



Clavulinopsis fusiformis, a new record for Turkish mycobiota

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Clavulinopsis fusiformis, Türkiye mikobiyotası için yeni bir kayıt

Abstract: *Clavulinopsis fusiformis* (Sowerby) Corner. is reported for the first time for the mycobiota of Turkey. This species is the fourth member of the genus *Clavulinopsis* Overeem in Turkey and characterized by its yellow and fasciculated fruit bodies, ellipsoid to subglobose or globose, one to multi-guttulate basidiospores with a distinct apiculus, and the presence of clamp connection at the base of basidia. The collected sample is described briefly and the photographs related to its macro and micromorphologies were provided.

Key words: Agaricales, Basidiomycota, biodiversity, new record, taxonomy

Özet: *Clavulinopsis fusiformis* (Sowerby) Corner. Türkiye mikobiyotası için ilk kez rapor edilmiştir. Bu tür *Clavulinopsis* Overeem cinsinin Türkiye'deki dördüncü üyesidir, ve sarı ve fasikül halindeki gövdesi, elipsoit, küremsiye yakın veya küremsi, tek veya çok damlacıklı, belirgin apikulusa sahip bazidiyosporlar ve bazidiyumların tabanında kulplu bağlantı ile karakterizedir. Toplanan örnek kısaca betimlenmiş ve makro ve mikromorfolojilerine ilişkin fotoğrafları verilmiştir.

Anahtar Kelimeler: Agaricales, Basidiomycota, biyoçeşitlilik, yeni kayıt, taksonomi

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1. Introduction

Clavulinopsis Overeem is a genus of coral fungi in the family *Clavariaceae*. It was first established by Casper van Overeem (1923). Members of the genus are widespread (Kirk et al., 2008) and characterized by yellow, orange or beige coloured, simple or regularly dichotomously branched, cylindrical or fusoid stem with obtuse, inflated or cylindrical, thin-walled hypha with clamps, truncate or attenuated apex, 2-4 spored basidia with clamps at the base, and smooth or echinulate spores often with big oil drop (Knudsen and Vesterholt, 2018; Petersen, 1969).

Kirk et al. (2008) reports the existence of 33 species, but Index Fungorum (2021) lists 68 conformed *Clavulinopsis* species, three of which, *C. corniculata* (Schaeff.: Fr.) Corner, *C. helvola* (Pers.) Corner and *C. umbrinella* (Sacc.) Corner, were also reported from Turkey (Vlaev, 1915; Pekşen and Karaca, 2003; Doğan et al., 2005; Yağız et al., 2005; Solak et al., 2015).

But the current checklist (Sesli et al., 2020) and the latest contributions (Allı et al., 2019; Yakar et al., 2019; Yıldız et al., 2019; Akçay, 2020; Yeşil et al., 2020; Acar et al., 2021; Doğan, 2021; Kaygusuz et al., 2021; Sesli, 2021; Uzun, 2021) on Turkish mycobiota indicate that, *C. fusiformis* hasn't been reported from Turkey before.

The study aims to make a contribution to the mycobiota of Turkey.

2. Materials and Method

The basidiocarps of *C. fusiformis* were collected during a routine field study in İyidere district of Rize province. Color photographs of the fruit bodies were taken in the field and ecological properties were recorded. Then the samples were collected and transferred to the fungarium within

paper boxes. The samples were dried in an air conditioned room and prepared as fungarium material. Investigations were performed under a Leica trinocular microscope by preparing slides from dry specimens. Photographs related to micromorphology were obtained through a Leica ICC50HD digital camera. Identification was performed with the help of

Breitenbach and Kränzlin (1986), Ellis and Ellis (1990), Jordan (1995), Bessette et al. (2007), Kuo and Methven (2014), Furtado et al. (2016) and Acharya et al (2017).

The specimens are kept at Van Yüzüncü Yıl University Herbarium (VANF).

3. Results

Fungi R.T. Moore

Basidiomycota R.T. Moore

Agaricales Underw.

Clavariaceae Chevall

Clavulinopsis fusiformis (Sowerby) Corner, Monograph of Clavaria and allied Genera, (Annals of Botany Memoirs No. 1): 367 (1950)

Syn: [*Clavaria ceranoides* Pers., *Clavaria compressa* Schwein., *Clavaria fusiformis* Sowerby, *Clavaria fusiformis* f. *aurantiaca* S. Imai, *Clavaria fusiformis* var. *ceranoides* W.G. Sm., *Clavaria fusiformis* var. *congoensis* Beeli, *Clavaria inaequalis* var. *fusiformis* (Sowerby) Fr., *Clavaria platyclada* Peck, Bull. *Clavulinopsis fusiformis* var. *bispora* K.S. Thind & Sharda, *Ramaria ceranoides* (Pers.) Gray, *Ramariopsis fusiformis* (Sowerby) R.H. Petersen]

Macroscopic and microscopic features: Basidiocarps 65-130 × 4-9 mm, cylindrical to slenderly fusiform, usually

twisted and pointed at the apex, some flattening or compressed with longitudinal grooves, surface smooth, bright to pale yellow, fading with age, somewhat darker toward the base and brownish at the tips at maturity (Fig 1). Flesh yellow, fragile. Taste somewhat bitter, odor not distinctive. Basidia $45\text{--}58 \times 6.5\text{--}8 \mu\text{m}$, slenderly clavate to subclavate, almost hyaline, with 2-4 sterigmata of $5.5\text{--}7 \mu\text{m}$ long (Fig 2a), clamps present. Basidiospores $5.5\text{--}8.2 \times 5\text{--}7.7 \mu\text{m}$, broadly ellipsoid, subglobose to almost sub-

spherical, smooth, with drops or a large guttule and a prominent apiculus (Fig 2b).

