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Survey of Fungal Aeroallergens of Hospitals in Chhatrapati Sambhajinagar

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Abstract: ***Present study deals with indoor aerospora of Hospitals in Chhatrapati Sambhajinagar city of Maharashtra. The survey of sampling was carried out from 1st January 2023 to 31st December 2023 in 2 hospitals i.e. Kamal Nayan Bajaj Hospital and Government hospital and training institute (GHATI). Total 248 colonies were observed on petri plates exposed during 3 seasons i.e. Winter, Summer, Rainy. The seasonal variations, colony characters and number of species were compared with meteorological data and Questionnaire.***
Keyword: Meteorology, Indoor-Aerospora, Allergic fungi.

I. INTRODUCTION

Indoor fungal spores were chief bio-contaminants, which have adversely effects on human health. Indoor airborne fungi are known to induce numerous human diseases such as chronic bronchitis, asthma, fungal allergies and hypersensitivity reactions (Verman, et.al., 2019). In the low percentage of fungal spores in atmosphere were less harmful as compare to high or susceptible people affects with allergies, asthma and respiratory conditions (Haleem, Khan S and M. Karuppayil, 2012). Present studies of indoor environment shows that *Aspergillus sp, Alternaria sp, Penicillium sp and Cladosporium sp.* were predominant fungi responsible for allergies and other diseases.

II. MATERIAL AND METHODS

The indoor fungal aerospora were collected from 2 different hospitals by Petri plate exposure method. The Fungal identification done by identification keys (Illustration of Imperfect Fungi- Barnet 1972) and comparing with reference slides with molecular identification techniques (Aerobiology to Astrobiology- Prof. Tilak 1998).

III. RESULT AND DISCUSSIONS

The fungal aerospora were collected from different Hospitals of Chhatrapati Sambhajinagar with the help of Petri plate exposure method. The fungal species were isolated on Potato Dextrose Agar (PDA). Frequent visits were done in Kamal Nayan Bajaj Hospital (KNB) and Government hospital and training institute (GHATI). The fungal aerospora were collected during 1st January 2023 to 31st December 2023 one-year data were recorded from these 2 hospitals. Total 248 fungal colonies were isolated from 2 hospitals located in different areas. 11 fungal species were obtained in all seasons. (Table No.1 & Photo plate No.1). Percent contribution and composition vary from locations and seasons. (M. Bhonde and R. Chaudhary (2022).

During Summer season fungal spores of *Cladosporium sp.*(15.15%) and *Penicillium sp* (15.16%) as well as *Alternaria sp.* (8.89%) *and Penicillium sp.* (15.56%) were found in significant amount at Kamal Nayan Bajaj Hospital and Government Hospital and training institute respectively whereas *Nigrospora sp.* were found to be absent during the summer season at selected sites, likely due to unfavourable conditions such as high temperature and low humidity. (Table No.2 & Graph No.1). The average temperature was 35 ^{0} C during summer season. This temperature was favourable for the growth of *Cladosporium sp. Penicillium sp.* along with *Alternaria species.*

While in Rainy season fungal aerospores viz. *Alternaria sp.* (11.86%) and *Nigrospora sp.* (16.95%) were noted highly at Kamal Nayan Bajaj Hospital as well as at Government Hospital and training institute fungal spores of *Curvularia sp.* (12.70%) and *Nigrospora sp.* (17.02%) were maximum Also the growth of *Trichothecium sp* (0.99%) were observed throughout this season. The air mycobiota contained numerous fungal species, particularly *Aspergillus sp, Penicillium sp, Cladosporium sp, Fusarium sp*, and *yeast (Candida)* species. Belizario A. (2021). During this season the average temperature, relative humidity and rainfall was 29ºC, 20% and 4.5% respectively, this meteorological data was favourable for the growth of *Nigrospora sp, Curvularia sp* as well as *Alternaria sp.* (Graph No.2). (M.R.Majumdara, K.Bhattacharya,2004). The seasonal variation affects quantity of fungal aerospora.

