STUDY OF AIR-SPORA OVER THE GROUND FIELD AT MANWATH.

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ABSTRACT:
The Present aerobiological investigation was carried out at Manwat, Dist. Parbhani by using a device Tilak Air sampler. Continuous air monitoring operation was done for 130 days during the months of November, December, January, February & March of Rabi Season during the year 2016-2017. Airborne catches trapped over the groundnut (*Arachis hypogea* L.) field includes total 55 airborne bio components. They have been categorized in to their five respective groups. Out of 55 air borne components, three (3) belonged to Phycomycetes, twenty two (22) belonged to Ascomycetes, four (4) belonged to Basidiomycetes, twenty one (21) belonged to Deuteromycetes, and five (5) included to other types.The percentage contribution of each spore type to the total airspora was calculated.The group Deuteromycetes was dominant with higherspore concentration 110,068/m^3 of air and with 43.40% contribution, followed by Ascomycetes with spore concentration 84,140/m^3 of air and 33.16% contribution, then Basidiomycetes with spore concentration 23,968/m^3 of air and 9.45% contribution, then other types with 21,504/m^3 with 8.48% contribution, then Phycomycetes with 13,986/$m^3$of air with 5.51% contribution. Influence of weather factors such as humidity, rainfall, and temperature on the incidence of disease and percentage contribution of airborne components was also studied & recorded. The information provided by this research study is useful for forecasting of the air borne diseases affecting the groundnut crop and to provide the effective control measures.

Key Words: Air-spora, Tilak air sampler, Groundnut crop, Rabi season.

INTRODUCTION:

Groundnut (*Arachis hypogaea* L.) is commonly called Peanut is an oil yielding, food and cash crop of tropical and subtropical regions. It is an annual herb growing up to 30 to 50 cm & belongs to a family Fabaceae. Groundnut is an classical example of geocarpy. Groundnut is the third most important source of vegetable protein. Groundnut kernel contains up to 50% of non-drying oil and 35% proteins. Oil seeds account of groundnutis for one ninth(1/9) of the total agricultural production in India. Groundnut oil is used as lubricant, used for cooking, production of vanaspati ghee, making shaving cream, illumination of lamp. Peanut can be eaten raw, roasted or used in various recipes. After harvesting Groundnut (*Arachis hypogaea* L) plants are used as nutritious fodder to cattle. Oil cack is a by-product formed after extraction of oil from seed is rich in protein and used as cattle feed and fertilizer for many crops. Groundnut crop is susceptible to a many kind of air borne, soilborne and seed borne diseases caused by fungi,bacteria, viruses and nematodes results into low yield of kernel & poor quality of fruits. Some of the important and major fungal diseases of groundnut crop are early leaf spot (*Cercospora arachidicola)*; late leaf spot (*Cercospora personata*); Rust disease (*Puccinia arachidis*); Collar rot or seedling blight (*Aspergillus niger*); Root rot (*Macrophominaphaseolina*), Viral disease are Rosette (Groundnut rosette assistor virus); Groundnut bud necrosis disease (Groundnut bud necrosis virus), however during present investigation more trace has been given to the fungal components of airspora.Aerobiology is a scientific and multidisciplinary approach focussed on the transport of organisms & biologically significant material (Prof. S.T. Tilak). Due to vast study and experiment in aerobiology Prof. S.T. Tilak is known as “father of aerobiology” in India. Deshpande et.al.(1967) and Gopan (2002-2003) study the airspora of groundnut crop field. Sreeramulu & Seshavataram 1962, Sreeramulu and Ramalingam, (1963,1966); Sreeramulu and Vittal (1966,1971); Tilak et al. (1967) and onwards etc. were involved in the aerobiology and studied the aerospora over groundnut crop, Paddy crop, sunflower crop, cotton crop in different regions of India. Aerobiological work still has not been done on groundnut crop at Manwath. With this idea, it was intended to findout the components of airspora over groundnut field at Manwath. Dist. Parbhani (M.S.).

