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# Diversity of Aeromycoflora around the Abu Drain Landfill site in Saharanpur

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**ABSTRACT**

**A total of 48 genera of sporulating fungi belonging to 110 species were recorded from the air of Abha during 2024–2025. Seven most dominating fungi in decreasing order were Aspergillus, Alternaria, Cladosporium, Drechslera, Trichoderma, Penicillium and Mucor. Maximum fungal species were observed in summer season while Cladosporium was found most in winter seasons. Alternaria tenuissima, Aspergillus niger, Curvularia lunata were also frequent in summer while Aspergillus fumigatus, Epicoccum nigrum, Cladosporium herbarum, Curvularia brachyspora, Mucor racemosus and Torula species were also in this frequency class in winter. Many fungi recorded before were trapped and have health implications, e.g., Basidiomycetes, Embellisia, Helicosporium, Memnoniella, Stachybotrys, Tetracoccosporium, Verticillium and Wardomyces.**

## 1. INTRODUCTION

Aeromycflora refers to the airborne fungal spores and microorganisms that are present in the atmosphere. These fungal spores play an important role in environmental and ecological processes and can also influence human health and air quality. Landfill areas and waste disposal sites often create suitable conditions for the growth and spread of various fungal species due to the presence of organic waste and moisture.

The transit landfill of Abu Drain in Saharanpur is one such location where the decomposition of waste may contribute to the release of different airborne fungi into the surrounding environment. Studying the aeromycflora in such areas helps in understanding the diversity, distribution, and seasonal occurrence of fungal species present in the air.

Therefore, the present study aims to examine the composition and frequency of airborne fungal spores over the transit landfill of Abu Drain at Saharanpur, in order to understand their environmental presence and potential impact.

A drainage system in Saharanpur, with recent initiatives focusing on improving infrastructure to address waterlogging, including a ₹530 crore 107 drainage repair project across the city. The city handles around 86 MLD of sewage, with untreated waste flowing into the Dhamola River through some areas. Severe waterlogging occurs during heavy rains. The city is upgrading its drainage network, particularly around industrial areas like Kuhna and Maheshwari colony, which are constructing their own drains and pumping systems to prevent 3–4 feet of water logging.

## MATERIALS AND METHODS

Solid waste generation although temporary at Saharanpur act as a transit landfill and major storm drain increasing the health budget of nearly 17 lakhs inhabitants necessitating trapping of airborne fungi for which sterilized petridishes of 9 cm diameter containing Rosebengal-Streptomycin Sabouraud Agar meduum were exposed for 10 minutes at regular intervals in different seasons at different place with replicated of three petriplates per site. The exposed petridishes were incubated in an inverted position at $27\pm 10^0$ C for 5 days or so depending upon the growth of CFUs. Fungal colonies were identified using standard textbooks, Bernett and Hunter (1972), Ellis (1971) etc, Percent occurrence of fungi was calculated employing following formula.

## RESULTS-

A glance at adjoining Table-1 would reveal that:
(1) A total of 48 genera of fungi having 110 species were isolated in culture from the atmosphere of Abu Drain.

(2) Aspergillus with 29 spp., Alternaria with 10 spp., and Curvularia and Cladosporium with 9 and 8 spp. were the most dominant fungi.

(3) The trend of dominance in different seasons was Summer > Winter > Rainy with 62, 57 and 43 species, respectively. However, genera-wise the trend was W > R > S.

(4) Frequency-wise fungi were divisible into three classes as follows:

| Fungus | Seasons | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Summer | | | Rainy | | | Winter | | |
| | 100% F | 65% F | 34% F | 100%F | 65%F | 34% | 100% F | 65% F | 34% F |
| Genera | 3 | 5 | 22 | 0 | 5 | 31 | 5 | 6 | 29 |
| Species | 2 | 8 | 50 | 0 | 5 | 51 | 5 | 8 | 43 |

(5) Bisporomyces, Embellisia, Gilmaniella, Helicosporium, Meria, Paecilomyces, Sepedonium, Syncephalastrum, Syncephalis, Tetracosporium, Thielaviopsis, Verticillium and Wardomyces were interesting catches from this ecological niche.

(6) Alternaria helianthi, A. ramulosa, A. zinnae, Aspergillus calyptratus, A. conicus, A. fuscus, A. glaucus, A. proliferans, A. okasaki, Botrytis galanthiana, Cercospora athacina, Cladosporium fusiformae, C. lignymicolum, C. uredinicola, Curvularia catenulata, C. tubulatum, Drechslera tetramera, D. tuberosa, Fusarium bulbigennum, F. bullatum, Meria, Coniospora, Periconia typhicola, Trichoderma album and T. glaucum are interestingly new species reported for the first time from Saharanpur.

