

FIRST RECORD AND DESCRIPTION OF *PISOLITHUSTINCTORIUS* (PERS.) FROM BALOCHISTAN, PAKISTAN

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خلاصہ

کھمبیاں یوکیٹریک اور دھاگہ نما فنجائیسیں جو عام طور پر ہائیلی سے ملکر بنے ہوتے ہیں۔ بہت سے ہائیلی آپس میں ملکر ایک مخصوص ساخت مائے سلیم بناتے ہیں۔ اکثر یہ مائے سلیم زمین کی تہہ میں، کسی درخت کے تنے میں یا پھر غذا امہیا کرنے والے کسی سبسٹریٹ میں مدفون ہوتے ہیں۔ یہ فطر تا " دگر پروردہ ہوتے ہیں اور ان کی ماحولیاتی اور غذائی ضروریات بھی مخصوص ہوتی ہیں۔ پزولیتس ٹنکٹوریس ایک میسیڈیومیٹیکولس فنگس ہے جس کو علاقائی زبان میں پیش خف کہا جاتا ہے۔ زیر نظر تحقیق کا مقصد بلوچستان کے ضلع خضدار کے مختلف علاقوں میں اس فنگس کی نشاندہی کرنا ہے۔ ہمارے علم کے مطابق یہ تحقیق بلوچستان کے ضلع خضدار میں اس فنگس کی پہلی نشاندہی ہے۔ اس تحقیق میں مذکورہ فنگس کی حیاتیاتی اوصاف نگاری (ڈسکرپٹیو بائیولوجی) بھی بتائی گئی ہے۔ علاوہ ازیں، مٹی میں پائی جانے والی پانی کی مقدار، مٹی کی پی ایچ اور علاقے کی کمیٹی کی ساخت کی جانچ بھی کی گئی ہے۔

Abstract

Mushrooms are eukaryotic and filamentous fungi often composed of hyphae which collectively form a beautiful structure. Mostly their mycelia are buried in the soil, on a rotting tree trunk, on leaves, wood, organic matter or any other nurturing substrates. They are heterotrophic, cosmopolitan organisms being specific in their ecological and nutritional requirements. *Pisolithustinctorius* is a Basidiomycotous fungus belonging to the family Sclerodermataceae of the order Sclerodermales. The genus has fruiting bodies of different sizes and shapes. Current study is an attempt to report *Pisolithustinctorius* (Locally known as BeeshKhaf in Balochi) from different localities of district Khuzdar, Balochistan, Pakistan. This mushroom is first time reported from this area. Habitat and morphological description of the species is given in this paper. Additionally moisture content, pH and texture of soil from the area where mushroom collection area are also reported.

Key Words: Khuzdar, Mushrooms, *Pisolithustinctorius*

Introduction

Mushrooms are eukaryotic organisms belonging to kingdom Mycota. They may be saprophytic, parasitic, epiphytic or symbiotic. They are composed of mycelium which is a network of hyphae. Hyphae are thread like structure which may be septate or aseptate. According to habitat types fungi are cosmopolitan. Fungi have great importance for human being as they are being used as food and medicine (Chang, 1980; Rambelli and Menini 1983; Stamets, 1993; Mattila *et al.*, 2017). They play a great role in bio remediation as well as used commercially (Smith, 1972; Stamets, 1993). They are rich source of protein, carbohydrates and vitamins (Aletor, 1995; Isikhuemhen *et al.*, 1996; Okwulehie and Odunze, 2004). Their proteins, carbohydrates and vitamins are almost in similar amount as found in wheat, egg, meat and milk (Aletor, 1990; Thatoi and Singdevsachan, 2014). They have been observed to be generally much less expensive than meat, pork and chicken that contain comparable supplements. (Adejumo & Awosanya, 2005). Mushrooms are potential wellsprings of dietary strands (Crisan & sands, 1978; Kurasawa *et al.*, 1982) and rough protein (Alofe *et al.*, 1996).

Mushrooms appear in diverse habitats during rainy season as seasonal fungi. They also occur in spring when snow melts. Infact they are the fruit of underground fungal mycelium. Species of mushroom are the indicators of the forest life support system (Stamets, 2000).