Clavulinopsis fusiformis was reported to grow gregariously or in dense clusters with fused bases, on soil among grass or mosses, in poor meadows, grassland or in woods under hardwoods, conifers or shrubs (Breitenbach and Kränzlin, 1986; Buczacki, 1989; Ellis and Ellis, 1990; Jordan, 1995; Bessette et al., 2007; Acharya et al., 2017; Knudsen and Vesterholt, 2018).



Figure 1. Basidiocarps of *Clavulinopsis fusiformis*

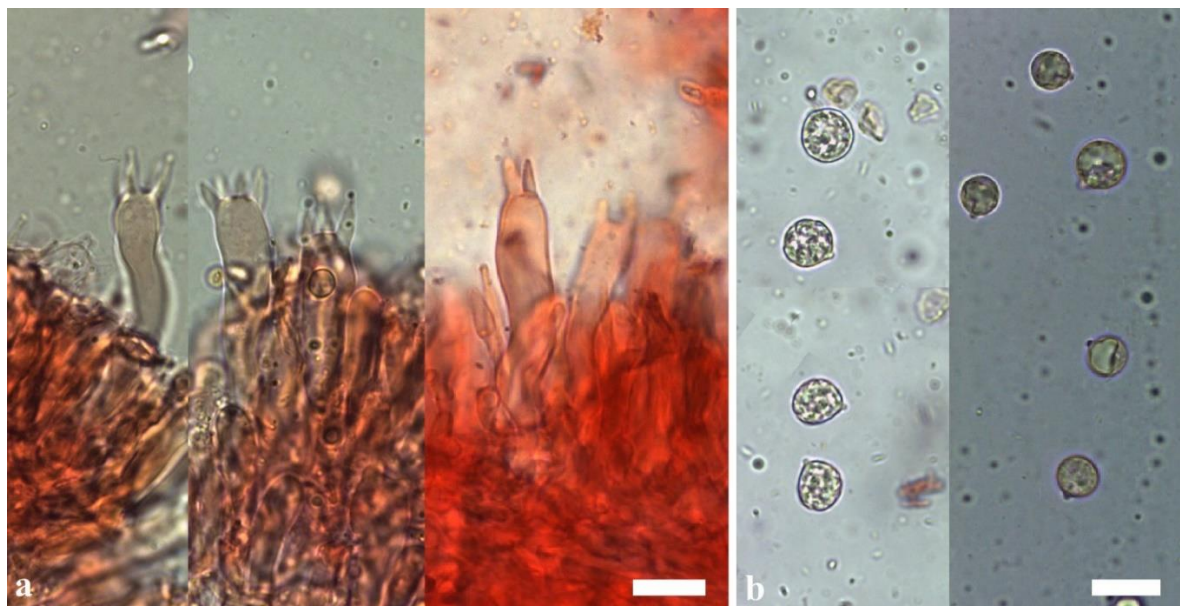


Figure 2. Basidia (a), and basidiospores (b) of *Clavulinopsis fusiformis* (bars: $10 \mu\text{m}$) (a: kongo red; b: water)

Specimens examined: Rize, İyidere, Denizgören village, Cami cemetery, on soil among mosses in coniferous forest., 40°58'408N, 40°22'351E, 118 m, 14.11.2015, AK. 2998.

4. Discussions

Clavulinopsis fusiformis was given as new record for Turkish mycobiota as the fourth member of the genus *Clavulinopsis*. In general, macro and micromorphology are in agreement with those given in literature (Breitenbach and Kränzlin, 1986; Buczacki, 1989; Ellis and Ellis, 1990; Jordan, 1995; Bessette et al., 2007, Acharya et al., 2017; Knudsen and Vesterholt, 2018).

Though Breitenbach and Kränzlin (1986) and Jordan (1995) give the spore size of *C. fusiformis* up to $6.5 \times 6 \mu\text{m}$, but we measured them up to $8.2 \times 7.7 \mu\text{m}$. Bessette et al. (2007) and Knudsen and Vesterhold (2018) also give the spore size up to $9 \times 9 \mu\text{m}$.

Clavulinopsis fusiformis is often confused with *C. laeticolor* (Berk. & M.A. Curtis) R.H. Petersen. But some

macro and micromorphological characters differentiate these two species. *Clavulinopsis fusiformis* is typically yellow while *C. laeticolor* is usually some shade of orange. *Clavulinopsis laeticolor* is usually mild in taste, while *C. fusiformis* typically bitter. Spores of *C. laeticolor* are subglobose to pyriforme while those of *C. fusiformis* spores are subglobose to almost spherical (Desjardin et al., 2014).

Lincoff (1981), Russel (2006) and Bessette et al. (2007) reports *C. fusiformis* as an edible species. But local people know it as an inedible fungus.

Conflict of Interest

Authors have declared no conflict of interest.

Authors' Contributions

The authors contributed equally.

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