

DOI No.: <http://doi.org/10.53550/EEC.2024.v30i02s.037>

Wild mushrooms: A Source of livelihood and future urban food

B.L. Manjula and Sanjeet Kumar

Department of Botany, Sri Jagadguru Renukacharya College of Science, Arts and Commerce, Karnataka, India

²Ambika Parsad Research Foundation, Odisha, India

(Received 19 July, 2023; Accepted 6 September, 2023)

ABSTRACT

Wild edible mushrooms are more popular non timber forest products (NTFPs) which are highly valued as functional food for their medicinal and nutritional benefits. Several wild mushroom species have been pointed out as sources of bioactive compounds, in addition to their important nutritional value. They are the major source of income for the indigenous communities throughout the world. In Bonai Forest Division, Sundargarh, Odisha, survey was conducted during 2021 to 2022 with informants using semistructured interviews and gathered the information about the wild edible mushrooms available in their forest with their marketability. It was observed that the mushrooms play as an excellent source of livelihood for local communities in Bonai Forest Division and these mushrooms are sold in the local markets starting from 10-20 rupees to 400 rupees. Therefore, the wild edible mushrooms which are available in the state need more exploration. It could be a valuable nutraceutical, making them essential in combating food insecurity. Additional research is needed so that the wild edible mushrooms can be commercialized which can play a key role in the socio-economic upliftment of the tribal people and will add organic food to the urban food basket.

Key words: NTFPs, Mushrooms, Indigenous people, Nutraceutical, Urban food

Introduction

Forest provides significant social and economic benefits to the whole world, especially in developing countries (Singh *et al.*, 2020). Globally, more than a billion people depend directly or indirectly on forest and forest products. Out of which Non-Timber Forest Products (NTFPs) contribution is significant in providing the necessities of people for growing populations. There is growing evidence that non timber forest products (NTFPs) contribute significantly to maintain livelihoods in rural area (Sharma *et al.*, 2019). Non timber forest products (NTFPs) are any product or service other than timber that is pro-

duced in forests. They include fruits and nuts, medicinal plants, resins, essences and a range of barks and fibres such as bamboo, rattan, and a host of other palms, grasses, and mushrooms (Kumar *et al.*, 2022).

Mushrooms are an integral component of the forest ecosystem that carry out vital processes such as decomposition and nutrient recycling (Hussain *et al.*, 2023). Since ancient times, mushrooms have been treated as a special kind of nutritious food. In the earlier times, mushrooms were collected from their natural growing habitats, but with the passage of time, several attempts have been made to domesticate mushrooms under controlled conditions

(Kakraliya, 2020). Generally, the growth of fruiting body is controlled by different environmental and ecological factors where they grow. They appear in such a place where the habitats are undisturbed, high with humid atmosphere during monsoon wherein nutrition is necessary for growth, fructification, and reproduction (Singha *et al.*, 2020). Indigenous communities have used wild edible mushrooms as an additional source of food. They use mushroom as food and part of the traditional medicine system from ancient human civilization (Khastini *et al.*, 2023). Some wild edible mushrooms have been widely recognized as nutritionally important food with low caloric content, pleasant taste and aroma and it is reported that mushrooms are rich in nutritional profile, containing high protein, trace mineral elements, vitamins, fibers and low fat contents providing good benefits to human wellbeing. Other than nutritional purpose, wild mushrooms are also nutraceuticals with bioactive compounds such as secondary metabolites that have a role in antioxidant and antibacterial functions (Hussain *et al.*, 2023; Kumar *et al.*, 2023). These wild mushrooms are one of the important natural sources of food, medicine, and income for many indigenous communities across the world (Borah *et al.*, 2018). Traditional or indigenous knowledge systems are generally embedded in the cultural practices of regional or local communities which is based on the

accumulation of empirical observations and interactions with the environment (Singha *et al.*, 2020). Edible mushrooms belong to genera *Astraeus*, *Russula*, *Termitomyces* etc. which are used as food by the indigenous people and is a major source of income during rainy season. Documentation, exploration, and the research activities on the wild edible mushrooms could lead to a nutraceutical of future urban food.

