Bangladesh J. Plant Taxon. **31**(2): 293-299, 2024 (December) DOI: https://doi.org/10.3329/bjpt.v31i2.78755

NEW RECORDS OF MACROFUNGI OF THE MANGROVE ECOSYSTEM OF SUNDARBANS OF BANGLADESH

SYED ARMAN ALAM, SHAMIM SHAMSI* AND ASHFAQUE AHMED

Department of Botany, University of Dhaka, Dhaka-1000, Bangladesh

Keywords: Macrofungi; Mangrove; Ecological zones; Sundarbans; Bangladesh.

Abstract

An investigation was carried out from January to July 2021 to study the diversity of macrofungi from mangrove ecosystem of Sundarbans of Bangladesh. This paper deals with 7 newly recorded macrofungi found in Sundarbans of Bangladesh namely, *Entoloma strictius* (Peck) Sacc., *Hexagonia hirta* (P. Beauv.) Fr., *Hexagonia tenuis* (Hook.) Fr., *Hexagonia nitida* Durieu & Mont., *Coriolopsis gallica* (Fr.) Ryvarden, *Pleurotus pulmonaris* (Fr.) Quél., *Trichaptum abietinum* (Dicks.) Ryvarden. Detailed taxonomic description of the newly reported species with photographs are provided here.

Introduction

Fungi are very diverse group of eukaryotic organisms that range in size from microscopic to macroscopic. Macrofungi are large, prominent and spore bearing structures that produce visible fruiting bodies. Most of the macrofungi belong to ascomycetes or basidiomycetes and a few are of zygomycetes having large, easily visible, spore-bearing structures below or above the ground (Mueller *et al.*, 2007; Tang *et al.*, 2015).

The total diversity and distribution of macrofungi are not properly explored worldwide (Buyck *et al*., 2006). Macrofungi can be found in a variety of habitats depending on the species of trees and other substrates. The distribution of macrofungal species is influenced by geography, light and vegetation in a temperate forest (Chen *et al*., 2018). Macrofungi are commercially significant because of their uses in food, medicine, as bio-control agents and in industries (Monoharachary *et al.*, 2005). The taxonomic reports of macrofungi from Bangladesh are not so enriched in literature (Rashid *et al.*, 2017; Rubina *et al.*, 2017; Islam and Aminuzzaman, 2016; Islam *et al.*, 2015).

The Sundarbans, the single largest mangrove forest of the world has been declared as a world heritage site (WHS) by the UNESCO in 1997 and recognized as an international important Ramsar site in 1992. Mangrove ecosystems are "hotspots" for marine fungal biodiversity and they are home to a diverse range of fungal communities (Shearer *et al.*, 2007). Shamsi *et al*. (2018) reported six species and one genus of fungi associated with two mangrove species namely *Sonneratia apetala* Buch. Ham and *S. caseolaris* (L.) from coast zone of Bangladesh. Most of studies of Bangladesh Sundarbans focused on various aspects such as the diversity analysis of algae (Aziz *et al*., 2012; Ahmed *et al*., 2019), angiosperm species diversity and forest cover changes (Ahmed *et al*., 2018), physiochemical properties and contamination level of different metals of soil (Ataullah *et al*., 2017, 2018), anatomical adaptation of different mangrove plant species (Rashid *et al*., 2020), carbon stock of different plant parts (Ahmed *et al*., 2021), soil carbon pool and respiration of rhizosphere of different mangrove species (Alam *et al*., 2024).

*Corresponding author: prof.shamsi@gmail.com.

However, very few studies focused on the fungi, especially on macrofungi (Das and Aminuzzaman, 2017; Rubina *et al*., 2017). Macrofungal diversity and ecology of the Indian part of Sundarbans were observed by some researchers, from which total 62 species across 27 families and 46 genera were documented in three years study (Dutta *et al.*, 2013). The whole macrofungal community of Sundarbans of Bangladesh was not recorded according to the literature available (Das and Aminuzzaman, 2017). Therefore, this study has been conducted to document the macrofungal community of mangrove ecosystem of Sundarbans of Bangladesh.

Materials and Methods

Sundarbans mangrove ecosystem is located between the latitudes 21°30'N and 22°30'N, and longitudes 89°00'E and 89°55'E (Das and Aminuzzaman, 2017; Rubina *et al*., 2017; Iftekhar and Islam, 2004). It belongs to Satkhira, Khulna, and Bagerhat districts of Khulna division (Ataullah *et al*., 2017, 2018). Macrofungal samples were collected from different sub-stations and near the sub-stations under 4 ranges *viz*., Satkhira, Khulna, Chandpai and Sarankhola from the three ecological zones (Ahmed *et al*., 2018, 2019). Total 30 places were selected for sampling sites, in which each quadrate covered about (20m×20m) area were established in each area for sample collections (Alam, 2022).

