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Fungal Diversity Assessment: Aeromycoflora Of Indoor And Outdoor Environment At Govt. SSP College Campus Waraseoni Balaghat Madhyapradesh India.

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Abstract: Fungal spores constitute a significant portion of primary biological aerosol particles, and large amounts have been identified in the air. They are present in the atmosphere throughout the year, and their concentration varies due to meteorological factors such as temperature, relative humidity, location, construction conditions, and vegetation. This study investigates the diversity and distribution of airborne fungal spores at college campus waraseoni, located in the Balaghat region**. Materials and Methods**: Airborne fungal composition was sampled from indoor, outdoor, using the sedimentation plate method. Grown fungi were identified using standard mycological techniques, including determining macroscopic and microscopic characteristics. **Results**: A total of 94 colonies belonging to 10 genera of fungi were isolated from all culture media. The highest and lowest percent of positive samples were found in outdoor (100%) and indoor (64.3%) air samples, respectively. *Penicillium, Curvularia, Cladosporium, Pythium, Rhizopus* and *Aspergillus* were the most common fungi isolated from the samples. *Neofusicoccum, Paecilomyces, Mucor,* and *Acremonium* were the least isolated fungi. **Conclusion**: This study showed the difference in the diversity and distribution of fungi in different environments. *Aspergillus, clostridium* and *Peniciiliium* were the most common fungi isolated.

Key Words Aeromycoflora, Spore, Diversity, College campus and Insights.

INTRODUCTION

Fungi are eukaryotic, achlorophyllous, and heterotrophic microorganisms that depend entirely on external source for survival Martinez et al, (2022). Fungal spores are ubiquitous (Bowers et al. 2009). Environmental factors like humidity, moisture, temperature, pollution and wind speed affect the distribution and release of fungal spores (Nielsen 2003). Indoor environments are potential sources of fungal spores which can be harmful to human health (Cabral 2010). Aerobiology focused to study the passive movement of biological particles through the atmosphere, emphasizing their sources, deposition and implications for ecosystems and human health (Burge *et al.,* 2000 and Burge *et al.,* 2001). Airborne fungi are typically dispersed through aerosolization, which may occur naturally via wind or anthropogenic activities such as construction, agriculture, or industrial processes Wang *et al.,* (2007). Fungal spores gradually settle out and the process of settling out and becoming airborne may be repeated for long periods of time, because the fungal spores can survive for months in suitable conditions. Low humidity, physical activity and the wind speed inside the buildings are effective in the release and distribution of spores Fog., (2003).

Materials and Methods

Sampling was carried out during September to December 2025 at college campus Waraseoni in the state of Madhya Pradesh

Air and Surface Sampling

Sampling of air was done from indoor and outdoor environments of Botany Lab. By settle plate method according on Potato Dextrose Agar medium. The sampling of outdoor air was performed by placing the open plates in various areas of Lab. To obtain samples from surfaces, pre-moistened swabs with cotton tipped were applied on different surfaces (floor, the walls, windows, tables, lockers, benches, and lab equipments were collected and immediately inoculated on to plates containing only PDA media.

Isolation and Identification of Fungi

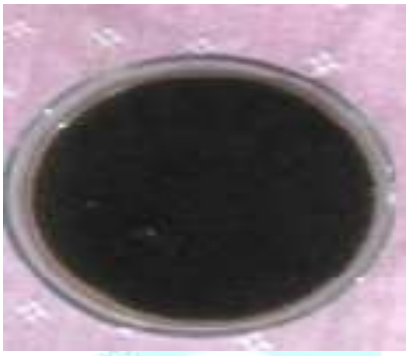
Culture plates of air and surfaces on PDA were incubated in the dark at 28 to 30 ºC and were examined daily. The fungal colonies were identified with the help of morphological (color, texture, shape, diameter appearance of colony) and microscopic characteristics (reproductive structures, conidia structure along with conidiophores size, shape and mycelium structure). Microphotography was done by using Binocular microscope at department of Botany Govt. SSP college Waraseoni. The lacto phenol and aniline blue wet mount preparation was used for staining and observing under microscope. Fungal isolates were also identified by using the mycology text books (Samson *et al*., 2000, De Hoog *et al*., 2000 and Frey *et al*., 1985)