MATERIALS AND METHODS:

The present aerobiological investigation involved qualitative and quantitative analysis of air spora over ground field at Manwath which belongs to Parbhani district of Maharashtra state. Manwath city is situated between

the latitude $19^0$18'00.0 North and Longitude 76 ^{0}29'60 East. Air monitoring survey was carried out by using Volumetric Tilak Air Sampler (Tilak and Kulkrni,1970). Tilak Air Sampler was installed in the centre of 2 acre 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 complete one rotation in eight days. Acellophane tape has one surface sticky, wrapped around the drum while other surface was smeared with petroleum jelly as adhesive so as to stick spores. Continuous air was sampled at the rate of five
(5) litters per minute for a rabi season of a year 2016-2017. After each eight days when drum completed one rotation, previous cellophane tape was removed & replaced by a new cellophane tape. A Cellophane tape was brought to the laboratory & cut into 16 (sixteen) pieces of equal length. Each division provides a qualitative and quantitative data of airborne biocomponents of day & night. The slides were prepared and scanned. Air sampling was initiated eight days prior to the sowing of seeds of groundnut in the experimental field and continued eight days even after harvesting the crop. The daily record of meteorological data was regularly maintained with the help of digital thermometer and hygrometer and rain fall record was obtained from Manwath Tehsil.

RESULT AND DISCUSSION:

The slide were observed and identification of fungal spore carried out with the help of visual identification, comparing with permanent slides and available literature of aerobiology and the result of the analysis given in table 1 & 2 . The present aerobiological investigation for the Rabi season of the year 2016-2017 have revealed total fifty-five (55) airborne components. Of these fifty-five(55), fifty (50) are fugal air borne bio components and are classified in to four groups such as Phycomycetes includes three (3) spore types, Ascomycetes contributes twenty two (22) spore types, Basidiomycetes contributed total four (4) spore types and deuteromycetes contributed total twenty one
(21) spore types. The remaining five (5) airborne components forms artificial group and are belonged to other type. The percentage contribution of each spore type to the total air-spora was calculated. The group Phycomycetes with total spore concentration 13986/m^3 of air and with 5.51% contribution, the group Ascomycetes with total spore concentration 84140/m^3 of air and with 33.16% contribution, the group Basidiomycetes with total spore concentration 23,968/m^3 of air and with 9.45% contribution & the group Deuteromycetes with total spore concentration 1,10,068/m^3 of air and with 43.40 % contribution & group Other type with total airborne biocomponents concentration 21,504/m^3 of air and with 8. 48 % contribution. The airspora biocomponents which could not be identified due to their inadequate distinct external morphological features have been belonged to under 'unidentified' sub-group of group other type. This observation noticed that group deuteromycetes contribute highest percentage contribution (43.40%), and stood first to the total airspora and was followed by ascomycetes with percentage contribution (33.16%), Basidiomycetes with (09.45%), then other types with (08.48%) concentration & last one group is Phycomycetes with lowest airborne (5.51%) contribution. See (Table 1 & Graph 1).

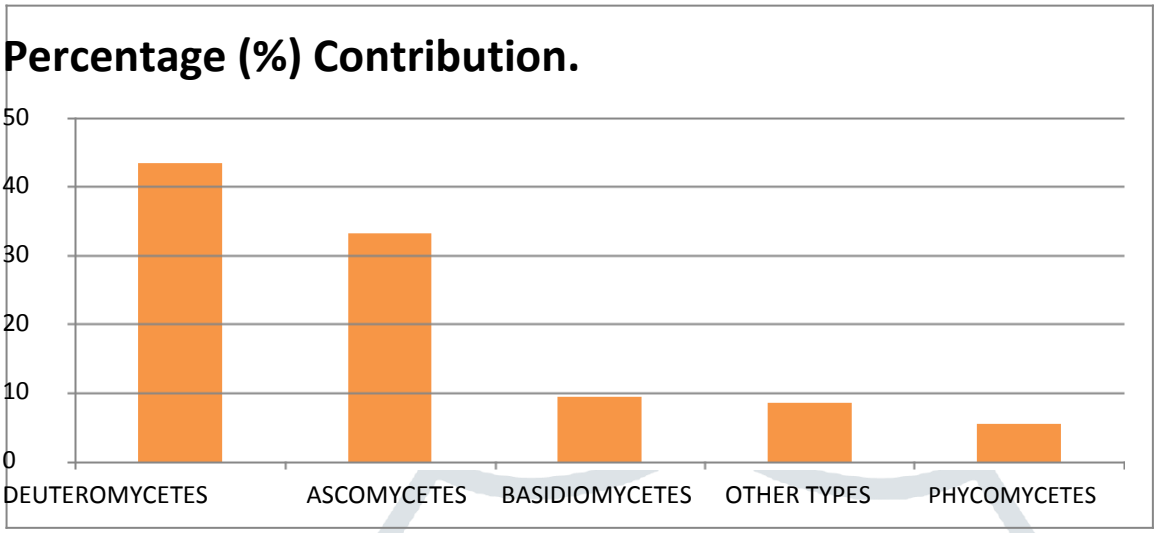
The group basidiomycetes includes only four (4) spore types but individual spore concentration and percentage contribution of each & every spore type is more comparatively to the spore concentration and percentage contribution of any other individual spore types of phycomycetes & ascomycetes. The group deuteromycetes contribute total 21 spore types but the highest percentage contribution (2.79%) of Cladosporium spores again confirm that it is always dominant fungus every where in the world. Along with Cladosporium (2.79), Alternaria (2.72%),Nigrospora (2.28%), Cercospora (2.27%) & Biospora (2.25%), Heterosporium (2.25%), Diplodia(2.22%) are also some of the dominated airspora of group Deuteromycetes. Ascomycetes group noticed that the airspora counted shows dominance in percentage contribution (33.16%) next to Deuteromycetes (43.40%).