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Over Winter season at Kamal Nayan Bajaj Hospital fungal spores of *Alternaria sp* (15.15%) and *Nigrospopra sp* (18.24%) besides at Government Hospital and training institute *Alternaria sp* (21.88%) and *Penicillium sp* (16.24%) were found in higher concentration apart from this *Trichoderma sp* and *Trichothecium* sp were absent during the winter season. This was due to the cool and moist conditions prevalent during this time, which provide an ideal environment for their growth and sporulation.The percent contribution of *Alternaria sp* (13.17%), *Cladosporium sp* (10.64%), *Nigrospora sp* (10.82%) *and Penicillium sp* (13.24%) spores plus *Aspergillus niger* (4.48%), *Aspergillus nidulance* (2.12%) and *Aspergillus flavous* (1.94%) were maximum in all three season as compared to other species. (A.G. Gofron and *et.al*.,2021). Total percent contribution of some dominant fungal spores i.e. *Penicillium sp(14.45%), Nigrospora sp (12.06%), Cladosporium sp (11.23%), Alternaria sp* (12.04%) were observed as well as the average percent contribution of some of the dominant fungal spores i.e. *Aspergillus sp* (15.30 *%), Cladosporium sp*(12.44 %), *Alternaria sp* (8.63 %), *Penicillium sp* (8.07 %) (Vaishali A, P. K. Jite , (2015).

Table No.1 Total No. 2 data of sample collection from Hospitals of Chhatrapati Sambhajinagar district in different Seasons.

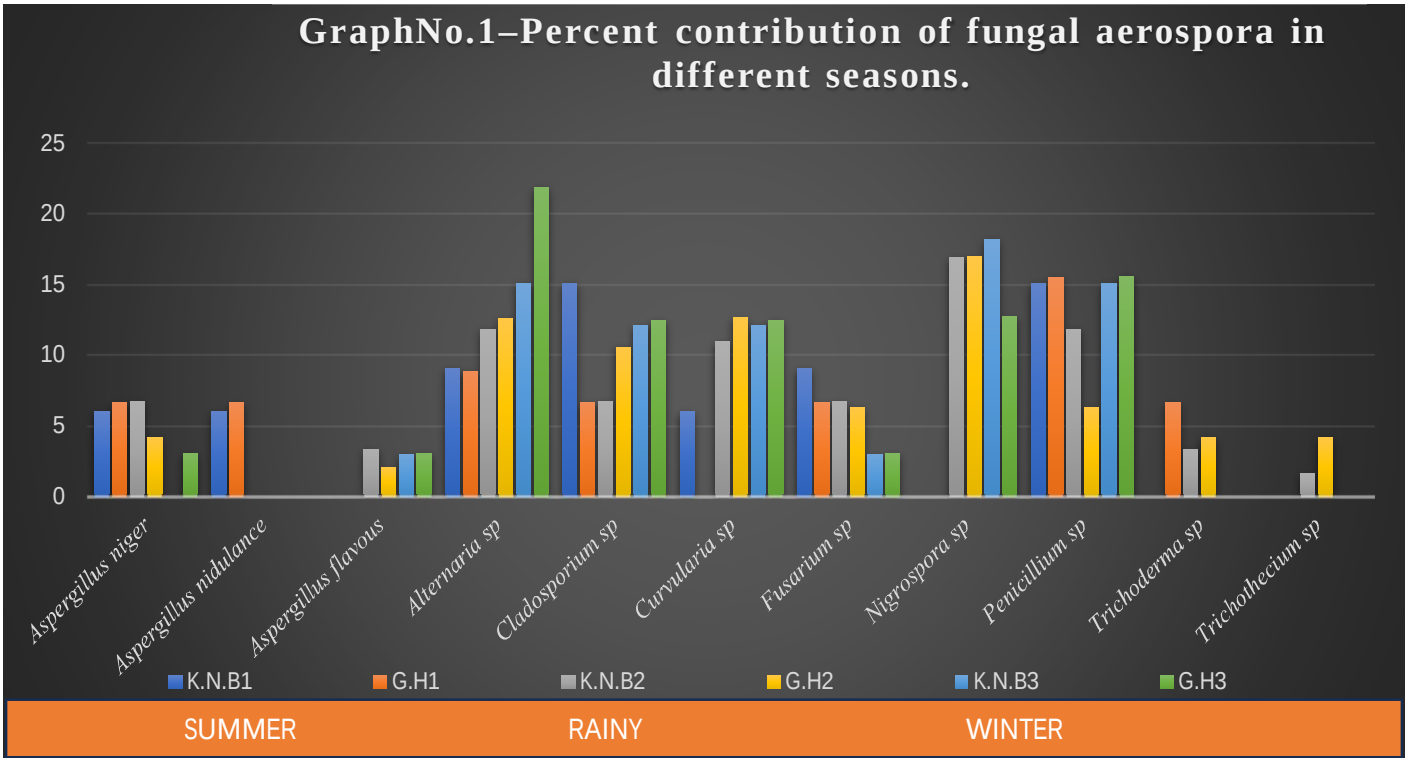
Collection Sites	Season of collection			Total
	Summer	Rainy	Winter	
Kamal Nayan Bajaj Hospital	33	33	59	125
GHATI Hospital	32	45	46	123
Grant Total samples				248