## DISCUSSION

The Abu Drain and its surrounding banks act as a temporary dumping site for different types of wastes such as domestic, municipal, biomedical, and agricultural solid waste. These wastes can seriously contaminate the soil, water, and air if they are not managed properly. Therefore, an effective waste management system is necessary to reduce environmental pollution.

**The management plan should include the following steps:**
1. Waste should first be identified and separated into biodegradable and non-biodegradable categories.
2. Garbage should be sorted and placed into green and red containers for proper handling.
3. Sanitation workers should handle waste carefully by using covered vehicles and protective equipment such as masks and gloves.
Table 1: Distrubition of Aeromycospora of Abu Drain arranged Season and Frequency wise.
4. Waste must be collected and stored safely in designated landfill sites before further treatment.
5. Methods such as fogging and deodorizing agents can be used to control bad smells and harmful microorganisms.
6. Proper hygiene and cleanliness of the landfill area should be maintained.
7. Any leakage from waste sites that could contaminate soil or water systems must be identified and controlled.
8. Plastic waste should be reduced and separated, often with the help of rag pickers for recycling.
9. The aeromycological flora (airborne fungi) present in the atmosphere above the landfill site should be studied and identified.
10. Environment-friendly biological control agents should be recognized and used when possible.
11. Techniques such as bioremediation and phytoremediation can help break down or reduce waste biomass.

**Table 1:- Distribution of Aeromycospora of Abu Drain arranged Season and Frequency wise.**

| S. No. | Fungi | Frequency classes in different Season | | |
|---|---|---|---|---|
| | | Summer (%F) | Rainy (%F) | Winter (%F) |
| 1 | Alternaria alternata | 34 | | |
| 2 | A cinerariae | | | 34 |
| 3 | A chiamydospora | | | |
| 4 | A helianthi | 65 | 34 | |
| 5 | A humicola | 34 | 34 | |
| 6 | A phragmospora | 34 | | |
| 7 | a Ramulosa | 100 | 34 | |
| 8 | A tritici | 65 | 34 | 34 |
| 9 | A triticina | 34 | 65 | 65 |
| 10 | A zinnia | | | 65 |
| 11 | Aspergullus candidus | | | 34 |
| 12 | A calyptratus | | 34 | 34 |
| 13 | A clavatus | | 34 | |
| 14 | A conicus | | | 34 |
| 15 | A Flafipes | 34 | | |
| 16 | A. Flavus | 65 | | 34 |
| 17 | A. fonsecaeus | 34 | | 34 |
| 18 | A fumigates | 64 | | 100 |

| | | | | |
|---|---|---|---|---|
| 19 | A fuscus | | | 65 |
| 20 | A giganteus | 34 | | |
| 21 | A globosus | 34 | | |
| 22 | A granulosis | | 34 | |
| 23 | A nidulans | 34 | | |
| 24 | A niger | 65 | 34 | 65 |
| 25 | A okasakii | 34 | | |
| 26 | A proleferans | 34 | | |
| 27 | A sulphureus | 34 | | |
| 28 | A sydowi | | 34 | |
| 29 | A terreus | 34 | | |
| 30 | A usfus | 34 | | |
| 31 | A versicolor | 34 | 34 | 34 |
| 32 | A wentii | 100 | 34 | 34 |
| 33 | Arthrobotrytis Sp. | 34 | | |
| 34 | Aureobasidium pullulans | | 34 | 65 |
| 35 | Bahusakala sp. | | 34 | 65 |
| 36 | Beltrania sp. | | 34 | 34 |
| 37 | Bipolaris indica | | | 34 |
| 38 | Bispora | | 34 | |
| 39 | Bisporomyces | | 34 | 34 |
| 40 | Blastomyces sp. | 34 | | |
| 41 | Botrytis cinereae | | 34 | 34 |
| 42 | Botrytis galanthina | 34 | 34 | |
| 43 | Candida albicans | | 34 | 34 |
| 44 | Cercospora Althacina | | 34 | |
| 45 | Cercospora nigricans | | 34 | |
| 46 | Cladosporium astrinae | | 65 | |
| 47 | C. clavatum | 34 | | |
| 48 | C. epiphyllum | 34 | 34 | |
| 49 | C. fusiformae | 65 | | |
| 50 | C. herbarum | 34 | 34 | 34 |
| 51 | C lignicolum | 34 | | |
| 52 | C. tenuissimum | 34 | 34 | |
| 53 | C. uredinicola | | | 34 |
| 54 | Curvularia catenuleta | 100 | | |
| 55 | C. ellissi | | 34 | |
| 56 | C. geniculata | 34 | 34 | 34 |
| 57 | C. interseminata | | | |
| 58 | C. subulata | 34 | 34 | |
| 59 | C. tetramera | 34 | 34 | 34 |
| 60 | C. tritici | | | 34 |
| 61 | C. tubulatum | | | 100 |
| 62 | Drechslea ellisi | 34 | | |
| 63 | D. indica | 34 | | 34 |
| 64 | D. japonica | 34 | | 34 |
| 65 | D. tetrehenae | 34 | 34 | |
| 66 | D. tuberose | 34 | | |
| 67 | Embellisia nyacinhi | | 34 | 34 |
| 68 | Epicocum nigrum | | | 100 |
| 69 | Fusarium bulbigenum | 34 | | |
| 70 | F. bullatum | 34 | | |
| 71 | F. oxysporum | 34 | 34 | 34 |
| 72 | Geotrichum candidum | 34 | 34 | 34 |
| 73 | Gilmanielle. sp. | | 34 | 34 |
| 74 | Gliocladium | | | 34 |
| 75 | Helocosporium | 34 | 34 | 34 |
| 76 | Memnoniella | | | 34 |
| 77 | Meria coniospora | | 34 | 34 |
| 78 | Monilia sp. | 34 | | 34 |

