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Full Length Research Article

# Exploration of Serampore, West Bengal, India, Aeromycoflora on Agricultural Waste, Sweet Lime (*Mosambi*, *Citrus limetta*) Peel-Based Media: A New Dimension of Solid Waste Management

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## Abstract

The management of waste is one of the biggest problems in India. Recycling waste should now be an integral part of waste management because it causes less pollution. Fruit peel, which is an agricultural solid waste, has been obtained from the fruit processing industry, fruit juice shops, households, etc. In this study, we used *Mosambi*, or sweet lime peel, as the growth medium for fungi. So, airborne fungi from Serampore, a suburban area near Kolkata, West Bengal, India, were studied during the winter and summer seasons on *Mosambi* peel-derived media, fruit peel agar (FPA) and fruit peel filtrate agar (FPFA) to explore the variation of fungal spores. We found that *Cladosporium* sp. was the dominant fungus during the winter and *Curvularia* was prevalent in the summer. The growth of other fungi, such as *Aspergillus niger*, *Aspergillus* sp., *Aspergillus flavus*, *Fusarium sp., Penicillium* sp., and *Geotrichum* sp. was also noticed on these media. The microscopic view and macroscopic characteristics of fungi were also studied. Recycling *Mosambi* peel into fungal media generates the cheapest media used for fungal growth in comparison to commercially available media. Hence, fungal media derived from *Mosambi* peel not only causes solid waste management but also provides an easily available and cheapest resource for alternative media used for cultivation of fungi. In addition, the aeromycoflora of Serampore, West Bengal, was studied for the first time in this study.

***Key words*:** Media, *Mosambi* peel, Fruit peel agar (FPA), Fruit peel filtrate agar (FPFA), Solid waste management, Cheapest resource

India is the most populous country in the world, with 1,428.6 million people, according to the report of the United Nations Population Fund's (UNFPA) State of World Population, 2023 [1]. This huge population has a negative impact on the environment. The generation of solid waste has been associated with an increasing population. Because enhanced industrialization and urbanisation due to a growing population lead to the production of waste [2]. Solid waste can be generated from households, industries, institutes, markets, hotels, restaurants, stores, construction sites, hospitals, parks, gardens, roadside trees, streets, power plants, treatment plants, etc. Solid waste can be categorised into food waste (garbage), rubbish, industrial waste, horticulture waste, industrial waste, street waste, construction waste, hazardous waste, and agricultural waste [2-3]. Landfill and incineration are two main methods for disposing of solid waste [4]. Anaerobic decomposition of organic solid waste results in the production of gases [2]. Methane, which is the second most abundant greenhouse gas, may be produced from landfills [2], [5]. In addition, carbon dioxide is released from landfills. Incineration also results in the formation of pollutants that pose serious health hazards [4]. Greenhouse gases have the ability to absorb infrared radiation from the surface and radiate it back to the surface or space. This results in the entrapment of heat within the atmosphere by greenhouse gases [6]. Uncontrolled dumping may cause leaching, leading to water pollution [4]. Lower-middle-income countries (LMIC) like India and lower-income countries (LIC) like Bangladesh, Nepal, Ghana, Pakistan, and Uganda still prefer open dumping and landfilling. whereas high-income countries like the US, Italy, the UK, France, Germany, and Spain prefer reducing or recycling to landfilling or incineration. Ineffective waste management may lead to local and global environmental degradation. The scenario in India is quite different. Around 62Mt solid waste was generated from

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urban India in 2015. Around 50 Mt of municipal solid waste (MSW) was collected, whereas, 12 Mt was litter. MSW will be by 165 Mt and 230 Mt by 2030 and 2041 respectively [5]. This data is really alarming. We should give more emphasis on the recycling of solid waste.

The supply of vegetables and fruits increases as the population increases [7]. After consumption of fruit, the peel which is the outer protective cover, is left and it serves as solid waste [4], [8]. Generally, it is dumped into landfills [8]. Dumping sites for fruit peel play a significant role in the growth of pathogenic bacteria. Substantial fruit peels are generated after the processing of fruits for fruit juice in industries [4]. In addition, household or roadside juice outlets or roadside fruit salad shops are responsible for the production of fruit peel.

Substantial papers are available where we can find that fruit peels may be reused and recycled to produce value-added products. Stojanovi *et al*. [9] reported that the peel extract of pomegranate might serve as a therapeutic agent against chronic inflammatory disorders. Fruit peel powder also served as a natural fertiliser for plant growth [10]. Saleem *et al*. [11] showed that fruit peels also had antimicrobial activities against six gram-positive bacteria, six gram-negative bacteria, two filamentous fungi, and two yeast species. Fruit peel also provides nutrients for fungal growth [12]. Fruit peels are generally rich sources of dietary fibre, antioxidants, minerals, polyphenols, etc. [13]. Hence, the generation of products by recycling fruit peels reduces solid waste. Hence, it serves dual roles [8].

