

Study the Diversity, Morphology and Edibility of *Flammulina* Sp. From Different Areas of Amravati, Maharashtra.

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Abstract

Flammulina is one of the most major economically farmed mushroom genera. This fungus is particularly well-known for its flavour and for having both therapeutic and preventative qualities for ulcers of the stomach and liver. Winter mushrooms have also reportedly been found to have immunomodulatory and anticancer antibiotic compounds. We evaluated the survey, collection, morphological analysis, microscopic observation, and preservation of *Flammulina* from several sites in the Amravati district of Maharashtra in this study. *Flammulina* was used extensively to decorate the decayed wood of *Ipomoea pinnata*, both in its standing and fallen forms. Morphological elements, such as a study of the fruiting body's shape and colour, stalk, gills, etc., were carried out. Spore size, ornamentation, ornamentation, and hyphal structure were all comprehensively examined using microscopic examination. Interacting with local and tribal residents who regularly consumed the same foods allowed researchers to confirm their palatability. In the Maharashtra region of Amravati, the consumption of edible mushrooms per capita is very low. The cultivation and introduction of this species may draw in new eaters of edible mushrooms. This mushroom can be made using sawdust, which will increase the number of jobs and the welfare system overall.

Key words :

Flammulina , curative, gastroenteric ulcers, immunomodulatory, antibiotic, antitumor, Amravati, *Ipomoea pinnata*, ornamentation, Edibility, Sawdust.

Introduction

In India, there are several potential for commercial mushroom cultivation due to the country's diverse agroclimatic conditions and accessibility of industrial and agricultural waste. To satisfy the growing public demand for novel meals, it is crucial to introduce new varieties of mushrooms. The total global production of various mushrooms, in particular *Lentinula*, *Pleurotus*, *Auricularia*, and *Flammulina*, has increased dramatically during the past few years. Sometimes a surplus of a certain commodity during a period of bountiful production also results in low market prices for the growers, as occurred in the early 1990s, prompting many growers to look for new crops to supplement their income. In addition to providing our cuisine with variety, flavour, and aesthetic appeal, mushrooms are also thought to be nutritive due to their high protein, fibre, vitamin, and mineral content. Numerous researchers have noted a significant variance in the chemical make-up of a specific mushroom, which may be a result of the ambient factors, sample stage, and analysis procedure.

The majority of Indians are vegetarians, thus adding mushrooms to their diet will improve their lack of proteins and minerals. Thus, both growing children and nursing mothers can benefit from eating mushrooms. Some types of mushrooms are particularly valuable for medical purposes. Since the beginning of time, specialty mushrooms have been used in China and Japan for therapeutic and restorative purposes. Patients with high blood pressure, diabetes, and cardiac issues have found benefits from eating mushrooms. Shiitake ingestion has been linked to advantages like increased vigour, energy, potency, and slowed ageing. Consequently, the growing and eating of mushrooms can promote good health. *Flammulina* P. Karst. (1891) species are significant economically. One of the most well-liked edible mushrooms in East Asia, the winter mushroom, or Enokitake, has been farmed for food for generations and is recognised for its anti-

cancer capabilities (Stamets 1993; Yamanaka 1997; Hughes et al. 1999; Methven et al. 2000; Psurtseva) (2005).

The genus *Flammulina* currently embraces 15 species worldwide, including *F. callistosporioides* (Singer) Singer, *F. cephalariae* Pérez-Butrón & Fern.-Vic., *F. elastica* (Sacc.) Redhead & R.H. Petersen, *F. fennae* Bas, *F. ferrugineolutea* (Beeli) Singer, *F. glutinosa* G. Stev., *F. lupinicola* (Redhead & R.H. Petersen) C. Hahn, *F. mexicana* Redhead et al., *F. ononidis*, Arnolds, *F. populicola*, Redhead & R.H. Petersen, *F. rossica* Redhead & R.H. Petersen, *F. similis* E. Horak, *F. stratosa* Redhead et al., *F. velutipes* (Curtis) Singer, and *F. yunnanensis* Z.W. Ge & Zhu L. Yang, and is reported from both in the Northern Hemisphere (Arnolds 1977; Bas 1983; Bas and Robich 1988; Redhead and Petersen 1999; Redhead et al. 2000; Methven et al. 2000; Hughes and Petersen 2001; Ge et al. 2008; Petersen et al. 2012; Vizzini et al. 2012; Hahn 2016) and Southern Hemisphere (Singer 1964, 1969; Horak 1979; Redhead et al. 1998). While some species, like *Flammulina velutipes* and *Flammulina rossica*, are widely dispersed, others, including *Flammulina mexicana* and *Flammulina stratosa*, appear to be very geographically restricted (Redhead et al. 1998, 2000; Ge et al. 2008; Petersen et al. 2012). Some species exhibit strong relationships with their hosts, as evidenced by the relationships between *Flammulina ononidis* and *Flammulina populicola* and particular *Ononis spinosa* and *Populus* spp. substrates, respectively (Arnolds 1977; Redhead et al. 2000; Petersen et al. 2012).

