

Allergenic Fungal Spores Diversity In The Air Of Dr.B.R.Ambedkar Open University, Telangana

Kumar Y^{1*}, Devender R², G.Prabhakar³ and Ramakrishna H¹.

1. Department of Botany, Osmania University, Hyderabad-500 007

2. Department of Botany, University College of Science, Saifabad, Osmania University, Hyderabad, Telangana -500 004

3. Research associate, Sri Gp Avens Life sciences Pvt. Ltd, AIC-CCMB, Medical Biotechnology complex, Annex-2, IDA Uppal, Habsiguda, Hyderabad, Telangana -500 39

*Corresponding author email: kumarpooja052@gmail.com.

DOI: 10.47750/pnr.2023.14.02.105

Abstract

The main aim of the present study is to find out about allergenic fungal spores concentration in Dr.B.R.Ambedkar Open University, during the monsoon, pre-winter seasons of 2022 through the spider web analysis. Twelve allergenic fungal spores viz., Cladosporium sp., Alternaria sp., Ascospores, Ganoderma sp., Dipolodia sp., Pithomyces sp., Curvularia sp., Spegazzinia sp., Coprinus sp., Nigrospora sp., Tetraploa sp., Kretzschmaria sp., which cause allergic rhinitis to human beings, were recorded from representing locality. Among the fungal diversity, Alternaria sp. (26.21%) was the most abundant fungal spore type, next predominant fungal spores were Curvularia sp. (22.65%).

Key words: Allergenic, rhinitis, fungal spores

INTRODUCTION

The fungal spores have the property of strong allergens, which cause adverse health effects to the immunocompromised individuals. The main allergic symptoms of fungal spores are asthma, rhinitis, sinuses, bronchopulmonary mycoses, mycotoxicosis and hyper sensitivity pneumonitis etc.

Oliveira M et al.,(2010) earlier reported that the concentration of fungal spores are more in urban areas than in rural areas. Symptoms of certain fungal allergens can be similar to those of COVID-19, including fever, cough, and shortness of breath. People merely afraid of Covid -19 even if they were infected with allergenic fungal spores.

Alternaria and Cladosporium were reported, which are frequently causes severe health disorders like bronchitis and other respiratory failures (Idalia et.al.,2021)

MATERIALS AND METHODS:

STUDY AREA



Dr.B.R.Ambedkar open university is situated in Cyberabad area, jubilee hills, Hyderabad city,Telangana with 17.431584°N Latitude and 78.3940344°E Longitude and the university is spread over 53.63 acres.

05 spider web samples were collected in and around Dr .Br Ambedkar Open University during 2022 monsoon & pre-winter seasons .These spider webs were collected from the open corners of buildings, trees and bushes by rolling the end of the stick. The fungal spores were recorded by using methodology adopted by Bera et.al. (2002).

The spider webs were collected and stored in adhesive resealable plastic pouch, it was first treated with conc.HCL for 2-3 days to remove superfluous matter and then filtered into plastic centrifuge tubes through brass mesh, centrifuge them by adding distilled water at 2-3times, the residue was treated with HF in polythene test tube for 2-3days so as to remove silica particles. Thereafter, the residue was acetolysed by Erdtman (1943, 1969) acetolysis method. Three slides were prepared for each sample for the analysis of fungal spores. Examine the pollen slides by using Olympus trinocular research microscope in Palynology and Paleo botany research lab, department of Botany, University college of Science, Saifabad O.U, Hyderabad, Telangana state.

OBSERVATION:

12 allergenic fungal spores were observed after acetolysis method (table no-1&fig-2).Apart from the allergenic fungal spores, pollen taxa were also observed. Fungal spores rather dominated over pollen taxa, hence the pollen taxa have been ignored. Most of the fungal spores were recorded in sample-4&5.

