
SHORT COMMUNICATION

Occurrence and characterization of *Hericium coralloides*: a rare wild edible mushroom from Doda region of J&K, India

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During a collection foray in the temperate Doda region of J&K, a rare and interesting wild edible mushroom *H. coralloides* was collected. It was found growing on Oak (*Quercus leucotricophora*) trees and fallen wood. It has been reported to occur in the European, North American and some East Asian countries. In India it has been reported from Himachal Pradesh. First collection of *H. coralloides* from temperate Doda region of J&K adds to its known range and allows for improved description.

Key words: *Hericium coralloides*, temperate, edible.

INTRODUCTION

Hericium coralloides (Scop.: Fr.) Pers. is a wild edible mushroom in the Hericiaceae family. The species is aptly named because of its resemblance to marine coral. It is also known by various other common names like comb tooth, coral tooth, conifer coral, coral spine fungus, Goat's beard etc.

The genus *Hericium* was originally described by Christian Hendrick Persoon in 1794 whereas Elias Magnus Fries mentioned it in *Systema Mycologicum* (1822) and in 1825 recognised it as a distinct genus (Miller, 1933). Now a day, molecular genetic markers have been developed that allow for quick and sensitive identification of *Hericium* species using the polymerase chain reaction (Lu *et al.*, 2002).

H. coralloides is found in many countries around the world particularly Europe (Hallenburg, 1983) and North America (Ginns, 1985). In India it was

reported by Lakhanpal (1994) from Himachal Pradesh.

This species has been used as food in a number of areas around the world for many years. In the folk medicines of China and Japan it is highly valued for its medicinal properties particularly nerve stimulating properties (Cannon and Kirk, 2007). In recent years considerable research has been done on bioactive properties of this species and several biologically active compounds have been isolated and tested for medicinal uses. The most exciting medicinal value of *Hericium* has been the discovery of factors called erinacines that have shown the ability to stimulate the production of nerve growth factors (NGF) and hold promise as possible therapeutic agents in treatment of Alzheimer's, Parkinsons and other neurodegenerative disorders (Yamada *et al.*, 1997). Several other compounds isolated from culture broth of two species of *Hericium* (*H. coralloides* and *H. erinaceus*) are known to exhibit anti-tumor (Mizuno *et al.*, 1992), immune stimulating properties (Mizuno and Takashi, 1995), anti-microbial and nematicidal activities

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(Stadler *et al.*, 1994).

The medicinal use of this mushroom has been limited until recently due to its relative rarity in the world. The medicinal importance and cherished taste has prompted researchers to undertake work on its artificial cultivation and some work has already been done during last few years (Liu, 1981).

MATERIALS AND METHODS

Specimens of *H. coralloides* were collected during August–September, 2012 during a collection trip to the upper reaches of temperate forests of Doda region of J&K, India which is at an elevation of 2000- 2500 meters above sea level and brought to Division of Plant Pathology, of Sher-e- Kashmir University of Agricultural Sciences and Technology, Jammu. Species identification was done following Ginns (1985). For studying hyphal system and spores, microscopic examinations were done on lactophenol cotton blue mounts under light and binocular microscopes at various magnifications and photographed by digital camera. For hyphal system study the thin sections of flesh from various parts of fruiting body were cut and individually teased out with fine needles under a dissecting microscope. Microscopic studies were done under light microscopy for hyphae and basidiospores. For morphological studies basidiospores were taken from spore print and also extracted from fresh fruiting bodies by aseptically removing several small sections of fruiting bodies. These sections were then placed in 5 ml sterile distilled water and shaken thrice on a mechanical shaker for 30 seconds at an interval of 5 minutes. The suspension was poured through three layers of cheese cloth to remove the unwanted tissue and the basidiospores were observed under microscope and counted using a haemocytometer. Spore length and width were determined for 25 spores of each specimen. The hyphal and spore length and width were determined using a micrometer. Air dried samples were deposited in the mycological collection laboratory of SKUAST Jammu.

RESULTS AND DISCUSSIONS

Ecology

The species was found in upper reaches of Doda forests on Oak (*Quercus leucotricophora*) trees

and fallen wood. It appeared primarily saprobic and weakly parasitic. The fruiting bodies appeared solitary and in groups on live and fallen logs and branches. The fungus appeared to be quite aggressive in its ability to degrade wood and experienced local mushroom gatherers revealed its unique fruiting behavior in that once it has commenced fruiting, it usually produces fruiting bodies annually for up to three to four years or so and then reproduction ceases.

Macromorphology

Basidiocarp

The fruiting bodies (Fig. 1) are white when fresh and discolouring cream to buffy brown or yellowish tan when old. The fruiting bodies are 10-31cm across, consisting of an open framework of rather delicate, branches arising from repeatedly branching base, the spines arranged in rows along the branches like teeth on a comb and also in small tufts at the branch tips. The stems are short, thin, branched and arise from more or less central core. Spines are up to 1 cm long slender and tapering. Flesh is soft and brittle. It has a pleasant odor and taste.