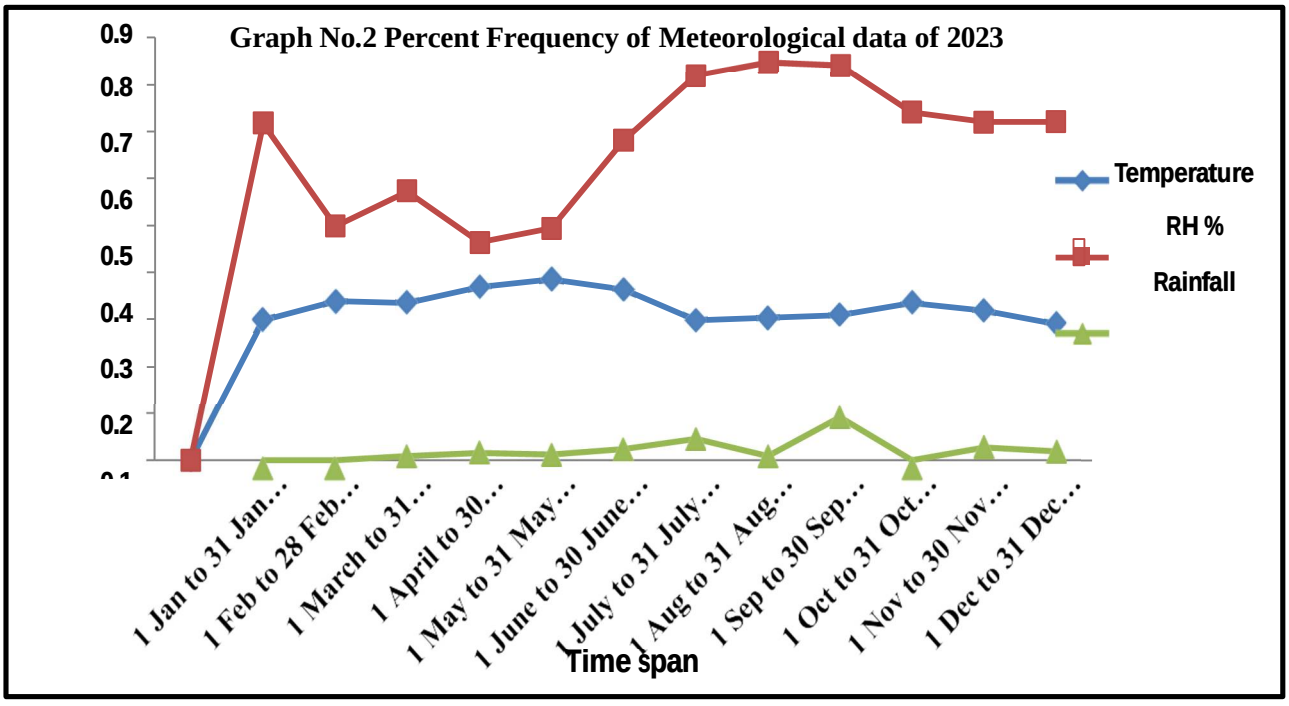
Table No. 2.-Fungal aerospora of three different seasons.

