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TWO HITHERTO UNREPORTED MACRO-FUNGI FROM ZABARVAN RANGE OF KASHMIR HIMALAYA, INDIA

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Abstract

Two hitherto unreported macrofungi viz., Peziza retrocurvata K. Hansen & Sandal and Xylaria polymorpha (Pers.) Grev were collected during mycorrhizal survey in conifer-dominated forests of Kashmir, India. These species were identified on the basis of macro and microscopic characteristics. The Kashmir valley located in the north extreme of the India lies between 33º20' and 34º54' N latitude and 73º 55' and 75º35' E longitude. The forests constituting approximately 20% of the geographical area harbors diverse macro fungal species due to their wide variability in climate altitude and nature of species constituting them. The base line of mushroom flora in the Kashmir Valley has not been generated till date. With this purpose, a systematic survey for exploration and documentation of macrofungal species of Zabarvan forest range of Himalaya was undertaken during the year 2010-2012. These macrofungi are reported for the first time from the Jammu & Kashmir State.

INTRODUCTION

Fungi are key functional components of forest ecosystems (Brown et al. 2006) and they have received less attention than animals and plants, although they are omnipresent and highly diverse in nature (Piepenbring, 2007). Defining the exact number of fungi on the earth has always been a point of discussion and several studies have focused simply on the enumeration of world's fungal diversity (Crous, 2006). Mushroom is regarded as a macro-fungus with a distinctive fruiting body that may either be epigeous or hypogeous but large enough to be seen with naked eye and to be picked by hand (Chang and Miles, 1992). Many macrofungal species are believed to fruit sporadically with no consistent pattern of occurrence from year to year (Walting, 1995). Moreover their sporocarps are ephemeral and even when produced, may last only a few days before decomposing or being eaten (Brown et al. 2006). Mushrooms constitutes the most diverse group of organisms after insects on this biosphere.

Biodiversity refers to the variety of life in the form of species in a specific ecosystem or on the entire Earth. Biodiversity depicts the health of biological systems and helps to devise appropriate strategies to save the rare and endangered species from the threat of extinction. The lack of knowledge of total fungal diversity and associations within any community is due in part to the lack of fungal diversity studies worldwide (Hawksworth, 1991; 2001). The socio-economic significance of wild fungi as food, medicinal source, ecosystem conservation, plant growth promotion, etc., has long been recognized in Europe, USA, China and other developed countries and this has attracted scientists to explore the potential macrofungi and their diversity (Marques et al., 2001; Pilz, 2001).

The Jammu & Kashmir State lies in the Western Himalayas and is presently divided into three parts with bulk portion lying in India and rest under the control of Pakistan and China. The forests of Jammu and Kashmir owing to enormous agro-climatic variations and peculiar physiography harbour rich diversity in macro fungi. Zabarvan forest lie on the northern side of Srinagar city (Jammu & Kashmir) at an elevation of 1,600 to 4,200 m masl. Hardly 240 macro fungal species have been reported from Jammu and Kashmir State (Walting and Abraham 1992; Beig et al 2008; Kumar & Sharma, 2009; Dar et al 2009a,b c; Dar et al 2010b;). There is urgent need to thoroughly explore Kashmir forests for macro fungi emanating in different seasons under varied environments and conserve the biodiversity prevailing in the State for future use (Walting and Gregori 1980; Samant and Dhar 1997; Dar et al 2010a). The present communication, describes some newly reported macrofungi from Jammu and Kashmir, India.

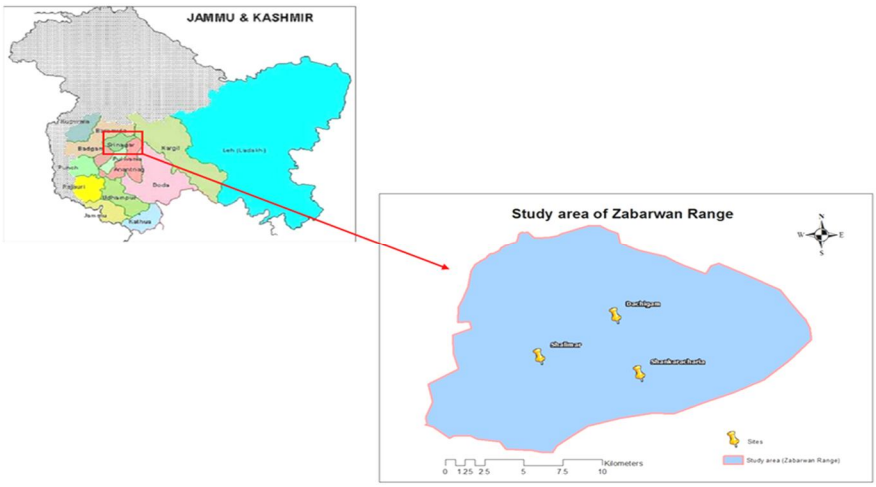


Fig. 1 : Map of the sites surveyed in Zabarvan forest range for macrofungal diversity

