

Systematic Studies On Wild Edible Mushroom *Sparassis crispa* Wulf. Ex. Fr. Collected From Shimla Hills of Himachal Pradesh, India

Dr. Renu Rana

Associate Professor, Department of Botany, RKMV Shimla-1. H.P, India

ABSTRACT: *Sparassis crispa* also known as cauliflower mushroom) is a genus of parasitic and saprobic mushrooms characterised by their unique shape and appearance. This appearance can be described as similar to a sea sponge, a brain, or a head of cauliflower, from which it has been given its popular name. The generic name comes from the Greek *sparassein* meaning to tear. *Sparassis crispa* is very tasty, but should be thoroughly cleaned before use, as the folds can contain dirt and other material, as it grows and envelops objects around it such as pine needles. It grows in small or large clusters on living or dead trees or on soil above buried wood often fruiting year after from the same log or stump. Fruiting body :is 10-40 cm broad, arising from large basal branches that in turn arise from a large underground base or short and contorted, whitish to yellowish or tan; each branch with fairly conspicuous zones of color or evenly colored Spore Print: whitish. Spores 5-7 x 4-5 μ smooth; broadly elliptical; non amyloid. Clamp connections present *Sparassis crispa* is being described from Shimla hills of Himachal Pradesh. Its habit, habitat, taxonomic features, edibility and ethnomycological details have been incorporated in this communication.

KEYWORDS: *sparassein*, taxonomic features, Clamp connections hymenium, Melzer's reagen, lactophenol camera lucida. *Sparassis crispa*,

I. INTRODUCTION

The edible mushrooms belong both to Ascomycotina and Basidiomycotina. The Ascomycetous members are contained in Discomycetes and these are non-lamellate, whereas the Basidiomycetous members are usually contained in the order Agaricales and are lamellate or gill bearing.

Around 2000 species of fungi are reported to be edible throughout the world and nearly 300 of these are said to be available in India (Purkayastha and Chandra, 1985). Out of these, only a few e.g. *Pleurotus* spp., *Agaricus bisporous*, *A. compestris*, *Volvariella dysplasia*, *V. volvacea*, *V. esculenta*, and *Coprinus comatus* are being cultivated on commercial or experimental scale in many parts of India, including Himachal Pradesh. These species, however, represent just a fraction of the available mushroom resource of the country and Himachal Pradesh in particular. In Himachal Pradesh, there are about 138 species of wild mushrooms which are edible. Out of these, presently being consumed in different parts of Himachal Pradesh, regularly during their growing seasons, by the local inhabitants, without causality or fatality are the species of *Morchella*, *Helvella*, *Sparassis*, *Hydnum*, *Clavaria*, *Clavulina*, *Trappiendra* new genus (Octaviania) and *Albatrelus* among non-gilled members and species of *Lactarius*, *Russula*, *Cantharellus*, *Armillariella*, *Pleurotus*, *Coprinus*, *Lepiota*, and *Lentinus* among the gilled fungi. These are not only consumed fresh but collected and dried for use during winter or snow months (Lakhanpal, 1991).

In recent years, the rate of consumption of mushrooms in many countries has increased considerably and hence, it has become imperative to explore new sources of edible mushrooms. In the present day scenario, a quick and reliable method for fungal identification is particularly appealing. However, since the fruiting body of mushroom is easily affected by environmental conditions such as light, moisture, temperature and nutrient sources, the identification based on morphological characters have been problematic. The mushrooms are highly polymorphic in appearance,

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exhibiting many shapes, sizes and colour variants. This polymorphic nature has led to taxonomic uncertainties. Morphological markers to study polymorphism in the mushrooms are limited. The present study, therefore, have been carried out on *Sparassis crispa*, to work out its systematic study. The systematic study was conducted by:

- i) Making frequent trips during rainy/winter seasons to collect mushroom specimens;
- ii) Noting important macroscopic characters such as colour, size shape and texture of cap and stalk in the field in fresh specimens;
- iii) Working out microscopic details of specimens in the laboratory and identify them on the basis of macroscopic and microscopic characteristics;
- iv) Interviewing the local inhabitants and record data on collection, drying, consumption (recipes) and myths attached, if any, with appearance of the species; and
- v) Recording data regarding habit, habitat, forest type and associated tree, if any, with these mushroom species.

II. MATERIALS AND METHODS

Collection of material

The specimens of *Sparassis crispa* were collected from nature during 2011-2012. Collections were made from different parts of Distt. Shimla (H. P.)¹. Distant sites were visited during mushroom growing season by temporarily camping at different places and making mushroom forays to different localities in the vicinity. The collections were usually made till mid day and rest of the time was utilized in recording field characteristics.

