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INTRAMURAL AEROMYCOLOGICAL STUDY OF GOVERNMENT ADIWASI GIRLS HOSTEL OF DESAIGANJ WADSA, DISTRICT-GADCHIROLI MAHARASHTRA

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ABSTRACT

This study investigates the Intramural aeromycoflora of Government Adiwasi girlshostel of DesaiganjWadsa located in Gadchiroli District of Maharashtra state. The sampling was conducted from the different section of hostel, such as Girls room, Dining area, Kitchen. Air samples collected during February, 2023 to January, 2024 for a year at an interval of 15 days. Air sampling was done by two methods with the help of Hi Air Sampler (Mark ll), Hi Media Loboratories, India and simultaneous Exposure Petri plate method. For this study culture media Czapek's Dox Agar (CDA) was utilized for Petri plate method and Rose Bengal Strips were used in air sampler. Fungal spores were collected from indoor air of different sections of hostel. Total 1312colonies were appeared from Feb-2023 to Jan-2024 by exposure petri plate method. Total6700 CFUs/m^3were trapped by sampler method. The genera like *Aspergillus, Alternaria, Cladosporium, Penicillium, Fusarium, Mucor,* and *Rhizopus*were reported in Adiwasi girl's hostel. Seasonal variations revealed, higher fungal spore concentration and CFUs/m^3 during rainy season correlating with increased humidity and decreased temperature levels. Temperature, Humidity and Rainfall affect the growth of fungus.

INTRODUCTION

Aerobiology is a branch of biology focused on the passive transport of organic particles, including bacteria,fungal spores,pollen grains andviruses.It examines the impact ofthese particles on organisms, such as causing infections and allergies in humans and animals, as well as infections in plants (Hicks, 1992;Kasprzyk, n. d.). Aeromycology is a subfield of aerobiology that investigates the dispersion of fungal spores and other fungal elements in both indoor and outdoor air.It studies the variations in their concentrations and the factors influencing these changes (Patil &Talhande, n. d.; Vaidya & Sahare, 2023). The study of airborne fungal spores, is crucial for understanding air quality, especially in indoor environments such as residential buildings, schools, hostels and many more places (Giri, n. d.;Pady, 1957; Sanchez Espinosa et al., 2023)

Airborne fungal spores are ubiquitous in nature and can survive in both dry and wet environments through scavenging nutrients from the atmosphere (Ahmed, n. d.; Pady & Kapica, 1995; Verma et al., 2013)).The fungal flora of indoor air originates both from outdoor air and from various indoor sources. The base level of indoor fungal spore counts may partly because by unnoticeable fungal micro colonies that may develop on any temporarily wet surface (Ginkel &Hasselaar, 2005; Oh et al., 2014). However, there may be another indoor fungal spore source also.

Girl's hostel which is selected for intramural environmental studies means a place used for lodging the girl students by an educational institution whether government or private. The hostel life also allows the girls to learn important life skills, such as time management, teamwork and communication and fosters a sense of community. The hostel staff plays a crucial role in creating a nurturing and supportive environment for the girls, which is essential for their overall development. Government Adiwasi girls hostel places in 5 acer area.In this Adiwasi girls' hostel there are 75 girls students were present in year 2023-24. In one room 4 or 5 girls can live at one time.

The present study focuses on the intramural aeromycological profile of girls hostel in DesaiganjWadsa, District Gadchiroli. Gadchiroli located in the central Indian state of Maharashtra, experiences a tropical climate with high humidity levels, especially during monsoon season. These conditions are conductive to the growth and proliferation of fungi, making it an ideal location for studying airborne fungal concentration.

The aim of present study is to determine the Intramural Aeromycoflora, their concentration and seasonal variation in indoor environment. Intramural aeromycoflora means the study of fungus present in indoor environment of the indoor places. There are many fungi which are responsible for bio deterioration of storage material, equipment and the health of people.

MATERIALS AND METHODS

Study area -Government Adiwasigirls hostel DesaiganjWadsa (Lat 20.617153^0, Long 79.971949^0)was selected for the sampling site. Different sections of hostel such as girls room, dining area and kitchen room were selected. The samples were collected from February 2023 to January 2024.

For the present study following methodology were applied.

I.Exposure Petri plate method -Czapek's Dox Agar (CDA) was used in Petri plate method. This media prepared by using 12.24 gm of Czapek's Dox Agar (CDA) suspended in 250ml distilled water with streptomycin. Heat to boiling to dissolved media completely.Sterilized by autoclave for 15min. and cool down. Mix well and poured into Petri plates. Petri plates containing sterilized CDA were exposed in the hostel in three different sections for 5 to 10 min. by keeping them at the height of five feet from the ground level. After that petri plates were sealed with cello tape and brought into laboratory. Petri plates incubated at room temperature for 3 to 8 days.

