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Diversity and Seasonal Variation of Aeromycoflora in the Kalinga University Campus, New Raipur: An Ecological and Health Perspective

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ABSTRACT

Fungi are an essential micro flora found in well diverse ecological conditions. Aerobic studies are very important because in a given area they provide qualitative and quantitative information on airborne fungi. Fungi are a variety of species in indoor and outdoor settings, and are present in significant numbers and quantities. This study investigates the diversity, abundance, and seasonal dynamics of airborne fungal spores (aeromycoflora) on the campus of Kalinga University in New Raipur. The current study was undertaken at Kalinga University, New Raipur (C.G.).The investigation period was September 2024 to November 2024. Kalinga University located in Chhattisgarh State. The culture plate method for trapping mycoflora has been adopted. 26 fungal species and 12 fungal genera have been obtained in this study, of which *Aspergillus*, *Penicillium* and *Cladosporium* were the most dominant.

KEYWORDS: Aeromycoflora, micro flora, Ecological Condition, Fung, Kalinga University.

INTRODUCTION

Aeromycology is a vast branch of science nowadays, which draws information from life in different disciplines Allergy, plant disease, forestry, mycology and biodeterioration. Aeromycoflora (airborne fungal spores) play crucial ecological roles in nutrient cycling, but also represent a major source of respiratory allergens and pathogens Environmental factor plays an important role in the spread of fungal spores. Previous studies in Chhattisgarh (e.g., Durg courts and Raipur railway station) and nearby Nagpur show seasonal peaks in winter and monsoon, with dominant genera including *Aspergillus, Cladosporium, Alternaria, Penicillium, Curvularia,* and *Rhizopu*s (Prasad, R. B. 2020). Air contains several forms of microbes in the atmosphere; the fungal spores are spread in air from different sources and cause multiple diseases in vegetations, human beings and animals. Airborne fungal spores are almost predominant airborne diseases, allergens and skin diseases and their concentration depends on environmental factors such as

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geographical position, humidity, temperature, wind speed and degradation. Open-air almost filled with bacteria, fungal spores, pollen grains etc.

Kalinga University located at Kotani Village, Atal Nagar and has 35 acres of area. The aim of this study was to estimate aeromycoflora in Kalinga University outdoor environment.

MATERIAL AND METHODS

Air sampling was done using petri plate gravity method (Jadhav and Tiwari, 1994; Tiwari, 1999). Sterilized petri plates containing PDA media were exposed for 5 to 10 minutes in outdoor environment of the Kalinga University campus (Devi et al., 2010; and Kalbende et al., 2012). The exposed petri plates were placed into the laboratory and incubated at room temperature after that, at the end of the incubation cycle, the fungal colonies were counted and isolated. Identification was done by using available literature (Bernett and Hunter, 1972; Cooke, 1963; Tilak, 1989; Kalbende et al., 2012). Calculation of the percentage frequency and Percentage Contribution of the fungal flora was done by following formula formula (Tiwari, 1999).

$$\text{Percentage Frequency} = \frac{\text{No. of observation in which a species observed}}{\text{Total No. of observations}} \text{X } 100$$

$$\text{Percentage Contribution} = \frac{\text{No. of colonies of individual species in all the plates}}{\text{Total No. of colonies of all species}} \text{ X } 100$$

RESULT AND DISCUSSIONS

A total of twenty six fungal species under twelve genera had been reported during the investigation period. The maximum contribution of *Aspergillus niger* (10.11%), followed by *Cladosporium cladosporioides* (8.99%), *Aspergillus flavus* and *Penicillium chrysogenum* (7.87%) respectively (Table1 & Figure 2). The most influential genera of various study sites were *Aspergillus, Cladosporium and Penicillium*.The same type of result were also reported by Harishankar et al, 2015 at Raipur. Saluja et al (2011) reported most abundant species at Ambikapur, Soni et al (2016) at Bilaspur. *Aspergillus* and *Alterneria* were observed most frequently at Bhilai by Kulkarni, 2011.

Therefore, the highest frequent species (100%) were *Aspergillus flavus, Aspergillus fumigatus*, *Aspergillus* niger, *Cladosporium cladosporioides* & *Penicillium chrysogenum Alternaria alternata* followed by *Alterneria crassa* (66.66%), *Aspergillus aureus*(66.66%), *Aspergillus*

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awamori (66.66%), *Penicillium citrinum* (66.66%), *Penicillium marneffei*(66.66%) *Paecilomyces varioti* (66.66%) *Curvularia lunata* (66.66%), Fusarium *moniliforme* (66.66%), *Mycelia sterilia*(66.66%), and *Penicillium marneffei*(33.33%), *Penicillium restrictum* (33.33%), *Phoma exigua* (33.33%), Uniknown sp.-I (33.33%) (Figure1 and Table 1).

Table1: Aeromycoflora of Kalinga Universaity, New Raipur, (C.G.)