The samples were collected from January to July 2021. Morphological and ecological data of these samples were recorded. Samples were then sun-dried (Parveen *et al.*, 2017) and transported to Mycology and Plant Pathology Laboratory, Department of Botany, University of Dhaka. Samples were then examined and were preserved in the herbarium of this laboratory. The taxonomic identification of macrofungi was done with consultation of the standard monographs and literature (Dickinson and John, 1982; Jorden, 2000; Arora, 1986; Halling, 1983). Consultations of mycologists from home and abroad were also taken for the identification.

Results and Discussion

A total of 36 species of macrofungi have been recorded during the period of this study (Alam, 2022). Out of these 36 species, 7 species of macrofungi are new records for Bangladesh with special reference to Bangladesh Sundarbans. These macrofungi have been recorded from different ecological zones of Sundarbans of Bangladesh. Detailed taxonomic description, photographs, illustrations and other relevant information are given below:

1. Coriolopsis gallica (Fr.) Ryvarden (Family Polyporaceae) **(Pl. 1, Figs 1a-b)**

Common name: Brownflesh Bracket.

Found about 4 to 10 cm wide and 5 cm deep. Cap was semicircular, bracket-shaped or somewhat irregular. Sometimes cap was fused laterally with other caps. Brown to grayish brownish or gray coloured cap was densely hairy and bald on the margin. Pore surface was gray to gray-brown and discoloring reddish brown in places. Pores were angular, becoming elongated and jagged but sometimes maze-like or gill like found in some places. Stem absent and flesh was rusty brown to dull brown, corky, tough and leathery.

Habitat: Found on dead Gewa trees (*Excoecaria agallocha* L.). It is saprobic on dead woods. Mode of nutrition is saprophytic. Collected in January, April and July of 2021.

Material studied: Recorded from Q-29 of Sundarbans of Bangladesh. Alam SA 25, 9 April 2021.

2. Entoloma strictius (Peck) Sacc. (Family: Entolomataceae) **(Pl. 1, Figs 2a-b)**

Common name: Straight-stalked *Entoloma*.

Cap was conical or bell shaped having a distinct but small pointed center. Surface was smooth, grayish-brown when moist, paler and streaked when dry. Gills were broad, adnate to deeply notched, narrowly attached to the stem. Gills were whitish to buff at first but became pinkish and eventually brownish. Stem 9 cm long and about 7 mm thick and slightly enlarged towards the base. Spore print was slightly pinkish.

Habitat: This species has been found as solitary in humicolous soil with ectomycorrhizal activity in July 2021.

Material studied: Recorded from Q-23 of Sundarbans of Bangladesh. Alam SA 31, 15 July 2021.