Results

The present study deals with an investigation on the distribution of airborne fungi within College campus Waraseoni Balaghat India that has been conducted during 2025. Total 94 airborne fungal colonies were isolated, of which 15 species identified in the study. Among them *Penicillium* species species found the most prevalent in the college campus followed byAspergillus, *Rhizopus, Pythium, Curvularia, Trichoderma* and *Geotrichum* during the month of September. In December *Aspergillus* species was found to be highest followed by *Penicillium, Rhizopus Curvularia,* and *Paecilomyces* respectively. *Aspergillus* and *Curvularia*

were more abundant in both the indoor and outdoor environment of the college campus September to December respectively. In the study, the Waraseoni Balaghat college campus was selected having more than 2000 students enrolled. It is surrounded by the moist place during this time as it is rainy season that makes a favorable habitat for huge number of fungal species. All the 15 fungal genera except *Geotrichum*, *Cladosporium* and *Curvularia* were reported from Lab. surfaces, while 9 and 10 fungal genera were isolated from indoor and outdoor airs, respectively. Six genera i.e.*Aspergillus, Penicillium, Fusarium, Rhizopus, Pytium* and *Alternaria* comprised the most prominent fungal groups isolated. The current study findings demonstrated that the highest rate of *Aspergillus* colonies existed in the instrument section of Lab.

Culture plates having fungal infection (PDA media used)



Aspergillus niger

Trichoderma

Aspergillus flavus

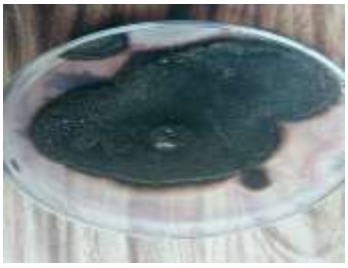
Fusarium sp.

Curvularia sp.

Rhizopus sp.

Geotrichum sp.

Penicillium sp.



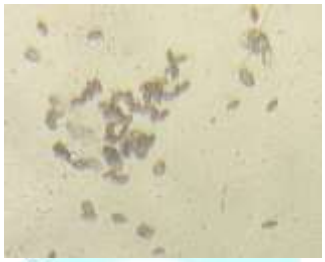
Alternaria sp.

Aspergillus and Pythium

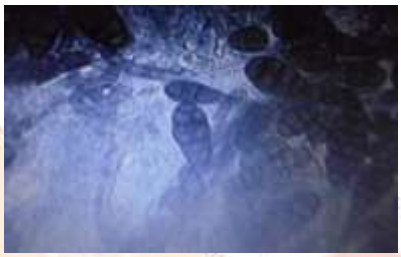
Neofusicoccum sp.

Microscopic examination under Binocular microscope

Cladosporium sp.



Alternaria sp.

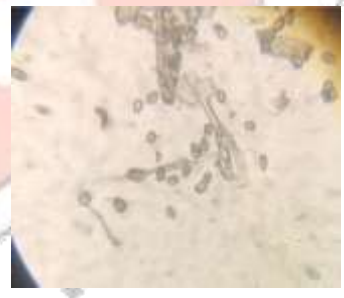


Curvularia sp.

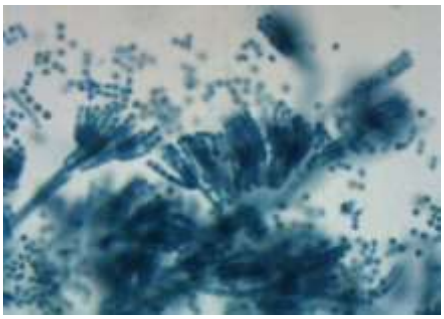
Fusarium sp.

Geotrichum sp.

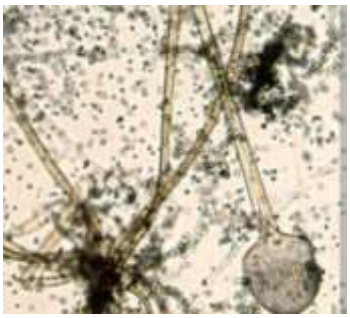
Neofusicoccum sp.



Penicillium sp.



Rhizopus sp.



Aspergillus sp.