Citrus fruit is one of the most abundant crops in the world. They are processed for juice and jam [14]. Juice production from citrus fruit leads to the generation of huge quantities of waste, including peel, seeds, wastewater, etc. Citrus fruit peels are quickly getting damaged by microbes, flies, and mould. Hence, proper disposal is necessary; otherwise, it may lead to soil or water pollution [15]. In central and southern Asia, *Mosambi* is cultivated. The juice industry generates lots of waste after processing it. A higher level of crude fibre is present in *Mosambi* peel [16]. After China, India ranks as the second-biggest producer of fruits and vegetables worldwide.107.10 million metric tonnes of fruits were produced during 2021–22 [17]. A survey conducted by Madalageri *et al*. [18] showed that all twelve fruit juice outlets prepared juice from *Mosambi* (*Citrus limetta*), and *Mosambi* juice was one of the most popular juices sold. So, it is easily understood how much *Mosambi* peel is generated in India.

Bioaerosol is the suspension of biological materials like bacteria, fungal spores, viruses, mites, products from bacteria or fungi, pollen, fragments of plants, insects, etc. in the air [19-20]. Their diameter varies from 0.01 m to 100 m [19]. Bioaerosol, being small and lightweight, can be dispersed through the air from one place to another [21]. Soil, water bodies, rainfall, plants, animals, municipal waste, and living or dead organisms have significantly contributed to bioaerosol [19], [21]. Daily human activities like talking, sneezing, and coughing are also responsible for giving rise to microbes in the air. In addition to farms like poultry and pigs, waste water treatment plants, landfill areas, and waste sorting plants, these have become common sources for bioaerosol [21]. Environment factors such as temperature, humidity, rainfall, and air current have been thought to play a pivotal role in the quality and quantity of aerosol [20].

Fungal spores account for the highest numbers in total bioaerosol [20]. *Cladosporium, Alternaria, Curvuleria, Aspergillus, Penicillum, and Drechslera* are the predominant airborne fungal spores. Some spores may be present throughout the year; some may be seasonal [22]. Airborne fungi have been associated with respiratory allergies [23-24]. Several methods have been used for the collection of bioaerosol, including sedimentation, filtration, impaction, impingement, etc. [25].

This work aims to prepare the sweet lime (*Mosambi*/musombi, *Citrus limetta*) peel as a low-cost medium for the isolation of fungi from the air. In this way, *Mosambi* peel, a peel-based agricultural waste, was recycled to produce very cost-effective microbiological media, leading to the bioconversion of solid waste into a value-added product.

## MATERIALS AND METHODS

*Sampling location*

Serampore, a suburban area near Kolkata, West Bengal, India, was chosen as the sampling location for the present study. A residential area was chosen for sampling. Serampore is located in the Hooghly district of West Bengal, India. It is located between Rishra and Sheoraphuli on the Howrah-Bardhaman railway main line. It is situated on the west bank of the Hooghly River (Fig 1). It is situated at 22.75° N 88.34° E. It has a tropical, wet climate. The average annual precipitation in this city is 150.21 mm. There is no published record of the aeromycoflora of Serampore to date. Hence, it was chosen as the sampling site.


Fig 1 Geographical description of Serampore, West Bengal, India. a) India map showing location of Serampore. b) Satellite map (Google map) showing location of Serampore

*Chemicals*

Agar was procured from Himedia and lactophenol cotton blue was purchased from Nice chemicals. Benedict's reagent was purchased from Qualigens. Potato dextrose agar (PDA) was procured from Sisco Research Laboratory Pvt. Ltd. (SRL).

*Design of experiment*

This study was conducted for five months (both the winter and summer seasons). An air sample was collected on a *Mosambi* peel based-medium by the gravitational settling method. Two types of media were prepared by using *Mosambi* peel. Fruit peel agar (FPA) was prepared when direct *Mosambi* peel powder was used. Fruit peel filtrate agar (FPFA) was made by using *Mosambi* peel filtrate. The plates were exposed to the air for 3 hours. Fungi were identified based on microscopic features and morphological characteristics. The abundance of airborne fungi was studied during the winter and summer seasons. PDA was used as a control medium in this study.

*Collection of fruit peel (Mosambi peel)*

*Mosambi* peel was obtained from a local fruit juice shop. They were cleaned and washed with tap water, followed by being sun-dried for a few days until they were crisp. Then the samples were ground to powder using a mixer grinder. It was

stored in a bottle for future use. It was kept in the refrigerator (Fig 2).

