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Basidiomycetes Spore Concentration Over Soybean Field

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ABSTRACT

Aerobiology is the study of airspora like air borne fungal spores,pollen grains insect parts,trichome, protozoan cyst etc . Aerobiological study is useful to understand the general components of air spora and also useful to develop disease forecasting method for saving crop diseases. Air sampling over Soybean *(Glycin max L.)* field was carried out by using continuous Tilak air sampler from 15th June 2017 to 6th October 2017 for Kharif season. In this investigation Basidiomycetes spore concentration was 43562 spores /m^3 of air recorded during the season from aerobiological sampling. Maximum concentration of Basidiomycetes spore concentration were recorded 19218 spores/m^3 of air in the month of September 2017 and minimum 2204 spores/m^3 of air in the month of July 2017. Mostly air borne plant pathogens cause diseases to crop plants. The main aim of this experiment is to findout the concentration of air borne Besidiomycetes spores and their relation with the disease incidence.

Key words- Kharif season, Tilak air sampler,Basidiomycetes.

INTRODUCTION

Aerobiology is the study of air borne microorganism and their release into atmosphere. According to Edmonds and Benninghoof[1] (1973) aerobiology is a scientific and multidisciplinary approach focussed on the transport of organisms and biologically significant materials. It can also be defined as “The microbiology of atmosphere”. These studies are of great importance to mycologist, microbiologist,allergologist. According to Jacobs[2](1951) aerobiology includes the dispertion of insect population,fungal spores,bacteria,viruses and pollen grains. The variation in the concentration and type of microorganisms in air involves number of factors like meteorological parameters, source strength, distance from source, height and atmospheric condition.

The extensive and exhaustive work in airspora was carried out in agricultur department of U.S.A. by Gregory and Hirst[3] (1957) in England, Meredith[4](1961) in West Indies,Sreeramulu[5] (1958) in Waltair, Tilak[6] (1967) at Aurangabad. These workers obtained huge data on aerobiology and worked out the composition and components of airspora. In Maharashtra aerobiological study was started by Karla and Dumbry[7](1957) at Pune by using Vaseline coated slides.

Tilak and Kulkarni[8](1978) studied the occurrence ,seasonal distribution and diurnal periodicity of rust and smut spore content of air over Sugercane field.Tilak and Bhalke[9](1978) studied concentration, seasonal variation and diurnal periodicity of insect parts, Ascospores, Cladosporium and Alternaria at Aurangabad. Mane[10](1981) made a systematic aerobiological approach to rust disease of Bajra caused by *Puccinia penniseti.*

The present investigation deals with the air spora over Soybean *(Glycin max L.*) fields. Soybean is a member of family- Leguminaceae,sub-family-Papilionaceae.It is one of the important crop of the world. Soybean is rich in protein, carbohydrate,oils, major and minor minerals. Soybean oil is used for manufacturing Vanaspati ghee and other industrial product. It is widely used in the production of antibiotics like streptomycin and tetracycline.

Present study deals with the airspora and analysis of pathogenic as well as nonpathogenic fungal spores over Soybean field. This investigation will be helpful in establishing disease forecasting system for the prevention, avoidance and treatment of Soybean diseases.

MATERIALS AND METHODS

The aerobiological investigation over Soybean crop fields includes qualitative and quantitative analysis of air spora at Udgir. Investigation can be carried out through out the day and night or round the clock. For present work volumetric Tilak air sampler[11](1967) has been used. Sampler is an electrically operated device which is largely used for air sampling in India. The apparatus provides continuous sampling of air for 8 days. The sampler is a tin box with 10.4”x 8’ size.It has an elevated round cap on its lid. The cap contrits an exhaust fan inside. The cap is provided with a neted window for expelling out the internal sucked air. At the bottom of box a clockwise mechanism is fitted. A circular drum is attached on the clock box. The drum rotates in anticlockwise manner when electricity on. The circular outer surface of drum has 16 line mark at equal distance. The front side of sampler is fitted with a pilot lamp a socket for electrical connection and a switch for on and off. Backside of tinbox is provided with a small orifice projecting tube through witch sucked air enters in the air sampler. As the air rushes in, it impinges on transparent cellotape of the rotating drum coated with a thin layer of petroleum jelly and thus entraps the bioparticles from the air.

