International Journal of Science, Strategic Management and Technology
Volume **02** Issue **03** March-**2026** | ISSN: **3108-1762 (Online)** | Impact Factor: 3.8
An International, Peer-Reviewed, Open Access Scholarly Journal Indexed in recognized academic databases

OPEN ACCESS

Isolation and Identification of Air Microflora from Different Locations of College Campus

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https://doi.org/10.55041/ijsmt.v2i3.357

Cite this Article: Joshi, P., Panke, S., Patil, S. & Pawar, R. (2026). Isolation and Identification of Air Microflora From Different Locations of College Campus. International Journal of Science, Strategic Management and Technology, *02*(03). https://doi.org/10.55041/ijsmt.v2i3.357

Abstract:
The study of air microflora is important in microbiology to understand the diversity and distribution of airborne microorganisms. Isolation and identification of these microorganisms help in determining air quality and possible sources of contamination. The present study focuses on the isolation and identification of air microflora from different locations of Lokmangal college campus in order to check types of microorganisms present in the air and assessing air quality
Compare their distribution in different locations.

Introduction:
Air contains a wide variety of microorganisms such as bacteria, fungi, yeast, and spores that originate from soil, water, plants, animals, and human activities. These microorganisms are collectively known as air microflora or airborne microorganisms. Although air is not a natural habitat for microbial growth, it acts as a medium for the dispersal and transportation of microorganisms from one place to another. Air is considered one of the least hospitable environments for microbes because it has fewer nutrients and supports relatively fewer organisms. Exposure to bioaerosols containing airborne pathogenic microorganisms and their by-products can cause respiratory disorders and air-borne diseases. (Nimota et al.2025). Air microflora plays an important role in environmental and public health. Some airborne microorganisms are harmless, while others may cause allergies, infections, and diseases in humans, animals, and plants. The presence and concentration of microorganisms in the air depend on several factors such as temperature, humidity, air movement, pollution, and human activity. Different environments such as indoor areas (laboratories, classrooms, homes) and outdoor areas (gardens, roadsides, markets) may contain different types and numbers of microorganisms. In the context of public health and One Health, understanding the dynamics of these organisms in the environment is key to disease prevention and control (Fernanda et al., 2025). To maintain air quality, constant monitoring of parameters like temperature and humidity that promote the presence organisms in the air, reducing the number of occupants, ensuring a well-functioning ventilation system, and implementing regular cleaning routines should be practiced (Osaghae, et al., 2025). The presence of potential airborne pathogens with proven internal sources underscores the need for detailed monitoring of corridor air quality (Ayaz et al., 2026). Common indoor pollutants include biological particles and their byproducts, impacting people's health and productivity. Biological pollutants can affect indoor air quality and cause

nosocomial infections (Akhtar et al., 2026). *Particular attention is given to the role of ventilation systems, sanitary-hygienic practices, occupancy levels, and preventive measures (Aziza, 2026).*

Materials and Methods:

Materials:
Sterile Petri plates, Nutrient agar medium, Autoclave, Incubator, Laminar airflow cabinet, Sterile cotton swabs, Inoculating loop/needle, Alcohol (70%), Marker pen and labels, Microscope, Glass slides and cover slips, Lactophenol cotton blue stain (for fungi), Gram staining reagents (for bacteria) 3% Hydrogen peroxide (H_2O_2), Clean glass slide, Inoculating loop/wooden stick, Sugar fermentation broth (with indicator, e.g., phenol red), Durham tubes, Sterile test tubes

1. Preparation of Nutrient Agar
Nutrient agar medium was prepared according to the manufacturer'sinstructions.It was Sterilized in an autoclave at 121°C for 15 minutes. The sterilized medium was poured into sterile Petri plates under aseptic conditions. Allowed the agar to solidify at room temperature.

2. Sample Collection (Settle Plate Method)
Petri plates were exposed to air at predetermined different locations of Lokmangal campuses for 10–15 minutes to allow airborne microorganisms to settle on the agar surface. After exposure, closed the lid carefully to prevent further contamination.

3. Incubation
The exposed plates were placed in an incubator in inverted position at 37°C for 24–48 hours. After incubation, observed the formation of microbial colonies.

4. Isolation of Pure Cultures
Observed colonies were proceed further for morphological characterization such as size, shape, color, elevation, and margin. Further picked a single colony using a sterile inoculating loop. Streaked it onto a fresh nutrient agar plate to obtain a pure culture. Incubated again at 37°C for 24 hours.

5. Identification of Bacteria
Prepared a smear of the isolated colony on a clean glass slide. Performed Gram staining. Observed the stained smear under a microscope to determine the shape and Gram reaction of bacteria.

6. Recording the Results
Recorded the number of colonies present on each plate.Note the morphological characteristics of the colonies. Confirmatory test such. Catalase Test, starch test, sugar fermentation test were performed for confirmation of specific microorganism.

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Results:

Table no.1 Results of Sugar Fermentation Test

Plate	Sugar used	Colour change	Gas in Durham tube	Result
1	Glucose	Yellow	Present	Positive
2	Glucose	Yellow	Present	Positive
3	Glucose	Red	Absent	Negative
4	Glucose	Yellow	Absent	Positive
5	Glucose	Yellow	Slight gas	Positive

Table no. 2 Results of Catalase Test

Test/Slide	Observation adding H2O2	Result
1	No bubbles	Negative
2	Few delayed bubbles	Weak positive
3	Immediate vigorous bubbling	Positive
4	Rapid bubbles	Positive
5	Rapid bubbles	Positive

Table no.3 Results of Starch hydrolysis test

Sr.no.	Locations	Observation after Iodine	Result
1	Biotechnology Department	No clear zone	Negative
2	Girls Hostel	No clear zone	Negative
3	Pharmacy Department	Clear zone around colony	Positive
4	Nursing Department	Large clear halo zone	Positive
5	Nursing Department	Moderate clear zone	Positive

Table no.4.Results of Airmicroflora at different locations of Campus

Sr.no. Locations		Microorganisms		
		Bacillus	Staphylococcus	Yeast
1	Biotechnology Department	Negative	Positive	Negative
2	Girls Hostel	Negative	Positive	Negative
3	Pharmacy Department	Positive	Negative	Positive
4	Nursing Department	Positive	Positive	Positive
5	Lokmangal Hospital	Positive	Positive	Positive

Fig.1. Growth of Colonies after incubation

Fig.2.Confirmatory tests

Conclusion

Isolation and Identification of Air Microflora from Different Environments

The present study demonstrated that air contains a variety of microorganisms collectively known as air microflora. By using the settle plate method with nutrient agar plates, different types of microbial colonies were successfully isolated from various environments. The growth observed on the culture plates indicated the presence of airborne bacteria in the sampled locations. The microorganisms were identified are based on their colony morphology and microscopic characteristics after staining. The identified microorganisms are Bacillus, Staphylococcus and yeast Differences in the number and types of colonies were observed in different environments, showing that microbial distribution in air depends on factors such as human activity, ventilation, temperature, and environmental conditions. Thus, the study confirms that air acts as an important medium for the dispersal of microorganisms. Monitoring air microflora is useful for understanding air quality, environmental hygiene, and potential sources of microbial contamination.

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