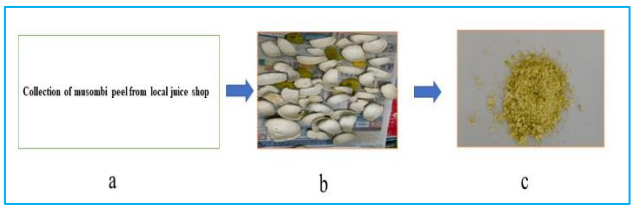


Fig 2 Collection and processing of fruit peel (*Mosambi* peel). (a) collection of *Mosambi* peel from local juice shop (b) sun drying of *Mosambi* peel (c) powder formation after grinding

*Preparation of media*

*Preparation of solid media, fruit peel agar (FPA) by direct use of fruit peel powder*

10 gm of *Mosambi* peel powder was dissolved into 100 ml of distilled water. 1.5% agar was used for solidification. It was autoclaved at 15 psi for 15 minutes. After solidification, the lid of the plates was opened in the air, followed by incubation for 5-7 days at 25°C - 28°C (Fig 3).

*Preparation of solid media, fruit peel filtrate agar (FPFA) by using fruit peel filtrate*

4 gm of *Mosambi* peel powder was dissolved into 200 ml of distilled water, followed by filtration. Filtrate was taken, and agar (3%) was added to the filtrate and autoclaved at 15 psi for 15 minutes. After solidification, the plates were exposed to the air. It was incubated for 5-7 days at 25°C - 28° C (Fig 3).

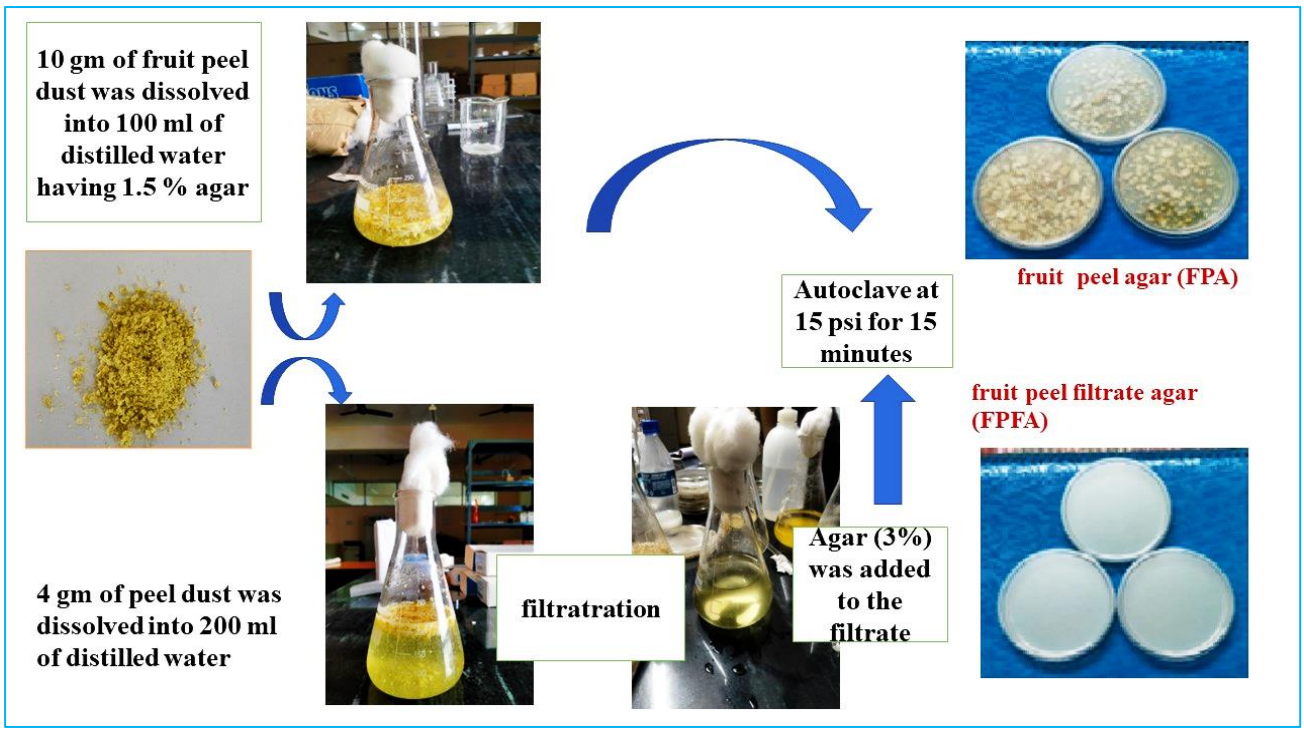


Fig 3 Preparation of media- fruit peel agar (FPA) and fruit peel filtrate agar (FPFA)

*Identification of fungi*

*Macroscopic and microscopic characteristics*

Taxonomic identification of fungi was done based on morphological characteristics and colony characteristics. The morphological identification was performed based on colony shape, colour, growth, etc.