Materials and Methods

The Bonai Forest Division (BFD) is located in 21°39'-22°8' N and 84° 30'-85° 23' E towards the North-Western boundary of the state of Odisha in eastern India. The forest division is spread over an area of 2934.21 km² of Sundargarh district. It is bounded on the North by Jharkhand State and Rourkela Forest Division. On the east it is bounded by Keonjhar Forest Division and Deogarh Forest Division. On the west and south it is bounded by Bamra Forest Division and Deogarh Forest Division (Kumar *et al.*, 2021a). BFD is divided into 7 ranges (Bonai, Kuliposh, Tamra, Jarda, Sole, Barsuan and Koira) having diverse landscapes, vegetation, communities, and land use practices. BFD (Figure 1) is part of the southern portion of Chotanagpur Plateau. The forest in the region is covered with a variety of different habitats in which Sal Forest is predominant

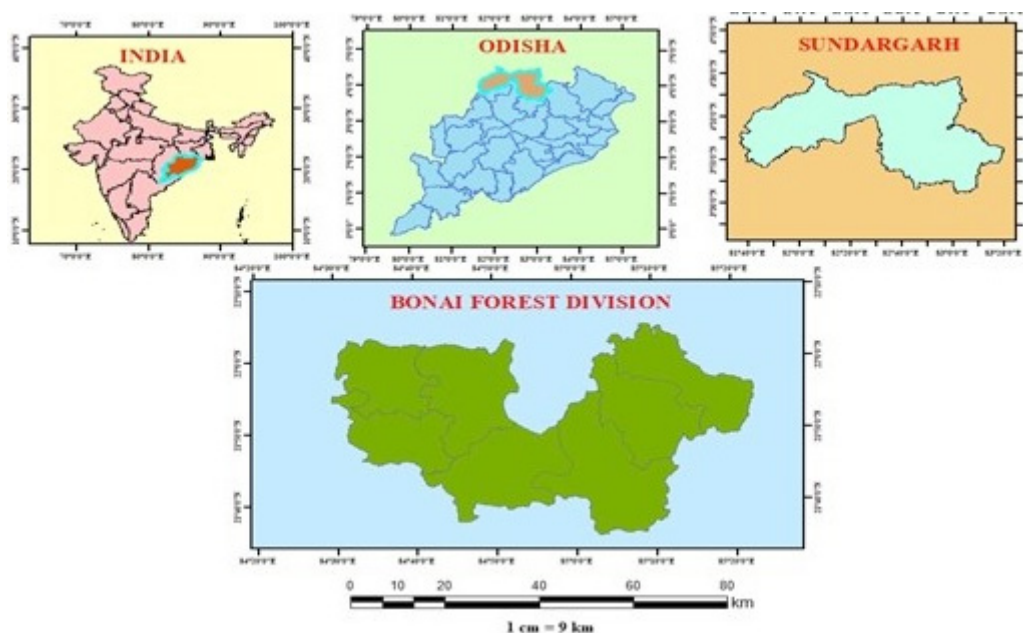


Fig. 1. Geographical location of study areas

which provides an ideal platform for wild mushrooms. The study area is dominated with many tribal communities. Major communities in this area are Munda, Ho, Dehuri, Bhuiyan, Oram, Kisan etc. BFD has good forests and is facing the problems of different types of anthropogenic activities, including deforestation. About 1000 plant species growing in this division are providing food, medicines, shelter, firewood in addition to balancing the ecosystem. Number of wild foods is reported and recorded from BFD. Among these wild foods, wild mushrooms have their own charm in providing food and livelihood (Kumar *et al.*, 2021a; Kumar *et al.*, 2021b). Field survey was conducted during 2021 to 2022 in very close interaction with informants using semi-structured interviews, focus group discussions, participant observation, and walk-in-the-woods methods. Interactions were conducted in different tribal communities in different ranges. The practice of human-mushroom interaction which include local names of mushrooms as well as their local uses (medicine, food, etc.), habitat, seasonality of species, marketability, form of mushrooms used (fresh/dried), methods of preparation for food, and preservation (storage) were recorded. Independent walk-in-the-woods method was employed with key informants for practical identification of wild edible mushrooms in the actual habitat. Participant observations were carried out to study how the indigenous people collect, prepare, and use mushrooms.