S.no	Spore type	S.W-1	S.W-2	S.W-3	S.W-4	S.W-5	Total
1.	Alternaria sp.	18	12	11	22	18	81
2.	Curvularia sp.	10	09	17	12	22	70
3.	Cladosporium sp.	06	14	10	17	15	62
4.	Nigrospora sp.	03	0	09	05	12	29

5.	Ascospores	05	05	0	06	11	27
6	Coprinus sp.	01	01	0	02	05	09
7	Ganoderma sp.	0	02	05	01	01	09
8	Spegazzinia sp.	0	0	0	03	03	06
9	Diplodia sp.	0	0	01	04	0	05
10	Kretzshamaria sp.	01	0	0	02	02	05
11	Tetraploa sp.	0	1	1	0	02	04
12	Pithomyces sp.	0	0	0	01	01	02

(S.W= Spider web sample)

Table: 1- Diversity of recorded allergic fungal spore types

RESULT AND DISCUSSION:

In the air of study area *Alternaria* sp. (26.21%) were recorded maximum and minimum percentage of fungal spore recorded as *Pithomyces* sp. (0.65%)(Table-2)

S.no	Spore type	Quantity	Percentage
6.	<i>Alternaria</i> sp.	81	26.21
7.	<i>Curvularia</i> sp.	70	22.65
8.	<i>Cladosporium</i> sp.	62	20.06
9.	<i>Nigrospora</i> sp.	29	9.39
10.	Ascospores	27	8.74
6	<i>Coprinus</i> sp.	09	2.91
7	<i>Ganoderma</i> sp.	09	2.91
8	<i>Spegazzinia</i> sp.	06	1.94
9	<i>Diplodia</i> sp.	05	1.62
10	<i>Kretzshamaria</i> sp.	05	1.62
11	<i>Tetraploa</i> sp.	04	1.29
12	<i>Pithomyces</i> sp.	02	0.65

Table-2: Quantitative analysis of recorded allergenic fungal spores of the study area

Alternaria sp.: *Alternaria* sp allergens can cause significant respiratory allergies in Patients in the United States and were implicated recently in serious cases of respiratory arrest in children and young adults (Horner et al.1995.).The allergic fungal spores of *Alternaria* sp. recorded all five spider web samples and were peaked in S.W-4, which were collected in the month of October .Spores of this genus constituted 26.21 % of total spores in the air of study area. *Alternaria* spores are peaked throughout the year (Elif Ataygul et al.2007).

Curvularia sp.: The allergic fungal spores of *Curvularia* sp.were recorded in all five spider web samples and were peaked in S.W-5, which were collected in the month of November .Spores of this genus constituted 22.65 % of total spores in the air of study area.

Cladosporium sp.: *Cladosporium* spores were present in the air in the highest level (Idalia et al., 2021), but in present study area they are placed at the third position after *Alternaria* and *Curvularia*. They were recorded in all five spider web samples and were peaked in S.W-4, which were collected in the month of October .Spores of this genus constituted 20.06 % of total spores in the air of the study area.

Nigrospora sp.: The allergic fungal spores of *Nigrospora* sp. Were recorded in 4 spider web samples which were not found in sample -2 (August) and were peaked in S.W-5,which were collected in the month of November .Spores of this genus include 9.39 % of total spores in the air of study area.

Ascospores :The allergic fungal spores of Ascospores were recorded in 4 spider web samples, which were not found in sample -3 (September) and were peaked in S.W-5,which were collected in the month of November .Spores of this genus constituted 8.74 % of total spores in the air of the study area.

Coprinus sp. : The allergic fungal spores of Coprinus sp.were recorded in 4 spider web samples which were not found in sample -3 (September) and were peaked in S.W-5,which were collected in the month of November .Spores of this genus constituted 2.91 % of total spores in the air of the study area.

Ganoderma sp. :The allergic fungal spores of Ganoderma sp.,were recorded in 4 spider web samples which were not found in sample -1 (July) and were peaked in S.W-3, collected in the month of August .Spores of this genus constituted 2.91 % of total spores in the air of the study area.

Spegazzinia sp. The allergic fungal spores of Spegazzinia sp.were recorded in only spider web samples 4&5. Which were not found in sample -1, 2&3 and were peaked in S.W-4&5,which were collected in the month of October & November .Spores of this genus constituted 1.94 % of total spores in the air of the study area.

Diplodia sp.: The allergic fungal spores of Diplodia sp.were recorded in only spider web samples 3&4. Which were not found in sample -1, 2&5 and were peaked in S.W-4, collected in the month of October. Spores of this genus constituted 1.62 % of total spores in the air of the study area.