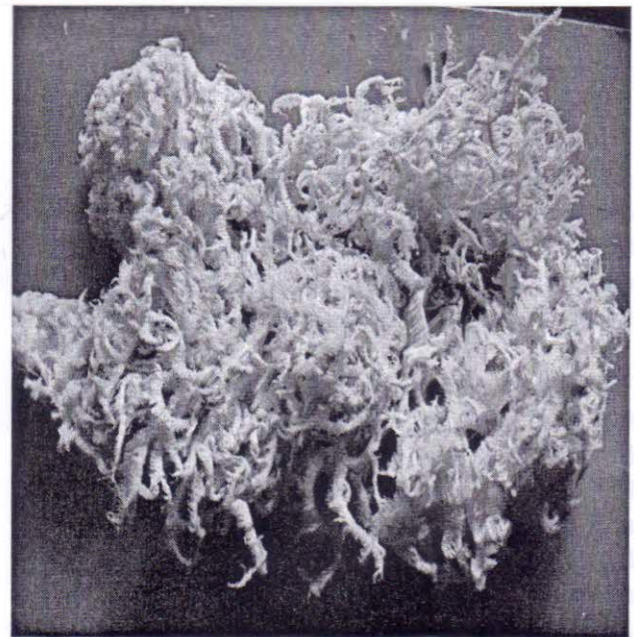


Fig. 1 : Basidiocarp of *H. coralloides*

Micromorphology

Hyphae

The hyphal system is monomitic with only generative hyphae present. The hyphae are 4-12 μm wide,

thin to thick walled, with clamp connections at septa and filled with numerous gloeoplerous elements filled with oily droplets which can protrude in to hymenium as gloeocystedia.

Basidiospores

Spore print is white. Basidiospores (Fig. 1) are 3-5×3.5-4.8 µm, colorless, hyaline, nearly round, smooth, amyloid.

DISCUSSION

Distinctive characteristics of *H. coralloides* studied here include ecology, macromorphology and micromorphology and the information generated here has taxonomical and conservation importance. *H. coralloides* is a rare fungus despite being present in a number of countries and is of conservation importance. It finds its name among the red-data list of threatened European fungi (Ing, 1992). It is threatened at several scales ranging from changing land use to removal and use of individual pieces of wood supporting its mycelia. Of particular concern is the cutting of wood of host trees in areas with known fruiting population of the fungus. A study of ecology of this mushroom can be of help in many ways. Firstly it may help in evolving techniques for artificial cultivation of this fungus, secondly it may provide clues about substrates and environment suitable for its cultivation and thirdly it may prove useful in conservation of this threatened species. There are reports of successful cultivation of another species of this genus namely *H. erinaceus* in some East Asian countries (Liu, 1981).

The observations about basidiocarp are similar to those of Ginns (1985). Basidiocarp characteristics provide information necessary in understanding the species and its better identification. This will help in further clarification of taxonomy of this species. The observations about microscopic characteristics are similar to those observed by Ginns

(1985). The above studied characteristics will be helpful in understanding this species and further studies are needed for popularizing this beneficial mushroom.

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REFERENCES

- Cannon, P. F. and Kirk, P. M. 2007. *Fungal families of the world*, Wallingford, UK, CABI, pp. 158.
- Ginns, J. 1985. *Heridium* in North-America: cultural characteristics and mating behaviour. *Canadian Journal of Botany*, **63**: 1551-1563.
- Hallenberg, N. 1983. *Heridium coralloides* and *H. alpestre* (Basidiomycetes) in Europe. *Mycotaxon*, **18**: 181-89.
- Ing, B. 1992. A provisional Red Data List of British Fungi. *Mycologist*, **6**: 124-28.
- Lakhanpal, T. N. 1994. Prospects of mushrooms from the wild. *Advances in mushroom Biotechnology* (Nair, M.C., C. Gokulapalan and Lulu Das, eds.), Scientific Publishers, Jodhpur, pp. 16-22.
- Liu, C.Y. 1981. Technique of cultivation of monkeyhead mushroom. *Edible Fungi*, **4**: 33-34.
- Lu, L., Li, J and Cang, Y. 2002. PCR-based sensitive detection of medicinal fungi, *Heridium* species from ribosomal internal transcribed spacer (ITS) sequences. *Biological and Pharmaceutical Bulletin*, **25**: 975-980.
- Miller, L. W. 1933. The genera of Hydnaceae. *Mycologia*, **25**: 286-302.
- Mizuno, T., Wasa, T., Ito, H., Suzuki, C., Ukai, N. 1992. Antitumor-active polysaccharides isolated from the fruiting body of *Hericeum erinaceus*, an edible and medicinal mushroom called Yamabushitake or houtou. *Bioscience, Biotechnology and Biochemistry*, **56**: 347-48.
- Mizuno, Y and Takashi. 1995. *Hericeum erinaceus* : bioactive substances and medicinal utilization. *Food Reviews International*, **11**: 173-78.
- Stadler, M., Mayer, A., Anke, H and Sterner, O. 1994. Fatty acids and other compounds with nematicidal activity from cultures of Basidiomycetes. *Planta Medica*, **60**: 128-32.
- Yamada, K., Nitta, A., Hasegawa, T., Fuji, K., Hiramatsu, M., Kameyama, T., Furukawa, Y., Hayashi, K., Nabeshima, K. 1997. Orally active NGF synthesis stimulators: potential therapeutic agents in Alzheimer's disease. *Behavioural Brain Research*, **83**: 117-22.