Results and Discussion

Wild mushroom acts as a source of food for many wild lives, which includes insects (beetles, flies, gnats, springtails, centipedes, etc.) squirrels, deer etc. The communities in BFD, particularly women of Munda, Ho, Dehuri, Bhuiyan, Oram, Kisan etc. enter the forest in the early morning, in the group of 4-5 numbers and collect different types of mushrooms as per availability during the rainy season up to October. The collection of wild mushrooms starts in the pre-monsoon and this practice is a source of livelihood for local communities and food for good health. Some groups only collect to consume them whereas some groups collect to sell it in their weekly local market (Haat). They collect mushrooms like Bhanu chatu (*Amanita caesarea*), Manda chatu (*Amanita egregia*), Patra chatu (*Russula rosea*), Bali chatu (*Termitomyces medius*), Bali chatu (*Termitomyces microcarpus*), Pala chatu (*Volvariella*

volvacea), Rugda (*Astraeus hygrometricus*), Jamu chatu (*Suillus luteus*), Khadada chatu (*Macrolepiota procera*), Patra chatu (*Russula brevipes*), Patra chatu (*Russula vesca*), Patra chatu (*Russula virescens*), Patra chatu (*Russula xerampelina*), Benua chatu (*Termitomyces heimii*), Genda phul chatu (*Cantharellus lateritius*) etc. It was also observed that local communities of this division set forest fires to get good number of mushrooms during the rainy season, whereas some people set forest fire in Sal Forest to get good amount of Rugda mushrooms. The practices indicate that if value addition of these mushrooms can be done, we can save our forest from destruction. It was observed that mushrooms play as an excellent source of livelihood for local communities in Bonai Forest Division. Some common economic mushrooms are *Amanita caesarea*, *Amanita egregia*, *Russula rosea*, *Termitomyces medius*, *Termitomyces microcarpus*, *Volvariella volvacea* etc. Mushrooms are sold in the local markets starting from 10- 20 rupees to 400 rupees. Rugda (*Astraeus hygrometricus*) is one of the highly valuable mushrooms found in this region. The market values of Rugda mushrooms vary from region to region and it costs about 200 to 400 rupees per kg. in BFD (Plate 1).



Plate 1. Wild Edible Mushrooms in local market in BFD

Recommendations

Awareness on forest fire: Fire is one of the most destructive threats faced by our forest and in current scenario, forest fires are a potential hazard with physical, biological, ecological, and environmental consequences. The causes behind the fires in our forests lies within human activity carried out whether intentionally or unintentionally and mushroom is one of the major reasons listed there. In BFD, tribals set fire for the collection of Rugda mushrooms in summer. Awareness is needed about the forest fire as well as collection and utilization of mushrooms.

Tissue culture: Effective and continuous researches are required for the advancement of wild edible mushroom cultivation. Mushroom cultivation is not only of economic importance but also has important role to play in integrated rural development programme by increasing income and self-employment opportunities for village youths, woman folk and housewives to make them financially independent.

Value addition: Mushrooms have huge health and nutritional benefits and can solve many problems of under-nutrition and malnutrition. It could be a nutraceutical for urban people. Despite this fact mushroom cultivation and its utilization are not catching up fast because mushrooms are highly perishable. Thus, it is important to process mushrooms into value added products which will not only cater to the protein and micronutrient requirement of masses but at the same time will solve the problem of short shelf-life and post harvest losses of mushrooms. Technologies for production of some other products like mushroom based biscuits, nuggets, preserve, noodles, papad, candies and readymade mushroom curry in retort pouches have been developed but are yet to be popularized. Attractive packaging of the value-added products is yet another area which may be called the secondary value addition. While small growers may add value by grading and packaging, industry may go for the processed products for better returns as well as improvement in the demand, which shall have cascaded positive effect on the production.