For microscopic identification, the lactophenol cotton blue wet mount-tease mount preparation method was used [26]. A drop of lactophenol cotton blue stain was kept on a clean slide. A small portion of mycelium from the fungal culture was removed and put in the drop of stain with the help of a mounted needle. It was teased (spread apart) gently with the help of two mounted needles, and a coverslip was put on. It was then examined under the microscope. Observation was performed with the high-power objective (45x) of the microscope.

*Qualitative assay of reducing sugar of Mosambi peel filtrate by Benedict's test*

1 ml of *Mosambi* peel filtrate was taken in a test tube. 2 ml of Benedict's reagent was added to it and mixed well. It was placed in a boiling water bath for 3 to 5 minutes. The presence of reducing sugar is indicated by the development of a brick-red-coloured precipitate of cuprous oxide [27].

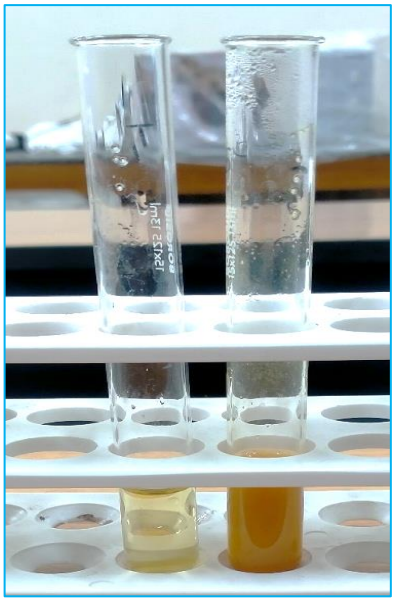

Fig 4 Benedict's test of *Mosambi* peel filtrate. Left test tube indicates only *Mosambi* peel filtrate and right test tube indicates *Mosambi* peel filtrate after reaction with Benedict's reagent. Appearance of red colour denotes presence of reducing sugar

*Data analysis*

The mean and standard deviation of the data were calculated using Excel analysis (MS Office). Values were expressed as the mean ± SD for triplicates.

## RESULTS AND DISCUSSION

We performed Benedict's test of *Mosambi* (*Citrus limetta*) peel filtrate. A brick-red appearance was observed (Fig 4). It indicated that *Mosambi* peel filtrate contained reducing sugar. It is clearly shown that *Mosambi* peel is suitable for the growth of fungi.

Our result showed that FPA and FPFA derived from *Mosambi* peel had served as media for fungi cultivation during the winter and summer seasons of aeromycoflora of Serampore, a suburban city in West Bengal (Fig 5a-d; 6a-f). We also observed fungal growth on PDA when we used it as a control medium (Fig 7). The distribution of airborne fungi (mean number of colonies) during summer and winter on FPA and FPFA was graphically depicted in (Fig 8). Mean number of fungal colonies on FPA and FPFA were presented as mean values with SD values in the (Table 1). From this data, we can conclude that, *Cladosporium* sp., and *Curvularia* sp. were found to be the dominant genera during the winter and summer seasons in the aeromycoflora of Serampore, West Bengal respectively. Another conclusion can be drawn from our data that, *Aspergillus niger* was observed throughout the year. Microscopic observation of various fungi isolated on FPA and FPFA was depicted in (Fig 9). The macroscopic and microscopic characteristics of these fungi was presented in (Table 3). Fungal colonies on PDA were presented as mean values with SD values in the (Table 2).

Table 1 Mean number of colonies of different fungi on FPA and FPFA during summer and winter season. Values were expressed as the mean ± SD for triplicates

| Fungi | Mean number of colonies on FPA | | Mean number of colonies on FPFA | |
|---|---|---|---|---|
| | Winter | Summer | Winter | Summer |
| *Aspergillus flavus* | - | - | 1± 1.41 | - |
| *Aspergillus niger* | 3 ± 4.24 | 1.33 ± 1.24 | 3.66± 2.86 | 6 ± 3.55 |
| *Aspergillus sp* | - | - | 3.33 ± 1.24 | - |
| *Cladposporium* sp | 32 ± 7.78 | 0.66 ± 0.94 | 34 ± 7.34 | - |
| *Curvularia* sp | 1.75 ± 3.29 | 8 ± 2.82 | 8 ± 3.74 | 30.33 ± 18.73 |
| *Fusarium* sp | - | 5.66 ± 2.49 | 0.66 ± 0.94 | 0.33 ±0.47 |
| *Penicillum* sp | 0.33 ± 0.47 | 2 ± 2.16 | 5.66 ±6.01 | 3 ± 3.55 |
| Unidentified 1 | 2 ± 2.82 | 1.33 ± 0.94 | 3.33 ± 2.86 | 5.33 ± 2.05 |
| Unidentified 2 | - | 2.33 ± 2.62 | - | 2.33 ± 1.24 |

