



# Bioscene

**Bioscene**  
**Volume- 21 Number- 04**  
**ISSN: 1539-2422 (P) 2055-1583 (O)**  
[www.explorebioscene.com](http://www.explorebioscene.com)

## **Air Borne Fungal Flora of Sivasagar District, Assam, with Special Reference to Human Health**

**Nibedita Baruah<sup>1</sup>, Priyakshi Buragohain<sup>2</sup>**

<sup>1</sup>Assistant Professor, <sup>2</sup>Ad Hoc Faculty

Department of Botany, Sibsagar Girls' College, Sivasagar, Assam, India

---

---

**Abstract:** Airborne microorganisms are those which are present in air as biological air borne contaminants. They can easily spread from one victim to another one without any physical contact. These airborne microorganism may come into the environment by different sources like by plumbing systems , heating, ventilation, air-conditioning systems, mold, dust suspension humans, pets, plants etc. ultimately causing air pollution. Airborne transmission happens when the bacteria or virus travel on respiratory droplets or dust. These airborne particles are a major cause of respiratory ailments of humans, causing allergies, asthma, and pathogenic infection of the respiratory tract. Measles', mumps, small pox, allergies etc are very much common among people due to airborne microorganism. Fungal spores are widely distributed all over the world which constitute the major component of the air borne mycoflora. Seasonal variation affects the distribution of fungi of particular area. Occurrence and types of fungal species change with season and geographical locations. A study was conducted on air mycoflora over different areas of Sivasagar district of Assam during various seasons of the year 2020. The site for the study represents a municipal & urban area. A total of 22 species of fungi were isolated and identified on the basis of colony morphology, mycelia, sporangiophore and spore structure from different groups. The mycoflora were isolated by using Culture method or Gravitational setting method on Rose Bengal Agar medium supplemented by suitable antibiotics The present study was conducted to elucidate the distribution and occurrence of airborne fungi with special reference to human diseases throughout the year 2020.

**Keywords:** Air mycoflora, Fungi, Seasonal variation, Human health, Sivasagar district

---

---

### **Introduction:**

The widely distributed air borne fungal spores are affected by seasonal variation and various environmental factors. They are based solely on morphological and physiological characteristics, which are easily influenced by the environment. Different types of microorganisms are responsible for causing different diseases to human being. It is gradually become evident that a good numbers of fungi do not exist in nature individually, but a number of

microorganisms (viz. fungi, bacteria and algae) are present in the air, rhizosphere, phylloplane and in other habitats in the host or in close proximity of that host. So the presence of a pathogen does not always signify the possibility of initiation of a disease.

Sometimes different organisms occurring together may be individually involved in disease syndrome, while in some cases some may not be non-pathogenic. Variations in altitude and climatic conditions such as temperature, relative humidity, rainfall etc. prevailing in Northeastern region are responsible for development of different diseases and insect pest as well. The forest areas and tea garden areas of the study site the peoples are frequently suffering from asthmatic problem, skin diseases and allergy. The fungal spore affects in human health causes several diseases and it reveals from the study by the researchers. This study gives an idea of role of fungal spores in human health. There are several mycoflora isolated from the study site through petri plate method such as *Aspergillus*, *Rhizopus*, *Aspergillus Alternaria*, *Cladosporium*, *Curvularia*, *Fusarium*, *Penicillium*, *Yeast* etc. which causes mainly allergy, skin diseases and asthma.

The diversity microorganisms in air have been studied by different workers. Some aerobiological studies conducted in India have been made by Debnath S.; Rajan et al.; Sreeramulu & Ramalingam<sup>15</sup>; Mehrotra & Claudius, Agarwal et al.; Ramalingam, Bhati & Gaur<sup>3</sup>. Aerobiological studies have received much attention recently because of applications in the field of allergy, dispersal of pathogens & in allied aspects of microbiology.

### **Objectives of the Study:**

1. To study the airborne mycoflora present in the forest region of Sivasagar district, Assam
2. Isolation and identification of airborne mycoflora present in the study site
3. Study of different human diseases relating to mycoflora

### **Materials and Methods Study**

#### **Area:**

Sivasagar district, a historically very important place of North East India is rich in biodiversity consisting of different types of flora and fauna. It is a transitional zone of Arunachal Pradesh and Nagaland. The district has great significance having rich floristic diversity and great variability of species at ecosystem level with different types of vegetation in various habitats. Sivasagar district of Assam falls under North East biogeographic zone and Brahmaputra valley. Total geographic area of the district is 2668 sq. km and lies between 94°15' - 95° 45' East longitude and 26°45' -

27°15' North latitude. The area comprises with three subdivision viz. Sivasagar Nazira and Charadeo and seven reserve forests: Abhoypur, Diroi, Sapekhati, Dilli, Sola, Panidihing, and Galekey. The climate of the area is tropical monsoon having rainfall about 250mm. The type of soil of the district is alluvium. Temperature ranges from 11.6°C to 38.5°C and it comprises evergreen, semievergreen, grassland and deciduous forest.