Khuzdar is the second largest city of Balochistan province and lies between 25° 43' and 28° 52' North latitudes and 67° 29' East longitudes. The total area of the district is 35380 square Km (Fig. 1). The elevation of the district is varying from 300 to 1800 meters above sea level. Minimum mean temperature for the years 1971-1990 was 3°C in the month of January, while the maximum mean temperature was 38°C in the month of June. The city is located in monsoon range and receives rainfall in summer (Faisal *et al.*, 2013). *Pisolithus tinctorius* was reported for the first time in Pakistan by Mirza & Qureshi in 1978. Later on Razzaq and Shahzad (2004)

reported it for the first time from Karachi. Current study is an attempt to report *Pisolithustinctorius* from different localities of district Khuzdar, Balochistan, Pakistan. To our knowledge this is the first ever report of this mushroom from Balochistan, Pakistan.

Materials and Methods

Pisolithustinctorius (Pers.) species were collected at different stages of their life cycle, from different areas of Khuzdar district namely Naal (76 KM West of Khuzdar), Pirumar (23 KM South of Khuzdar), Kori (32 KM East of Khuzdar), Professor's colony and Boys hostel campus during the months of April and May 2016. Meanwhile soil samples were also collected from each locality. The samples of mushroom were taken out with the help of scalpel. These mushrooms were brought to the biology lab of Department of Botany, Government Boys Degree College Khuzdar. Here each specimen was weighed separately with the help of digital balance (fresh weight). Their stipe and caps were measured with the help of measuring tape. The sample were air dried and weighed once again (dry weight). Spores were separated by removing the peridium from mature basidiocarps with the help of a spatula. Later the spores were brought to the Center of excellence in Vaccinology & Biotechnology (CASVAB) for electron microscopic studies to measure their length and width of spores, photographs were taken. Besides this water content, pH and texture of soil of study area were also determined. The water content (in percentage) of soil samples were calculated with the help of given below formula.

$$\frac{(\text{Fresh weight of soil} - \text{Oven dried weight}) \times 100}{\text{Fresh weight of soil}}$$

For determination of pH, the soil samples were thoroughly stirred in a graduated cylinder with the help of a stirrer. The particles were left to settle down and pH was measured by immersing the pH paper in it. Soil texture of study area were also determined by "Hydrometer method" (Bouyoucos 1951).

Results and Discussion

Habitat: The species was found to be frequently associated with Eucalyptus in damp soils, on the litter and near water canals. They were also abundant in shady places which were rich in litter.

Morphology: Since the specimens were collected at different stages of their life cycle, therefore shape, size, colour and texture of basidiocarps, peridium, basidia and stipe were observed carefully for each stage of life cycle.

Basidiocarp: The shape of basidiocarps showed great variety i.e. from globular to oval (at young age) and irregular (at bursting stage) as shown in Fig.2 and Fig.3. The average length and width of basidiocarps was recorded as 6.5 cm and 2.5 cm respectively.

Peridium: The colour of peridium was off white/white at young stage and dark green at mature stage. The peridium was soft at early stage and hard at mature stages.

Basidia: The spores were spherical in shape and were observed to be non-spiny at young stage and spiny at mature stage. The length of spores (basidia), as revealed by electron microscopy, ranged from 4 μm to 5.2 μm and their width ranged from 4.30 μm to 5.30 μm (Fig.4).

Stipe: The average length and width of stipes were 9.2 cm and 1.93 cm respectively and their lengths were far smaller as compared to basidiocarps.

Physico-chemical properties of soil: The physico-chemical properties of soil were also determined which showed that the texture of soil of selected areas was sandy (as determined by Jar method) and their average water content was only 1.96%. The average soil pH was recorded to be slightly alkaline i.e. 7.85 (Table.1).

Since it is an ectomycorrhizal mushroom and its association with the roots of eucalyptus trees has been frequently reported by many researchers (Garbaye *et al.*, 1988; Ashford *et al.*, 1999; Razzag and Shahzad, 2004; Bashir and Khalid, 2015). It's no wonder to find it around the eucalyptus trees in our study area during the damp months of April and May. This mushroom *Pisolithustinctorius* is being reported for the first time from Balochistan and it would be an important addition in distributional record of fungal and mushroom flora in Pakistan.

Conclusion

This is the first report of mushroom *Pisolithustinctorius* collected from Khuzdar district of Balochistan. They were found growing abundantly in spring season at moist soil under the shade which is rich in litter. It was also found growing in close association to *Euclyptus* trees.

