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Schizophyllum commune a Nutritionally Rich Underutilized Delicacy

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Abstract

Schizophyllum commune (split gill mushroom) is a cosmopolitan basidiomycete exhibiting exceptional ecological adaptability, functioning as a saprophytic fungus, rich source of protein, vitamins and minerals. This mushroom is widely distributed globally from temperate to tropical climate. In India, particularly in the North-East, it holds strong ethnomycological importance and is traditionally consumed in curries, fish or pork preparations, and deep-fried pakoras under local names such as lengphong, pakha chhatu, Kanglayen, and Pasi. Nutritionally, it is rich in proteins, amino acids, vitamins, and minerals, while medicinally it produces bioactive polysaccharides, notably schizophyllan, with immunomodulatory and anticancer potential. Although commercial cultivation is still emerging in India, research focuses on low-cost substrates like paddy and wheat straw to enhance yield. Its cultural relevance, therapeutic value, and biotechnological applications underscore its scientific and societal significance.

Keywords: Schizophyllum, Mushroom, Nutrition, Ethnomycology, Fungus

Introduction

S. commune Fr., commonly known as the split gill mushroom, is a globally distributed basidiomycete belonging to the phylum Basidiomycota, class Agaricomycetes, order Agaricales, and family Schizophyllaceae. First described by Elias Magnus Fries in 1815, it is recognized by its unique longitudinally split gills that produce basidiospores. This fungus colonizes deadwood of more than 150 plant genera, usually as a white rot, and is found on all continents except Antarctica (Marian *et al.*, 2024). Its ecological versatility is remarkable, as it thrives under extreme conditions including high pressure, radiation, and both aerobic and anaerobic environments. In India, it holds ethnomycological importance, locally called *lengphong* or *pakha chhatu*, and is consumed in traditional dishes. Beyond its cultural role, *S. commune* serves as a model organism for mushroom development, mycelium materials, and cell wall studies, while also producing bioactive compounds of nutritional, medicinal, and industrial significance.

Diversity and Geographical Distribution

S. commune exhibits a truly cosmopolitan distribution, occurring across tropical, subtropical, and temperate regions worldwide. It commonly colonizes dead or decaying wood in forests, plantations, and even urban environments throughout Asia, Africa, Europe, the Americas, and Oceania, with greatest abundance in warm, humid climates. In India, the species is widely reported from the northeastern states viz., Assam, Manipur, Meghalaya, Nagaland, Tripura, Mizoram and Sikkim, eastern regions (West Bengal, Odisha), central India, Western Ghats, Himachal Pradesh, Jammu and Kashmir and Uttarakhand where favourable forest conditions support its widespread occurrence.

S. commune demonstrates extraordinary genetic diversity. Phylogenetic analyses of ITS and IGS regions revealed three major clades: North/Central America, South America/Caribbean, and Eastern Hemisphere. Recent studies confirmed paraphyly of the Eastern Hemisphere clade. Comparative genomics distinguish *S. commune* from related species such as *S. radiatum* and *S. fasciatum*. Its genome size (38.7 Mbp, 16,204 genes) surpasses that of *S. fasciatum* (30.4 Mbp, 11,722 genes), underscoring species-level distinctions (Marian *et al.*, 2024).

Nutritional Values

S. commune is a rich source of macro- and micronutrients, vitamins, minerals, and bioactive compounds. Comparative studies show its nutritional value is comparable to meat, eggs, and milk. Proximate analyses reveal

balanced protein, carbohydrate, and fat content, with amino acids such as valine, leucine, and isoleucine contributing to its dietary importance. Fatty acid profiling indicates both saturated and unsaturated components, enhancing its nutritional diversity. In Southeast Asia and Africa, *S. commune* is incorporated into daily diets, valued for its chewy texture and resilience in humid climates (Laplamool *et al.*, 2023). Despite Western skepticism due to its leathery structure, its nutritional richness supports its consumption in tropical regions. Its polysaccharides also exhibit immunomodulatory properties, adding functional food value. Thus, *S. commune* represents a nutritionally balanced mushroom with potential as a sustainable dietary supplement.