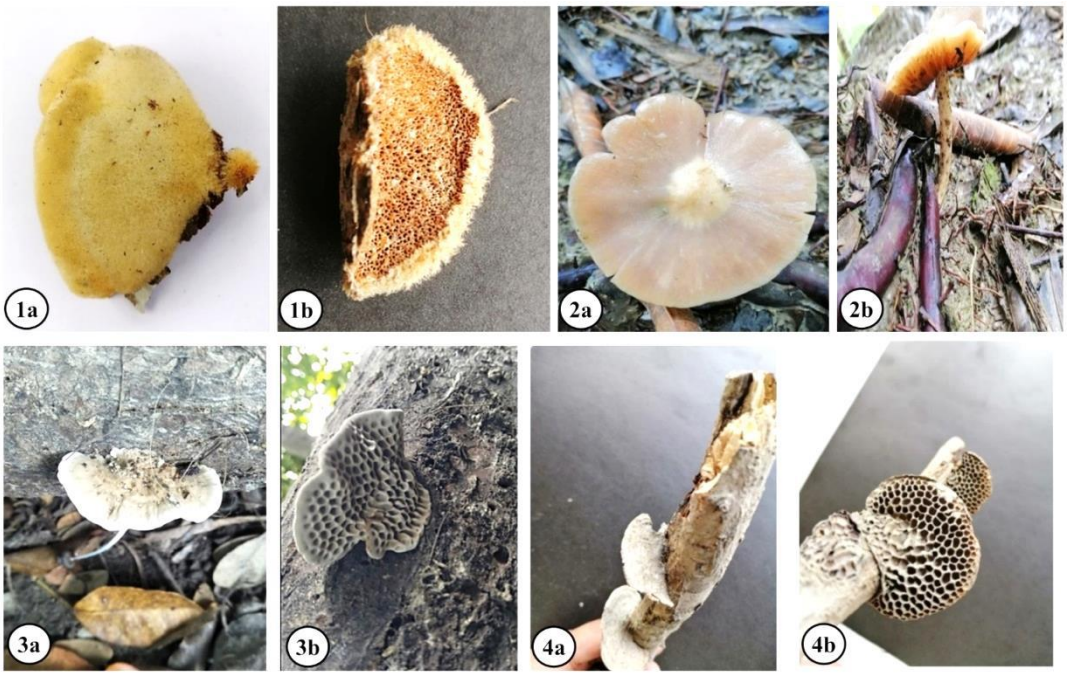

Plate 1. Figs 1-4: 1. Fruit bodies of *Coriolopsis gallica* (Fr.) Ryvarden (1a: dorsal view, 1b: ventral view); 2. Fruit bodies of *Entoloma strictius* (Peck) Sacc. (2a: dorsal view, 2b: ventral view); 3. Fruit bodies of *Hexagonia hirta* (P. Beauv.) Fr. (3a: dorsal view, 3b: ventral view); 4. Fruit bodies of *Hexagonia nitida* Durieu & Mont. (4a: dorsal view, 4b: ventral view).

3. Hexagonia hirta (P. Beauv.) Fr. (Family: Polyporaceae) **(Pl. 1, Figs 3a-b)**

Common name: Not known.

Fruit body was 6 cm in length and 3 cm in wide with wavy margin and little lumpy appearance near the point of attachment. Cap had different colors whitish, yellowish-brown to light brown respectively from the margin. Surface was whitish and pores were largely rounded to large hexagonal shape and at the point of attachment had yellowish colored tubes. Margin was thick and wavy.

Habitat: Found on dead *Avicennia officinalis* L. (Bain tree).

Material studied: Recorded from Q-24 of Sundarbans of Bangladesh. Alam SA 36, 18 July 2021.

4. Hexagonia nitida Durieu & Mont. (Family: Polyporaceae) **(Pl. 1, Figs 4a-b)**

Common name: Not known.

The fruit body was 7 cm in length and 4 cm in wide and 2 cm in thickness sessile, semi-circular, convex, bumpy with 3 to 6 concentric furrows. Color was brown at first and then became dark after dried. Margin was thin, straight, sterile, smooth, yellow-brown to bronze-brown colored. Underside was yellow colored. Tubes were long, thick walled, dark yellow-brown. Pores were large, hexagonal, smooth, shiny, fairly light-brown and then blackish brown when matured. Spore print was whitish. No stipe present.

Habitat: Found on dead branches of Gewa trees (*E. agallocha*) in January, April and July 2021.

Material studied: Recorded from Q-13 of Sundarbans of Bangladesh. Alam SA 08, 16 January 2021.

5. Hexagonia tenuis (Hook.) Fr. (Family: Polyporaceae) **(Pl. 2, Figs 1a-b)**

Common name: Not known.

Fruit body was 6 cm in length and 5 cm wide. Pileus was thin, leathery, bracket, reniform, coriaceous, glabrous. The upper surface had concentric zones of tan or ochraceous to dark brown. Fruit bodies were very persistent to slightly depressed. Dried samples had dark brown to blackish colored pileus. Under surface had pores of small, angular to hexagonal shape. Pore surface was grayish to ashy bluish tint. Thin fruit body is the diagnostic characteristic of this fungi.

Habitat: Found in dead Bain trees *A. officinalis* in January, April and July 2021.

Material studied: Recorded from Q-5 of Sundarbans of Bangladesh. Alam SA 05, 15 January 2021.

6. Pleurotus pulmonaris (Fr.) Quél. (Family: Pleurotaceae) **(Pl. 2, Figs 2a-b)**

Common name: Indian Oyster or Lung Oyster.

Cap was 3-5 cm was across, convex, becoming flat and depressed when mature, lung shaped to fan-shaped or semi-circular in outline. Found circular when growing on the tops of the logs. When young and fresh, the cap was whitish, fairly bald. The margin was in rolled when young and wavy after matured.

Gills were running down the stem, short-gills frequent, whitish when young and discoloring yellowish with age. Stem was 1-4 cm long. Flesh was thick and white. Spore print was whitish.

Habitat: Dead trees and branches of Gewa (*E. agallocha*). Found in July 2021.

Material studied: Recorded from Q-27 of Sundarbans of Bangladesh. Alam SA 34, 20 July 2021.

7. Trichaptum abietinum (Dicks.) Ryvarden (Family: Polyporacea) **(Pl. 2, Figs 3a-b)**

Common Name: Purple Pore Bracket.

