



## Vertical Incidence of *Aspergillus* Spores in an Extramural Environment of Kamptee.

**Jayshree Thaware**

Department of Botany, S. K. Porwal College, Kamptee  
E-mail- jsthaware@gmail.com

### Abstract:

Aeromycological study of *Aspergillus* species was carried out by only petridish exposure method using malt extract agar culture medium. At four sites i.e. at S. K Porwal College, Khalashi Line area Cantonment area, and Yerkheda of Kamptee which is situated just 18 kilometers north to the Nagpur city. Culture plates were exposed at different altitudes for outdoor study, from ground level at 10', 20', 30' and 40' height. Each culture plate was exposed for 5-8 minutes between 9 to 10 am after every one month interval. Samples were collected from July 2012 to June 2013. Petri dishes were incubated at room temperature. The fungal colonies were counted and identified by using specific standard literature.

During the study, 14 different species of *Aspergillus* were identified from Kamptee region. It was observed that *A. fumigatus* (23.27%), *A. flavus* (19.39) and *A. niger* (19.12%) showed dominance. The dominant species of *Aspergillus* viz. *A. flavus*, *A. fumigates* and *A. niger* showed appearance from ground level up to 40' height during every period of investigation.

### Keywords:

Aero mycology, Culture plate method, Vertical Incidence, Extramural Environment.

### Introduction:

Mould spores are present in atmosphere in concentration considering greater than those of pollen grains. Many surveys have been carried out in different geographical location to determine the atmosphere & the sources of allergenic species of fungi and to record their seasonal variation. The preference of molds, however, show different pattern which depends on such factors on such factors as climates, seasons, the type of vegetation, sampling method etc. (Chati, S.S.,1998)

Aerospora can become dispersed long distances only when mixed vertically into the turbulent boundary of atmospheric layer. Knowledge of the vertical profile of aero spora is important to both plant pathologists and allergists for a better understanding of spore and pollen distribution. Very little work from Vidarbha region regarding the vertical incidence of fungal spores in the atmosphere at high altitude has been reported. Considering the necessity of knowing the distribution of fungal spores in the atmosphere at varying heights, the present work was carried out. It deals with the study of *Aspergillus* species in the intramural as well as extramural environment relating to different heights.





## Material and methods:

Aero mycological study of *Aspergillus* species was carried out by only Petri dish or culture plate method using Malt Extract Agar Culture Medium. The culture plate technique was used because of its simplicity and availability of large body of comparable data.

At four sites i.e. at S. K Porwal College, Khalashi Line area, Cantonment area and Yerkheda of Kamptee city, the culture plates were exposed at different altitudes outdoor study. The survey was carried out from ground level at 10', 20' 30' and 40' height. Each culture plate was exposed for 5-8 minutes between 9 to 10 am after every one month interval. Samples were collected from July 2012 to May 2013. Petri dishes were incubated at room temperature. The *Aspergillus* colonies were identified by colony color, colony characteristics and spore morphology up to species level with the help of scientific literature (Watanabe, 1930; Gilman, 1945; Funder et.al.,1953; Raper and Fennel, 1965 and 1977; Bernett,1960). Percentage of abundance calculated (Tilak, et. al., 1989) as,

$$\text{Percentage of abundance} = \frac{\text{Total no. of colonies of the species in all observations}}{\text{Total number of colonies}} \times 100$$

## Result and discussion:

Altogether 14 species of *Aspergillus* were identified. Most of the species of *Aspergillus* showed dominance during summer season. They are present sub dominantly in the atmosphere during winter season. During monsoon the frequency of the *Aspergillus* is low. This shows seasonal variation of *Aspergillus* species. The species of *Aspergillus* formed a common and dominant constituent of air spora in Kamptee, showing comparatively higher counts during summer and winter seasons and lower frequency during monsoon. *Aspergillus* species maintained a fair percentage during February onwards till June with the peak period being noted during April- May (Table 2).

Amongst different isolates species of *Aspergillus*, most common species around Kamptee is *Aspergillus fumigates* (21.48%). It maintained regularity in its occurrence throughout the survey period. It showed appearance from ground level up to 40' height but the colony count of *A. fumigatus* decreases as the altitude increases from ground level. At the height of 40' the total numbers of colonies counted were less (Table 1). This species showed clear seasonal variation. *A. Niger* (21.17%) and *A. flavus* (18.20%) also occurred frequently and found as dominant species throughout the survey period, while other species were irregular in their occurrence.