Ascomycetes group included Clasterosporium has highest (1.67%) contribution followed by Lacnidion (1.66%), then Otthia (1.64%), & Bombardia (1.62%). Basidiomycetes included Smut spore has highest (2.45%,) contribution, followed by Uromyces with (2.39%) contribution. In group phycomycetes Rhizopus shows highest percentage contribution with (2.03%), followed by Cunnighameella with (1.81%), to Circinella with lowest (1.66%) contribution.

Spore Groups	Percentage (%) Contribution.
DEUTEROMYCETES	43.40
ASCOMYCETES	33.16
BASIDIOMYCETES	09.45
OTHER TYPES	08.48

PHYCOMYCETES	05.51

Table 1. Percentage Contribution Of Total Spores Types Of Each Group In Rabi Season during the year 2016-17.

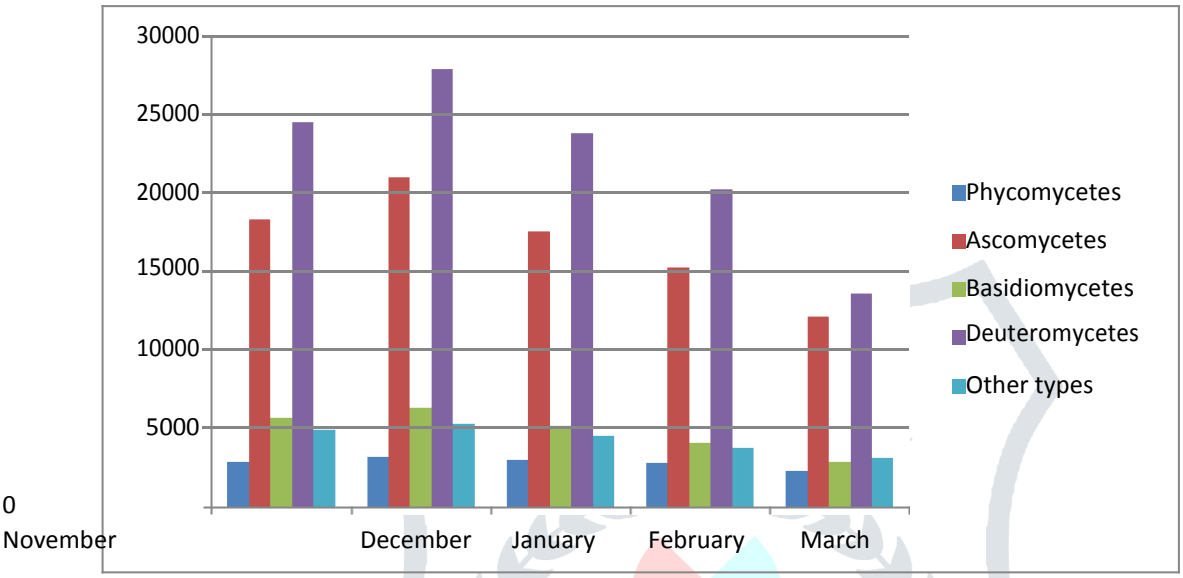


Graph 1. Percentage contribution of total spores types of each Group in Rabi season during the year 2016-2017.