| | | | | |
|---|---|---|---|---|
| 79 | Mucor | | 34 | 100 |
| 80 | Nigrospora | | 34 | |
| 81 | Oidium | 34 | 34 | |
| 82 | Oidiodendron citrinum | | 34 | |
| 83 | O. flavum | 34 | 34 | |
| 84 | Paecilomyces | | | 34 |
| 85 | Penicillium caslae | 34 | | 34 |
| 86 | P. citrinum | 34 | | 34 |
| 87 | P fuscum | 34 | | 34 |
| 88 | Periconia azalea | | | 34 |
| 89 | P. typhicola | | 65 | 34 |
| 90 | Pithomyces | 65 | 34 | |
| 91 | Rhizopus nigricants | | | 34 |
| 92 | R nodusus | 34 | 34 | 65 |
| 93 | Spedonium | | | 65 |
| 94 | Sporobolomyces sp. | 34 | 34 | 34 |
| 95 | Stachybotrys atra | | | 34 |
| 96 | Streptomyces | 34 | | |
| 97 | Syncephalastrum | | 24 | |
| 98 | Syncephalis | | 34 | |
| 99 | Tetracosportium | | 34 | |
| 100 | Thielaviopsis | 34 | | 100 |
| 101 | Torula sp. | 34 | 34 | |
| 102 | Trichoderma album | | 34 | 34 |
| 103 | T. harriarum | | 34 | |
| 104 | T. flavus | | 34 | |
| 105 | T. lignorum | | 65 | |
| 106 | T. glavum | 34 | | |
| 107 | Ulocladium sp. | | | 34 |
| 108 | Verticillium | 34 | | 34 |
| 109 | Wardomyces | | | 34 |

As to local scenario, Balpande (2014) opined that solid wastes of Nagpur amount to about 830 metric tonnes per day and we have a lifting capacity of 575 metric tonnes per day that can generate 3.5 Megawatt power and 800 bags of fertilizer per day, but we lack processing plants and money to do so. Bio-compost, Biofertilizers and vermicomposting and organic farming by biologically converting lignocellulosic materials (Bagyaraj, 2013; Ehanecchaya & Pandey, 20104; Prabhu, 2014) is a way out.

Also fungi could be used for pest management (Sandhu et al., 2000) producing laccases for lignin degradation (Deepurkar, 2000), increasing soil fertility (Reddy & Joy, 2000), producing environmentally benign pollution-free and cheap bio-control agents (Gola et al., 2015) using Paecilomyces, Trichoderma spp. (Gola et al., 2015) to control Pergillus, craspes, Tribulus terrestris, Aurobasidium and Torula help as antidotes and bio-absorption agents to treat heavy metals.

The growth of Streptomyces helps as deodorant. Present aeromycolora of Abu drain is at variance with the one reported by Singh (2011) for reasons discussed by Gola et al. (2015). Recently Udaya Prakash and Vittal (2013) also reported good harvest of moulds at solid waste dumping site at Chennai.

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