In present findings, *Aspergillus* showed a clear seasonal variation and it was found to be increased in number at higher temperature and humidity levels. *A. versicolor* (10.89%), *A. nidulans* (7.15%), *A. candidus* (6.40) and *A. wentii* (6.75%) appeared as in frequent and sub dominant species in extramural environment of Kamptee. All these species are present on ground level and up to 40 feet height. These species also showed decrease in number with the increase in altitudes. The species such as *A. orchraceus*, *A. glaucus*, *A. versicolor* and *A. tamarii* disappears during the winter season. In the present investigation other *Aspergillus* species such as *A. repens*(0.86%), *A. terreus* (0.88%), *A. tamarii* (0.71%), *A. glaucous* (1.02%) and *A. ochraceus* (2.05%) showed lower concentration in summer season .

*Aspergillus* species are common in outdoor as well as indoor air. They could also be responsible for the contamination of food and their bio- deterioration. *Aspergillus* species have been recognized as important allergens (Austwick, 1966). Agrawal et. al. (1974) found that *A. flavus* and *A. tamarii* gave severe reactions while *A. niger* and *A. versicolor* were only moderately antigenic and concluded that these *Aspergillus* species possess 'species specific' antigens. Thus prevalence of *Aspergillus* species in humid environment is not desirable and ways and means should be found to reduce its occurrence to the minimum possible level.

**Table 1:** Incidence of *Aspergillus* species in Extramural environment at different altitudes in Kamptee region.

Name of the	Total Colony count in						Total Colony count in winter season								
	G.L	10	20'	30	40'	Tot	%	G.L	10	20	30	40	Tot	%	
<i>A.fumigatus</i>	72	65	5	42	11	19	30.8	48	48	20	17	15	14	16.7	
<i>A.flavus</i>	65	45	11	---	1	12	19.3	62	58	43	40	---	20	22.9	
<i>A.niger</i>	68	28	9	7	---	11	17.7	60	56	58	47	---	22	24.9	
<i>A.nidulans</i>	2	---	---	---	---	2	0.32	39	37	---	21	11	10	12.1	
<i>A.orchraceu</i>	---	---	---	---	---	---	-----	---	---	---	---	---	-----	-----	
<i>A.glaucus</i>	---	---	---	---	---	---	-----	8	2	1	---	---	11	1.24	
<i>A.versicolor</i>	45	---	50	---	51	14	23.1	28	21	---	---	---	49	5.53	
<i>A.tamarii</i>	---	---	---	---	---	---	-----	---	---	---	---	---	-----	-----	
<i>A.clavatus</i>	---	---	---	---	---	---	-----	12	---	---	8	---	20	2.26	
<i>A.wentii</i>	23	17	8	---	---	48	7.60	32	---	---	---	---	32	3.61	
<i>A.candidus</i>	---	---	---	---	---	---	-----	34	1	---	---	---	35	3.95	
<i>A.flaviceps</i>	6	1	---	---	---	48	7.60	34	7	8	---	---	48	2.26	
<i>A.repens</i>	---	---	---	---	---	---	-----	1	---	---	---	---	1	5.53	
<i>A.terreus</i>	---	---	---	---	---	---	-----	5	---	---	---	---	5	1.02	
TOTAL NO.	632						881								
<b>Name of the</b>	<b>Total Colony count in summer</b>														
	G.L	10	20	30'	40	Tot	%								
<i>A.fumigatus</i>	67	61	---	---	5	13	8.91								
<i>A.flavus</i>	82	60	---	50	---	19	12.8								







<i>A.niger</i>	71	71	70	72	70	34	23.7
<i>A.nidulans</i>	43	41	40	12	---	13	9.12
<i>A.orchraceu</i>	23	23	19	11	5	81	5.43
<i>A.glaucus</i>	20	---	2	---	---	22	1.48
<i>A.versicolor</i>	21	21	15	15	10	86	5.43
<i>A.tamarii</i>	25	21	15	10	---	81	1.48
<i>A.clavatus</i>	---	---	---	---	---	---	5.76
<i>A.wentii</i>	37	32	25	24	24	14	5.43
<i>A.candidus</i>	42	38	36	35	30	18	-----
<i>A.flaviceps</i>	23	18	8	9	5	63	9.52
<i>A.repens</i>	12	3	3	3	1	21	12.1
<i>A.terreus</i>	---	---	---	---	---	---	4.22
TOTAL NO.	<b>1492</b>						

