International Journal of Agriculture and Allied Sciences July-December 9(2), 71- 76, 2024
ISSN 2583-6336, NAAS Rated 2.47: Peer Reviewed

A COMPREHENSIVE STUDY ON THE DIVERSE HOST RANGE OF THE BASIDIOMYCETOUS FUNGUS SCHIZOPHYLLUM COMMUNE IN ALLAHABAD REGION

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ABSTRACT: It is located in the Gangetic plains near the Tropic of Cancer; Allahabad experiences a subtropical climate that fosters a rich floristic diversity, providing an ideal environment for the proliferation of wood-decaying fungi. A periodic survey and collection of such fungi were conducted in Allahabad and its surrounding regions between 2005 and 2011. Survey sites within Allahabad included the University Campus, Company Garden, and Khusro Bagh, while adjacent areas such as Naini, Jhunsi, Nehru Park, Phulpur, and Phaphamau were also explored. Among the diverse wood-decaying fungi recorded, Schizophyllum commune emerged as one of the most common species with a global distribution.Schizophyllum commune exhibited a broad host range, thriving both as a parasite and a saprophyte. Its habitats encompassed a variety of woody substrates, including the bark and trunks of trees, stumps, fallen branches, logs, stacked timber, sticks, planks, and boards. The fungus was observed in various growth forms— solitary, clustered, scattered, or gregarious. Beyond its ecological significance, S. commune is notable as a favored edible mushroom with recognized medicinal properties, further emphasizing its importance in both ecological.

KEY WORDS: Allahabad, Schizophyllum commune, wood- decaying fungi, host range, edible mushrooms, medicinal properties

Economic contexts Introduction

The Allahabad district, situated between the Ganges and Yamuna rivers, boasts fertile lands and diverse climatic conditions that support a wide range of vegetation. These conditions also create an ideal woody substratum for the proliferation of various wood- decaying fungi (Tripathi and Basu, 2009). Among these, *Schizophyllum commune* Fr., commonly known as the split gill mushroom, is a globally distributed and prominent wood-degrading basidiomycetous fungus (Dasanayaka and Wijeyaratne, 2017).*Schizophyllum commune* is a white-rot fungus known for producing cellulases and ligninases, enabling it to decompose most cell wall components (Tovar-Herrera et al., 2018; Tanesaka et al., 1993). Although primarily regarded as a saprotroph, it can also act as a pathogen on various plant hosts and has increasingly been reported as a human pathogen (Singler et al., 1997). This fungus plays a crucial ecological role as a significant decomposer, contributing to nutrient cycling and ecosystem functioning (Parihar et al., 2012). Additionally, *S. commune* holds value as an edible mushroom and for its potential medicinal applications (Tripathi and Basu, 2010). In regions such as Northeast India, Indonesia, Malaysia, and Thailand, it is consumed both as food and medicine (Albina et al., 2023; Debnath et al., 2017). The fungus is also recognized for producing valuable metabolites and enzymes (Kumar et al., 2022). One such metabolite, schizophyllan—a polysaccharide produced by *S. commune*—exhibits several therapeutic effects and has garnered significant attention in the pharmaceutical industry in recent years (Acharya et al., 2022). This study reports the broad host range of *Schizophyllum commune* observed in Allahabad city and its surrounding areas, emphasizing its ecological, nutritional, and medicinal importance.

MATERIALS AND METHODS

A systematic survey and sample collection were conducted in various localities of Allahabad city and its adjoining areas during the rainy season, from late June to September, coinciding with the South-West Monsoon period of maximum rainfall. Sampling sites included botanical gardens, parks, woodland areas, and natural forested regions. Fresh specimens were photographed in the field alongside their woody substrates. During the field survey, macroscopic characteristics such as shape, size, color, texture, odor, and attachment were meticulously documented in a field notebook. Fruiting bodies were carefully collected, stored in polythene bags, and transported to the laboratory, where they were preserved at 4°C for further detailed analysis. Spore prints were obtained from fresh specimens by placing the fruiting bodies on white and black paper. Microscopic examination of the specimens was carried out to study their anatomical features. Identification was performed using morpho-anatomical characteristics and compared with descriptions available in standard