Conclusion

Wild edible mushrooms are one of the natural resources that is considered as a major diet for different indigenous communities in many parts of the

world. They are becoming more important in our diet due to their nutritional values, high protein, and low-fat contents. Mushrooms are commercialized as fresh or dried, as biomass dietary supplements or as an extract. In recent times, cultivated mushrooms have gained much attention and the wild mushrooms are underutilized though they are high in protein and nutrition. In such circumstances, the wild edible mushrooms which are available in the state should be brought to light so that the people can grab the benefits. In developing countries, wild edible mushrooms could be a valuable alternative to protein foods, making them essential in combating food insecurity. Moreover, with proper research and infrastructure facilities, wild edible mushrooms can be commercialized which can play a key role in the socio-economic upliftment of the people. Therefore, alternative methods of knowledge transfer should be explored to ensure the preservation and utilization of traditional knowledge for future generations.

Acknowledgement

Authors are thankful to the Divisional Forest Officer (DFO), Bonai Forest Division, Odisha and local communities of study areas.

Conflict of interest

Authors declare no conflict of interest

References

- Borah, N., Semwal, R.L. and Garkoti S.C. 2018. Ethnomycological knowledge of three indigenous communities of Assam, India. *Indian Journal of Traditional Knowledge*. 17(2): 327-335.
- Hussain, S., Sher, H., Ullah, Z., Elshikh M.S., Al Farraj, D.A., Ali, A. and Abbasi, A.M. 2023. Traditional Uses of Wild Edible Mushrooms among the Local Communities of Swat, Pakistan. *Foods*. 12: 1705. <https://doi.org/10.3390/foods12081705>.
- Kakraliya, S.S. 2020. Economic Importance of Mushroom and Their Uses. *Just agriculture*. 1(3): 1-8.
- Khastini, R.O., Maryani, N. and Lestari, L.D. 2023. Wild Edible Mushroom, a Potential and Valuable Source for Food Security. In Proceedings of the 2nd International Conference for Smart Agriculture, Food, and Environment. ICSAFE. 2021. *Atlantis Press*. https://doi.org/10.2991/978-94-6463-090-9_18.
- Kumar, S., Mishra, S., Mishra, A.K. and Kumar, S.N. 2023. Wild mushrooms of Bonai Forest Division. *APRF Publishers*, India. pp 1-74.

- Kumar, S.N. and Kumar, S. 2021b. Taxonomic note on *Luisiazeylanica* (Orchidaceae) from Bonai Forest Division, Odisha, India. *Richardiana*. 5:142-147.
- Kumar, S.N., Mishra, S. and Kumar, S. 2021a. Documentation of Indigenous Traditional Knowledge (ITK) on Commonly Available Plants in Koiria Range, Bonai Forest Division, Sundargarh, Odisha, India. *Asian Plant Research Journal*. 8(4): 83-95.
- Kumar, S., Mishra A.K., Mishra, S. and Marndi, S. 2022. Economic Importance of Wild Mushrooms in Mayurbhanj District, Odisha, India. *Asian Journal of Biology*. 15(4): 20-25.
- Sharma, K., Sharma, R. and Devi, N. 2019. Non Timber Forest Products (NTFPs) and Livelihood Security: *An Economic Study of High Hill Temperate Zone Households of Himachal Pradesh*. 64(2): 305-315.
- Singh, S., Chaudhary, N. and Bhatia A.K. 2020. Role of Non Timber Forest Products in Rural Economy of Farmers. *International Journal of Economic Plants*. 7(4): 165-169.
- Singha, K., Sahoo, S., Roy, A., Banerjee, A., Mondal, K.C., Pati, B.R. and Mohapatra, P.K.D. 2020. Contributions of wild mushrooms in livelihood management of ethnic tribes in Gurguripal, West Bengal, India. *International Journal of Pharmaceutical Sciences and Research*. 11(7): 3160-3171.
-