The fruiting bodies were removed carefully from substrate with the help of a sharp knife. The specimens were put in bags especially procured for the purpose and were carefully brought to the base camp. In base camp collections were systematically placed on papers, spreading on the tables or floor and each sample was allotted a collection number.

Villagers were enquired to gather data on methods of collection, drying and consumption of these wild edible mushrooms.

Preservation / drying of material

The specimens were preserved dry. The collections were dried in folding portable wooden driers, specifically designed for the purpose. The dried collections were wrapped in polythene bags and properly sealed. These bags were kept systematically in card board boxes which were stored in damp proof conditions. 1:4 P-Dichlorobenzene and Naphthalene balls were used as insect repellants.

Specimens to be used for raising culture and systematic studies were usually sun dried or dried gradually at 25-30°C in the drier.

Examination methods

Macroscopic observations

Various perishable macroscopic characters which help in the identification of mushrooms were recorded on the date of collection. These characteristics were carefully recorded in the field keys specifically designed for the purpose. The following macroscopic features were noted.

- a) **Pilues:** Shape, size, colour, consistency, dry/wet/ sticky/smooth/warty/ scaly/powdery, marginal characters, veil present or absent, if present colour and consistency.
- b) **Stipe:** Shape, size, colour, consistency, presence/ absence of annulus or volva, smooth/scaly/striate/fibrillose/dry/viscid, solid or hollow.
- c) **Lamellae:** Distinctly formed or not, attachment, crowded or distant, consistency, thickness, width, shape, colour, number, colour changes if any, edge.
- d) **Context:** Colour, consistency, thickness, colour change on cutting and bruising, presence/absence of latex.
- e) **Smell and taste**

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- f) **Spore print:** Spore prints were taken from the fresh collections on clean glass slides by placing the smaller pileus/pieces on the slides and covering them with petriplates. Spores were deposited on the slides after 3-4 hours. Colour of the spores in mass was noted and slides were kept carefully after placing a glass cover slip (60 x 22 mm) and wrapping in paper envelopes which carried the collection number.

Microscopic observations

Microscopic details of the specimens were worked out in the laboratory with the help of a research microscope. The magnification of the system with various combinations of eye piece and objective lenses was as: X 2350 at 10 x 100, X 1040 at 10 x 45 and X 235 at 10 x 10. Measurements of spores, basidia, cystidia and other parts have been represented by the scale. All microscopic structures were drawn with the help of a camera lucida and field photography was done using digital camera (Sony DSC-HX9V).

Following microscopic features were studied in detail.

Spores: Basidiospores were studied from spore deposits. Spores were mounted in water, 3% KOH as well as in Melzer's reagent (Melzer, 1934) and examined under oil immersion for their size, shape, ornamentation and colour.

Hymenium: Hymenium was studied by cutting free hand sections of dry material after soaking it into water until it softened. The sections were mounted in KOH with aqueous phloxine and also in 1% cotton blue lactophenol² size and shape of basidia, cystidia and number of sterigmata, subhymenium and hymenophoral trama were studied.

Habitat ecology

During collections, data regarding habit, habitat, predominant vegetation of the area explored, altitude and trees associated with the mushroom species were recorded in the field. Mycorrhizal associations were recorded by carefully digging the fruit bodies in the field and tracing mycelial connections between fruiting bodies and associated trees (Young, 1936, 1940; Zak, 1971, 1973; Sharma and Lakhanpal, 1981).

1.3.5 Identification

All the collections of wild edible mushrooms have been identified by integrating their macroscopic and microscopic characterization by following Singer (1987) and Lincoff (1981). The examined specimens have been deposited in the herbarium of Department, of Biosciences, Himachal Pradesh with accession numbers.

III. RESULTS

Sparassis crispa Wulf. ex Fr. Fig. 1 (A-D).

Fruiting body: large rounded, cauliflower like 10.0-20.0 cm in height and 20.0-40.0cm broad, the fruiting body composed of many flattened leaf like branches, flesh light yellow to yellowish white, fleshy with a pleasant smell and taste mild. Stalked without stalk, stalk 3.0-8.0 cm wide, yellowish brown, attached to the base of root. **Basidia:** 30.0-45.0 μm \times 4.0-1.0 μm closely packed, clavate, hyaline, double walled, 1 to 4 sterigmata, tetrasporic, sterigmata 2.0-3.0 μm ellipsoid, hyaline, guttulate. **Hypae** monometric, hyphac 6.0-10.0 μm , hyaline, loosely arranged, irregularly swollen and inflated with swollen portions upto 10 μm ; branched, clamp connections present. **Hymenium:** layer distinct, forming 30.0-40.0 μm zone. Spore Print: whitish.

