I J R B A T, Issue (XI) Vol (I) Jan 2023: 273-278
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCESS
e-ISSN 2347 – 517X
Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
 www.ijrbat.in

STUDY OF INDOOR ENVIRONMENT OF RICE MILL INDUSTRY AT DESAIGANJ (WADSA), IN RESPECT TO AEROMYCOFLORA

Seema T. Nagdeve

Department of Botany, Mahatma Gandhi Arts Science and Late N. P. Commerce College, Armori, Dist- Gadchiroli
Corresponding Email: seemanagdeve@gmail.com

Communicated :10.12.2022 | Revision: 20.01.2023 & 24.01.2023 Accepted: 26.01.2023 | Published: 30.01.2023

ABSTRACT:
The present study was conducted on indoor environment of rice mill industry, in respect to aeromycofloral diversity at Desaiganj (Wadsa) for two year study period February 2012- January -2014. Present study investigate indoor aeromycoflora are the agents responsible for triggering allergicreactions such as skin infections, rhinitis and severe asthma.In the current descriptive study, the incidence and diversity of potentially allergenic aeromycoflora were determined fortnightly sampling in rice mill industry Wadsa by exposure petriplate method over Czapek's Dox Agar medium and volumetric sampling using Hi Air sampler.Fungal colonies were counted and identified altogether 71 fungal species were confined to 29 genera. In the present study recorded most dominant species is Aspergillus followed by other species like Alternaria, Rhizopus,and Penicillium.The present study also observed the allergic reactions of workers in the rice mill industry.

Keywords: - Aeromycoflora, Indoor Fungal Spores, Allergic Diseases, Rice Mill Industry, Wadsa.

INTRODUCTION :

Fungi are among those pollutant organisms that under certain conditions can become pathogenic for humans and animals. Mycofloara is responsible for triggering allergic reactions such as rhinitis and severe asthma. Otomycosis, keratomycosis, chronic bronchitis, emphysema, asthma, and allergy are among the complications caused by airborne fungi [1,10,12].The commonest fungus causing lung infections is ***Aspergillus fumigatus***, although other Aspergillus spp. **fungal allergens, both indoors and outdoors, are a common cause of rhinitis and asthma exacerbations** and are just as potent as pollen. The exact incidence of fungal respiratory allergies is unknown, but it is estimated to be 20-30% among atopic subjects [3, 24] and 3-10% in the general population [2, 25]. It was shown that indoor airborne fungi have specific immunoglobulin E (IgE), which induces **TYPE- I**, allergic respiratory reactions like rhinitis, skin diseases and asthma in atopic individuals [3]. Limiting the exposure of vulnerable populations to allergenic fungal spores is crucial to preventing severe respiratory exacerbations. This is in conformity with the study demonstrating high contamination of air with a wide variety of allergenic fungi [9, 24, 25, 27, 28].Respiratory fungal infection is a severe clinical problem, especially in patients with compromised immune functions. Aspergillus, Cryptococcus, Pneumocystis, and endemic fungi are major pulmonary fungal pathogens that are able to result in life-threatening invasive diseases [3,17,18, 25].

This study was conducted to analyze the indoor environment of the rice mill industry, Desaiganj (Wadsa), and monitor the prevalence and distribution patterns of indoor airborne fungi with their adverse effects like skin diseases, rhinitis and asthma from February 2012-January -2014.The mycoflora data collected in

http://doi.org/10.29369/ijrbat.2023.010.1.0046

this investigation can help to establish a standard as a reference for future studies and may be useful in the development of preventive and educational strategies.

MATERIALS AND METHODS:-:

STUDY AREA:-

Desaiganj (Wadsa) is a town and taluka place of Gadchiroli district, inthe Nagpur division of the Central Provinces. Geographically Desaiganj has situatedat 20.6202 0 'North latitude and 79.9654 0 ' East longitude. An aeromycological survey from the indoor environment of Two Rice mills (Arva and Steam) of Desaiganj (Wadsa), Gadchiroli district, was conducted at an interval of 15 days (fortnightly) for two years (Feb 2012-Jan 2014).