MATERIALS AND METHODS

Study Area

The study area was Zabarvan forest range of Himalaya which is situated in Jammu and Kashmir in India. Zabarvan is located at 34°07 N 74°55E / 34.02°N 74.45°E. It has an average elevation of 2600 meters (8530 ft). The fungal surveys depend on timing and location of observations. The survey methods were adopted according to techniques adopted by (Natrajan et al, 2005, Susan Metzler and Van Metzaler 1992).

Macro-fungal collection

The regular field trips were undertaken from 2009 to 2012 in different sites of coniferous forests of Zabarvan range of Kashmir valley of J&K, India to collect the samples of macro fungi. During collection of these macro fungi extensive care was taken to avoid any damage to the base and fragile parts of mushrooms. Local people were consulted to elicit the necessary information regarding vernacular names, edibility, occurrence and economic uses of macro fungi. Detailed field notes covering habitat, soil type, time and date of collection etc. were recorded. The morphological characteristics of macro fungi were noted and the specimen photographed on-spot to facilitate identification. Fresh and undamaged specimens were taken to laboratory for detailed examination. Spore prints were taken on paper to study the colour of spores, shape of gills and pores, and attachment of gills to the stipe (Kuo, 2001; Kuo, 2006). The shade-dried specimens were preserved of Mycology Laboratory of the Division of Plant Pathology SKUAST- Kashmir, Shalimar, Srinagar [Atri et al., 2003]. Dried specimens were sectioned by hand and mounted in 3% KOH, Melzer 's reagent and nitric acid to determine colour change (Largent et al., 1977). The identification was made on the basis of critical macro- and microscopic observations of the specimens and perusal of relevant literature (Kibby, 1979; Pacioni, 1985; Simon and Schulters, 1989; Abbott and Currah, 1997; Negi et al., 1999) and Mycokey (http://www.mycokey.com).

Results and Discussion

Forests of Western Himalayas possess enormous wealth of economically important macro fungi which have medicinal and food value. During the survey of Zabarvan forest range which is dominated by conifer plantations two hitherto unreported macro-fungi were observed. These fungi are described as under.

A) Peziza retrocurvata taxonomy

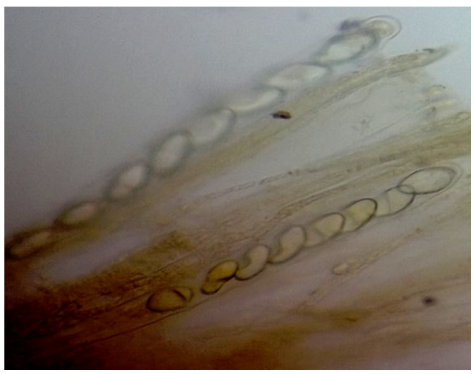
Kingdom : Fungi
Division: Ascomycota
Class: Pezizomycetes
Sub-class: Pezizomycetidae
Order: Pezizales
Family: Pezizacea
Species name: Peziza retrocurvata K. Hansen & Sandal

Syn: Peziza vesiculosa Bull.: Fr. 1791.