II. Hi Air Sampler Method - In this method Rose Bengal strips were used in Hi Air Sampler (Mark ll), Hi Media Laboratories, India. Hi air samplerwas moving in different sections of hostel for 5 to 10 min. After that Rose Bengal strips sealed, marked and brought into laboratory and incubated at room temperature.

After 6 to 8 days fungal colonies were appeared on petri plates and rose bengal strips. Number of colonies were counted. Fungus from the colony was picked up with needle and slide was prepared by using cotton blue and observed under microscope. The identification of spores caught was based on i. microscopic character, ii. Morphological character, iii. Rate of growth, colony colour, size and shape of colony and other diagnostic feature of the spores.

In Hi air sampler method, the fungal colonies per unit volume of the air were calculated as under,

$$CFUs/m3 = \frac{\text{colonies on agar strips} \times 25}{sampling\ time\ in\ minutes}$$

RESULTS AND DISCUSSION

Intramural aeromycological study in Government Adiwasi girls hostel DesaiganjWadsa district Gadchiroli of Maharashtra state was conducted from Feb. 2023 to Jan. 2024. For this study three sections of hostel such as girls room, dining area and kitchen were selected and air samples were collected for one year at an interval of 15 days. In hostel total 1312colonies were recorded in one year by exposure petri plate method. Maximum number of colonies recorded in kitchen section were 491 colonies(37.65%) followed by Dining area 425 colonies (32.39%) and minimum in Girls room were 396 colonies (30.18%). Table-1.

Seasonal variation showed more concentration of fungal spore in rainy season, total 592 colonies (45.12%) followed by winter season 459 colonies (34.98%) and in summer total 261 colonies (19.89%), Table-1. Monthly variation revealedthat maximum total 174 colonies (13.26%) in month of August followed by Julytotal 162 colonies (12.34%), September (12.04), December (10.67%), January-24 (9.52%), October (8.46%), February (7.69%), June (7.46%), November (6.32%), March (5.94%), April (3.50%), and minimum in month of May total 36 colonies (2.74%), Table-1.

Hi Air Sampler method recorded total 6700CFUs/m^3 in one year of sampling. Out of three sections of hostel kitchen section showed maximum total 2430 CFUs/m^3(36.26%) followed by Dining area total 2160 CFUs/m^3(32.23%) and minimum in Girls room total 2110 CFUs/m^3 (31.49%). (Table-2).

Seasonal variation showed that, in rainy season fungal spore concentration was recorded total 3110 CFUs/m^3(46.41%) followed by winter 2110 CFUs/m^3(31.49%) and in summer minimum 1480 CFUs/m^3(22.08%), Table-2.

In sampler method monthly variation varies from month to month and shows maximum concentration in month of August were 960 CFUs/m^3(14.32%) followed by July840CFUs/m^3(12.53%), September (12.08%), December (10.14%), January-24 (9.55%), February (8.50%), June (7.46),October (6.34%), November (5.44%), March (5.00%), April (4.92%), and minimum concentration in month of May were 245 CFUs/m^3(3.65%) were trapped. (Table-3).

From the above data, month of August and Julyrecorded higher fungal spore concentration by both the methods because of high humidity and rainfall in these months (Table-3) and lower concentration in month of May because of low humidityand high temperature in month of May. (Table-3).

In this intramural study of hostel Total 10 genera were identified in one year. *Aspergillus, Fusarium, Rhizopus, Penicillium, Mucor,Alternaria, Cercospora, Chaetomium, Cladosporium, Culvularia* fungal genera were reported in hostel.

Majority of researcher proved that optimum temperature, high moisture content, nutritive substrate creates favorable microclimate for growth, proliferation and sporulation of airospora leading higher population of fungal species (kayarkar and Bhajbhuje, 2014).