Discussion:-

Penicillium and Alternaria was significantly prevalent in the current study, consistent with the results of Sepahvand *et al*. (2013) and Garcia -Cruz *et al*., (2012), inconsistent with the result of Shams Ghahfarokhi *et al.,* (2014) study. Several fungi, like *Penicillium, Cladosporium , Aspergillus, , Alternaria*, and *Fusarium*, are highlighted in the air quality of Botany Department.In our study, the highest number of *Alternaria* was isolated from the chemical lab. The presence of Alternaria in Lab air samples has been mentioned Sakartepe *et al*., (2016). *Aspergillus* was also most common fungus isolated from air samples. *Paecilomyces, Mucor*, *Rhizopus, Rhodotorula, Syncephalastrum*, and *Acremonium* were other fungi isolated from air samples The airborne fungi such as *Aspergillus, Penicillium* etc. are causative agents of fungal allergies (de Ana *et al*. 2006). *Penicillium* and *Aspergillus* spores are the most widespread aeroallergens in the world (Asan *et al*. 2003). *Penicillium notatum , P. chrysogenum, Aspergillus fumigates* and *A. niger*, identified in our study are also observed to be widespread in the campus that resembles with the study of Asan *et al*. (2003).

Conclusion:-

This study elucidated the highly diverse community of airborne fungi in the Botany Department, indoor, and outdoor air samples. In addition, this study showed the difference in the distribution of fungi in different environments and provided a baseline for future research on the air quality of this city. In this study, *Penicillium, Alternaria* and *Aspergillus* were the most common fungi isolated, which need to be considered due to their ability to cause various diseases.

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References

1. Samson R, Hoekstra E, Frisvad J. (2000). Centraalbureau voor Schimmelcultures (CBS).
2. De Hoog G, Guarro J, Gene J, Figueras M. (2000). Centraalbureau voor Schimmelcultures Atlas of Clinical Fungi.
3. Frey D, Oldfield R, Bridger R., (1985). Wolf Medical Publications A Colour Atlas of Pathogenic Fungi.
4. Sepahvand A, Shams -Ghahfarokhi M, Allameh A, Razzaghi -Abyaneh M., (2013). Diversity and distribution patterns of airborne microfungi in indoor and outdoor hospital environments in Khorramabad, Southwest Iran. Jundishapur J Microbiol 6(2): 186 -92.
5. Garcia -Cruz C, Aguilar MN, Arroyo - Helguera O., (2012). Fungal and bacterial contamination on indoor surfaces of a hospital in Mexico. Jundishapur J Microbiol. 5(3): 460 -64.
6. Shams -Ghahfarokhi M, Aghaei -Gharehbolagh S, Aslani N, Razzaghi -Abyaneh M. (2014). Investigation on distribution of airborne fungi in outdoor environment in Tehran, Iran. Environ Health Sci Eng. 12(1): 54.

7. Sakartepe E, Uzan AH, Gunyar OA., (2016). Airborne mycobiota determined in the neonatal unit of the ege university hospital. Fresenius Environ Bull. 25(8): 2833 -841.
8. de Ana SG, Torres-Rodríguez JM, Ramírez EA, García SM & Belmonte-Soler J (2006) Seasonal distribution of Alternaria, Aspergillus, Cladosporium and Penicillium species isolated in homes of fungal allergic patients. Journal of Investigational Allergology and Clinical Immunology 16: 357–363.
9. Asan A, Kirgiz T, Sen B, Camur-elipek B, Guner U & Guher H (2003) Isolation, identification and seasonal distrubution of airborne and waterborne fungi in Terkos Lake (Istanbul-Turkey). Journal of Basic Microbiology 43(2): 83– 95.
10. Martinez -Bracero M, Markey E, Clancy JH, McGillicuddy EJ, Sewell G, O'Connor DJ. Airborne fungal spore review, new advances and automatisation. Atmosphere 2022; 13(2): 308.
11. Bowers R, Lauber C, Wiedinmyer C, Hamady M, Hallar A, Fall R, Knight R & Fierer N (2009) Characterization of airborne microbial communities at a high-elevation site and their potential to act as atmospheric ice nuclei. Applied Environmental Microbiology 75: 5121–5130.
12. Cabral JP (2010) Can we use indoor fungi as bioindicators of indoor air quality? Historical perspectives and open questions. Science of Total Environment 408(20): 4285–4295.
13. Wang, I.J., Y.L. Guo, H.J. Weng, W.S. Hsieh, Y.L. Chuang, S.J. Lin and P.C. Chen, 2007. Environmental risk factors for early infantile atopic dermatitis. Pediatr. Allergy Immunol., 18: 441-447.
14. Fog Nielsen K., (2003). Mycotoxin production by indoor molds. Fungal Genet Biol. 39(2):103-17.