Sr. No	Name of Fungal species	Summer		Rainy		Winter		Average Percentage
		K.N. B	G.H	K.N. B	G.H	K.N. B	G.H	
1	*Aspergillus niger*	6.06	6.67	6.78	4.26	0.00	3.13	4.48%
2	*Aspergillus nidulance*	6.06	6.67	0.00	0.00	0.00	0.00	2.12%
3	*Aspergillus flavous*	0.00	0.00	3.39	2.13	3.03	3.13	1.94%
4	*Alternaria sp*	9.09	8.89	11.86	12.67	15.15	21.88	13.17%
5	*Cladosporium sp*	15.15	6.67	6.78	10.64	12.11	12.50	10.64%
6	*Curvularia sp*	6.06	0.00	11.00	12.70	12.12	12.50	9.06%
7	*Fusarium sp*	9.09	6.67	6.78	6.38	3.03	3.13	5.84%
8	*Nigrospora sp*	0.00	0.00	16.95	17.02	18.24	12.75	10.82%
9	*Penicillium sp*	15.16	15.56	11.82	6.38	15.14	15.63	13.24%
10	*Trichoderma sp*	0.00	6.67	3.39	4.26	0.00	0.00	2.38%
11	*Trichothecium sp*	0.00	0.00	1.69	4.26	0.00	0.00	0.99%

Note – KNB = Kamal Nayan Bajaj Hospital, GH = Government hospital and training institude.

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GraphNo.1–Percent contribution of fungal aerospora in different seasons.
25
20
15
10
5
0
Aspergillus niger
Aspergillus nidulance
Aspergillus flavous
Alternaria sp
Cladosporium sp
Curvularia sp
Fusarium sp
Nigrospora sp
Penicillium sp
Trichoderma sp
Trichothecium sp
K.N.B1
G.H1
K.N.B2
G.H2
K.N.B3
G.H3
SUMMER
RAINY
WINTER


Graph No.2 Percent Frequency of Meteorological data of 2023
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
Temperature
RH %
Rainfall
1 Jan to 31 Jan…
1 Feb to 28 Feb…
1 March to 31…
1 April to 30…
1 May to 31 May…
1 June to 30 June…
July to 31 July…
1 Aug to 31 Aug…
1 Sep to 30 Sep…
1 Oct to 31 Oct…
1 Nov to 30 Nov…
1 Dec to 31 Dec…
Time span

Photoplate No.1 Fungal colonies on PDA and microscopic structures.

