In normal range of temperature i.e. when there was a increase in relative humidity, wind velocity and rainfall, the liberation of spores *Cladosporium* was reported to be increased considerably. Similar observations were made by Gregory (1954), Harvey (1967), Hirst (1957), Pande (1976), Bhalke (1981), Pawar (1997), Gopan (2004).The graphical presentation studies indicate that it belongs to " Day Spora" group. The graphical curve shows rapid increases in concentration form 08.00 hrs and reaches to the highest peak at 10.00 hrs. The spores showed continuous prevalence during the dry spell of winter season with gusty winds.

The prevalence of spores of *Cladosporium* was observed in the atmosphere over sunflower field throughout the period. Nevertheless, there was continuous concentration of *Cladosporium* spores, which was due to ever changing meteorological parameters viz. temperature, relative humidity, wind velocity and rainfall.

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