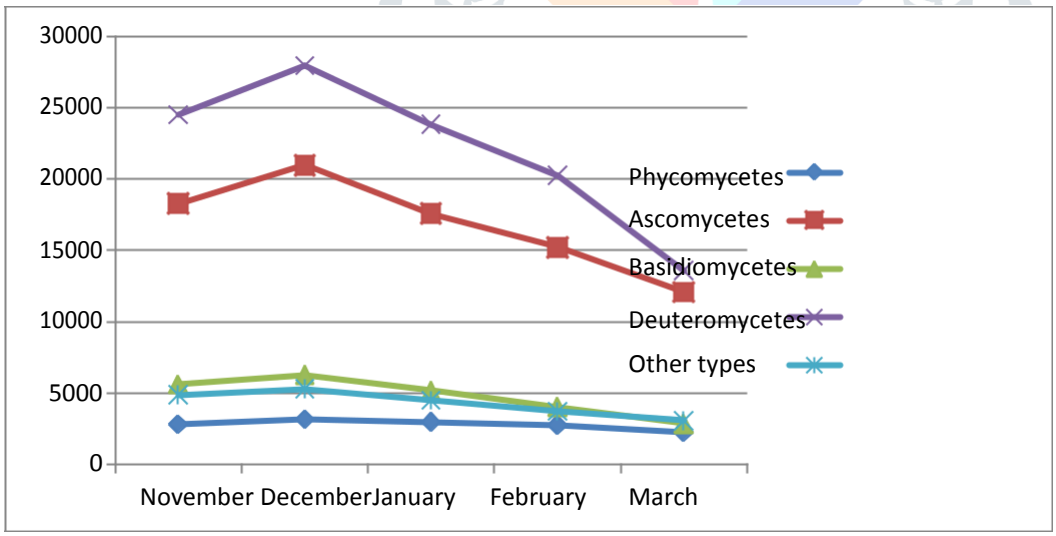
Monthwise contribution (Table 2. & Graph 2 A, B & C) of total airspora of each group noticed that i) Phycomycetes airspora concentration was gradually increased from November (2828/$m^3$of air) to December (3164/$m^3$of air) then decreased gradually upto 2968/$m^3$of air in January & 2772/m^3 in February and lowest in March i.e. (2254/m^3)ii)Similarly Ascomycetes air spora concentration also increased from November (18298/m^3) to December (20958/m) and then gradually decreased up to (17570/$m^{3)}$ in January &(15218/m^3) in February and lowest in March i.e. (12096/m^3)iii) Basidiomycetes airspora concentration was also gradually increased from November (5628/m^3) to

Groups	November	December	January	February	March
Phycomycetes	2828	3164	2968	2772	2254
Ascomycetes	18298	20958	17570	15218	12096
Basidiomycetes	5628	6286	5166	4032	2856
Deuteromycetes	24514	27916	23814	20244	13580
Other types	4886	5306	4508	3738	3066

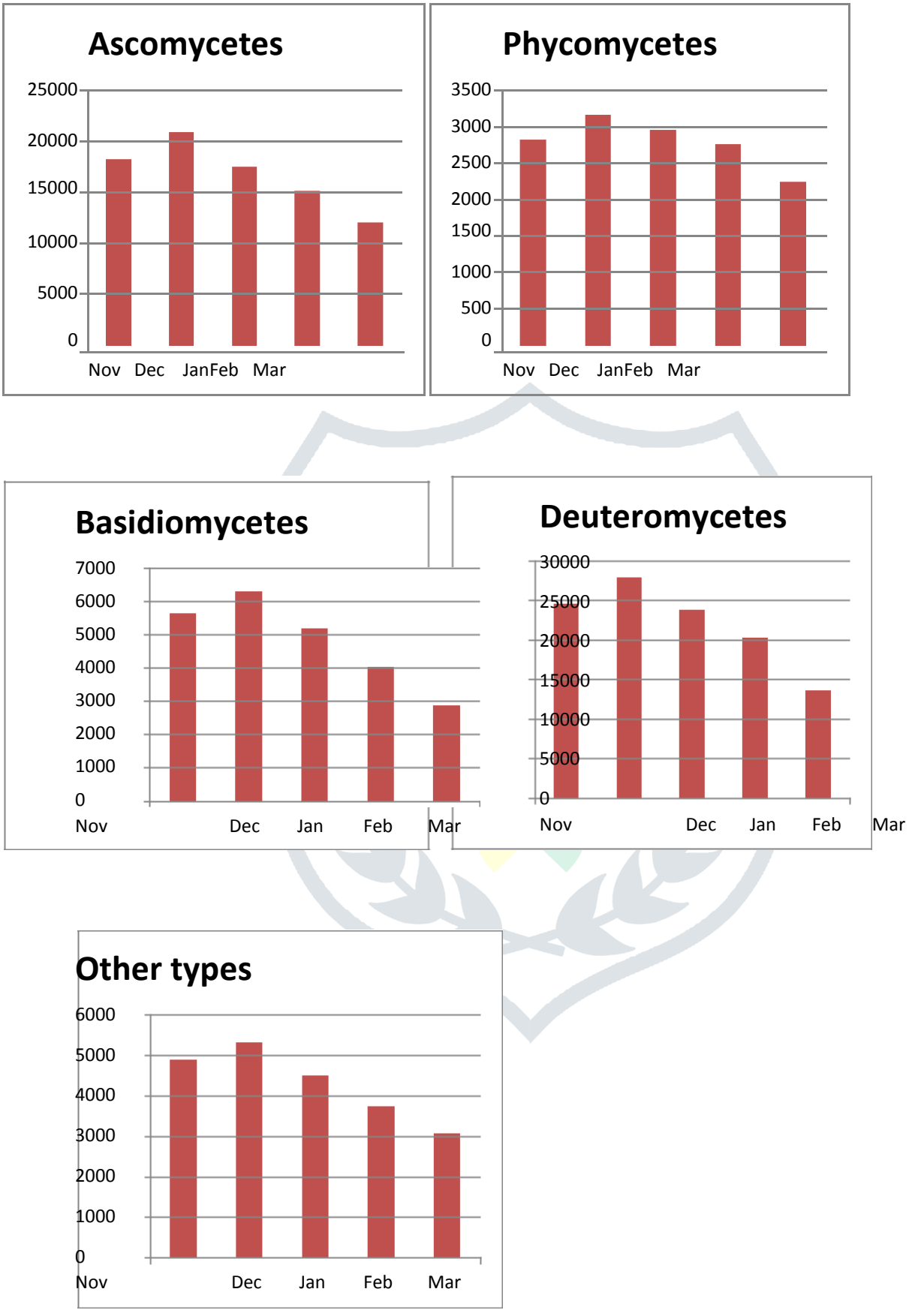
Table2.Month wise total spore concentration of each group in Rabi season of 2016-2017.



