

NEW RECORDS FOR HYPOGEOUS ASCOMYCETES IN BULGARIA

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ABSTRACT

New horological data on seven hypogeous ascomycetes are reported. One of them – *Tuber borchii* are reported for the first time in the country, and for the remaining six species to indicate new localities. Four species are of high conservation value included in the *Red List of fungi in Bulgaria*. The species is described and illustrated on the basis of Bulgarian specimens.

Key words: *Bulgaria, hypogeous ascomycetes, new taxa, rare taxa, species diversity, Red List, truffles.*

INTRODUCTION

In mycological literature only eight species of hypogeous fungi have been known so far from the country. They have been classified within two classes of the *Ascomycota* division: *Eurotiomycetes* (1) – *Elaphomyces granulatus* Fr. : Fr. (Kuthan and Kotlaba, 1981; Stoichev, 1981; Gyosheva, 2000; Denchev et al., 2007, Dimitrova and Gyosheva, 2008), and *Pezizomycetes* (7) – *Hydnotrya cerebriformis* (Tul. & C. Tul.) Harkn. (Stoichev and Gyosheva, 2005), *H. tulasnei* Berk. & Broome (Stoichev, 1981; Dimitrova and Gyosheva, 2008), *Choiromyces meandriformis* Sacc. & Bizz. (Georgiev, 1906, Barzakov, 1931, 1932, Hinkova, 1961), *Tuber aestivum* Vittad. (Hinkova, 1965, Dimitrova and Gyosheva, 2008), *T. brumale* Vittad. (Dimitrova and Gyosheva, 2008), *T. excavatum* Vittad. (Dimitrova and Gyosheva, 2008), and *T. puberulum* Vittad. (Hinkova and Stoichev, 1983, Dimitrova and Gyosheva, 2008, 2009).

This work presents new information about the species diversity and distribution of hypogeous ascomycetes in Bulgaria. Presented is a morphological description and macro photography of two new species. I hope that this document will be useful to create a database Bulgarian hypogeous ascomycetes.

MATERIALS AND METHODS

The macromycetes were registered during mycological field trips. Air-dried studied specimens of the fungus are kept in the Mycological collection of the Agricultural University, Plovdiv (SOA).

The samples are documented with color photographs and concise description. Ascospores of the species were photographed with SONY Cyber-shot 5.1Mpix. in standard JPEG format. Microscopic features are observed and measured in Melzer's reagent under Amplival LM, with magnification $\times 1000$.

The authors abbreviations of fungi are according to Kirk & Ansell (2004). Nomenclature of species follows Kirk & al. (2008).

Hypogeous ascomycetes were identified with the aid of works by Moser (1963), Hennig (1971), Dennis (1978), Montecchi and Lazzari (1993), and Dimitrova and Gyosheva (2008). Distribution of the taxa is given according to the floristic regions adopted in the *Flora of the PR Bulgaria* (Jordanov, 1966). The new species species to Bulgaria in the list below are designated with asterisks. The conservation status is indicated according to the *Red List of Fungi in Bulgaria* (Gyosheva et al., 2006).

RESULTS

One hypogeous ascomycetes species – *Tuber borchii* are reported for the first time from Bulgaria. New localities for six species (*Elaphomyces granulatus*, *Choiromyces meandriformis*, *Hydnotrya tulasnei*, *H. cerebriformis*, *Tuber exavatum*, and *T. puberulum*) have been established. Four hypogeous species (*Elaphomyces granulatus*, *Hydnotrya tulasnei*, *Choiromyces meandriformis*, and *T. puberulum*) are with high conservation value and are included in the *Red List of Fungi in Bulgaria* (Gyosheva et al., 2006).

Elaphomycetales

Elaphomycetaceae

***Elaphomyces granulatus* Fr. : Fr. (Fig. 1)**

Rila Mts, in soil among mosses, along *Picea abies* forest, near the Treshtenik chalet, above the Yakoruda town, 20.06.2010, leg. & det. *M. Lacheva* (SOA 6000124).

Rhodopi Mts (*Central*), in soil among mosses, in a community of *Corylus avellana*, *Pinus sylvestris*, in the vicinity of the colony of Galabovo village, Plovdiv distr., 16.11.2004, leg. & det. *G. Stoichev* (SOA 6000126).

The species is known from Black Sea Coast, Northeast Bulgaria and Pirin Mts (Kuthan and Kotlaba, 1981, Gyosheva, 2000, Dimitrova and Gyosheva, 2008). The species is included in the *Red List of Fungi in Bulgaria* (Gyosheva et al., 2006) under the category Critically Endangered (CR).



Fig. 1. Ascomata of *Elaphomyces granulatus*

Pezizales

Pezizaceae

***Hydnotrya cerebriformis* (Tul. & C. Tul.) Harkn.**

Rhodopi Mts (*Central*), in the community of *Picea abies* and *Pinus sylvestris* forests, nearly the Ravnishta chalet, Plovdiv distr., 19.09.2005, leg. *M. Lacheva*, det. *G. Stoichev* & *M. Lacheva* (SOA 6000125).