Table 2 Mean number of colonies of different fungi on PDA. Values were expressed as the mean ± SD for triplicates

| Fungi | Mean number of colonies on PDA |
|---|---|
| *Aspergillus flavus* | 1.66 ± 0.47 |
| *Aspergillus niger* | 2.33 ± 1.24 |
| *Aspergillus sp* | 0.66 ± 0.47 |
| *Cladposporium* sp | - |
| *Curvularia* sp | 9 ± 4.32 |
| *Fusarium* sp | 2.66 ± 0.94 |
| *Penicillum* sp | 2.66 ± 1.69 |
| Unidentified 1 | 1.33 ± 1.24 |
| Unidentified 2 | 1.66 ±1.24 |

Fungi play a prominent role in ecosystems. They are involved in the decomposition of organic matter, nutrient cycling, or production of biofuel, bioplastics, etc. [28]. They can be used in the medicinal field for the production of antibiotics, vitamins, etc., as well as in industry for the generation of wine, cheese, enzymes, bioremediation, wastewater treatment in the field of the environment, etc. [29]. Fungi are not always beneficial at all. They may be pathogens of plants and animals, including humans [30]. Hence, cultivation of fungi is essential for exploring the activity of various fungi in different fields.

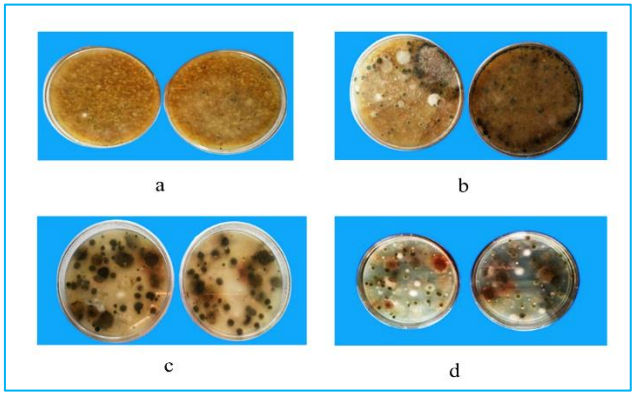


Fig 5 Growth of fungal colonies on FPA and FPFA during winter season. a) and b) fungal growth on FPA. c) and d) fungal growth on FPFA

Table 3 Macroscopic and microscopic appearance of fungi isolated on mosambi peel- based medium

| Macroscopic appearance | Microscopic appearance | Identification of fungi |
|---|---|---|
| Brownish-black colony | Spore containing large head with dark brown, Conidiophore looks like a vesicle | *Aspergillus niger* |
| Black colony with wolly surface | Septate, brown conidiophore and conidia were observed | *Curvularia* sp. |
| Soft velvety green colony | Unbranched rough, nonseptate condiophore, | *Aspergillus flavus* |
| Velvety patches of blue or bluish green colour colony | Branched spore bearing heads looks like little brushes | *Penicillium* sp. |
| Greyish colony | Slightly curved macroconidia, fusiform | *Fusarium* sp. |
| Velvety olive -to gray-green colony | Chains of conidia | *Cladosporium* sp. |
| Light pinkish dry powdery appearance | Arrangement of barrel-shaped arthroconidia in chain | *Geotrichum* sp. |

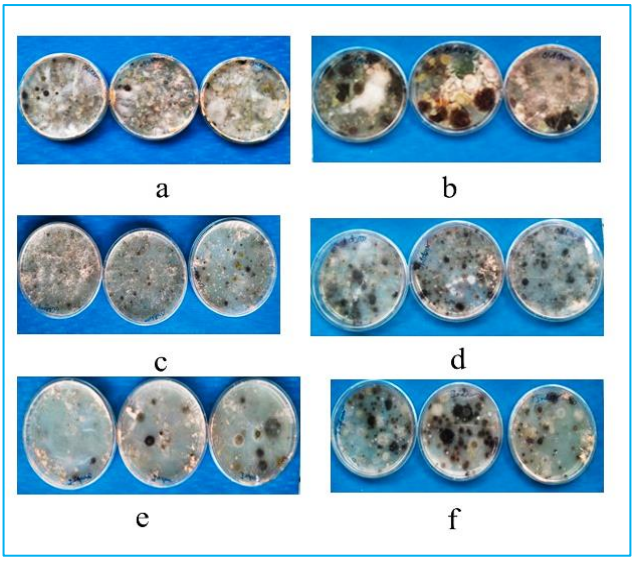


Fig 6 Growth of fungal colonies on FPA and FPFA during summer season. a) and b) growth on FPA. c), d), e) and f) growth on FPFA