Medicinal Values

Medicinally, *S. commune* is renowned for producing bioactive polysaccharides, notably Schizophyllan (SPG), a β-glucan with immunomodulatory and anticancer properties. SPG enhances vaccine efficacy, acts as a biological response modifier, and demonstrates synergistic effects with chemotherapeutics. Ethnopharmacological studies highlight its use against headaches, rheumatism, intestinal pain, obesity, and inflammation. Antiviral, antifungal, hepatoprotective, and antidiabetic activities have also been reported (Sileshi *et al.*, 2023). Its extracts show cytotoxic and genotoxic effects, supporting potential insecticidal applications. Furthermore, *S. commune* produces enzymes such as lipases and feruloyl esterases, contributing to pharmaceutical and industrial biotechnology. Its ability to ferment ethanol under anaerobic conditions (Arifeen *et al.*, 2021) adds biofuel relevance. Collectively, *S. commune* medicinal potential spans cancer therapy, immune modulation, metabolic regulation, and antimicrobial activity, positioning it as a promising candidate for modern pharmacological development.

Ethnomycological Uses

In India, *S. commune* (lengphong, pakha chhatu) is consumed with fish, pork, or as pakora (Longvah & Deosthale, 1998). Globally, it is known as Kulat Kodop in Malaysia and Congo, and widely eaten in Mexico and Africa (Kamalebo *et al.*, 2018). Ethnic groups value it for culinary and medicinal purposes, integrating it into traditional diets and remedies.

Split gill mushrooms (*Schizophyllum commune*) are used in both traditional and modern cuisines across different regions. In India, they are commonly prepared as pakoras, where the mushrooms are coated in a spiced gram flour batter and deep-fried until crisp, usually served with chutney. Another well-known dish is Lengphong curry from Manipur, in which the mushrooms are cooked with ginger, garlic, chilies, potatoes, and sometimes meat, and served with rice or flatbread.

In Malaysia, split gill mushrooms are featured in Tinamba Linopot, where they are cooked with meat, potatoes, and spices, wrapped in banana leaves, and steamed, enhancing their earthy flavour. In modern international cuisine, they are used in Mexican-style mushroom soup, simmered with onion, garlic, tomato, chilies, and broth, and in vegetable stir-fries, where quick cooking with soy sauce, garlic, and sesame oil helps retain their characteristic chewy texture. Although split gill mushrooms are nutritious and flavourful, they have a naturally tough texture that may limit acceptance in some cuisines. They are rarely pathogenic, and proper cooking minimizes any potential risk. Widely consumed in Asia, Africa, and Latin America, their use remains limited but gradually expanding in Western countries.

Other Important Uses

S. commune is widely used as a model organism for studying mushroom development, mycelial materials, and cell wall biology (Ohm *et al*., 2010). It also has important industrial applications, producing enzymes such as feruloyl esterase and lipases used in flavouring, food processing, and biofuel industries (Kamalebo *et al*., 2018). Environmentally, the fungus shows potential in dye bioremediation, while in agriculture it exhibits insecticidal activity against certain pests. Additionally, *S. commune* can perform ethanol fermentation under anaerobic conditions, making it relevant to biofuel research (Arifeen *et al.*, 2021).

Cultivation

S. commune completes its life cycle in ten days on defined media, even in Petri dishes or 96-well plates (Ohm *et al.*, 2010). The spawn is produced followed by the standard procedure given by Sharma *et al.*, 2010; Kumar and Suman, 2014; & Kumar and Chhetri, 2024. Its ease of cultivation, availability of CRISPR tools, and sexual reproduction system make it highly suitable for laboratory research and industrial exploitation.

Conclusion

S. commune represents a multifunctional mushroom and macro fungus with significant value in nutrition, medicine, and biotechnology. Its adaptability and well-characterized genetics make it an important model for understanding fungal development and biomaterial formation.

Bioactive metabolites, particularly polysaccharides, demonstrate notable therapeutic potential, while its enzymes support industrial and bioenergy applications. Sustainable mass cultivation using agricultural residues can enhance food security and reduce pressure on wild populations. Combined with strong ethnomycological relevance, *S. commune* remains a promising resource for future scientific innovation and sustainable development.

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