Anatolian Journal of Botany
7(2): 128-130 (2023)
Research article *doi:10.30616/ajb.1285406*

Agaricus micromegethus, a new record for Turkish Mycobiota

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Received : 19.04.2023
Accepted : 07.06.2023
Online : 04.07.2023

Agaricus micromegethus, Türkiye Mikobiotası için yeni bir kayıt

Abstract: The *Agaricaceae* is a monophyletic group of saprotrophic fungi distributed worldwide. The family exhibits considerable variations such as spore color and structure of pileus covering in morphology. Agaricus is the type genus of the family containing both edible and poisonous species, with more than 500 species worldwide. This genus includes many species that are considerably important so takes attention of scientists in the fields of medicine, biochemistry and food science. This study aims to introduce a new record, *Agaricus micromegethus*, for the Turkish mycobiota based on macro- and micromorphology. An illustrated description of the record is provided.

Key words: *Agaricaceae, Basidiomycota,* taxonomy, Türkiye

Özet: *Agaricaceae*, dünya çapında yayılmış, saprotrofik mantarların monofiletik bir grubudur. Familya, morfolojik açıdan spor rengi ve pileus örtüsünün yapısı gibi önemli farklılıklar gösterir. *Agaricus* dünya genelinde 500'den fazla yenilebilir ve zehirli türleri kapsayan tip cinsidir. Bu cins oldukça önemli birçok türü içerdiğinden, tıp, biyokimya ve gıda bilimleri gibi alanlarda bilim insanlarının dikkatini çeker. Bu çalışma, makro- ve mikromorfolojiye dayanarak Türkiye'nin mikotası için yeni bir kayıt olan *Agaricus micromegethus*'u tanıtmayı amaçlamaktadır. Yeni kaydın resimli bir tanımı sunulmaktadır.

Anahtar Kelimeler: *Agaricaceae, Basidiomycota,* taksonomi, Türkiye

Citation: Acar İ, Dizkırıcı A (2023). *Agaricus micromegethus,* a new record for Turkish Mycobiota. Anatolian Journal of Botany 7(2): 128-130.

1. Introduction

Agaricaceae Chevall. is a well-known fungal family with global distribution. It is a monophyletic group of fungi that exhibits huge diversity in spore colour and structure of the pileus covering (Vellinga 2004). *Agaricus* is a large and saprotrophic genus of the family growing in forests, gardens, woods, grass-land, on roadside, rubbish dumps, fields, pasture-land, alluvial soils and manure heaps. Although members of the genus are easily recognized in the field based on the macro-morphological features alone, species delimitation is often hard due to the absence of distinguishable characters and intraspecific variability (Zhao et al., 2011). The genus is characterized by umbrella shaped carpophores with scaly to furfuraceous pileus surface. In young specimens, the lamellae are pinkish in colour, while in mature specimens they are sometimes dark brown. Lamellae are usually free-attached to stipe. *Agaricus* species have a partial veil that usually forms a ring on the stem. The spore print is dark brown and coca brown dark to purple brown-coloured spores without any germ pore (Karunarathna et al. 2016; Kuo, 2018; Saini et al. 2018).

Taxonomic monographs and other taxonomic studies of *Agaricus* species are mostly from America, Australia, Europe, India and New Zealand. However, many studies have been carried out in Türkiye for the last ten years (Güngör et al., 2015; Uzun et al., 2017; Işık et al., 2019; Keleş, 2019; Acar et al., 2020; Çağli and Öztürk, 2020; Işık, 2020; Sadullahoğlu and Uzun, 2020; Sesli et al., 2020; Uzun et al., 2020; Yeşil et al., 2020; Çevik et al., 2021; Kaşık et al., 2022; Solak and Türkoğlu, 2022). Accordingly, the total number of species in our country is presently 45. In an attempt to further knowledge of the taxonomy this genus, we describe a specimen of *Agaricus, Agaricus micromegethus* Peck., as a new record for Türkiye based on morphological characteristics. Detailed morphological descriptions and field photographs of the collected basidiomata are provided.

2. Materials and Method

Fresh samples of *Agaricus* were collected from Güveçli village (Bingöl) in 2019. The samples were photographed and transported to the laboratory where its fresh macroscopic details were described. Morphological descriptions of the specimens were made following Desjardin et al. (2015), Kerrigan (2016) and Siegel and Schwarz (2016). Following the methodology described by Senthilarasu and Kumaresan (2018), microscopical features (basidiospores, basidia, pileipellis and hyphae) of each dried specimen were examined. The specimens cited are deposited in the Herbarium of Van Yüzüncü Yıl University (VANF) and in the author's personal collection. Micro-morphological observations were examined from dried specimens treated with distilled water by a Leica DM500 research microscope under oil immersion. Thin sections were manually prepared from different parts of the basidiomata. At least 20 basidiospores and basidia were measured from each specimen using the Leica Application Suite (version 3.4.0) programme. The drawings used in the manuscript were made in CorelDRAW (64-bit).