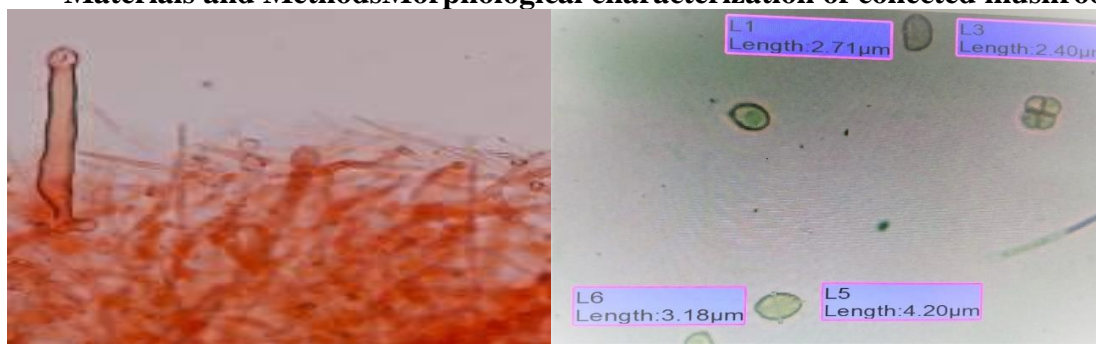
Morphological characterization:



Wild mushrooms typically have a dark brown colour, however mushrooms grown in a lab are white since they are not exposed to light. The stems of wild mushrooms are substantially shorter and thicker than those of cultivated mushrooms, which are also produced to produce long, thin stems. It produces little but excellent fruit bodies. Early in its development, the pileus is 2-3 cm in diameter, hemispheric or convex, and progressively opens to a plane as it grows. The pileus's surface is often light brown with a light brown edge, and it is viscid when moist. The flesh is virtually white. The stipe is annexed or decurrent to the gills, which are white or light-cream in color.

The stiff stipe measures 2–9 cm in length and 2–8 mm in width. While the upper portion of the stipe is light brown and occasionally virtually white, the lower portion is dark brown. The spores are 5-7 X 3-4 m, are white, have a flat surface, and are cylindrically oval in shape.

Materials and Methods Morphological characterization of collected mushroom:



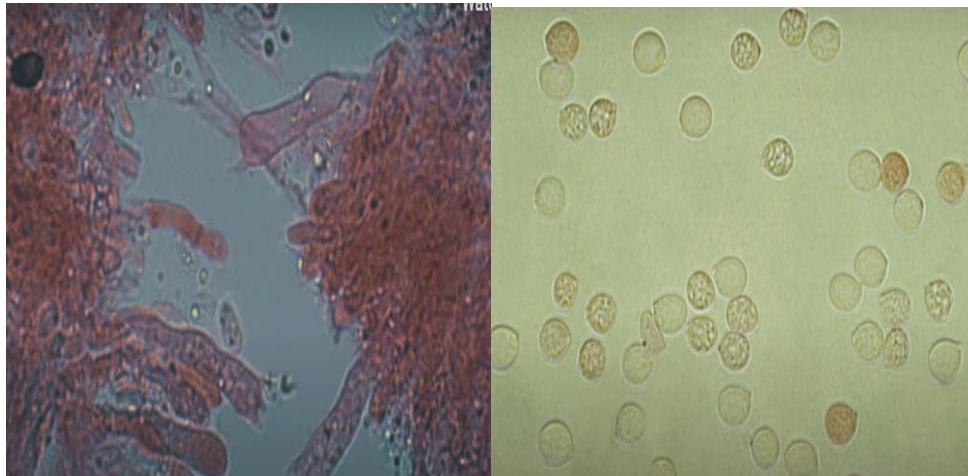


Fig. Basidiospore

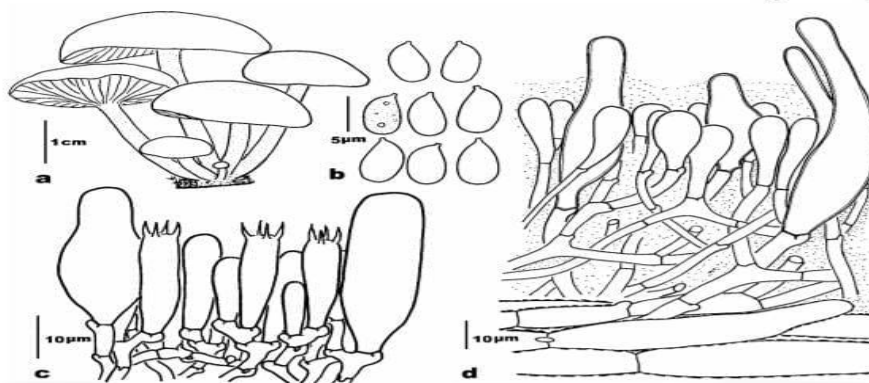


Fig. a) Basidiomycete b) Basidiospore c) Hymenium and subhymenium with pleurocystidia and basidia d) Radial section of pileipellis

The current study was carried out in the years 2020–2022, in several locations within the Amravati region. Based on morphological and other phenotypic characteristics captured in fresh samples, all the obtained edible mushrooms were examined. The fruit bodies of the mushrooms that were harvested were measured in millimetres. The various fruit body components—including the cap, stalk, gills, volva, annulus, form, and color—are noted as present or absent. By using the methods of Singer (1986), Atri and Kaur (2003), and Upadhyay and Kaur (2006), the morphological observations, such as the cap, gills, stalk, and veils, were examined (2004).

Identification of collected edible mushrooms as genus and species:

The authors' names and taxonomic positions were cited together with the collected edible mushrooms' date-wise and as-correct-as-possible scientific names (Nage et al., 1991). With the use of literature and departmental experience, edible fleshy fungal identification was accomplished. The tribes in the area documented their identification practises. The locals used edible mushrooms in a variety of ways, which were also documented.

Edibility tests of collected edible mushrooms by information of local tribal consumers:

By getting feedback from local and tribal consumers who had eaten the mushrooms, the ethanobotanical edibility of the collected edible mushrooms was determined. This information was noted, along with the mushroom's fruiting stage, the portion used at the time of consumption, and their edibility tastes and flavour.

The following parameters were recorded by consumers.

Fruiting stage (pre-mature, mature and over mature)
Edible part (cap, stalk /entire part)
Edibility tastes (excellent, good, average and poor)
Edibility flavor (cheese, vegetable, fish and chicken)
Chewing (softness/ hardness)

Result and Discussion

Ipomoea pinnata (deciduous trees) stand trees from various locations of the Amravati region are the primary substrates for *Flammulina velutipes*. It can often be found from June to September because that is when it rains. *Flammulina velutipes* is distributed throughout the world, most likely as a result of human intervention. It produces fruits either saprotrophically on dead wood or as a parasite of living trees (Kreisel, 1961; Vellinga, 1996, Hughes, 1999; Petersen and Hughes, 2007). Standard methods for collection, preservation, microscopic, and macroscopic description of wild edible fungi were used. Morphological parameters of collected edible mushrooms. The methods of Singer (1986), Atri and Kaur (2003), and Upadhyay and Kaur were used to collect the morphological observations such as cap, gills, stalk, veil, spores, growth, and germination (2004). Also noted were the fruit bodies' colour and form. The volva and annulus of *Flammulina velutipes* are lacking, but the cap, stalk, and gills are fully developed. The colour and shape of the hat are orange and brown, respectively.

Conclusion

For a large variety of wild meaty mushrooms, the Amravati-Melghat area is known as a key biodiversity hotspot. It is essential to protect and preserve this biodiversity. If the edible mushroom industry is effectively structured, it will be possible to decrease the widespread issue of malnutrition in Melghat.

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