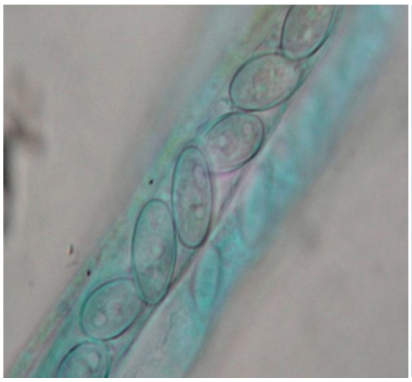
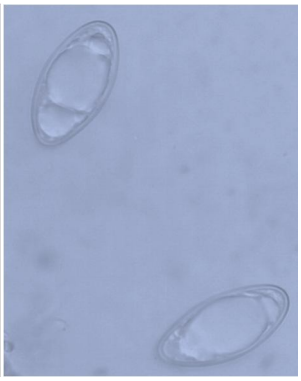
Peziza retrocurvata (local name 'Kun'; English name 'blistered cup') was saprobic and observed on the stumps of blue pine (Pinus wallachiana) and common willow (Salix alba) both in groups and in scattered manner. They were found at an elevation of 2,117 m masl (34°05'N - 74°50'E) in Dachigham . The cap of the fungus was sessile, disc shaped, soft, fragile and measured 42.0 mm (range: 35.4-49.1 mm) across. The hymenium was flat to slightly depressed, smooth, occasionally wrinkled and brown. Stipe was absent. Paraphyses were cylindrical, septate, occasionally with constricted septa and measured 2.5 - 20 µm wide, upper part was clavate, irregularily capitates and occasionally exceeding the asci. The spores were smooth, elliptical, white and measured 17.0 × 13.5 µm (range: 15.6-19.8 × 11.5-14.7 µm) in size.

The context treated with Melzer's reagent and 10 per cent KOH solution depicted positive reaction but it showed negative reaction with conc. HNO_3. The fungus did not grow on PDA and MMN media.

A) Sporocarp of Peziza retrocurvata



B) Ascus bodies with paraphyses

C) Single ascus D) Spores

B) Xylaria polymorpha taxonomy:

Kingdom: Fungi
Division: Ascomycota
Class: Sordariomycetes
Sub-class: Xylariomycetidae
Order: Xylariales
Family: Xylariaceae

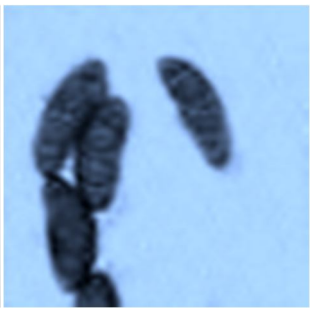
Species name**: Xylaria polymorpha (Pers.) Grev**

Syn: Xylosphaera hypoxylon (L.) Dumort

Xylaria polymorpha (English name 'Dead man's finger) was observed on rotting wood of European hackberry (Celitus australis), especially those emerging at ground level. They were found at an elevation of 2,291 m masl (34°05'N - 74°50'E) in Dachigam. This fungus was quite club-like, often slightly lobate in the upper fertile part, pointed at the tip, solitary or in small groups, initially dark greenish but later turned blackish and measured 48.3 mm (range: 37.6-59.8 mm) in width. The stipe was cylindrical and measured 14.1 × 6.7 mm (range: 12.0-17.1 × 5.9-8.7 mm) in size. Stromata was cylindrical, dichotomously branched several times or infrequently unbranched, surface with conspicuous perithecial mounds and wrinkled. Asci 8-spored, uniseriate, and cylindrical. The spore print was slight black. The spores were dark brown, fusiform, smooth and measured 25.0 x 7.0 µm (range: 21.5-28.8 × 5.7-8.9 µm) in size.

The context treated with Melzer's reagent and 10 per cent KOH solution depicted positive reaction but negative reaction with conc. HNO_3. The fungus grew on PDA medium at 25±1°C, colony white, felty, flat to heaped, reverse dark brown, hyphae hyaline turns brown with age, no sporulation in culture. Growth rate is slow, colonies not reaching the edge of petri dish (9 cm diameter) in 1 month.





A) Sporocarp of Xylaria polymorpha B) Inside view of sporocarp C) Spores

D) Culture of Xylaria polymorpha

Perusal of literature revealed that the two fungi have not been reported from J&K state (Bilgrami, et al, 1982, 1991; Sorhbay et al, 1996; Jammaludin et al, 2004). From J & K earlier two species of Peziza viz., P. exogelatinosa and P. versulosa from the Gulmarg forests (Dar, 2009) and one species of Xylaria hypoxylon have been reported from Dachigam (Dar, 2009). J & K state especially temperate Kashmir valley harbours many unknown fungi which used to be explored through extensive systematic of surveys.

With this study new distribution of Peziza retrocurvata K. Hansen & Sandal and Xylaria polymorpha (Pers.) Grevn were given and a contribution was made to state of J & K mycobiota by adding new records.

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