The present work of air sampling was carried out from 15th June 2017 to 6th October 2017 by operating air sampler in the centre of Soybean crop fields kept at constant height of 4 feets from ground level. After 8 days power supply of the sampler is stoped by putting the electric button off. The rotating drum is removed without touching the cellotaoe. The cellotape is removed and mounted on glass slide. Scanning of slides containing air borne microbioparticles was done regularly. The identification of spore types and other biological material on the tape was done by microscopic observation of spore with reference to size, colour , shape and septation. The confirmation of identity was made by referring standard literature and relevant books of the authors Tilak[12](1989), Barnet and Hunter[13](1972) ,Mukadam[14](1997), Alexopolus[15](1980), Dube[16](1978), Ainswoth[17](1973). The fungal spore, hyphal fragment, pollen grains, insect part, trichomes, protozoan cyst and unidentified spores were counted from

the scanned tape. The main aim of this study is to findout airspora components over Soybean in relation to different growth stages and meteorological parameters.

RESULT AND DISCUSSION

In the investigation of Soybean field in all 57 types of microbioparticles were recorded of which 51 were fungal spore types and remaining 06 constituted other biological forms which included hyphal fragments, insect parts,pollen grains, protozoan cysts and unclassified group. Out of 57 air borne components 01 belongs to Phycomycetes, 12 to Ascomycetes, 04 to Basidiomycetes, 34 to Deuteromycetes and 06 other types.

During this investigation the spore types belonging to Deuteromycetes group having highest percentage contribution 68.08 % to the total air spora followed by Ascomycetes 15.24 %, other types 13.12 %, Basidiomycetes3.43 % and Phycomycetes 0.13 % over Soybean field. The group Basidiomycetes contributed 04 spore types and ranked 4th in the order of dominance (Table I). Maximum concentration of Basidiomycetes spore were recorded 19218 spores/m3 of air in the month of September 2017 and minimum 2204 spores/m3 of air in the month of July 2017(Table II).

TABLE I

Concentration and percentage contribution during the period of 15th June 2017 to 6th October 2017.

Sr. No.	Spore Group	Total Spora	Percentage
1	Phycomycetes	1834	0.13
2	Ascomycetes	195488	15.24
3	Basidiomycetes	43562	3.43
4	Deuteromycetes	874289	68.08
5	Other group	163812	13.12

TABLE II

Monthwise seasonal concentration of Basidiomycetes spore during 15th June 2017 to 6th October2017.

Sr. No.	Spore Group	June	July	August	September	October
1	Basidiomycetes	10064	2209	4078	19218	7998

The spores of Basidiomycetes contributed 43562 spores/m3 of air to the total air spora during the season. The spore types of Basidiomycetes were grouped into Ganoderma, Rust spore, Smut spore and Telitospore. Comparative analysis of disease epidemiology of different diseases over

Soybean crop during the season have revealed that moderate temperature ,high humidity and rainy days preferably at the flowering stages of the crop favoured the disease incidence. During these investigations Soybean crop showed incidence of leaf rust disease caused by *Phacopsora pachvrihizi* and is the new record from from this region. The disease incidence was observed in kharif season in October. Rust spore contributed on an average 13972 spores/m3 of air to the total air spore during the season. Patil[18] (1985) reported the disease spread and intensity was higher in the flowering stage and onwards as compared to seedling and flowering stage. It indicates that spositive inoculum and environmental factors cause the disease but plant age is also important which determines disease incidence and intencity of various ways infection before flowering and at the flowering stage of the crop cause considerable damage and loss in yield. Bhalke[19](1981), and Wankhede[20](1983) also recorded similar findings smut spores were more abundant throughout the period of investigation,smut diseases in Sorghum and Sugarcane were common in this areas. Basidiospore constituted a heterogenous group. Hirst[21](1957) observed maximum incidence of smut spores in June and July. Pady and Cramer[22](1962) recorded smut spores throughout the year with maximum number in June and July and from January to April, Pande[23] (1976), Bhalke (1981), Wankhede (1983), Patil(1985), Jogdand[24](1987) recorded similar findings. Ganoderma basidiospores contributed to the total airspora. In this investigation it was observed that there is a temporary increase of spore in heavy rain.According to Ingold[25](1965) the hygroscopic movement of the conidiophores release spore from organic contact. This is significant particularly in rust. Gregory[26](1961) pointed out that blowing away occurs commonly with dry spored fungi including moulds ,smut,rust because the spores are often present on an elevated sporophore in any stem and leaf pathogen being raised on its host tissue.

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