Fruit body was 4 cm in length and 2.6 cm wide, tough. It was leathery when fresh but rigid when dried. The cap was 4 cm broad, fan shaped or resupinate. Surface was dry and covered with stiff hairs, concentrically zone or grooved, grayish colored. Margin was wavy flesh was pale gray to purplish. Pores were 2-4 per mm, rounded to angular, irregularly tooth-like. Pore surface was brown with hardly a hint of purple especially toward the cap margin. Spore print was white.

Habitat: Found on dead trees and fallen branches and injured Gewa trees (*E. agallocha*). Found in January and April 2021.

Material studied: Recorded from Q-8 of Sundarbans of Bangladesh. Alam SA 04, 15 January 2021.

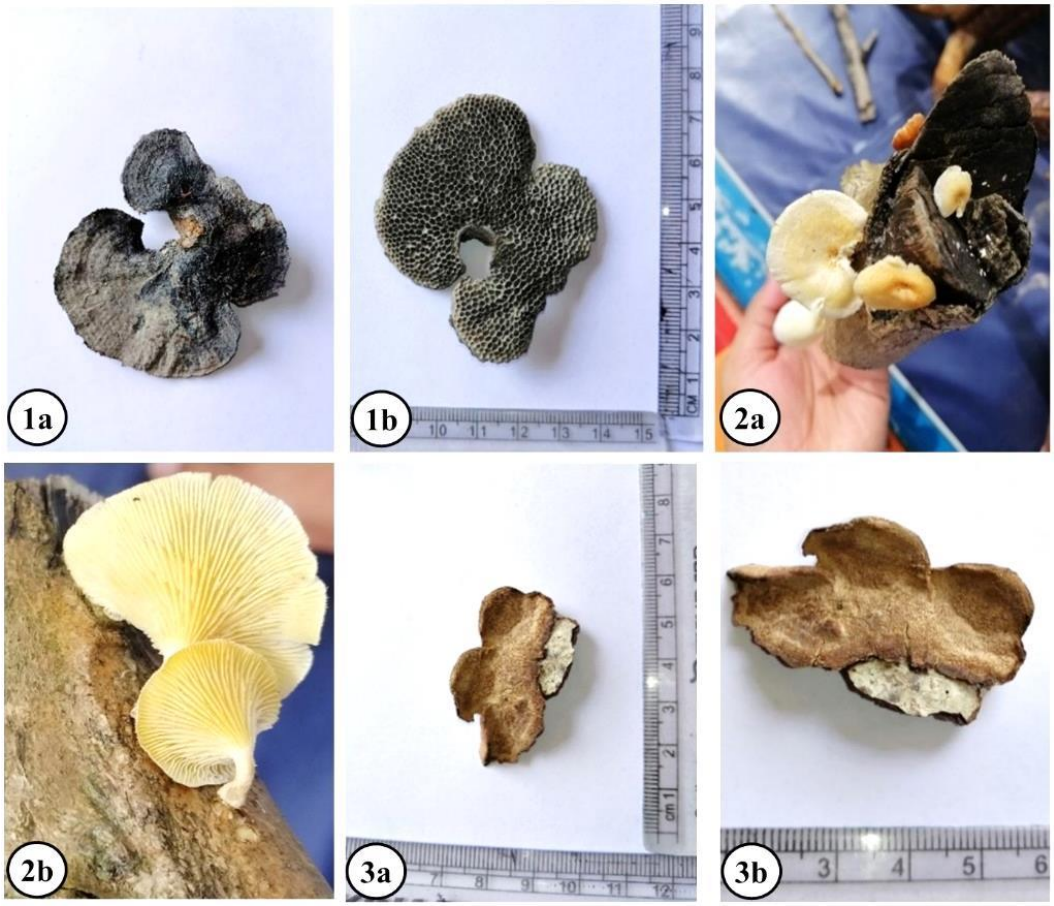

Plate 2. Figs 1-3: 1. Fruit bodies of *Hexagonia tenuis* (Hook.) Fr. (1a: dorsal view, 1b: ventral view); 2. Fruit bodies of *Pleurotus pulmonaris* (Fr.) Quél. (2a: dorsal view, 2b: ventral view); 3. Fruit bodies of *Trichaptum abietinum* (Dicks.) Ryvarden (3a: dorsal view, 3b: ventral view).

Acknowledgement

The first author would like to acknowledge the NST fellowship, Ministry of Science and Technology, Govt. of the People's Republic of Bangladesh for providing the financial assistance. This paper is also a part of the M.S. thesis work of the first author. The second author also like to acknowledge the Director of Advanced Studies and Research in Biological Science, DU for providing the financial support as Research project for fiscal year 2019-2020.

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(Manuscript received on 3 December 2023; revised on 5 November 2024)