MATERIALS AND METHODS:

In the present investigation, air sampling was conducted inside the four different sections using a Hi Air sampler (Mark II), Hi media Laboratories, India, for five minutes on Agar strips, fortnightly. Simultaneously exposure Petri plate method containing CDA (Czapek's Dox Agar) with streptomycin, two times a month, by keeping them at a height of five feet from the ground level. Petri plates were incubated at room temperature. The plates were horizontally exposed to air at about 1.5 m height for 20 min. The average summer temperature ranges from 25°C to 35 °C and the humidity is up to 50%.Sampling intervals were two times per day, at 8 o'clock in the morning and 4 in the afternoon.

After 3 - 4 days colonies were observed, counted and sub-cultured for identification. The identification of spores caught was based on (I) Microscopic characters, (ii) Comparison with parasitic and saprophytic fungal material collected in and around the field, and (iii) Comparison with cultural characters. In all possible cases, generic counts were made which are based on the colour, shape, size and other diagnostic features of the spores. In general, climatic conditions at this place are favourable for agricultural growth; similarly, favourable rain and humidity during most of the days indirectly favour the growth of diseases.The identification of fungal mould species was based on the macroscopic and microscopic characteristics of the isolates according to the methods of Watanabe. The results were expressed as colony-forming units (CFU) per sample.

RESULTS AND DISCUSSION:

In this survey, mycological analyses revealed that all the examined samples were positive for fungal growth.Altogether a total of 71 fungal species were recorded and confined to 29 genera. The isolates were classified into Oomycota, Zygomycota, Ascomycota and Deuteromycota. No members of Basidiomycota were reported through the exposure Petri plate method over Czapek's Dox Agar medium. Ascomycota dominated with a fungal count of 7629 (56.25%) followed by Deuteromycota (31.64%) and Zygomycota (5.41%). Oomycota contributes only 1.14% with a total of 155 colonies. Due to their viability, also serves as means of propagation. The significant contribution of fungal fragments was noted during the daytime.

The distribution of the fungal spores in the air of different parts of the city and in different hours of the day was almost equal and there was no significant difference among them ($P>0.05$). Additionally, there was no significant difference in the mean of CFU of the isolated fungi during the three months of winter ($P>0.05$). There were no statistical differences in the mean of CFU of the isolated fungi between different sampling day times ($P>0.05$).

During the present investigation altogether 71 different fungal species were identified from the Arva Rice mill and Steam Rice mill of Desaiganj (Wadsa) which were confined to Oomycota, Zygomycota, Ascomycota, Deuteromycota and

http://doi.org/10.29369/ijrbat.2023.010.1.0046

some fungi were shown only black, brown, orange and white sterile mycelia (Table 1).

Fungal spores are almost always present in the air, but their quantity and quality vary according to the time of day, climate, geographical situation, and the presence of spore sources in the environment [1,4,8,9]. Denning et al. described some epidemiological evidence that associated the severity of asthma with allergenic fungi, like *Cladosporium*, *Aspergillus*, *Penicillium*, and *Alternaria*, present in the air of the city and houses in the UK. They also stated that severe fungal-induced asthma is on the rise [16, 21, 22, & 25].

CONCLUSION:

The present study concluded that the most dominant and diverse species is ***Aspergillus*** followed by other species like *Alternaria, Rhizopus,* and *Penicillium*. The present study also observed the **allergic reactions** of workers in the rice mill industry. Although the detection of allergenic and potentially pathogenic fungi in the air does not necessarily indicate that all may cause problems, it addresses the potential risk of diseases and sensitivity in individuals. Furthermore, the results of this study provide a better perception of the incidence pattern of airborne fungi, which may be important for allergists, physicians, as well as epidemiologists.

REFERENCES:

Ruzer LS, Harley NH. *Aerosols handbook: measurement, dosimetry and health effects.* Florida: CRC Press; 2005.

Twaroch TE, Curin M, Valenta R, Swoboda I. Mold allergens in respiratory allergy: from structure to therapy. *Allergy Asthma Immunol Res.* 2015;7(3):205–20.

Horner WE, Helbling A, Salvaggio JE, Lehrer SB. Fungal allergens. *Clin Microbiol Rev.* 1995;8(2):161–79.

Yoda S, Enomoto T, Dake Y, Ikeda H, Shibano A, Sakoda T, et al. Epidemiological survey of allergic diseases in first-year junior high school students in Wakayama prefecture in 2003. *Nippon Jibinkoka Gakkai Kaiho.* 2006;109(10):742–8.