S.No.	Fungi Name	September	October	November	Total Colonies	Percent Contibtion	Percent Frequency
		Colony Number	Colony Number	Colony Number			
1	*Alternaria alternata*	2	2	1	5	5.62	100
2	*Alternaria crassa*	1	1	0	2	2.25	66.66
3	*Aspergillus aureus*	2	0	1	3	3.37	66.66
4	*Aspergillus awamori*	2	1	0	3	3.37	66.66
5	*Aspergillus candidus gr.*	0	0	1	1	1.12	33.33
6	*Aspergillus felis*	1	0	0	1	1.12	33.33
7	***Aspergillus flavus***	**3**	**2**	**2**	**7**	**7.87**	**100**
8	*Aspergillus fumigatus*	2	2	1	5	5.62	100
9	***Aspergillus niger***	**4**	**3**	**2**	**9**	**10.11**	**100**
10	*Aspergillus sp.*	1	0	0	1	1.12	33.33
11	*Aspergillus sydowii*	1	1	0	2	2.25	66.66
12	*Cladosporium cladosporioides*	**4**	**2**	**2**	**8**	**8.99**	**100**
13	*Curvularia lunata*	2	0	1	3	3.37	66.66
14	*Fusarium moniliforme*	1	1	0	2	2.25	66.66
15	*Fusarium oxysporum*	1	1	0	2	2.25	66.66
16	*Mucor sp.*	3	2	1	6	6.74	100
17	*Paecilomyces variotii*	1	1	0	2	2.25	66.66
18	*Penicillium chrysogenum*	3	2	2	**7**	**7.87**	100
19	*Penicillium citrinum*	2	1	0	3	3.37	66.66
20	*Penicillium marneffei*	1	1	0	2	2.25	66.66

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21	*Penicillium restrictum*	1	0	0	1	1.12	33.33
22	*Phoma exigua*	1	0	0	1	1.12	33.33
23	*Rhizopus stolonifer*	3	1	1	5	5.62	100
24	*Rhizopus oryzae*	2	1	2	5	5.62	100
25	*Mycelia sterilia*	1	0	1	2	2.25	66.66
26	*Unknown sp.I*	0	0	1	1	1.12	33.33
	Total Isolates	**45**	**25**	**19**	**89**	**100**	