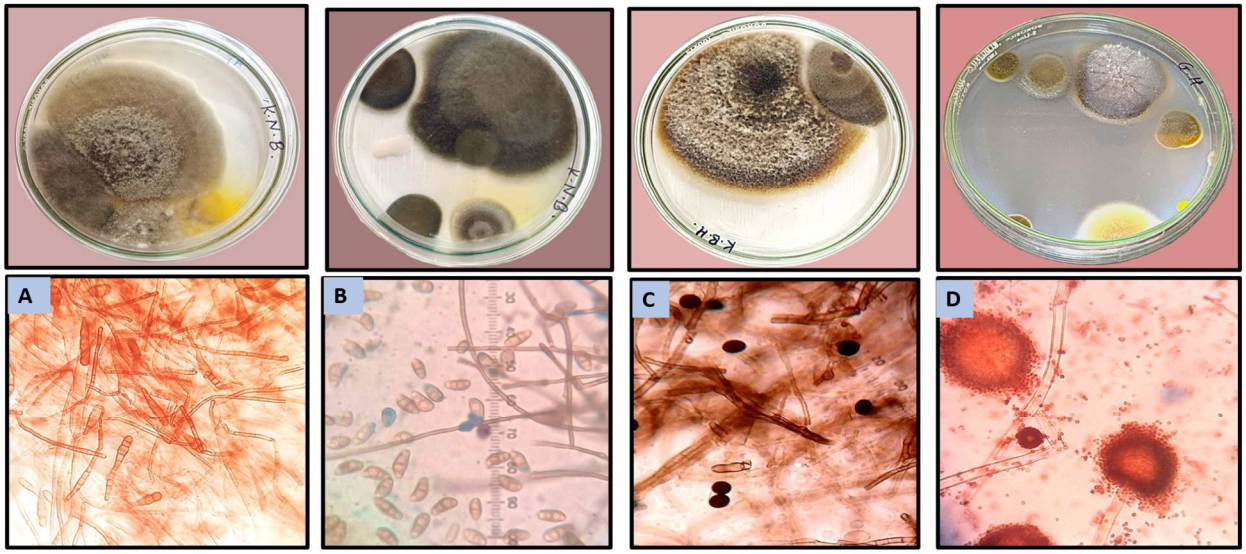


Fig (A) :*Alternaria sp* spores Fig (B) : *Curvularia sp* spores Fig (C): *Nigrospora sp* spores
Fig (D):*Aspergillus sp* spores and hyphae.

IV. CONCLUSION

The fungal spores of *Penicillium sp* (13.24%), *Alternaria sp* (13.17%), *Nigrospora sp* (10.82%) *and Cladosporium sp* (10.64%) were found to be dominant across all three seasons, indicating their consistent prevalence and potential role as major allergens throughout the year. If cleaning and disinfection procedures are not followed strictly and improper hands of hygiene or the use of contaminated medical equipment by healthcare workers can facilitate the transmission of infections. Some pathogens can spread through the air, especially in crowded areas, contributing to contamination in shared spaces. Hospitals often have complex environment with various materials (e.g. carpets, fabrics) that can bear contaminants if not properly maintained. To minimize contamination, hospitals should strictly implement the infection controlling measures including regular cleaning proper waste disposal, and staff training on hygiene practices.