literature (Alexopoulos et al., 1996; Fergus, 1960; Ainsworth et al., 1973). Host identification was aided by the works of Bose and Chaudhary (1991), Misra and Verma (1992), and Bose et al. (1998). To obtain pure mycelial cultures of *Schizophyllum commune*, tissue from the fruiting body or basidiospores was inoculated on potato dextrose agar (PDA) supplemented with 0.5% yeast extract. All procedures were conducted under standard aseptic laboratory conditions. The cultures were incubated at room temperature for 7–15 days, during which pure cultures with clamp connections were obtained. Dried specimens and pure cultures of *S. commune* were deposited in the Mitter Mycology Laboratory, Department of Botany, University of Allahabad, for future reference and study.

RESULTS AND DISCUSSION

Schizophyllum commune was frequently collected from a wide range of substrates across Allahabad and its adjoining areas. These included the bark and trunks of trees such as *Acacia nilotica*, *Butea monosperma*, *Cassia fistula*, *Delonix regia*, *Ficus religiosa*, *Madhuca indica*, *Mangifera indica* and *Nerium oleander*. Additionally, *S. commune* was found on logs from *Acacia senegal*, *Delonix regia*, *Ficus religiosa*, *Mangifera indica* and *Roystonea regia*; on bamboo culms; and even on painted doors (Plate-1, Table-1). It was also observed on stumps, sticks, and both fresh and decayed fallen branches. Interestingly, the dry fruiting bodies of *S. commune* were noted to persist on these substrates for extended periods, sometimes remaining throughout the year.

Description of *Schizophyllum commune* Fr. Ex. Fr.

The basidiocarp of *S. commune* typically grows in a gregarious, scattered, or tiered arrangement on the substrate. The fruiting body has a fan- to shell-shaped appearance when laterally attached and a saucer shape when centrally attached. It is relatively small, measuring up to 6 cm in width. The basidiocarp is soft and coriaceous when young, brownish-grey when moist and whitish-grey when dry. The upper surface is densely covered with hairs, and the margin is incurved with a somewhat lobed appearance. The flesh is thin and tough, with the margin being lobed and elastic when moist.

The ridges of the fruiting body are gill-like, radiating from the point of attachment of the cap. These ridges split longitudinally into two parts, curling inwards to protect the spore-producing layers during dry conditions. Upon rehydration, the gills straighten and quickly begin to shed spores. The spore print is white and the basidiospores are white in mass, cylindrical, smooth and colorless, with a size range of 3.5–5.4 µm in length and 1.5–3 µm in width.

Description was based on Specimen No. MMLR XIX. The characteristics observed in the specimen were consistent with those described in the literature. These findings further support the wide distribution and ecological adaptability of *S. commune* in the Allahabad region.

Host Range and New Host Records

Table 1 lists the host species of *Schizophyllum commune* observed during this study. The fungus was found on a variety of host species, including both economically important and ornamental plants. Notably, the species *Mangifera indica* was found to be the most favorable host, with fruiting bodies collected from it consistently over several years (2005–2011). Earlier *S.commune* was reported on *Butea monosperma* by Saksena and Vyas (1962); on *Cassia fistula, Shorea robusta* by Vijayan and Rehill (1990); on *Mangifera indica* by Singh and Basu (2007); on log of *Madhuca indica* by Tripathi and Basu (2009); on dead Bamboou culm by Sarma *et al.,* (2010). Here *Acacia nilotica, Delonix regia, Ficus religiosa, Madhuca indica, Nerium oleander;* log of *Acacia senegal, Delonix regia, Ficus religiosa, Roystonea regia* and painted door being reported as a new host and contributing new insight to the ecological range of *S. commune* (Bilgrami *et al*., 1981; Jamaluddin *et al.,* 2004). The presence of *S. commune* on these diverse substrates, including economically significant and ornamental plants, highlights its ecological versatility. The fungus demonstrates extensive growth on decaying wood, where its mycelia effectively degrade complex organic compounds into simpler forms. This process contributes to nutrient cycling and organic matter decomposition, which plays a critical role in ecosystem functioning.