Kretzshamaria sp. : The allergic fungal spores of Kretzshamaria sp., were recorded in only spider web samples 3&4. Which were not found in samples -1, 2&5 and were peaked in S.W-4, collected in the month of October .Spores of this genus constituted 1.62 % of the total spores in the air of study area.

Tetraploa sp. : The allergic fungal spores of Tetraploa sp were recorded in only spider web samples 2, 3&5. Which were not found in samples -1, 4 and were peaked in S.W-5, collected in the month of November .Spores of this genus constituted 1.29 % of total spores in the air of study area.

Pithomyces sp.: The allergic fungal spores of Pithomyces sp., were recorded in only spider web samples 4&5. Which were not found in sample -1,2&3 and were peaked in S.W-5, collected in the month of November .Spores of this genus constituted 0.65 % of total spores in the air of study area.

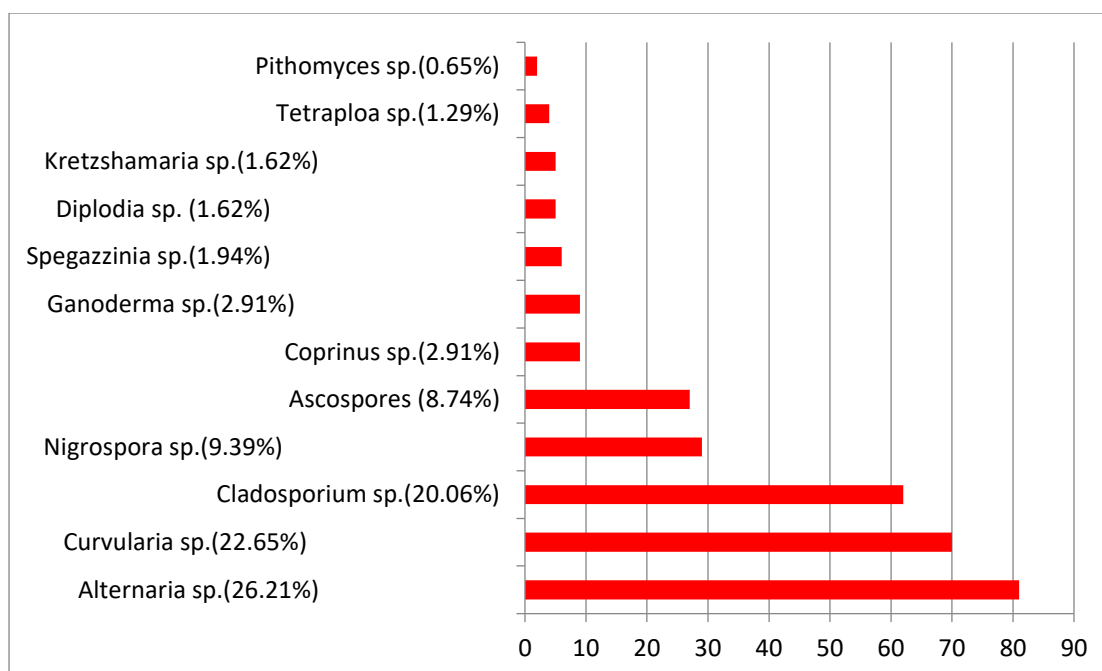


Fig-1: Quantitative analysis of atmospheric fungal spore of Dr B.R.Ambedkar Open University

CONCLUSION:

Diversity of fungal spores is dispersed in the air which was trapped in spider webs in the study area. The researcher assumed that these fungal spores are one of the causes for the allergic disorders to the people present at

Dr.B.R.Ambedkar Open University. Finally, this study will be helpful to provide information about allergenic fungal spores in and around Dr.B.R.Ambedkar Open University, and also helpful to medicinal practitioners.

