Impact of Weather Parameters on Incidence of Airspora Over Sugarcane Field

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Abstract

Aerobiological investigations were carried out over Sugarcane field by Air monitoring with the help of Tilak Air sampler. During the present aerobiological survey various types of fungal spores including pathogenic and saprophytic were encountered in the air over sugarcane field. The impact of meteorological parameters which results on the incidence of airspora and their seasonal variation. The group of phycomycetes represented three only with 1.70 % total airspora whereas Ascomycetes 13.72 % and Basidiomycetes 20.34 %, Dueteromycetas 61.69 % and other spore types 2.85 %. The member of phycomycetes *Albugo , Cunninghamella , Rhizopus* were reported maximum in August, which showed close relation with rainfall, moderate temperature (25^0C–30^0 C) and high % of humidity. Ascomycetes their percentage contribution to the total airspora was 13.72 % and showed their seasonal maxima in rainy period and number were found to be dependent on the occurrence and amount of rainfall rather than on the vegetation with area. In the present survey some of ascospores showed immediate spore release after rainfall OR showed delay. In case of *Leptosphaeria, Pringsheimia and Hypoxylon* Spores occurred during night hours mainly confined to the wet period. It might be effect of temperature, rainfall direct or indirect impact on ascospore. Basidiomycetes represented with 20.34 % , smut spores maximum during dry period, rust spore recorded maximum when temperature 24^0 C – 28^0 C, relative humidity (70- 80 %) with sporadic distribution of rainfall. Deuteromycetes contributed maximum i.e. 61.69 %. The spores occurred throughout the period of investigation with more or less percentage due to their more saprophytic ability. The effect of meteorological parameters on the spore load of diverse group of fungi are discussed in this paper .

KEYWORDS: Airspora, meteorological parameters

Introduction

Sugarcane is one of the most important commercial or cash crops of India. It is grown all over India, but UtterPradesh has the largest area of cultivation. Sugarcane is used for manufacturing of sugar and ethanol of cultivation. There are over 30 diseases of sugarcane in India. Hence attempt has been made to study this in detail to understand spore concentration and diseases incidence some of major important cause they are wide spread and cause severe losses in yield. The major fungal diseases are Red rot of sugarcane caused by (***Colletotrichum Falcatum***, went) caused extensive damage in some parts during 1939-42. Whip smut of sugarcane incited by (*Ustilago Scitaminea*) sydow . It is found in almost every sugarcane tract. Wilt (*Acremonium implicatum*), it was first reported by Butler and khan in 1913 from north India. Sett rot caused by(

ceratocystis paradoxa) moreau foliar Eye spot disease (*Drechslera (Helminthosporium) saccharin*. caused severe loss is quality and quality of yield , our observation on total air spore over sugarcane field weather influence on airspora .

METERIALS & METHODS

The present aerobiological experiments were conducted by operating continuously Tilak air sampler (Tilak and Kulkarni 1970) Air sampler was installed is the centre of sugarcane field with its orifice kept at a constant height of 1.5 meters above the ground level at Kandhar (Maharashtra), slides were scanned for estimating the spore types and their percentage concentration per day as described by earlier workers (Tilak and Srinivasulu 1967). The experiments were conducted for two years from March 2010 to Feb 2012 .

The disease incidence and severity of the disease was assessed by frequently visiting the field , Meteorological data such as daily temperature, relative humidity and rainfall were maintained throughout the period of investigation .

The fungal spores were identified based on morphological characters, visual identification by comparison with reference slides and also from literature.

Sriramulu and Ramakrishna (1971) studied the airspora over sugarcane and other crops.kshir Sagar & Pande, 2011 reported the Spores on sun flower crop.

Phycomycetes represents my *Albugo, cunniminghamella Rhizopus* and contribution 1.70% to the total airspora. The members of this group was maximum in August and clearly showing their close relationship with rainfall and humidity . Their concentration is very limited in the airspora. May be due to no special mechanism for efficient spore dispersal, spore size is larger which help in quick sedimentation.

The group Basidiomycetes, includes smut, rust , Basidiospores, *Ganoderma* were trapped . The *Ustilago scitominea* showed highest contribution 8.54 % and secured fourth position among the total airspora, Rust spores (Uredospores) were recorded 1.65% its contribution was maximum in the month of October to December during the period of investigation. It was due to availability of rust inoculum, favourable weather conditions such as temperature 24^{o}c to 28^{o}c, high relative humidity ranging from 70% - 80% with sporadic distribution of rainfall on few occasions.

The incidence of smut spores (*Ustilago scitaminea*) was increased from Aug to February due to heavily attack of whip smut on sugarcane field . The maximum percentage contribution at the time when harvesting of the crop. The smut spores were discharged mainly during the time daily maxima between 11.00 hrs to 16.00 hrs. This indicates that, The temperature has an enhanced effect on the release and the dispersal of smut spores Gregory (1961) observed that blowing away occurred in dry of fungi including smut, rust because of spores are present on host tissue the higher wind speed the more spores are carried away. Ahire p.p and kadam (2009) reported seasonal variation and diurnal periodicity of smut spores.