The species is known the first time from Central Rhodopi Mts (Stoichev and Gyosheva, 2005, sub *Hydnobolites cerebriformis* Tul. & C. Tul.).

***Hydnotrya tulasnei* (Ber.) Ber. & Broome (Fig. 2)**

Rhodopi Mts (*Central*), in soil, in a community of *Picea abies* and *Pinus sylvestris* forests, nearly the village of Byala Cherkva, 19.09.2004, leg. *G. Stoichev* & *M. Lacheva*, det. *G. Stoichev* & *M. Lacheva* (SOA 6000128).

Rila Mts, in soil, in a community of *Picea abies* and *Pinus sylvestris* L., above the Yakoruda town, 23.06. 2005, leg. *M. Lacheva*, det. *G. Stoichev* (SOA 6000140).

The species is known from Rhodopi Mts (*Western, Central*) (Stoichev, 1981, Dimitrova and Gyosheva, 2008).

It is considered to be *Critically Endangered* (CR), according to Gyosheva et al. (2006).



Fig. 2. Ascomata of *Hydnotrya tulasnei*

Tuberaceae

***Choiromyces meandriformis* Sacc. & Bizz. (Fig. 3)**

Rhodopi Mts (*Central*), in soil, in a community of *Picea abies* and *Abies alba*, above Smolyanski ezera chalet, 08.10.2004, leg. *M. Lacheva*, det. *G. Stoichev* & *M. Lacheva* (SOA 6000147).

The species is known from Vitosha region and Rila Mts (Georgiev, 1906, Barzakov, 1931, 1932, Hinkova, 1961).

It is considered to be *Endangered* (EN), according to Gyosheva et al. (2006).



Fig. 3. Ascomata of *Choiromyces meandriformis*

****Tuber borchii* Vittad.** (Fig. 4)

Ascomata hypogeous, more or less globose, 2–6 cm in diameter, with thick white, white yellowish, becoming brown ochre coat, initially pubescent, subsequently smooth; gleba initially whitish, subsequently beige, or pale reddish brown at maturity, with a close network of whitish meandering veins. **Asci** 70–80.7 x 50–80.5 µm, subglobose to ovate or ellipsoid, short-stalked, 1–3 (–4) spored (usually 3-spored). **Ascospores** 30–45.5 x 20–37 µm (with ornaments), varying in size according to their number in the ascus, ellipsoid to broadly ellipsoid, with a large reticulate coat, 4–6.5 µm high, initially hyaline, pale yellow to yellowish-brown at maturity. **Smell** tuber-like, garlicky, pleasant at first, unpleasant with age. **Taste** pleasant.

Habitat. *Tuber borchii* is tolerant of a wide variety of soils, but prefers sandy calcareous soils and calcareous soils, mainly in association with conifers (*Pinus sylvestris* L.) or broad-leaved (*Fagus sylvatica* L., *Quercus* sp.) trees. January–October.

Notes: *Tuber borchii* is closely related to *Tuber dryophilum*, *Tuber maculatum* and *Tuber puberulum* are a white truffles group, with reticulate spores, difficult to tell apart. They have similar macroscopic and microscopic characteristics and sometimes they show a range of intermediate forms between several of these species (Montecchi and Lazzari, 1993).

Specimens examined: Rhodopi Mts (*Western*), in soil, in a community of *Picea abies* and *Pinus sylvestris* forests, nearly the Jrebichko village, Pazardjik distr., 23.05.2004, leg. G. Stoichev, det. G. Stoichev (SOA 6000162); In soil among mosses, in a community of *Pinus sylvestris* and *Fagus sylvatica*, above Jrebichko village, Pazardjik distr., 07.09.2005, leg. G. Stoichev & M. Lacheva, det. G. Stoichev & M. Lacheva (SOA 6000174).



Fig. 3. Ascomata of *Tuber borchii*

***Tuber excavatum* Vittad.**

Rhodopi Mts (*Western*), in a community of *Fagus sylvatica* and *Pinus sylvestris*, near Ravnogor village, distr. Bratsigovo, 16.10.2004, leg. G. Stoichev & M. Lacheva, det. G. Stoichev & M. Lacheva (SOA 6000163).

The species is known the first time from Northeast Bulgaria (Dimitrova and Gyosheva, 2008).

***Tuber puberulum* Berk. & Broome**

Rhodopi Mts (*Central*), in soil, in a community of *Pinus sylvestris*, above Byala Cherkva village, 26.09.2005, leg. G. Stoichev (SOA SOA);

Rhodopi Mts (*Central*), in soil, in a community of *Pinus sylvestris*, around Brestnik village, Plovdiv distr., 10.09. 2005, leg. G. Stoichev, det. G. Stoichev (SOA 6000158).

The species is known from Rhodopi Mts (*Central*) (Hinkova and Stoichev, 1983, Dimitrova and Gyosheva, 2008).

It is considered to be *Endangered* (EN), according to Gyosheva et al. (2006).

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