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Research article

Helvella atra J. König (Helvellaceae) - First report from Northeast India

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Abstract: *Helvella atra* is a large apothecial ascomycetous fungus under the family Helvellaceae of order Pezizales of sub-class Pezizomycetidae, class Pezizomycetes and division Ascomycota which is commonly called black saddle fungus. A study was carried out from April 2017 to November 2020 in different districts of Mizoram for collection and identification of Macrofungi. During the study *Helvella atra* was described based on macro and micro morphological characters for the first time from Mizoram, Northeast India. So, this is the first record of *Helvella atra* for Northeast India.

Keywords: Ascomycota - Ascus - Ectomycorrhizal - *Helvella* - Pezizales.

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INTRODUCTION

The generic epithet *Helvella* is an ancient term for an aromatic herb and the specific epithet *atra* means black. *Helvella atra* J. König is one of the 'saddle fungi' found in forests, particularly beside foot paths. *H.atra* was originally described and presented in Flora Danica (Oeder 1770) and after two years re-described by Zoega (1772) based on a specimen that was collected by J. König. According to Kirk *et al*. (2008) there are 52 species of the genus *Helvella* and Mycobank database has entered more than 200 legitimate species name (MycoBank 2021). Many species of *Helvella* have been reported from Europe and North America (Anderson & Ickis 1921, Dissing 1966, Dissing & Lange 1967, Kempton & Wells 1970). A total of 12 species of *Helvella* have already been reported from India (Lloyd 1904-1919, Sohi *et al.* 1965, Kar & Maity 1970, Joshi *et al.* 1982, Bilgrami *et al*. 1991, Jamaluddin *et al.* 2004), out of which seven species were reported from Jammu and Kashmir (Kaul *et al.* 1978, Kaul 1981, Abraham 1991, Kumar & Sharma 2010). Dorjey *et al.* (2013) reported four species of *Helvella* from Jammu and Kashmir, out of which three species were new to India. *Helvella atra* is widely distributed which has been found in Europe (Kirk *et al*. 2008, Skrede *et al.* 2017), America (Dissing & Lange 1967, Abbott & Currah 1997), China (Zhuang 2004), Iran (Asef 2013), Japan (Nagao 2002), India and Nepal (Khadka & Aryal 2020). *Helvella atra* likes sandy alkaline soil rather than acidic soil or heavy clay and most frequently found in forests (Zhuang 2004). The saddle fungi usually have the capacity to form ectomycorrhizal relationships with forest trees, but it is also observed that they can live as saprobes. *Helvella atra* has no distinctive taste but has a faint pleasant odour and it mostly appears in summer and autumn season (Nagao 2002). Many mycologists worked on wild macro-fungi in India and they reported large number of macro-fungi from Northeast India. The available literature revealed that there was no any report of *Helvella atra* from Northeast India. So, the authors attempted to describe the *'saddle fungi'* through this *paper* which is new for Northeast India.

MATERIALS & METHODS

Study area

The Northeast India encompasses diverse hills and valleys which is a rather treasure of diverse flora and fauna. Land of Mizoram is surrounded by the states of Northeast India like Manipur, Assam and Tripura towards Northern part whose Southern part shares 722 km international borders of Myanmar and Bangladesh.

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It extends from 21° 56' N to 24° 31' N and 92° 16' E to 93° 26' E. The tropic of cancer passes through the state nearly at its centre. Mizoram has a mild climate, being relatively cool in summer 20 to 29°C but progressively warmer, most probably due to climate change, with summer temperatures crossing 30°C and winter temperatures ranging from 7 to 22°C. The average annual rainfall of Mizoram is 254 cm and climate pattern is moist tropical to moist sub-tropical.

Sample collection

The survey was done in the forest of eight districts (Aizwal, Lunglei, Champhai, Mamit, Kolasib, Saiha, Serchhip & Lawngtlai) of Mizoram periodically from April 2017 to November 2020. The sample was collected, photographed its macroscopic features and concise description of the fresh specimen was examined thoroughly in the sampling site. Identification of the sample was done according to standard macroscopic and microscopic characteristics through consultation with relevant literature (Kibby 1979).The specimen was preserved and deposited as herbarium at Rain Forest Research Institute, Jorhat, Assam with the allotted accession no. RFRI /MZ/ 00057.

RESULT & DISCUSSION

The specimen of *Helvella atra* was collected from Reiek reserve forest, Aizwal, Mizoram in July 2019 near foot path. The geo-coordinates of the location from where the specimen was located were latitude 23° 41' 36.98" N and longitude 92° 36' 24.04" E. A total of 248 different species of macro-fungi belonging to 21 orders, 52 families and 88 genera were documented from Mizoram. Out of these *Helvella atra* was found for the first time in Mizoram.

Macroscopic characters

The Apothecia of *Helvella atra* were found 0.7 to 3 cm across, 3 to 10 cm tall, saddle-shaped, stipitate-capitate with two upward projecting lobes, dark brown or black in colour. Cap 0.6 to 3 cm tall and 0.7 to 3 cm across, margin adnate, attached to stipe at 3–4 points, receptacle surface was grey, smooth while hymenium was somewhat pale and wrinkled. Stipe grey-brown, 3 to 7 cm long, 3 to 7 mm in diameter and thickening towards the base (Fig. 1A–B). The macroscopic features of the present specimen were compared with description given by several workers (Landeros *et al*. 2012, Asef 2013, Skrede *et al.* 2017) which were found almost similar about *Helvella atra.*

Figure 1. A*pothecia of Helvella atra* J. König at natural habitat.