The relationship between the occurrence of ascospores and presence of rainfall was found in the fungi like *Didymoshpaeria*, *Leptosphaeria* and *pringsheimia* showed immediate spore release rainfall.

Whereas the spores like *Chaetomium, Teichospara, Parodiella* release of the ascospores was delayed. Thus the effect of rainfall on ascospores was either immediate or delayed .

Leptosphaeria, Pringhseimia and Hypoxylon it was observed that spores occurred normally during the night hrs and their presence was mainly confirmed to the wet period. Ascospores concentration was sufficiently higher on rainless days accompanied with high relative humidity and moist laden air dewfall was also found effective in ascospores release (Ingold 1965). The continuous presence of many ascospore types in the airspora throughout the period of investigation may be enplained as due to the irrigation of sugarcane and neighbour crop fields .

During the summer months very less number of ascospores were observed in air it might be due to pronged dry and hot temperature .

The class Deuteromycetes contribution maximum during the period of investigation than any other fungal group. It contributed highest percentage 61.69% to the total airspora. Their months wise average contribution was highest71.58% in the month of September in first season (2010) and 59.08% in November second season (2011). This clearly indicated that the importance of meteorological parameters In the liberation and the occurrence of these fungal spores in air.

Cladosporium contributed 28.57% which is cosmopolitan in distribution and universal dominant form of airspora, recorded throughout the period of investigation but their maximum percentage in July & August. Reddy and Pandhare (2012) reported 16.03% in the air of library. The catches showed that cladosporium occurring in clumps of conidia and more saprophytic ability but their spore liberation was passive.

Most of the spore of Deuteromycetes followed a seasonal trend in their occurrance and number. *Alternaria , curvularia , Helminthosporium, periconia,* and *pithomyces* ,were increased during rainy season and later on their concentration gradually decreases. Some of the spores of *Fusarium, Heterosporium, periconia spegazzinia* and *Beltrania*, were frequently encountered throughout the year. It was observed that moderate temperature and high humidity helped in the saprophytic development fungi and its subsequent release of their spores in the air which may lead to increase the concentration of spore load. Many Deuteromycetes spores belong to dry spore group and high incidence was observed 2-3 days after rainfall. Ahire p.p etal.(2013)reported 69.39% over sugarcane field at Nasik.

Other types included hyphalfragments, insect parts, pollen grains, protozoan cysts and unidentified spores. They contributed 2.85% to total airspora. Hyphal fragment was mainly confined to dry hot and windy days . Dry and hot climate made to loose their contact with substratum while wind current liberates them in air.

Insect parts appear in the air after death and decay on the ground or shedding of

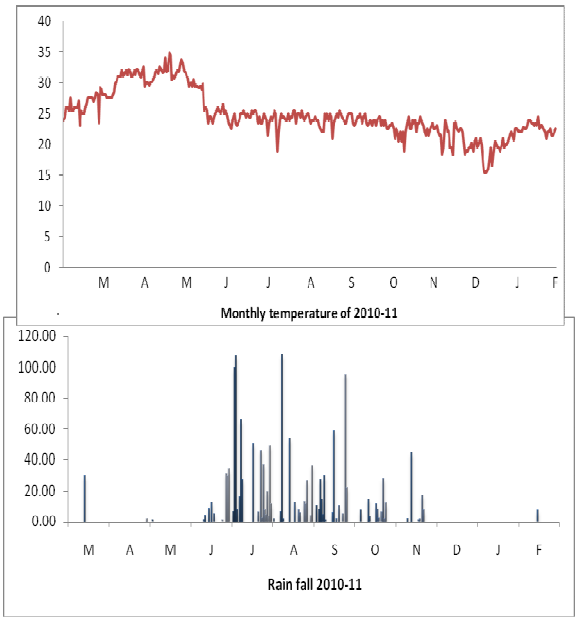
while flying. Tilak (1982) observed the relationship of insect parts with meteorological condition and high wind velocity also helped in lifting the insect parts in air and made them common component of airspora.

Pollen grains probably influenced by meteorological conditions in shedding of pollen by inhibiting or accelerating anthesis, protozoancysts contributed 0.20%, correlated with high percentage relative humidity and low temperatures as well as high wind velocity and their number was found to decrease during dry air.

Unidentified group contributed 0.49%, many fungal spore remained unidentified because of their indistinct morphological feature, hyaline spore, their concentration was found to change with atmospheric condition .

Incidence of fungal airspores was high during rainy season but decreased in dry season as suitable substrates become scarer and moisture for fungal growth and spore production become limiting. The spore concentration was less due to the heavy rainfall on some days and spores might have got deposited on the surface of soil with the rain drops and may be the reason for decreasing the spore load. In spite of this, the rapid changes in humidity, which occurs in early morning hours and early night hours probably play significant role in release of new conidia in to air has been found by Gregory (1961) and Meredith (1962). It was noted that the atmospheric spore concentration fluctuated according to meteorological condition.