**Table 2:** Occurrence of common and dominant *Aspergillus* species from outdoor environment as per the season

Name of	Monsoon	Winter	Summer
<i>A.fumigatus</i>	+++	+++	+
<i>A.flavus</i>	+++	+++	+++
<i>A.niger</i>	+++	+++	+++
<i>A.nidulans</i>	+	+	+
<i>A.orchraceus</i>	-	-	+
<i>A.glaucus</i>	-	+	+
<i>A.versicolor</i>	+++	+	+
<i>A.tamarii</i>	-	-	+
<i>A.clavatus</i>	-	+	-
<i>A.wentii</i>	+	+	+
<i>A.candidus</i>	-	+	+++
<i>A.flaviceps</i>	+	+	+
<i>A.repens</i>	-	+	+
<i>A.terreus</i>	-	+	-

+++ = Dominant ; ++ = Subdominant ; + = Present ; - = Absent

### Acknowledgement:

Author is thankful to University Grants Commission for financial support in the form of Major research project. Author is also grateful to Principal, S.K.Porwal College for providing all necessary help.

### References:

- Agrawal M. K. and Shivpuri D.N., (1974).** Adv. Pollen Spore Research, 1: 78-128
- Austwick P.K.C., (1966).** the role if spores in the allergies and mycoses of man and animals-Colton paper 18:321-338
- Barnett H.L., (1960).** Illustrated genera of imperfecti fungi, 2<sup>nd</sup> Ed.225 pp.Minneasota ;Burgess Publishing Co.





**ChatiS. S., (1998).** Aspergillus studies in Intramural and Extramural Environment of Nagpur(M.S.) Ph.D. Thesis ,Nagpur University, Nagpur.

**Funder Sigurd, (1953).** Practical Mycology; manual for identification of fungi .BroggersBoktr. Forlag , Oslo Norway.

**Gilman J.C., (1945).** Manual of Soil Fungi. The Iowa State College Press Ames, Iowa.

**RaperK. B. and Fennell D.I., (1965).** The genus *Aspergillus*. Ix+686 pp, 138 Figs. The William and Wilkins Co.,Baltimore.

**RaperK. B. and Fennell D.I., (1977).** The genus *Aspergillus*, R.E. Krieger Publ.Co.,New York.

**TilakS. T., (1989).** Airborne Pollen and fungal spores.VaijayantiPrakashan,Pune.

**Tsuneo Watanabe, (1930).** Pictorial Atlas of soil & seed fungi: morphologies of cultured fungi and key to species. 3<sup>rd</sup> Ed.

**2ND  
INTERNATIONAL  
CONFERENCE**  
on Science & Technology for Society, ICSTS - 2015

Conservation of Environment by Advanced Technologies  
through Social Approaches for Sustainable Development

MAY 19, 20 & 21, 2015, SRILANKA  
Hotel Galadari, Colombo

Collaboration with

--	--	--	--	--	--	--	--	--	--

**Paper Submission 1<sup>st</sup> April 2015:** [submission.icsts2015@gmail.com](mailto:submission.icsts2015@gmail.com)

**24 X 7 Helpline:**  
9404232104 (Pravin Sir), 9372727929 (Ashish Sir), 9422220447 (Prabhakar Sir),  
9970055471 (Shaah Sir), 9422137698 (Vijay Sir), 9822230297 (Sushil Sir) 9423654278 (Atul Sir)  
Email: [submission.icsts2015@gmail.com](mailto:submission.icsts2015@gmail.com), [submission.jybat@gmail.com](mailto:submission.jybat@gmail.com),  
[vsmngp@gmail.com](mailto:vsmngp@gmail.com) Website: [www.emsindia.org](http://www.emsindia.org)

**VISHWASHANTI MULTIPURPOSE SOCIETY**  
(Global Peace Multipurpose Society)  
Registration No. MAH-659/13(N)