Microscopic characters

The size of an acus was 240 × 18 µm, bearing eight ascospores; spore print white; spores hyaline, ellipsoidal, smooth, size 17–18 × 11–13µm (Fig. 2A–*B)*. Sub-hymenium cylindrical, 100 µm thick, composed of dense textura intricata, frequently septate hyphae, 4 µm broad, light brown if seen at low magnifications. Medullary excipulum was cylindrical, gelatinous of textura intricata, septate, hyaline, slightly thick-walled hyphae, 2–3 µm broad. Ectal excipulum was thin, 20 µm thick, of textura sub-globulosa to angularis made up of elements up to 10 µm broad, dark brown due to the colored thick wall. External hairs cylindrical, septate, smooth, on average ≤130 µm, straight and wavy, with tips blunt and enlarged to bulbous base with wall thickened up to 1µm. Almost similar microscopic features also described by other authors (Asef 2013, Skrede *et al.* 2017, Khadka & Aryal 2020) about the present species *Helvella atra.*

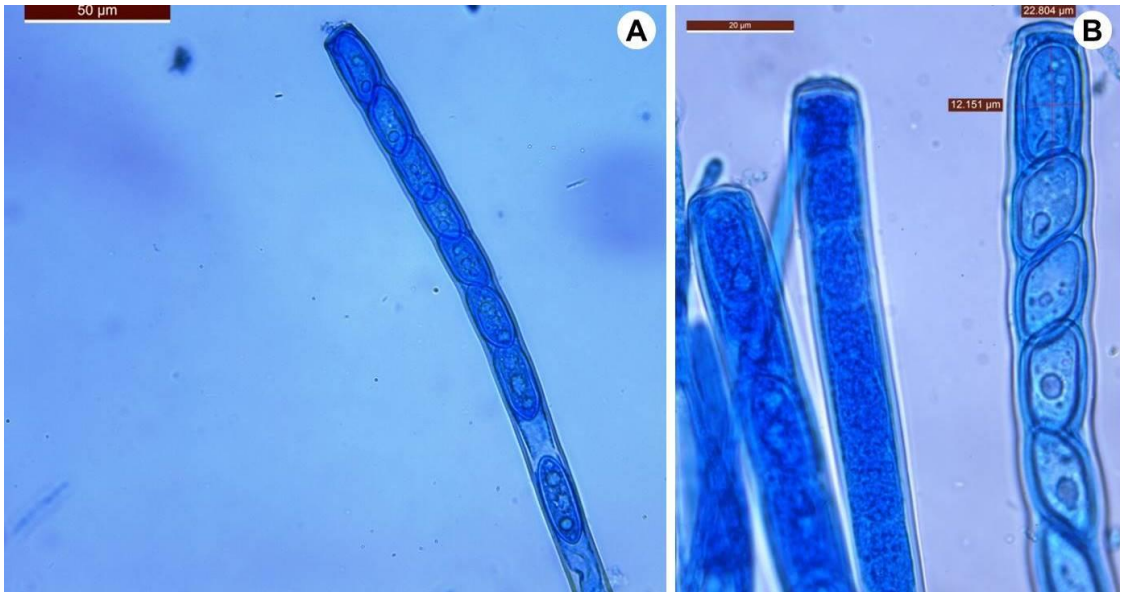

Figure 2. *Helvella atra* J. König under light microscope (100x): **A**, Asci; **B**, Ascospores.

Keys to the some *Helvella* species

1a.Apothecium cupulate ……..…. ……. *H. leucomelaena*
b. Apothecium convex to irregularly lobed ……..……...…… 2
2a. Stipe ribbed ……..……...…… 3
b. Stipe terete ……..……..... 6
3a. Excipular surface glabrous ……..…….. *H. lacunosa*
b. Excipular surface pubescent or villose near themargin ……...……... 4
4a. Hymenium and stipe whitish ……..…… *H. crispa*
b. Hymenium pale brownish to brownish 5
5a. Ribs with sharp edge, expanding up to the middlepart of the apothecium ……..…..... *H. acetabulum*
b. Ribs with blunt edge, expanding up to the most of the apothecium ……...….. *H. costifera*
6a. Apothecium and stipe very dark brown to black ……..…… *H. atra*
b. Apotheciun and stipe not very dark brown toblack ……...…… 7
7a. Excipular surface glabrous …….. 8
b. Excipular surface pubescent to villose ……...……..... 9
8a. Spore dimensions 18–21 × 11–13 µm ……..…… *H. elastica*
b. Spore dimensions 21–24×13–15 µm ..... *H. leucopus*
9a. Apotheciumupto1.5 cm, stipegrey-brown ……..…….. *H. ephippium*
b. Stipe white to cream ……..... *H. latispora*

CONCLUSION

It is concluded that the species is *Helvella atra* J. König which is reported from Mizoram and it is the first report from Northeast India.

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