Table-1: - Exposure Petri PlateMethod

Total number of fungal colonies recorded in three different sections of Adiwasi Girls Hostel in different months of investigation.(Feb. 2023-Jan. 2024)

Season	Month	Number of Colonies					
		Girls Room	Dining Area	Kitchen	Total fortnightly	Total Monthly	%
Summer	February 2023	17	15	25	57	101	**7.69**
		14	12	18	44		
	March 2023	12	14	16	42	78	**5.94**
		10	12	14	36		
	April 2023	5	7	8	20	46	**3.50**
		7	9	10	26		
	May 2023	6	5	8	19	36	**2.74**
		7	5	5	17		
Total						**261 (19.89%)**	
Rainy	June 2023	14	15	18	47	98	**7.46**
		15	16	20	51		
	July 2023	24	26	28	78	162	**12.34**
		26	28	30	84		
	August 2023	27	29	30	86	174	**13.26**
		27	29	32	88		
	September	25	25	27	77	158	**12.04**

	2023	24	27	30	81		
Total						**592 (45.12%)**	
Winter	**October 2023**	15	19	22	56	111	**8.46**
		17	18	20	55		
	November 2023	12	14	15	41	83	**6.32**
		14	13	15	42		
	December 2023	22	24	28	74	140	**10.67**
		20	21	25	66		
	January 2024	20	24	27	71	125	**9.52**
		16	18	20	54		
Total						**459(34.98%)**	
	Total	**396 (30.18%)**	**425 (32.39%)**	**491 (37.65%)**	**1312**	**1312**	

Table-2: -Hi Air Sampler Method

Total CFUs/m^3trapped in three different sections of Adiwasi Girls Hostel of DesaiganjWadsa(Feb. 2023-Jan. 2024)

Season	**Month**	**Number of Colonies**					
		CFUs/m^3 in Girls Room	**CFUs/m^3 in Dining Area**	**CFUs/m^3 in Kitchen**	**Total fortnightly**	**Total Monthly**	**%**
Summer	**February 2023**	90	100	100	290	570	**8.50**
		90	90	100	280		
	March 2023	100	50	75	225	335	**5.00**
		30	35	45	110		
	April 2023	40	25	50	115	330	**4.92**
		65	85	65	215		
	May 2023	30	50	55	135	245	**3.65**
		40	25	45	110		
Total						**1480(22.08 %)**	
Rainy	**June 2023**	70	75	80	225	500	**7.46**
		85	90	100	275		
	July 2023	120	130	145	395	840	**12.53**
		140	145	160	445		
	August 2023	145	150	170	450	960	**14.32**
		160	170	180	510		
	September 2023	150	140	150	440	810	**12.08**
		120	120	130	370		
Total						**3110 (46.41 %)**	
Winter	**October 2023**	60	70	75	205	425	**6.34**
		65	75	80	220		
	November 2023	50	55	70	175	365	**5.44**
		55	60	75	190		
	December 2023	100	105	110	315	680	**10.14**
		110	125	130	365		
	January 2024	120	125	140	385	640	**9.55**
		75	80	100	255		
Total						**2110(31.49 %)**	
	Total	**2110 (31.49%)**	**2160 (32.23%)**	**2430 (36.26%)**	**6700**	**6700**	

