

# “Studies on aeroallergens at Satpur Industrial Area, Nashik, India”

Deshmukh Vaishali Sampatrao<sup>1</sup> & Patel S.I.<sup>2</sup>

<sup>1</sup>Department of Biology, G.M.D Art's, B.W. Commerce., & Science College, Sinnar,

<sup>2</sup> Department of Botany, Arts, Commerce, & Science College, Nandgaon.

Received: February 28, 2019

Accepted: April 12, 2019

**ABSTRACT:** : *The present aeromycological investigation at Satpur Industrial Area, Nashik, India was carried out during the period December 2013 to December 2015. The present study is the attempt to analyze the air borne fungal spores and to correlate it with the symptoms of allergic patients in the residential individuals. The studies reveals close relationship of meteorological parameters like mean temperature, relative humidity and average rain fall over the release and dissemination of air borne fungal spores and allergic symptoms in the residential individuals. The maximum concentration and all time occurrence of aeroallergens like Aspergillus, Cladosporium, Penicillium, Alternaria, Fusarium, saccharomyces etc. are important allergens responsible for triggering allergic reaction such as allergic asthma, allergic rhinitis, fever, and dermatitis in the sensitive individuals.*

**Key Words:** *Aeromycology, Allergy, Satpur Industrial Area, Aspergillus, Cladosporium,*

## Introduction

Aerobiology is scientific and multidisciplinary science focused on the transport of organism. The aim of aerobiological studies is to determine and detect the occurrence of fungal spores in the atmosphere as well as and pollen spores. Fungal spores are considered as the most predominant allergens present in the atmosphere. Now a days most of the population suffers for allergic disorders due to fungal spores. All over the world approx. 30% of the population are suffering from allergic rhinitis, bronchial asthma, sinus infections, skin diseases etc.

The present aeromycological investigation carried out at Satpur industrial area, Nashik, The investigation site consist of many small and large scale industries of food preservation, beverages, pharmaceuticals, bakers, steel, fabrication, chemical, rubber accessories, bags, suitcases and nearby residential working community. Satpur industrial area is one of the biggest industrial zone in Nashik, mostly occupied by industrial workers and flanked by residential colonies As the result of industrialization and urbanization there is a overpopulation and overcrowding. Due to this many residential peoples are facing health problems related to allergic disorders. Natural resources like water, air, soil and also human being have impact and over load due to different types of industries. The present aeromycological investigation was carried out in two years with four successive seasons in the year 2014 and 2015.

## Material and Methods -

Sampling of air in Satpur industrial area was carried out from December 2013 to December 2015 by using Tilak's Air Sampler (Tilak and Kulkarni 1970). Tilak's air sampler provides a continuous sampling of air for eight days, the sampler installed in the field of constant height of 1 metre from the ground. The sampler is constructed with rotating drum within build of gear ratio to correlate the time, which is resulted in one rotation in eight days. On the rotating drum cello tape is coated by petroleum jelly. After eight days the coated tape is removed and equally divided into sixteen pieces. Each piece represent the air sampling of 12 hours (day and night respectively). Each piece is mounted on clean glass slide. Glycerin jelly is used as mounting media. Culture plate study is also carried out for proper identification of culturable fungi by exposing petriplates at an interval of one month which contain PDA as a nutrient medium. The plates were incubated at room temperature and developed colonies were counted. It is followed by preparation of sample slides of different fungal colonies for identification of fungal genera. The scanning was done regularly throughout the period of investigation. The prepared slides were scanned under stereoscopic research microscope with computerized eyepiece camera attachment. Identification of fungal spores and fungal colonies on culture plate was done on the basis of literature of Barnett and Hunter (1972) and Tilak (1989).

## Meteorological Data -

The metrological data for the investigation period of December 2013 to December 2015 was obtained from District Meteorological Departmental center located in Nashik city. The data is collected in

the form of mean temperature, relative humidity and average rain fall during the entire period of investigation

### Result and Discussion -

During the study of aerobiology it was observed that the air borne fungal spores were present almost in all the seasons of investigation with more or less concentration. The present investigations showed the occurrence of many allergic spores like *Aspergillus*, *Cladosporium*, *Penicillium*, *Alternaria* and *Fusarium* in high concentration with all-time occurrence etc.

During the period of investigation spores of *Aspergillus*, *Cladosporium*, *Penicillium*, *Alternaria*, *Fusarium* contributed maximum percentage to the total air spora. The most dominant fungal genera isolated from the air sample was *Aspergillus* (24.04% of first year and 18.94% of second year), *Cladosporium* (16.79% of first year and 17.93% of second year) and *Penicillium* (6.80% of first year and 12.48% of second year). The present investigation was agreed with the previous worker including (Singh, A.S. and A.B. Singh 1994) Agarwal and Shivpuri (1974), Sahu S.K. (1996), Tiwari et al. (2006), Jayshree, Thaware and Seema Jawade (2014), Mohture and Kalkar (2017) and Nayak B. K. (2018)

The present aeromycological studies reveals that many air borne fungal spores are important aeroallergens including all time occurrence and abundant viz, *Aspergillus*, *Cladosporium*, *Alternaria* are the most common aero allergen sources. These fungi were associated with respiratory and allied allergy causing allergic reactions such as hay fever, rhinitis, asthma, skin rashes, sneezing etc., (Singh 1994)

During the period of two successive year of investigations at Satpur industrial area, the following allergic disorders and number of patients were recorded.