Diagram showing Day to day variation of Meteorological parameters during 2010-2012



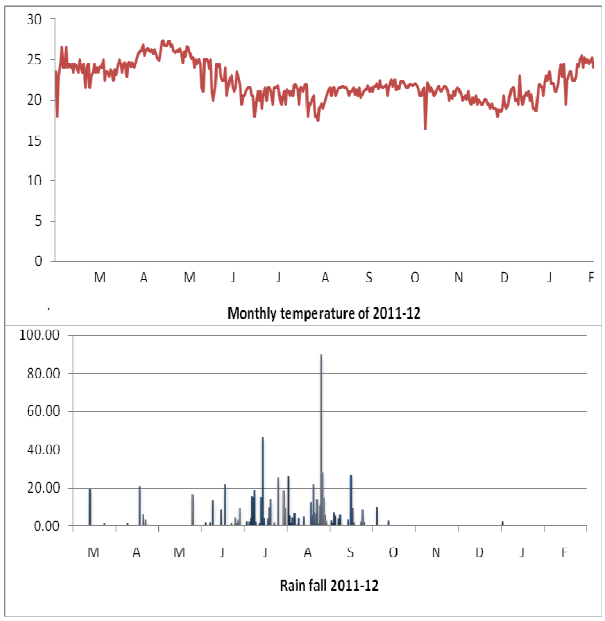
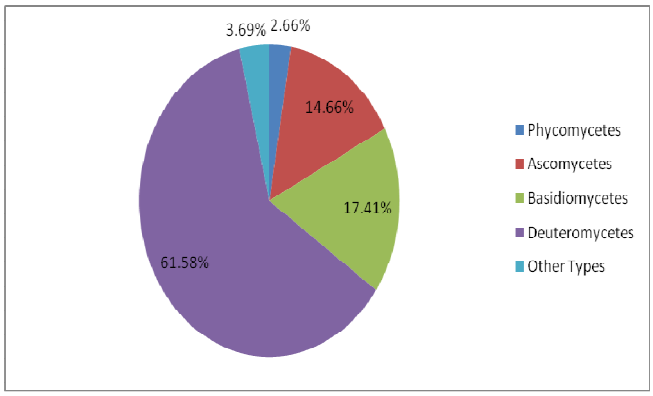
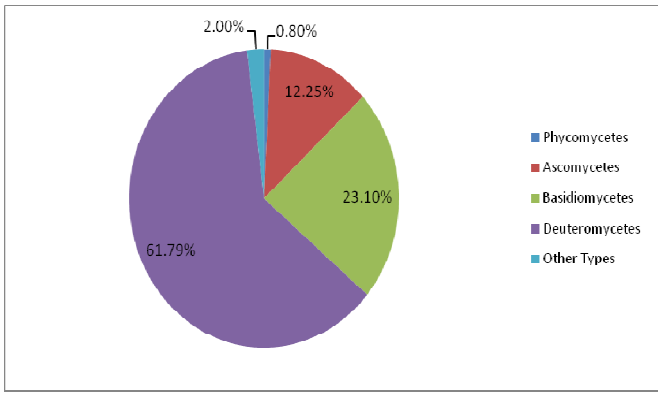


Diagram indicating the percentage contribution of each spore group to the total Airspora during 2010-2012

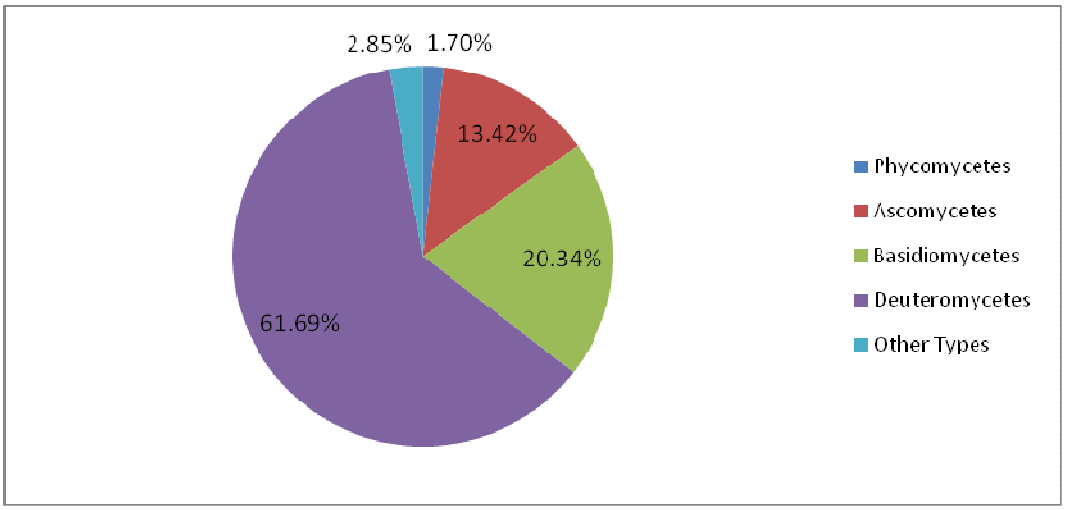
2010-2011



2011-2012



2010-12



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