Further experimentation showed that the mycelia of *S. commune* could grow extensively and produce some fruiting bodies in a mixture of organic waste and cellophane, indicating its potential in waste degradation (Gupta and Basu, 2017). The wide distribution of *S. commune* on a variety of substrates and its ability to grow in diverse ecological settings make it a valuable model organism for studying fungal biology and ecological interactions.

CONCLUSIONS

Due to its global distribution and ability to colonize a wide range of wooden substrates, *Schizophyllum commune* offers a unique opportunity for further ecological and biochemical studies. Its role in wood decay, nutrient cycling, and waste decomposition makes it an important species for research in both ecological and industrial contexts.

Acknowledgement

The author expresses sincere gratitude to the Head of the Botany Department, University of Allahabad for providing the necessary research facilities. I also extend my heartfelt thanks to Prof. D.K. Chauhan and Dr. Satyanarayan for their assistance in the identification of host species. Their contributions have been instrumental in the success of this research.

Table- 1 Host of Schizophyllum commune

S. No	Host Species	Family	Year	Locality
1	*Acacia nilotica* (L.)	Mimosaceae	2005	Nehru Park

2	*Butea monosperma* (Lam.)	Fabaceae	2007, 2009	Roxburgh Botanical garden, company garden
3	*Cassia fistula* Linn.	Caesalpiniaceae	2006, 2009	Company garden, George Town
4	*Delonix regia* (Bojer ex Hook.) Raf.	Caesalpiniaceae	2007, 2010	Naini, Women's hostel
5	*Ficus religiosa* (L.)	Moraceae	2008, 2009	Katra, Medical college, Company garden
6	*Madhuca indica* (Gmelin.)	Sapotaceae	2006, 2009	Women's hostel, Phaphamau
7	*Mangifera indica* (L.)	Anacardiaceae	2005, 2006, 2007, 2008, 2009, 2010,2011	Arts faculty, women's hostel, Nehru park, Phulpur, Botanical survey of India, Allenganj, Company Garden, medical college, Ashok Nagar
8	*Nerium oleander* (L.)	Apocynaceae	2011	Science faculty
9	Log of *Acacia senegal*	Mimosaceae	2011	Arts faculty
10	Log of *Delonix regia*	Caesalpiniaceae	2007, 2010	Company garden, Women's hostel
11	Log of *Roystonea regia*	Arecaceae	2008	Roxburgh Botanical garden
12	On Bamboo culms	Poaceae	2005, 2007, 2008	Woman's Hostel, Sangam area, Katra, Company garden
13	On painted door	-	2009, 2010	Old Katra
14	Stump, fallen branches and logs of unknown trees	-	2005, 2006, 2007, 2008, 2009, 2010, 2011	Women's hostel, Arts and Science faculty, college, George town, Allenganj, Naini, Nehru park, Phaphamau Phulpur, Company garden etc.