• Hay Fever (Allergic Rhinitis)	-----	89
• Asthma	-----	77
• Allergic Conjunctivitis	-----	62
• Respiratory / Sinus	-----	88
• Cough with Phlegm	-----	87
• Cough without Phlegm	-----	86
• Skin disorder	-----	53

During present investigation two peak periods of *Aspergillus* were recorded 1) July (1.85% of the first year and 1.65% of the second year) and 2) October (4.1% of the first year and 2.30% of the second year) – November (3.89% of the first year and 2.30% of the second year). It was also found that, in study area some peoples were suffering from allergic bronchopulmonary mycoses and fungal sinusitis mostly in the month of October – November, This would be due to the close relationship of high concentration of *Aspergillus* and allergic disorders. The concentration of *Aspergillus* reaches at the pick when high humidity (82.06% in July and 75.97% in October and 79.23% in November), low temperature (22.55°C in July and 18.82°C in October and 15.75°C in November) and moderate rainfall (5.98 mm in July and 1.29 mm in October and 1.80 mm in November) was observed.

The present investigation also reveals the concentration of *Alternaria* gradually increases from June (0.50 % of the first year and 0.66% of the second year) and it reaches maximum in August (1.05% of the first year and 1.02% of the second year). High level of *Alternaria* was also observed in the month of October (0.7% of the first year and 0.84 % of the second year). In this investigation it was also observed that many of the people working and residing in and near Satpur industrial area suffering from respiratory diseases, Asthma was also severe in many of the patients from June to August and also in the month of October. The meteorological parameters in the respective months showed decrease in temperature (23.17°C, 22.66°C, 21.49°C in the month of June, July and August respectively and 18.82°C in the month October), increased humidity (78.93% , 82.06%, 87.84% in the month of June, July and August respectively and 80.42 % in October) and alternate spell of rain (5.57mm, 5.98 mm, 1.55 mm in the month of June, July and August respectively and 1.29mm in October).

The concentration of *Cladosporium* gradually increases from July to November (1.91% of the first year and 2.01% of the second year in the month of July, 2.35 % of the first year and 2.46% of the second year in the month of August, 2.04 % of the first year and 2.01 % of the second year in the month of September, 2.08 % of the first year and 2.20 % of the second year in the month of October, 1.72 % of the first year and 1.86 % of the second year in the month of November) and it was highest in the month of August.

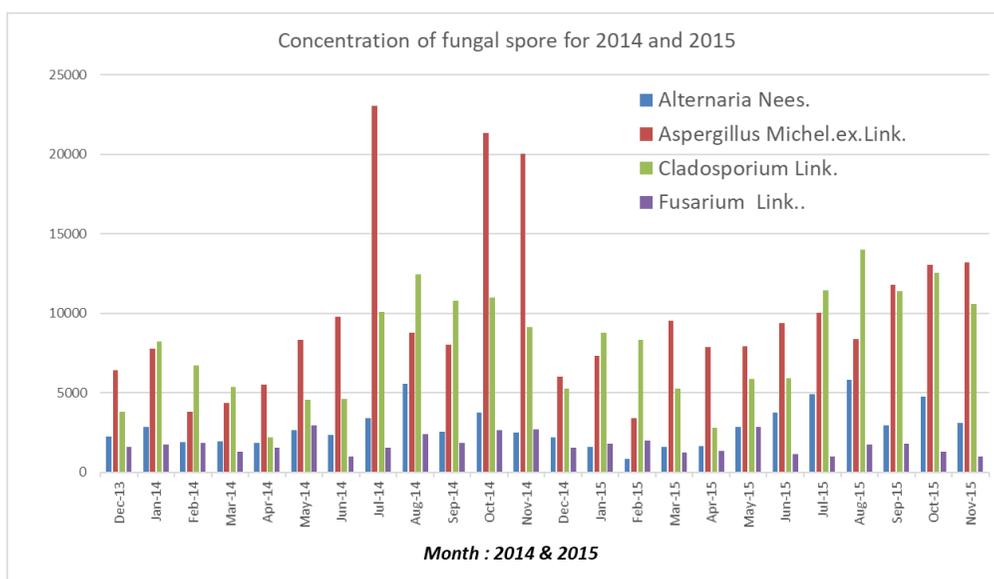
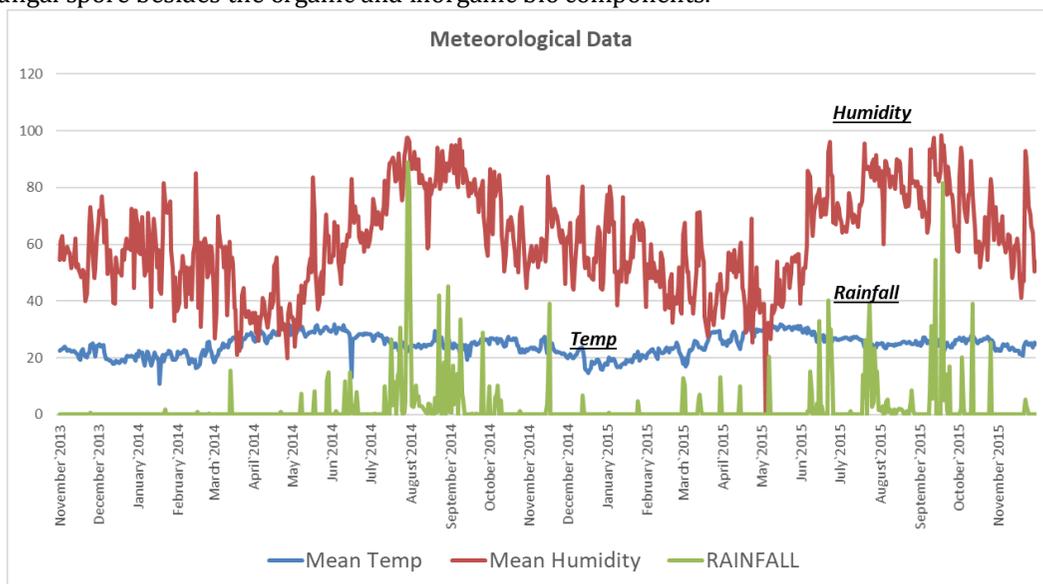
During the present investigation it was found that more residential peoples also suffering from