3. Results

Short description, locality, collection date, fungarium number, and figures are given below.

Agaricus micromegethus Peck

Pileus 30-45 mm, at first has a slightly cylindrical or convex appearance, but later widening to plano-convex; the margins are curved inward in young specimens, then decurved; surface dry, often fimbriated with veil fragments when young; central depressed, fibrillose-scaly towards the margins, and striate in places on the margins, the ornamentation pinkish-brown, pale yellowish brown to lilac-brown over a dull background, with age the fibrils brownish, staining stronger yellow when bruised. **Lamellae** free, relatively wide and rather cramped, at first cream-buff, then pinkish-tan, finally middle -brown. **Stipe** 25-35 × 5-8 mm, usually equal, sometimes expanding towards the base, fragile, bruising yellowish to tawny; partial veil membranous-fibrillose, it is covered with appressed fibrils above and below, the annulus is superior, white, whitish to tan-colored, single, thin, and often disappears or collapses against the stipe (Fig. 1). **Spores** 4.5-5.6 × 3.2-4.3 µm, smooth, ellipsoid to ovoid, thick-walled, usually dark brown. **Pileipellis** up to 15 µm, cylindrical, sometimes sausage-shaped, yellowish brown, clamp connection not observed. **Stipitipellis** up to 10 µm, parallel, tawny, clamp connection not observed (Fig. 2).

Specimen examined: Türkiye, Bingöl, Güveçli village, stream edge, in meadow, 38°50′56″N, 40°31′12″E, 1080 m, 27.10.2019.

Figure 1. *Agaricus micromegethus* **a**. photographs of the basidiomata in the laboratory **b**. in the field

4. Discussions

The present study identified *A. micromegethus*, originally described by Peck (1905), based on the morphologic analyses.

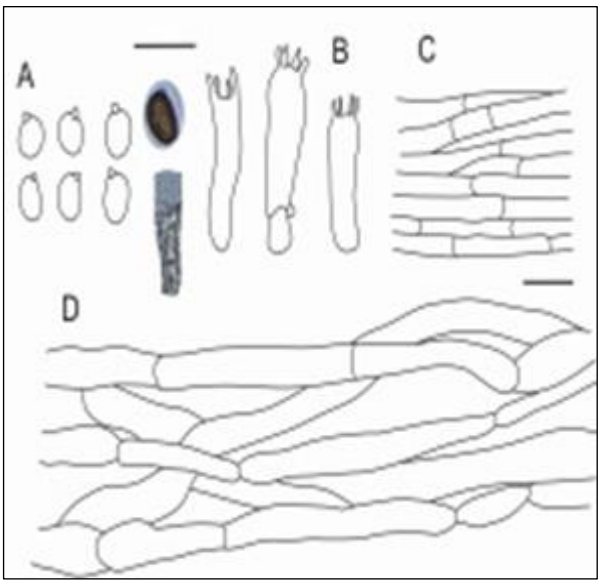

Figure 2. *Agaricus micromegethus* A. Basidiospores, B. Basidia, C. Stipitipellis, D. Pileipellis. Drawing by İ. Acar. **Scale Bar:** A-B= 10 µm, C-D= 20 µm

Agaricus micromegethus growns in grasslands and it is characterized by a small basidiocarp and pinkish to purplish fibrils on the pileus surface. As the species matures, the fibrils become brownish and turn yellowish when touched. *Agaricus comtulus* Fr. is related to *A. micromegethus* with its characteristic features that grows in meadow and slowly turn yellow when touched. However, it differs from *A. micromegethus* by cream-colored cap. *Agaricus micromegethus* is also related to *A. semotus* Fr. and *A. diminutivus* Peck, but can be distinguished by features of habitat; they are distributed in forested areas. *Agaricus micromegethus* can also be mixed with *Lepiota* species if the lamella color is not taken into account (Desjardin et al., 2015; Kerrigan, 2016; Anonymous, 2023).

Agaricus micromegethus, which is not very common in the world, is recorded in America, Colombia, Canada, China, and India when the literature is searched (Murrill, 1922; Sathe and Rahalkar, 1976; Liu and Bau, 1980; Devi and Thara, 2001; Kroeger and Berch, 2017). At the end of the study, thorough macro- and micro- morphological characters of the collected specimens indicated that the specimens represent *Agaricus micromegethus* for the first time from Türkiye and Europe.

Conflict of Interest

Authors have declared no conflict of interest.

Authors' Contributions

The authors contributed equally.

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