Fig 7 Growth of fungal colonies on potato dextrose agar (PDA)

In this regard, research on the formulation of alternative culture media for fungal growth has been appreciated. Natural plant protein sources like cowpea, chickpea, mung beans, soy protein, lentils, and split pea were used for the growth of *Penicillium* sp. and *Aspergillus* sp. [31]. Ravimannan *et al*. [32] showed fungal growth on media prepared by edible legumes such as green gram, black gram, soya meat (processed soy protein), and cowpea powder. Tharmila *et al*. [33] used sago, tubers of sweet potato, cassava, and raw dried palmyrah tuber flour for the preparation of fungal growth media. Here, fungi like *Trichoderma* sp., *Mucor* sp., *Penicillum* sp., and *Fusarium* sp. were used in this study. Another study reported that chickpeas, corn, soy flour, processed soy flour, dhal, and thinai had been used to prepare alternative fungal media [34]. Borah *et al*. [35] prepared alternative fungal media by using powders of beetroot, carrot, taro corm, and sweet potato. They also showed the cost-effectiveness of their formulated media. The price of their media came down to almost half that of commercial PDA media. These above-mentioned data obviously have two advantages: i) local ingredients or resources are used to prepare formulated media for fungal growth. As local resources have been used, sources are easily available. ii) They are cost-effective and the cheapest. Hence, the cheapest and easily available local sources have received more attention for making alternative media used for fungal culture. Fruit peel is one of the cheapest and most easily available resources. In addition, fruit peel serves as solid waste. Treatment of fruit peel for making fungal media has been associated with the management of solid waste, resulting in some reduction of environmental pollution. In our study, we obtained *Mosambi* peel from a local juice shop. After making juice, fruit peels are generally thrown away, leading to environmental pollution. So, *Mosambi* peel serves as an agricultural waste product [36]. Hence, *Mosambi* peels are easily available and the cheapest source for fungal media preparation, whereas, PDA, which is widely used for the cultivation of fungi, is a costly medium. The price for ready-made PDA media is around Rs 952 (approximately $11.52) per 100 gm in 2023. In 2023, the price of agar is around Rs 5245 (approximately $ 63.49) per 500 gm. For the preparation of 100 ml of FPA, 1.5 g of agar is needed. The cost for the preparation of 100 ml of FPA comes to around Rs 16 (approximately $ 0.19), whereas 100 ml of PDA requires around Rs 37(approximately $ 0.45). It is clearly seen that the price for the commercially available media is almost double in comparison to FPA for the fungal media. But, in the case of FPFA agar preparation, 3 g of agar is required. The cost of 100 ml of FPFA agar is around Rs 31(approximately $ 0.38), which is still less than commercially available media. This data indicates that using *Mosambi* peel as a fungal medium may cause less burden in financially weak Microbiology laboratories. Because cultivation and subculturing of fungi in a Microbiology laboratory needs huge amounts of media. In addition to, using *Mosambi* peel from a local juice shop as a raw material for media may contribute to cleaning up local solid waste in a very small way. Hence, there are two advantages using fruit peel as a medium: the generation of products as well as solid waste treatment [8]. Thus, choosing *Mosambi* peel for fungal media in our study provides us with two important advantages: obtaining the cheapest resources and managing solid waste.