Graph 2.A. Monthwise spore concentration of each respective group of aeromycoflora in rabi season of 2016-17.



Graph 2. B- Monthwise spore concentration of each respective group of aeromycoflora in Rabi season during the year 2016-2017.



Graph 2: C) Monthwise spore concentration of each individual group of mycoflora in Rabi season during the year 2016-2017.

to December (6286/m^3) then gradually decreased from January (5166/m^3) to February (4032/m^3) and airspora concentration was lowest in March i.e. (2856/m^3).iv) Lastly, group deuteromycetes airspora concentration was also gradually increased from November (24514/m^3) to December (27916/m^3) & then gradually decreased from January (23814/m^3) to February (20244/m^3) and lowest in March i.e.(13580). Last one group remaining is the other type which has air-spora concentration increased from November (4886/m^3) to December (5306/m^3) and gradually decreased from January (4508/m^3) to February (3738/m^3) and lowest in March (3066/m^3).This result concluded that, gradually increased in concentration of total airspora of each group from November to December due to gradually increase in humidity from November to December and gradual decrease in total airspora concentration per m^3 of air of each group was due to gradually decreasing humidity from January to March.

The present paper provides a critical account of impact of weather condition on concentration of airspora over groundnut crop during Rabi season. The spore load in the winter was due to favourable conditions of temperature, rain, and relative humidity.The spore load in the winter due to the some spores types occurred in higher range when the temperature was 27 to 32^0c and relative humidity range between 57 to 75%.The results are correlated with similar types of work carried out in different regions of the world by many workers such as Sulaiman and Agashe (1965) investigated effect of climatic factors on Tikka disease incidence. K.V.Mallaiah and A.S. Rao (1979), Jakson and Bell (1969), Shanta (1960) Madras university carried out investigation on Tikka disease with special reference to the role of environment factors and incidence of pathogen. Standing vegetation has a great influence on air spora of any place and it changes with changes in weather (Gregor 1973) Quazi (1985) studied the airspora components over groundnut fields at Aurangabad and analysed the concentration of Cercospora and rust spores in relation to meteorological parameters & disease incidence and brought out important features which would help in devising an efficient forecasting system for preventing Tikka disease. Leach (1980) studied the influence of humidity and other factors on the spore discharge by *pyricularia oryzae, Drechasleramaydis, and Drechslera turcica*.Jacob (1951) clearly pointed out the close relationship of aerobiological survey and its relevance to meteorological parameters.Meteorological factors influence the percentage of spores that become airborne from a source area. Generalized statement have been made concerning the effect of temperature, light, wind, relative humidity (RH), dew, rain, rain droplets, and storm fronts on the release of such spores into the atmosphere. Study of this aspect is highly interdisciplinary and has tremendous scope to find the significant application to agriculture. Environmental monitoring data obtained may be used for practical disease management by forewarning farmers about the attack of plant diseases.

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