The soil texture of the area was sandy with low water holding capacity, soil pH was highly alkaline. The morphology of specimens were determined through electron microscopic studies.

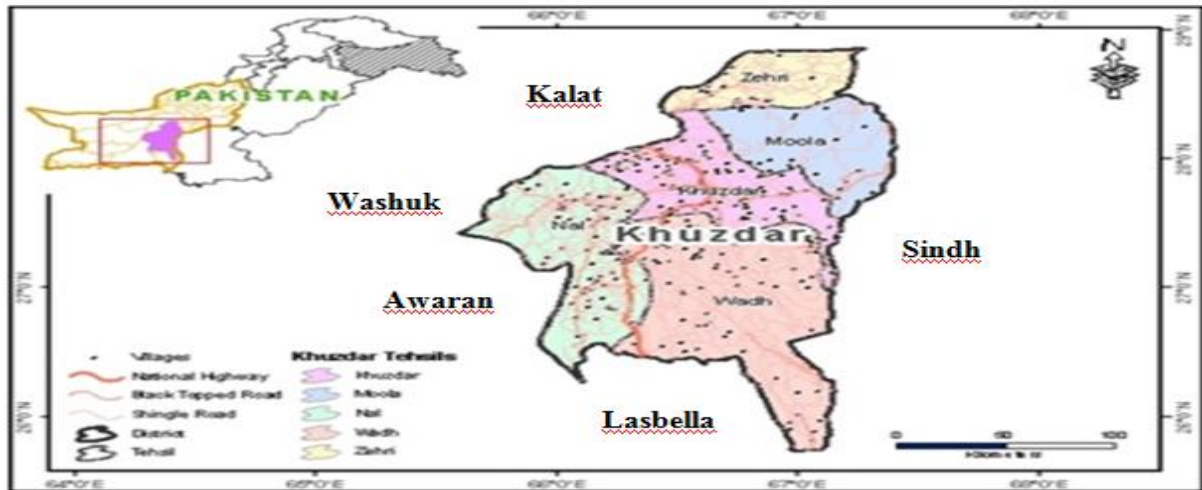


Fig.1. Map of Pakistan showing district Khuzdar Balochistan (District development profile, 2011)



Fig.2. and Fig.3. Fruiting body (basidiocarp) of *Pisolithustinctorius* at young (right) and mature (Left) stages of their life cycle respectively.

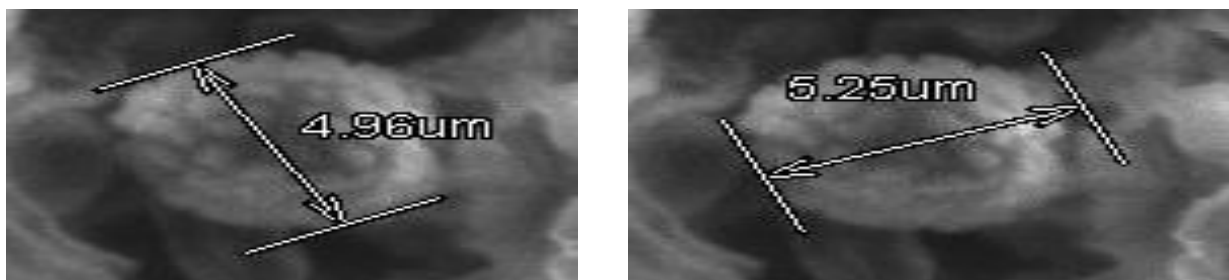


Fig.4. Electron microscopic image showing length (left) and width (right) of a basidium. Magnification=3205

Table.1. Percentage of Water content in soils of different localities and their pH

Name of the area	Percentage of Water content	pH of Soil	Soil Texture
Boys Degree college (Main city Khuzdar)	1.49%	7.5	Sandy
Girls Degree college (Main city Khuzdar)	2.04%	7.2	Sandy
Pirumar (South Khuzdar)	2.5%	7.2	Sandy
Saasol, Kori (East Khuzdar)	2.5%	8.6	Sandy
Shezad town (West Khuzdar)	1.5%	8.6	Sandy
Naal (South-West Khuzdar)	2.2%	7.7	Sandy
Khurasaan (South-West Khuzdar)	1.5%	8.2	Sandy
Average Values of Soil Water Content (in percentage) and pH	1.96 ± 0.21	7.85 ± 0.23	-

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