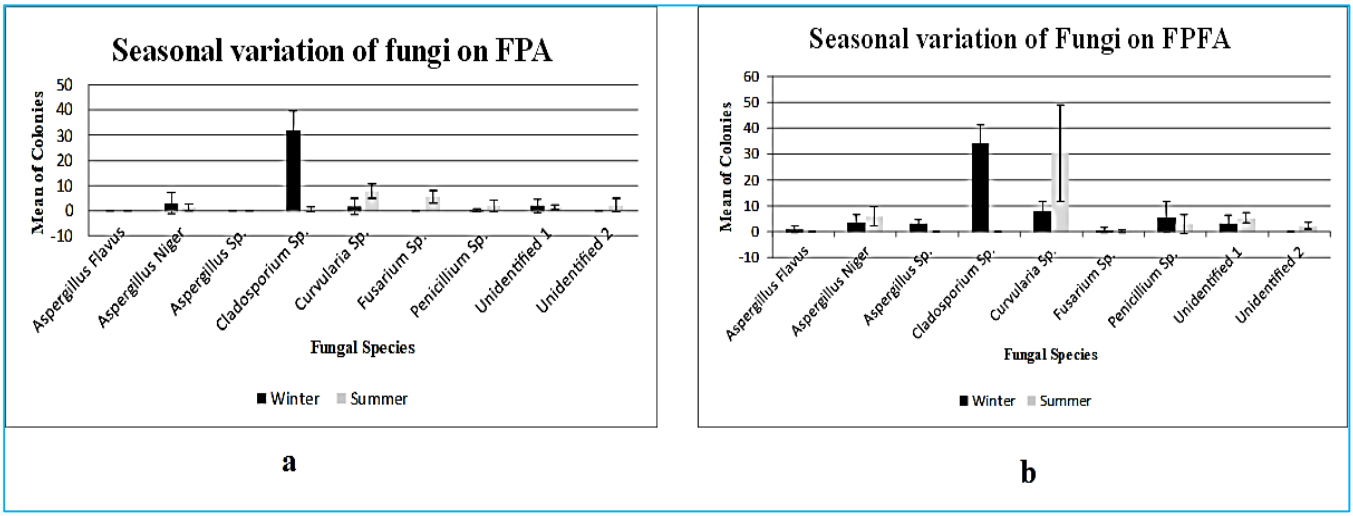


Fig 8 Mean number of colonies of different fungi on FPA and FPFA during summer and winter season. Values were expressed as the mean ± SD for triplicates

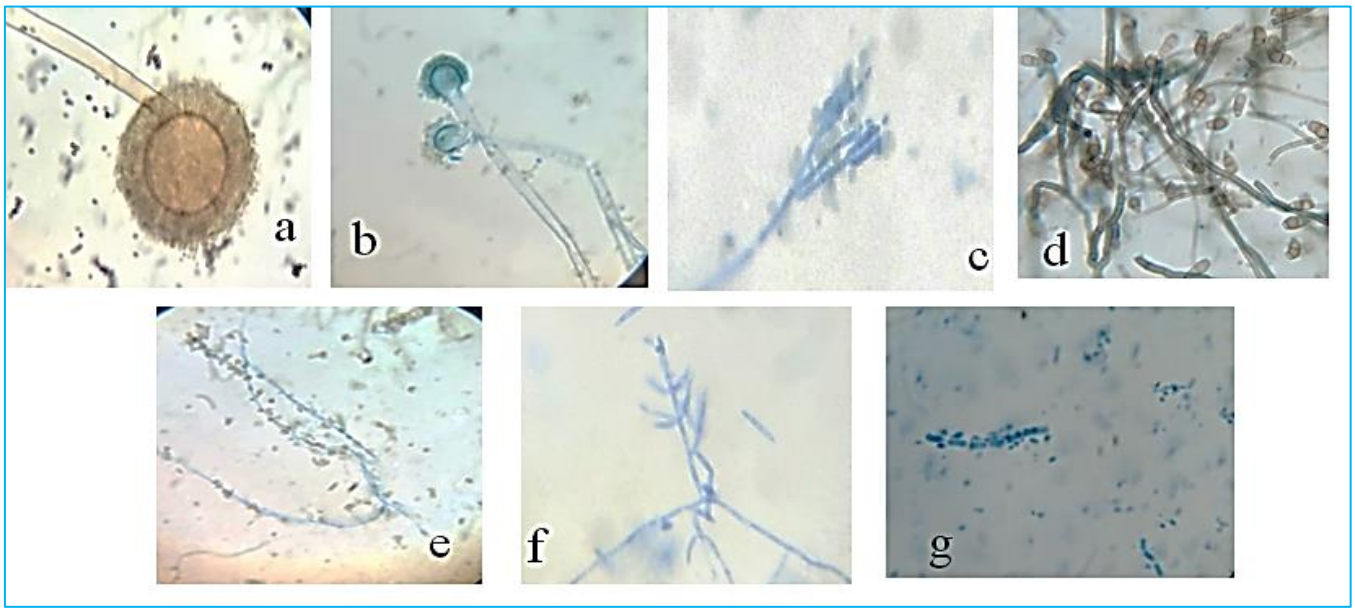


Fig 9 a) *Aspergillus niger*, b) *Aspergillus flavus* c) *Penicillium* sp. d) *Curvularia* sp. e) *Cladosporium* sp. f) *Fusarium* sp. g) *Geotrichum* sp.