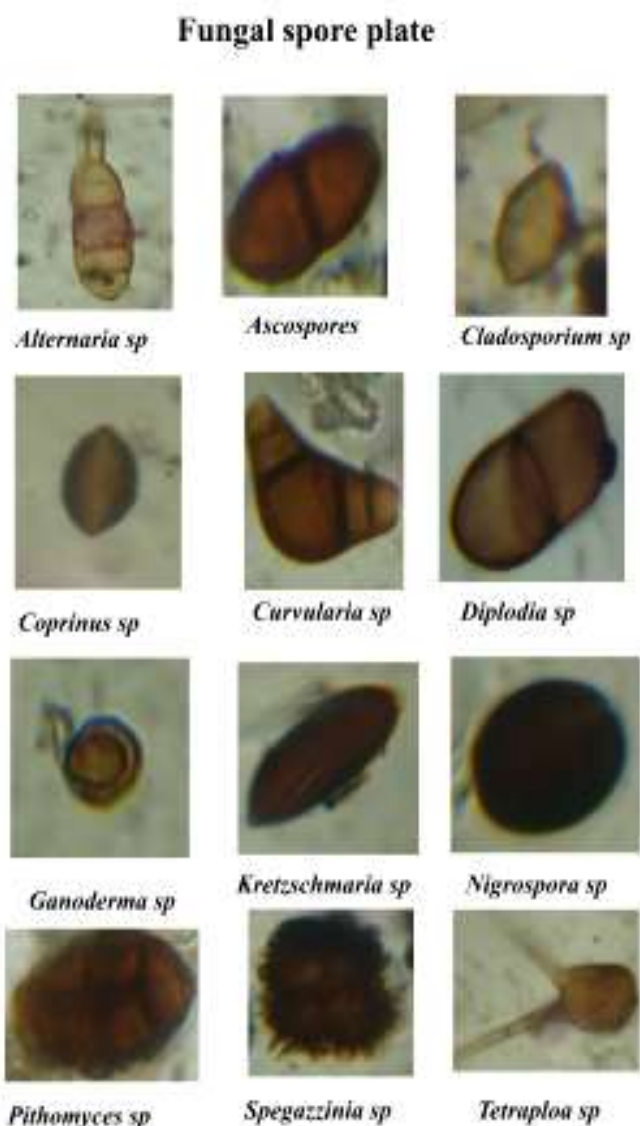


Fig-2: Allergenic fungal spores micro photo graph plate

ACKNOWLEDGEMENT

We are extremely grateful to Prof. K. Seetharama Rao, Vice-Chancellor and Prof. G.Pushpa Chakrapani, Dean Faculty of Sciences of Dr.B.R.Ambedkar Open University, for their encouragement. We extended our gratitude to Prof. C.Manohara chary (Retd.) Department of Botany, O.U., for helping fungal spore identification. Finally, we would also thankful to Dr.Karnakar Rao Kudle, Department of Bio-Chemistry, O.U. & Sri.K.Srinath, Research Scholar, Eflu for their immense support.

REFERENCES

1. Bera, S. K., Trivedi, A. and Sharma, C. 2002. Trapped pollen and spores from spiderwebs of Lucknow environs. *Curr. Sci.*, 83, 1580–1585.

2. Elif Ataygul , Sevcan Celenk , Yakup Canitez , Adem Bicakci , Hulusi Malyerand Nihat Sapan.2007.Allergenic Fungal Spore Concentrations in the air of Bursa, Turkey.J. BIOL. ENVIRON. SCI. 1(2), 73-79.
3. Erdtman, G. 1943. An Introduction to Pollen Analysis. Waltham, Mass., USA.
4. Erdtman, G. 1969. Handbook of Palynology. An Introduction to the study of pollen grains and spores. Hafner Publishing Co. New York,486.
5. Horner W.E.,Helbling A.,SalvaggioJ.E.,and Lehrer.S. B.1995. Fungal Allergens. Clini-cal microbiology reviews, Apr., p. 161–179 Vol. 8, No. 2 ,0893-8512/95/\$04.001 0
6. Idalia Kasprzyk ,Agnieszka Grinn-Gofron, Agata Cwik . Katarzyna Kluska . Paloma Carin anos . Tomasz Wojcik.2021.Allergenic fungal spores in the air of urban parks.Aerobiologia 37:39–51 <https://doi.org/10.1007/s10453-020-09671-7>.
7. Oliveira M, Ribeiro H, Delgado L, Fonseca J, Castel MG -Branco,Abreu. 2010.Outdoor Allergenic Fungal Spores: Comparison Between an Urban and a Rural Area in Northern Portugal.J Investig Allergol Clin Immunol; Vol. 20(2): 117-1