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Plate-1

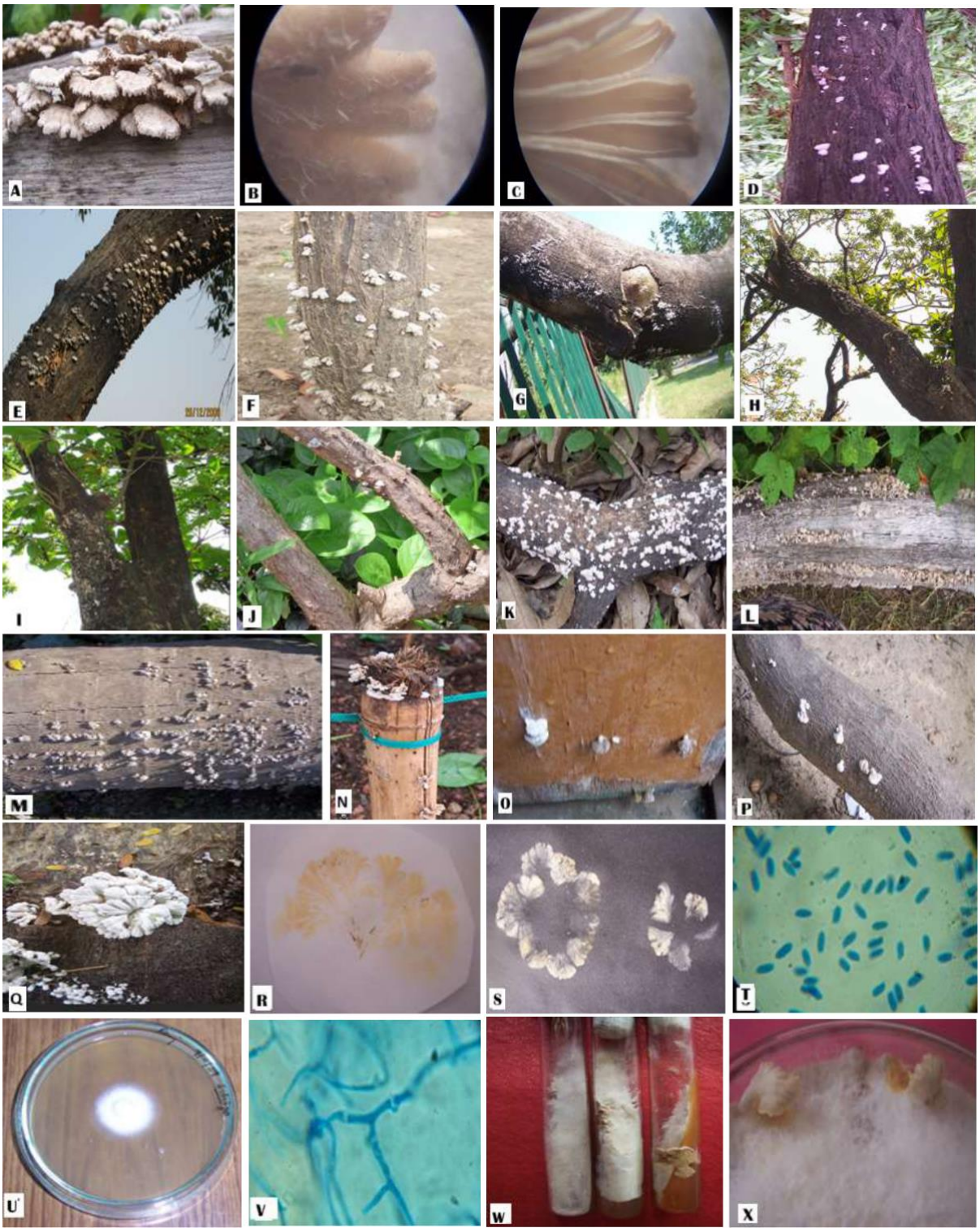

Plate-1 Description

- **A**: Mature fruiting bodies of *Schizophyllum commune.*
- **B**: Upper surface view of *S. commune* showing thick hairs.
- **C**: Lower surface view of *S.commune* showing split-gills.
- **D**: Fruiting bodies of *S.commune* on *Acacia nilotica.*
- **E**: Fruiting bodies of *S.commune* on *Butea monosperma.*
- **F**: Fruiting bodies of *S.commune* on *Cassia fistula.*
- **G**: Fruiting bodies of *S.commune* on *Delonix regia.*
- **H**: Fruiting bodies of *S.commun* on *Mangifera indica.*
- **I**: Fruiting bodies of *S.commun* on *Madhuca indica.*
- **J**: Fruiting bodies of *S. commune* on *Nerium oleander.*
- **K**: Fruiting bodies of *S.commune* on log of *Mangifera indica.*
- **L**: Fruiting bodies of *S.commune* on log of *Ficus religiosa*
- **M**: Fruiting bodies of *S.commune* on log of *Roystonea regia*
- **N**: Fruiting bodies of *S.commune* on Bamboo culm.
- **O**: Fruiting bodies of *S.commune* on painted door.
- **P**: Fruiting bodies of *S.commune* on log of *Acacia senegal*
- **Q**: Fruiting bodies of *S.commune* on log of *Delonix regia*
- **R & S**: Spore print of *S.commune.*
- **T**: Basidiospores of *S.commune.*
- **U**: Pure culture of *S.commune* in petri dish.
- **V**: Mycelium showing clamp connection.
- **W**: Developmental stages and mature fruiting body of *S.commune* in slant.
- **X**: Mature fruiting body of *S.commune* in petri dish. .