Collections examined: H.P., Shimla, Jakhoo, Aug. 10, 2011, HPUB 5042; H.P., Shimla, Kufri, Sep. 01, 2011, HPUB 5043; H.P., Shimla Kufri, Sep. 11, 2012, HPUB 5044; H.P., Shimla, Nerva, Aug.30, 2012, HPUB 5045.

Edibility: Lange and Hora (1963), Thind (1973), Rinaldi and Tyndalo (1974), Soothhill and Fairhurst (1978), Garcha (1980), Phillips (1981).

Excellent edible species, thorough washing is required. Young specimens are fleshy and preferred. It must be cooked on low fire.

Habit and Habitat Ecology

² Cotton blue	Lactic acid	25.0 ml
Lactophenol	Phenol	25.0 gm
	Glycerin	25.0 ml
	Distilled water	25.0 ml

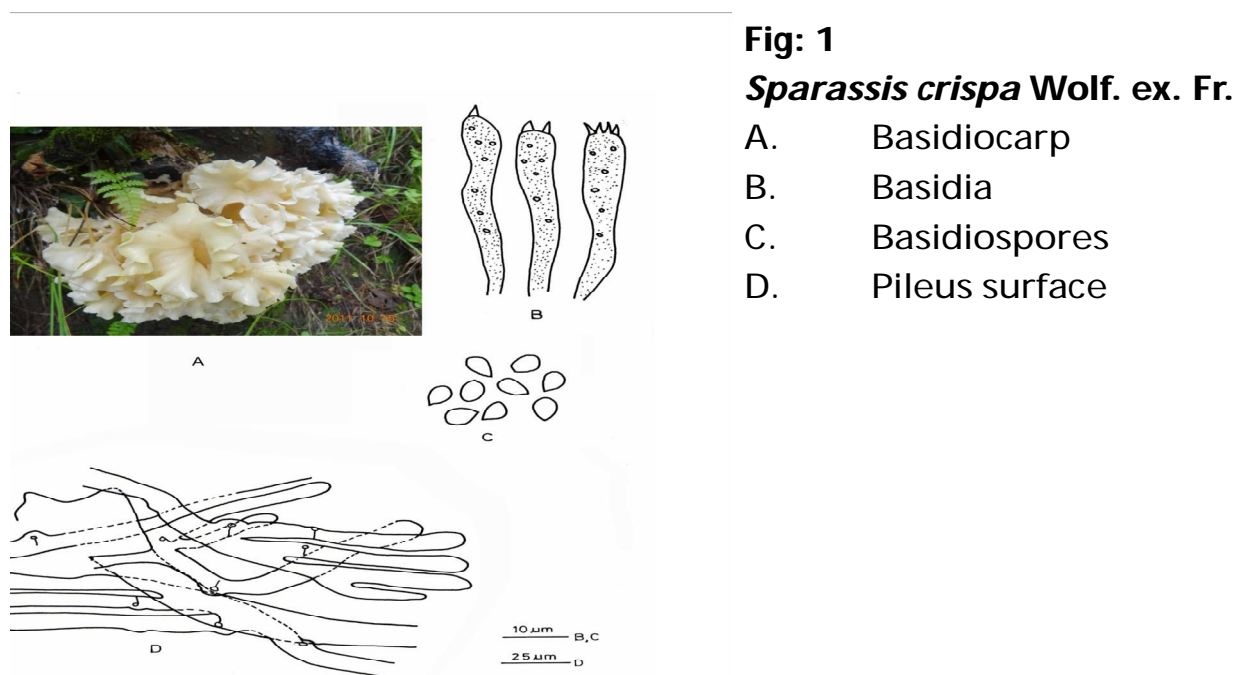
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Sparassis crispa is Pathogenic and saprobic; growing from the roots or bases of trees; found primarily under hardwoods--especially oaks--but occasionally reported under conifers; but often recurring yearly in the same location; causing a brown rot or a butt rot. It also grows in mixed forests of *Pinus wallichiana* (A.B.Jackson) *Picea smithithiana* (Wallich.), *Cedrus deodara* (Roxb.), *Quercus incana* (Roxb.) *Q. semicarpifolia* (Smith), *Quercus dilata* (Lindl.) and *Abies pindrow* (Spach.) *Rhododendron arboreum* (Smith) at an elevation ranging 1800 to 2800m.



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