Asthma and Allergic Rhinitis in the month of July and August. The coincide meteorological parameters showed decreasing temperature (22.66 °C in July and 21.49 °C in August) increasing humidity (82.06 % in July and 87.84 % in August) and average rainfall (5.98 mm in July and 1.55 mm in August) During these meteorological conditions the concentration of *Cladosporium* was remarkably very high.

Highest concentration of *Curvularia* was observed in the month of January (0.56 % of the first year and 0.51 % of the second year) when temperature decreases (11.77°C) humidity increases (77.32 %) and very little rainfall was there (0.18 mm) Peoples suffering from sinusitis, pneumonia also observed in the month of January. It showed that concentration of fungi effect on allergic symptoms in sensitive individuals.

The present investigations revealed that disease exacerbated among fungal allergic patients are in correlation with the concentrations of allergic fungi and the meteorological parameters like mean temperature, relative humidity and average rain fall.

The present studies reveals that the air spora in the Satpur industrial area, Nashik is rich in allergic air borne fungal spore besides the organic and inorganic bio components.



The results of present aeromycological studies in Satpur Industrial area would definitely help the allergic patients to avoid the allergic sites and environment and to take necessary precautionary measures and would also beneficial to the allergy experts, hospitals, Doctors, Pharmacist, Government department of health and health conscious peoples. The studies would also helpful to device the pollen and air borne allergic fungal spore calendar of the particular geographical areas and to broadcast the probable allergic

---

weather conditions and air borne pollen and spore load and to alarm the citizens through radio and Television.

### References

1. Agarwal, M. K., and D.N. Shivpuri. 1974. "Fungal Spores - Their Role in Respiratory Allergy." *Advances in Pollen Spores Research* 1: 72-128.
2. Barnett, H.L. and B.B.Hunter. 1972. In *Illustrated Genera of Imperfect Fungi*. Minnesota, Minieapolis 33: Burgess Publ. Co.
3. Mohture, V.M., and S.A. Kalkar. 2017. "Aeromycological Investigation in the atmospher of Nagpur,2010." *Applied Research (International Journal)* 3 (3): 166-169.
4. Nayak, B K. 2018. "An Aeromycological survey of differnt bus stand enviornment in Ponducherry District." *Medipharm Research* 4 (1): 33-38.
5. Sahu, S.K. 1996. "Fungal association with the leaf surface of some pulse crop in relation to air mycoflora." *Indian J. Aerobiol* 9: 23-28.
6. Singh, A.S. and A.B. singh. 1994. "Airborne fungi in Bakery and the prevalence of respiratory dysfunction among worker." *Grama* 33: 349 to 358.
7. Singh, A.S., and A.B. Singh. 1994. "Airborne fungi in Bakery and the prevalence of respiratory dysfunction among worker." *Grama* 33: 349 to 358.
8. Thaware, J.S., and S. Jawade. 2014. "Comparative aeromycological study of three libraries in Kamptee." *Annals of Bilological Sciences* 2 (4): 42-47.
9. Tilak, S.T., and R.L. Kulkarni. 1970. "A new air sampler." *Experimentia* 443.
10. Tiwari, K.L., S.K. Jadhav, and S.R. Kunjam. 2006. "Aeromycoflora of slum area of raipur." *Ad. Plant Science* 19 (11): 387-390.