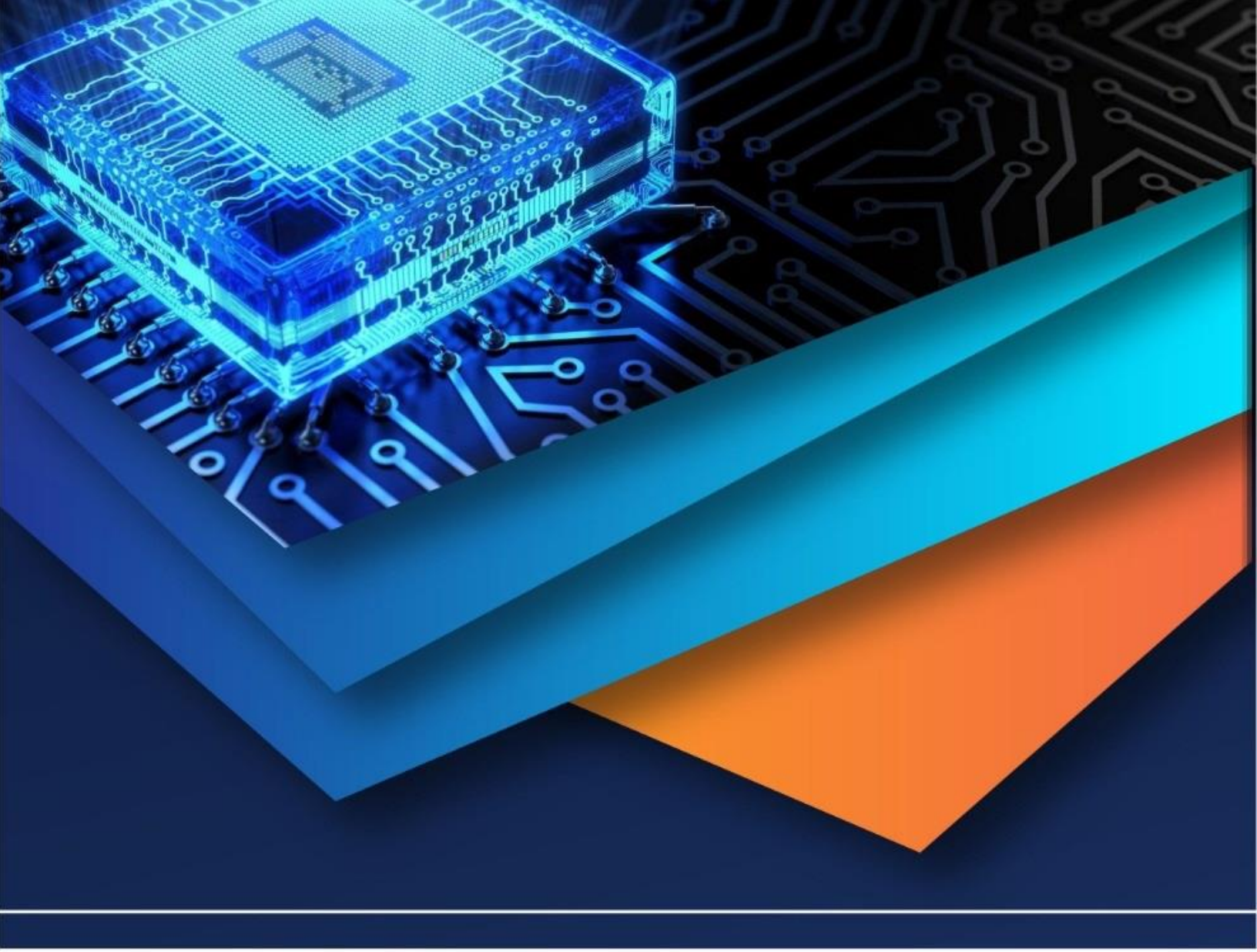
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REFERENCES

[1] A.A. Haleem Khan S. Mohan Karuppayil,(2012),Fungal pollution of indoor environments and its management, Saudi Journal of Biological Sciences,vol.19(4), pp.405 – 426 Aerobiology to Astrobiology, Prof.S.T.Tilak.
[2] Agnieszka Grinn-Gofron, Agata Cwik , Katarzyna Kluska (2021),Allergenic fungal spores in the air of urban parks Idalia Kasprzyk , Aerobiologia ,Vol. (37), pp.39–51
[3] Belizario A. Leonardo G. Lopes , Regina H. Pires, (2021), Fungi in the indoor air of critical hospital areas: a review Jenyffie, Aerobiologia ,Vol. 37, pp.379–394. Illustration of Imperfect Fungi,BarnetC.J.(1972).
[4] Maansi Vermani, Vandana Chauhan, Sunishtha ,Yadav and Neha Thukral, (2019), Profile of Indoor Airborne Fungi In Residential Houses of Delhi and National Capital Region, India, Asian Jr. of Microbiol. Biotech. Env. Sc., Vol.21(4), pp. 1063-1067
[5] Madhuri Bhonde,Rupali Chaudhary,(2022), Indoor Aeromycoflora from Air and Dust of Hospital environment by culture plate method in Nagpur city (MS) India, International Journal of Current Science, Vol.12: pp. 254-260.
[6] Manas Ranjan Majumdara Kashinath Bhattacharyya (2004), Measurement of Indoor Fungal Contaminants causing Allergy among the Workers of Paper-related Industries of West Bengal, Indoor Built Environ, Vol. 13, pp.189.
[7] Vaishali A. Thakurand Paramjit Kaur Jite,(2015), Air monitoring of fungal spores inside the B. J. Wadia Library, Pune, India, International Journal of Current Microbiology and Applied Sciences Vol.4: pp. 35-40.

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