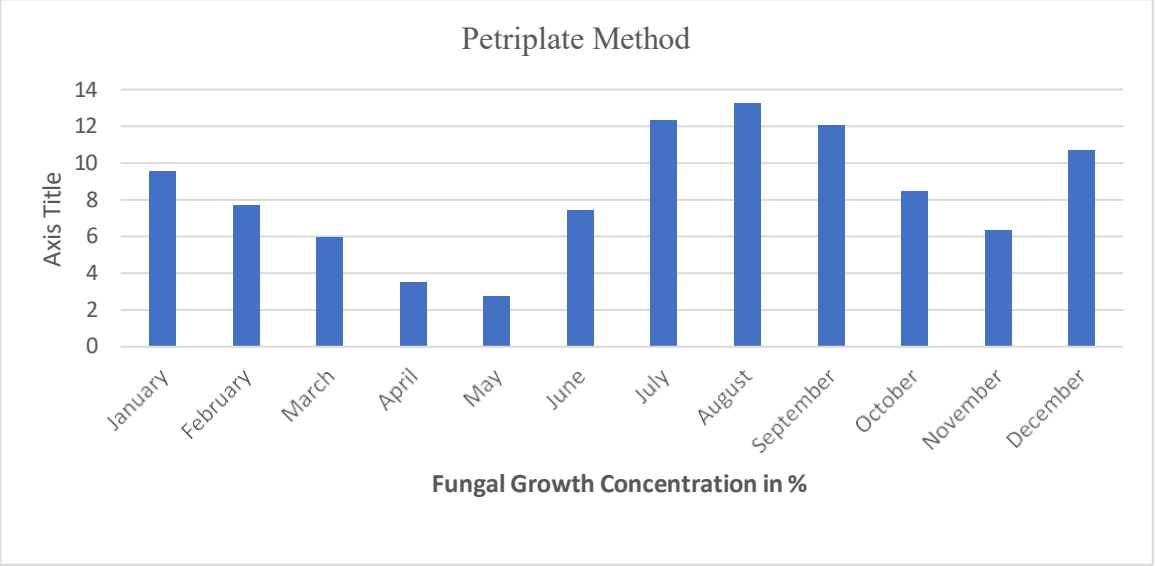

Fig 1: - Month wise Fungal Concentration by Petri plate Method

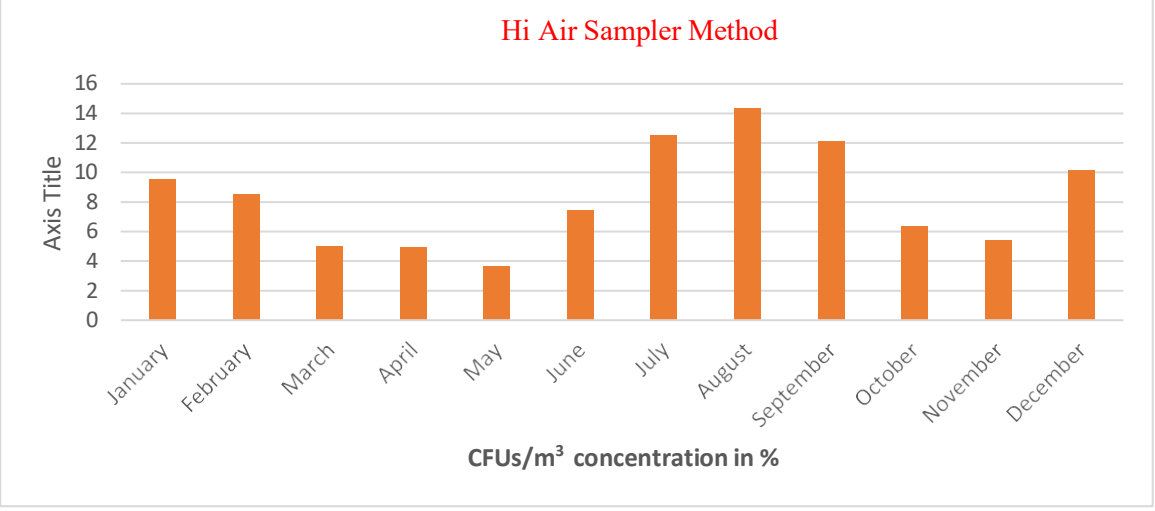

Fig 2: - Month wiseCFUs/m³ concentration by Hi Air Sampler Method.

Table-3: -The table shows the minimum,maximum and average temperature,Humidity and Rainfallfrom Feb-2023 to Jan-2024 in Gadchiroli district.

Month	Temperature, °C			Relative Humidity, %			Rainfall, mm
	Minimum	Maximum	Average	Minimum	Maximum	Average	Actual Rainfall
February 2023	15.6	36.3	25.6	17.4	95.1	45.9	0
March 2023	21.8	40.6	30.5	14.0	88.3	36.3	34.24
April 2023	26.7	43.6	33.2	16.8	69.7	40.1	47.69
May 2023	28.5	44.9	35.9	15.8	64.9	38.8	36.93
June 2023	23.8	40.6	31.1	28.5	97.7	63.0	127.23
July 2023	23.5	32.9	27.0	54.4	99.8	83.9	587.51
August 2023	23.4	33.6	26.5	51.5	100.0	86.1	273.11
September 2023	23.6	33.7	27.5	47.0	98.4	79.0	352.37
October	20.4	33.1	27.4	33.9	92.7	67.3	6.53

2023							
November 2023	17.5	32.7	25.2	29.2	84.6	56.5	2.12
December 2023	11.5	29.1	21.2	30.2	96.5	63.9	9.18
January 2024	14.3	31.3	21.6	24.2	78.5	48.6	2.02
Total							**1478.93**

Source- Indian climate department and Indian Wris department of India.

CONCLUSION

The study revealed significant seasonal variation and monthly variation in airborne fungal spores within girl's hostel. The highest spore concentration was observed during the humid months, highlighting significanteffect of meteorological parameters onproliferation of fungi. The presence of potentially harmful fungal species underscores the need for regular monitoring and effective air quality management practices. Kitchen section recorded high concentration by both methodsbecause of storage of food material, food source and moisture around water leaks, windows, drain pipes.

Fungal spores requirehumidity more that 75% and an average temperature range between 25^0C to 30^0C for their growth. The rainfall and humidity more in rainy season from month of June to Septemberand fungal spore concentration were high during that period. That shows increase in indoor aeromycospora in Girl's hostel in the month of August and July.

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