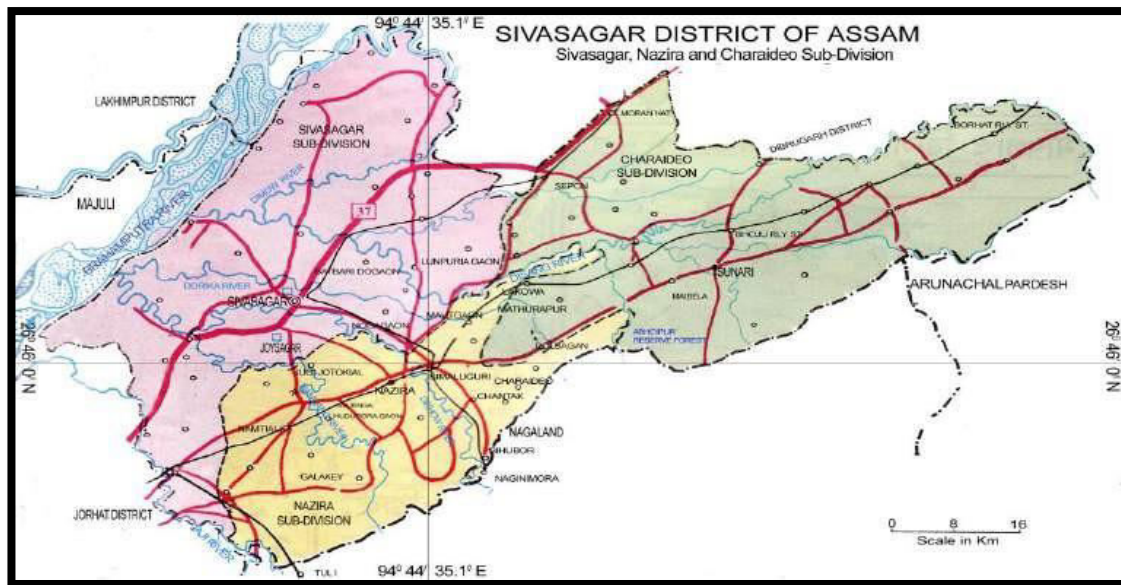


Fig. 1: Map of study area

#### Identification Procedure:

For isolation of airborne Mycoflora Petri plates containing Rose Bengal Agar medium were used. Air samples were collected from ten different locations of the study site by the plate sedimentation methods which involved exposing media-filled Petriplates to the air for 15 min. Observations were performed at a monthly interval starting from the month of January to December, 2020. Mycoflora were also isolated from the tea garden area and from forest areas following Deb et al. (1999). Identification and Maintenance of Culture Fungal species were identified based on characteristics as well as microscopic observations on the size and shape of conidia, conidiophores, sporangia etc. and related parameters etc. (Thom & Raper, 1945; Raper & Thom, 1949; Skinner et al., 1961; Smith, 1969; Debnath, S. et al., 2008.) Pure cultures of various isolates were maintained by sub culturing. The identifications were confirmed through Indian Type Culture Collection Centre, Division of Plant Pathology, IARI, New Delhi.

### Results and Discussion

During the study period, a total of 18 species of fungi were isolated and identified on the basis of colony morphology, mycelia, sporangiophore and spore structure from different groups. Among all the species the dominant fungal genera prevailing the whole year on the air of this area are *Aspergillus niger* and *Rhizopus stolonifer*. The other species includes *Aspergillus flavus*, *A. fumigatus*, *A. candidus*, *Alternaria alternate*, *Cladosporium cladosporioides*, *Curvularia lunata*, *Fusarium oxysporum* and *Penicillium chrysogenum*. From the table 1 it reveals that *Aspergillus* species are the most dominant species among the aeromycoflora from this area during the year 2020(Jan-Dec) at Sivasagar district, Assam in various seasons .

### Experimental Findings

Table :List of isolated mycoflora with their symptoms and diseases on humanhealth.

Sl. No	Name of fungal species	Symptom and diseases
1	<i>Alternaria fasciculata</i>	Causes allergy, cases of asthma induced by <i>Alternaria</i> increase especially in children during hervecting period.
2	<i>A. alternata</i>	Causes allergy and asthma.
3	<i>Aspergillus candidus</i>	Aspergillosis and Causes allergy.
4	<i>A. clavatus</i>	Infect lungs,causes allergy.
5	<i>A. flavus</i>	Produce mycotoxin, aflatoxin, contaminating food.
6	<i>A. fumigatus</i>	Cause respiratory disease undergrowing transplant theory,or AIDS patients, allergic bronchopulmonary aspergillosis.
7	<i>A. niger</i>	Infect persons lung causing fungal ball
8	<i>Aureobasidium kullulens</i>	It is demataceous fungus, it can colonize human hair & skin. Deleterious. Immune reactions may occur in human like hypersensitivity. Pneumonitis allergies, respiratory allergies may result due to high level of <i>Aureobasidium</i> in air.