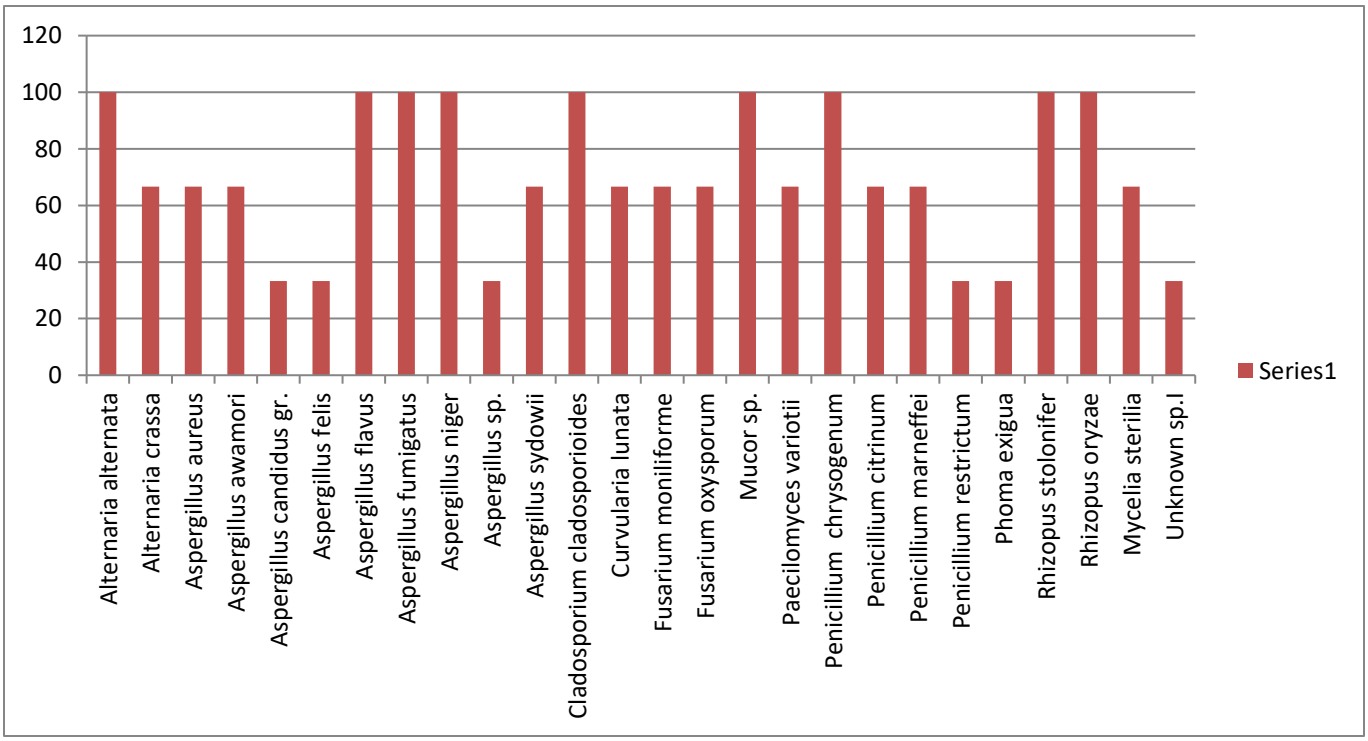

Figure 1: Percentage frequency of fungal species

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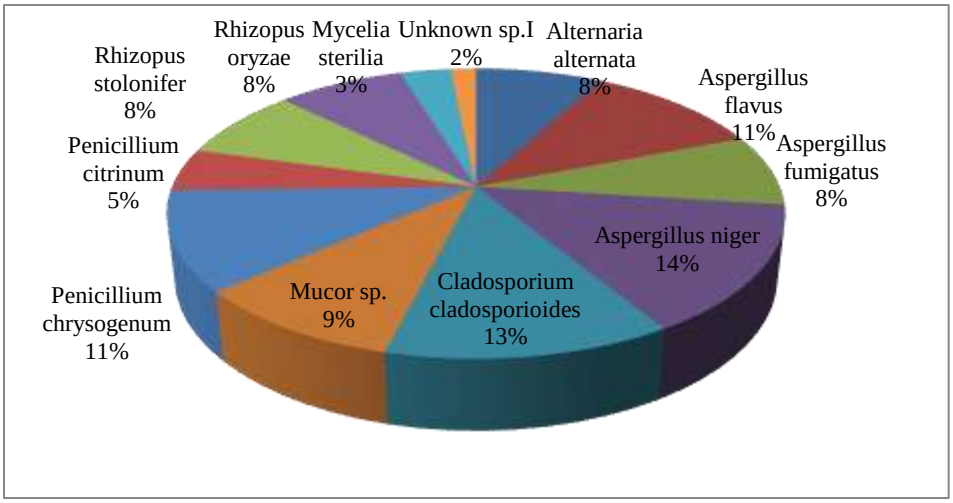

Figure 2: Percentage Contribution of fungal species

Fig3: *Aspergillus fumigatus*

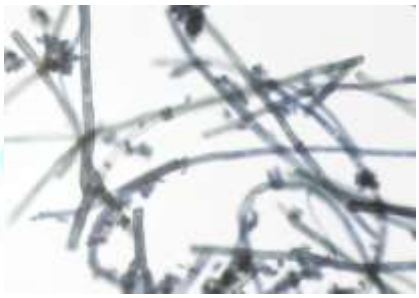

Fig4: *Cladosporium cladosporoids*

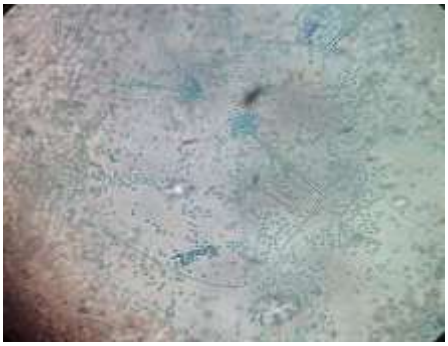

Fig5: *Aspergillus flavus*

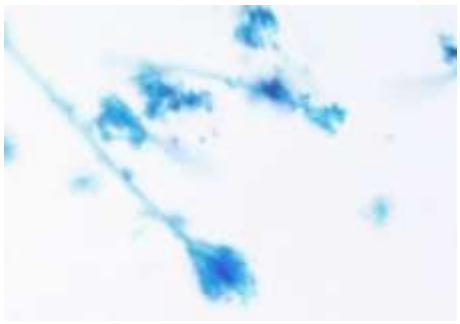

Fig6: *Penicillium citrinum*

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CONCLUSION

Cladosporium, Aspergillus, Penicillium, Alterneria and *Curvularia* were the most commonly occurring airborne fungal spores which contributed in large numbers. Dominant genera anticipated: *Aspergillus, Cladosporium, Penicillium, Alternaria, Curvularia, and Rhizopus* (Khare Diksha, & Tiwari K.L.; 2024) Seasonal patterns consistent with regional studies: winter peak due to reduced rainfall and dry air aiding spore survival; monsoon increase from high humidity (*Fu, X et al.*2020). These airborne mycoflora cause many diseases in humans such as infections of the upper respiratory tract, asthma, allergic reactions to hypersensitivity (Kulkarni, 2011) Discharged fungal spores dispersal by air in outdoor and indoor conditions and along with this all a large number of students are used every day to visit the University for studying purposes. The potential for pathogenic fungal contamination in the outdoors is very high. Through this analysis we seek to record several pathogenic fungal species borne by air for society's awareness support.

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