Airola K, Petman L, Mäkinen-Kiljunen S. Clustered sensitivity to fungi: anaphylactic reactions caused by ingestive allergy to yeasts. *Ann Allergy Asthma Immunol.* 2006;97(3):294–7.

Lighthart B. Mini-review of the concentration variations found in the alfresco atmospheric bacterial populations. *Aerobiologia.* 2000;16(1):7–16.

Oliveira M, Ribeiro H, Abreu I. Annual variation of fungal spores in atmosphere of Porto: 2003. *Ann Agric Environ Med.* 2005;12(2):309–15.

Aghamirian MR, Ghiasian SA. The prevalence of fungi in soil of Qazvin Iran. *Jundishapur J Microbiol.* 2012;6(1):76–9.

Aghamirian MR, Jahani Hashemi H. Survey of airborne fungi spores in Qazvin (Mar-Jun 2007) *J Qazvin Univ Med Sci.* 2010;14(1):65–70.

Ghiasian SA, Maghsood AH. Occurrence of aflatoxigenic fungi in cow feeds during the summer and winter season in Hamadan, Iran. *Afr J Microbiol Res.* 2011;5(5):516–21.

Ghiasian SA, Maghsood AH. Infants' exposure to aflatoxin M1 from mother's breast milk in Iran. *Iran J Public Health.* 2012;41(3):119–26.

Kramer MN, Kurup VP, Fink JN. Allergic bronchopulmonary aspergillosis from a contaminated Dump site. *Am Rev Respir Dis.* 1989;140(4):1086–8.

Latge JP. Aspergillus fumigatus and aspergillosis. *Clin Microbiol Rev.* 1999;12(2):310–50.

Hedayati MT, Mayahi S, Aghili R, Goharimoghadam K. Airborne fungal in

http://doi.org/10.29369/ijrbat.2023.010.1.0046

indoor and outdoor of asthmatic patients, home, living in the city of Sari. *Iran J Allergy Asthma Immunol.* 2005;4(4):189–91.

Cetinkaya Z, Fidan F, Unlu M, Hasenekoglu I, Tetik L, Demirel R. Assessment of indoor air fungi in Western-Anatolia Turkey. *Asian Pac J Allergy Immuol.* 2005;23(2-3):87–92.

Denning Dw, O'Driscoll BR, Hogaboam CM, Bowyer P, Niven RM. The Link between fungi and severe asthma: a summary of the evidence. *Eur Respir J.* 2006;27(3):613–26.

de Ana SG, Torres-Rodriguez JM, Ramirez EA, García SM, Belmonte-Soler J. Seasonal distribution of Alternaria, Aspergillus, Cladosporium and Penicillium species isolated in homes of fungal allergic patients. *J Investing Allergol Clin Immunol.* 2006;16(6):357–63.

Pitt JI, Hocking AD. *Fungi and food spoilage.* 3rd ed. . New York: Springer Publishers; 2009.

Shams-Ghahfarokhi M, Aghaei-Gharehbolagh S, Aslani N, Razzaghi-Abyaneh M. Investigation on distribution of airborne fungi in outdoor environment in Tehran, Iran. *J Environ Health Sci Eng.* 2014;12(1):54.

Kwon-Chung KJ, Bennett JE. *Medical mycology.* Philadelphia: Lea & Febiger; 1992.

Ananna A. Z., Hossain K. S. and Bashar M. A. 2013: Aeromycoflora of the Dhaka University Campus. *Bangladesh Journal of Botony*, 42(2):273-278.

Cunningham, D.D. (1873): Microscopic examination of air. Government Printer, Calcutta, pp.58.

Florian, M.L.E. (1994): Conidial fungi (mould, mildew) biology : A basis for logical prevention, eradication and treatment for Museum and Archival collections, *Leather conservation News*, Vol.10, pp.1-29.

Kukreja S. G. and Saoji (2006):A detail study of Paper deterioration by cellulotic Aeromycoflora In *Deapartment of Botany, Insttitute of Science.*

Nagdeve S.T. and Kukreja S. G. (2018):Diversity of intramural aeromycobiota of the rice godown of rice mill. UGC approved Journal Int. Advance Res. Jour. In Sci., & Engg & Technology, ISSN (Online) 2393-8021, (Print) 2394-1588, special vol. 4,Issue 8, pp:1-7.

Nagdeve S. T. Kukreja S. G. (2019): Aeromycological studies of Indoor environment of rice mill industry, at Desaiganj , Wadsa, Distt. Gadchiroli (MS) India. Thesis submitted to RTMNU, pp:1-107.