9	<i>Cladosporium herbarum</i>	Causes asthma, allergic response in the lungs. The cells lining bronchi and aveoli bacame inflamed,severely reducing the 10capacity of inhale.
11	<i>Curvularia interseminata</i>	People may experience asthma and allergic reaction.
12	<i>C lunata</i>	Causes asthma, allergic Bronchopulmonary Mycosis
13	<i>Fusarium oxysporum</i>	Causes allergic diseases like sinusitis, onychomycosis skin infection.
14	<i>F. lactus</i>	Causes allergic diseases like sinusitis, human oesophagal cancer.
15	<i>F. moniliformis</i>	Causes allergic diseases like sinusitis
16	<i>Mucor mucedo</i>	In rare cases, it can cause fungal infection known as Mucor mycosis.
17	<i>Helminthosporium sp.</i>	Causes asthma and other respiratory problem
18	<i>Penicillium citrinum</i>	Causes allergic reaction
19	<i>P. sclerotium</i>	Induces cell cycle arrest leading to apoptosis.
20	<i>P. chrysogenum</i>	Causes necrotizing oesophagitis, endophthalmatitis and asthma.
21	<i>Rhizopus nigricans</i>	Allergic reactions leading symptoms like sneezing, running nose, watery eyes, skin rashes and even asthma in severe cases.
22	<i>Saccharomyces cerevisiae</i>	Development of pneumonia like symptoms is followed by systemic infection



Photographs Showing Some Fungal Colonies Isolated From Air During The Stud

**Conclusion:**

The initial study over the year gives qualitative & quantitative data on the air mycoflora over the different areas of Sivasagar district. A total of 18 species of fungi were isolated and identified during the year and their occurrence with seasonal variation has been studied. The dominant fungal species found during the study period were the *Aspergillus niger* & *Rhizopus stolonifer*. More studies will be conducted and communicated due course of time. From the study it reveals that the people nearby teagarden and forest areas of Sivasagar district suffers skin disease, asthma and allergy due to the fungal infection.

**Acknowledgement:**

Author is grateful to Department of microbiology, Tocklai Research Centre (Jorhat) for giving permission to use the lab, especially to S. Debnath for providing microbial air sample and helping in entire work programme.

**References:**

- Agarwal, M.K., Shivpuri, D.N. and Mukerji, K.G.: Studies on the allergic fungal spores of the Delhi, India, metropolitan area. *Journal of Allergy.*, 44: 193 (1969)
- Baranatt H.L.: *Illustrated Genera of Imperfect Fungi*. 2nd Ed, Published by Burgess Publishing Co. (1960)
- Bhati, H.S. & R.D. Gaur.: Studies on Aerobiology-Atmospheric fungal spores. *New Phytol.*, 82: 519-527 (1979)
- Bhattacharjee, Kathakalee; G.C. Sharma; S. Kalita.: Aeromycological study in a bus terminus in guwahati city, Assam. *AJEBS*. 3(2): 311-319 (2012)
- Debnath, S. and Baruah, P.K.: Seasonal variation of air mycoflora over tea plantation in Jorhat district, Assam. *Ind. J. Aerobiol.* 21(2): 79-85 (2008)
- Dutta, S; B.K. Dutta, P.K. Nath.: Comparative study of air, phyllosphere and soil mycoflora of the tea plantation area of Cachar district, Assam. *Assam University Journal of Science & Technology: Biological and Environmental Sciences*, 5(1): 89-94 (2010)
- Gilman Joseph Charles. : *A manual of soil fungi*. Published by Printwell.(1995)
- 8.Goswami Chandrama and Manisha Bhattacharya.: Contribution of Sericulture to Women's Income in Assam -A Case Study in Goalpara District of Assam, India. *International Journal of Scientific and Research Publications*, 3(3): (2013)
- Kulkarni, Pragya.: Aeromycological profile of the public parks of Bhilai Township, Chhattisgarh, India. *Indian Journal of Science and Technology*;4(5):558-560 (2011)
- Mehrotra, R.S. & Claudius R.S.: Aerospora of Saugar University campus, *Bulletin*



- of the Botanical Society of the University of Saugar., 15:18 (1968)
- Rajan , B.S.V., Nigam, A. & Shukla, B.K.: A study of atmospheric fungal flora at Kanpur. Proceedings of the Indian Academy of Sciences., 35: 33 (1952)
  - Ramalingam, A.: Aerospora of Mysore. Proceedings of the Indian Academy of Sciences., 74: 22 (1971)
  - Ray, Manjit Kumar and P.K Mishra,: A preliminary Screening and identification of microflora in the outdoor and indoor environment of B.N.College, Dhubri, Assam. Ann Plant Physiol. 26(1): 35-39 (2012)
  - Sharma, Kavita.: Comparative study of Aeromycoflora in relation to soil mycoflora of Darjeeling tea garden, India. Recent Research in Science and Technology, 3(5): 84- 86 (2011)
  - Sreeramulu, T. & Ramalingam, A.: A two year study of air spora of paddy field near Vishakhapatnam, Indian journal of Agricultural Sciences., 36: 111 (1966)
  - Muhsin Tawfik M. And Munirah M. Adlan.: Seasonal distribution pattern of outdoor airborne fungi in Basrah city, southern Iraq. Journal of Basrah Researches (Sciences) 38(1)A: 90-98 (2012)