As fungi are chemoheterotrophs, organic compounds are required for carbon and energy sources [37]. Various sugars have been used by fungi for their growth. Glucose can be utilized by probably all fungi. Other sugars also act as carbon sources for fungal growth [38]. Polysaccharides like starch, cellulose, hemicellulose, chitin, and pectic substances can be used by fungi based on their extracellular enzymes. Nitrogen-containing compounds, either in the form of inorganic (salt) or organic form (amino acids) are also required. In addition to sulphur, phosphorus, potassium, magnesium, and other trace elements are essential for fungal growth. Most fungi are found to be aerobic [37]. Thus, the selection and composition of media play a significant role for the growth of fungi in the laboratory. The growth of *Aspergillus* on bacterial media was found to be around 30% less effective than fungal media [39]. Media should have high carbohydrate sources, and nitrogen sources for the cultivation of fungi in laboratories [40]. Sugar, protein, and minerals in agricultural wastes allow to grow microorganisms, mainly fungi and this may replace expensive media [4]. *Mosambi* peel is a good source of crude fiber (17.58%), along with protein (5.39%), and fat (1.58%). It is rich in pectin, and complex polysaccharides [41]. Another report showed that *Mosambi* peel had crude fiber (15.2 ± 0.5%) and crude protein (9.5 ± 0.02%) [42]. The incorporation of *Mosambi* peel powder (MPP) increased fiber content in meat products like sausages and patties [43]. Another study reported that *Mosambi* peel contains 18.3% cellulose, 26.2% hemicellulose, and 8.9% lignin [36]. Our study also showed that *Mosambi* peel filtrate contained reducing sugar. It is clearly shown that *Mosambi* peel is suitable for the growth of fungi.

For the study of aeromycoflora from Serampore, a suburban city, in West Bengal, we used FPA and FPFA derived from *Mosambi* peel as a medium for fungi cultivation during the winter and summer seasons. We also used PDA as a control medium for the fungal growth. Our data clearly showed that *Cladosporium* sp. was the dominant genus during the winter, whereas, *Curvularia* sp. was the prevalent genus during the summer season for the aeromycoflora of Serampore. In addition to, our data also showed that, *Aspergillus niger* was found throughout the year. Chakraborti *et al*. [22], found that, the winter season was the peak season of *Cladosporium* sp, when they studied the aeromycoflora of Madhyamgram, a suburban area close to Kolkata. Another report also showed that an abundance of *Cladosporium* sp. took place during the winter season, when indoor and outdoor aeromycological surveys of Burdwan, West Bengal, were carried out [44]. Spores of *Cladosporium* sp. accounted for 70% of the total during the winter and various species of *Aspergillus* were common in summer [45]. Another study [46] found that the highest and lowest numbers of *Cladosporium* sp. were found in Bengaluru during the winter and summer seasons, respectively. Hence, our data regarding the occurrence of *Cladosporium* sp. during the winter was quite similar to these studies. *Curvularia* sp. was found to have a higher frequency in crop field during the summer, when Karmakar *et al*. [47] studied Habra, a semi-rural area, North 24-Parganas District of West Bengal. A similar observation was made regarding the prevalence of *Curvularia* sp. in our study. The occurrence of fungal spores may be seasonal or throughout the year [22]. Our result also indicated that, because *Cladosporium* sp. was predominantly observed during the winter season, whereas, *Aspergillus niger* was found throughout the year. A similar result was obtained from Singh *et al*. [48]. They also found that, there was no seasonal variation for *Aspergillus niger*, but a seasonal preference for *Cladosporium* sp. was observed, dominant during the winter season.

Several scientific papers have been available for the study of airborne fungi from Kolkata and its nearby suburban, other suburban, and semirural areas in West Bengal [22], [47], [49-58]. Their studies mainly focused on indoor and outdoor aeromycoflora, seasonal variation of airborne fungi, relation between environmental parameters (climatic factors) and spore concentration, relation between respiratory allergy and fungal spore concentration, distribution of airborne fungi in local markets (fish market, meat market, farms), distribution of airborne fungi in the outdoor and indoor environments of the hospital etc. Our study was focused on the distribution of airborne fungi in Serampore, a suburban area near Kolkata. We cultivated fungi on formulated media derived from *Mosambi* peel, agricultural waste. There is no data on the aeromycoflora of Serampore, a suburban area near Kolkata, to date. In this regard, our study was the first to report the distribution of airborne fungi in Serampore during the winter and summer seasons. Along with this, fungal medium was derived from agricultural solid waste for this study. Hence, the study of aeromycoflora for Serampore on the peel of sweet lime or *Mosambi* was absolutely a new approach in the field of mycology as well as solid waste management.

## CONCLUSION

The main focus of the present study was on solid waste management in different ways. Fruit peel is one of the agricultural wastes derived from various sources and may cause environmental problems if it is left untreated. At the same time, commercially available media, which are generally used in microbiological labs for the cultivation of fungi, offer a very high price. Hence, the cheapest alternative media have received great attention from the researchers. In this present study, *Mosambi* peel-derived FPA and FPFA served as media for fungi due to their presence of nutrients. Variation in fungal spores in the air has been associated with various diseases. Exploration of the aeromycoflora of Serampore was carried out using *Mosambi* peel-derived media during the winter and summer. Recycling *Mosambi* peel, a solid waste, into the cheapest alternative media for fungal study seriously adds a new dimension to the field of solid waste management, along with mycological study in laboratories.

***Conflict of interest***

There is no conflict of interest. This study received no external funding.

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