Verma S., Thakur B., Karkun D. and Shrivastava R. 2013: Studies of aeromycoflora of District and Session Court of Durg, Chhattisgarh. *Jour. Bio. Innov*, 2(4):146-151.

http://doi.org/10.29369/ijrbat.2023.010.1.0046

Table 1: Isolated fungi from the Study area (Rice mill industry, Desaiganj)

Sr. no.	Fungal taxa
1	*Alternaria alternata* (Fr.) Keissl
2	*Alternaria brassicae* (Berk.) Sacc.
3	*Alternaria longipes* (Ellis & Everh.) E.W. Mason
4	*Alternaria solani* (Ellis & G. Martin) L.R. Jones
5	*Aspergillus candidus* Link
6	*Aspergillus flavipes* (Bainier & Sartory) Thom & Church
7	*Aspergillus flavus* Link
8	*Aspergillus fumigatus* Fresen
9	*Aspergillus glaucus* (L.) Link,
10	*Aspergillus humicola* Chaudhuri & Sachar
11	*Aspergillus nidulans* (Eidam) G. Winter
12	*Aspergillus niger* Tiegh
13	*Aspergillus ochraceus* K. Wilh.
14	*Aspergillus oryzae* (Ahlb.) Cohn
15	*Aspergillus sulphureus* (Fresen.) Wehmer
16	*Aspergillus sydowii* (Bainier & Sartory) Thom & Church
17	*Aspergillus terreus* Thom
18	*Aspergillus versicolor* (Vuill.) Tirab.
19	*Botrytis P.* Micheli ex Haller
20	*Cercospora* Fresen
21	*Chaetomium cochliodes* Palliser
22	*Chaetomium globosum* Kunze.
23	*Cladosporium cladosporioides* (Fresen.) G.A. de Vries
24	*Cladosporium herbarum* (Pers.) Link
25	*Cladosporium lignicola* Corda
26	*Cunninghamella* Matr.
27	*Curvularia brachyspora* Boedijn
28	*Curvularia geniculata* (Tracy & Earle) Boedijn,
29	*Curvularia lunata* (Wakker) Boedijn
30	*Curvularia subulata* (Nees ex Fr.) Boedijn
31	*Curvularia tetramera* (McKinney) Boedijn
32	*Drechslera* S. Ito
33	*Epicoccum* Link
34	*Fusarium equiseti* (Corda) Sac.
35	*Fusarium moniliforme* J. Sheld
36	*Fusarium oxysporum* Schltdl.
37	*Fusarium solani (Mart.)* Sacc
38	*Helminthosporium oryzae* Breda de Haan

http://doi.org/10.29369/ijrbat.2023.010.1.0046

39	*Helminthosporium tetramerum* McKinney
40	*Mucor racemosus* Fresen.
41	*Mucor hiemalis* Wehmer
42	*Mucor pusillus* Lindt
43	*Mucor racemosus* Fresen
44	*Nigrospora* Zim.
45	*Penicillium chrysogenum* Thom
46	*Penicillium citrinum* Thom
47	*Penicillium corylophilum* Dierckx
48	*Penicillium funiculosum* Thom
49	*Penicillium glabrum* (Wehmer) Westling
50	*Penicillium notatum* Westling
51	*Phoma glomerata* (Corda) Wollenw. & Hochapfel
52	*Phytophthora infestans* (Mont.) de Bary,
53	*Pithomyces* Berk. & Broome
54	*Pyricularia* (Sacc.) Sacc.
55	*Rhizopus nigricans* Ehrenb
56	*Rhizopus nodosus* Namysl
57	*Rhizopus oligosporus* Saito
58	*Rhizopus oryzae* Went & Prins.
59	*Rhizopus stolonifer* (Ehrenb.) Vuill
60	*Spicaria*Harting
61	*Torula graminis*Desm.
62	*Torula herbarum*(Pers.) Link.
63	*Trichoderma glaucum*E.V. Abbott,
64	*Trichoderma koningii*Oudem.
65	*Trichoderma lignorum*(Tode) Harz,
66	*Trichothecium roseum*(Pers.) Link
67	Black sterile
68	Brown sterile
69	Orange sterile
70	White sterile
71	*Yeast*

http://doi.org/10.29369/ijrbat.2023.010.1.0046