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## A Contribution to the Fungal Flora of Tokat Province

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**Abstract:** This study was conducted on specimens of macrofungi collected from Tokat province between 1998 and 2000. Five species belong to the class *Ascomycetes* and 54 to the class *Basidiomycetes* and they are as follows; *Ascomycetes*: *Helvellaceae*: 1, *Morchellaceae*: 3, *Nectriaceae*: 1, *Basidiomycetes*: *Lycoperdaceae*: 3, *Sclerotermataceae*: 1, *Tremellaceae*: 1, *Ganodermataceae*: 1, *Rhizopogonaceae*: 1, *Polyporaceae*: 8, *Schizophyllaceae*: 1, *Nidulariaceae*: 1, *Pleurotaceae*: 2, *Boletaceae*: 5, *Tricholomataceae*: 8, *Agaricaceae*: 9, *Coprinaceae*: 7, *Strophariaceae*: 1, *Cortinariaceae*: 2, *Russulaceae*: 3. *Coprinus fimetarius* (L.) Fr., *Coprinus silvaticus* (L.: Fr.) Fr., and *Cortinarius violaceus* (L.: Fr.) Fr. are new records for Turkish mycoflora.

**Key Words:** Taxonomy, Macrofungi, Tokat, Turkey, New records

### Tokat Yöresi Mantar Florasına Katkıları

**Özet:** Bu araştırma 1998-2000 yılları arasında Tokat ilinde toplanan mantar örneklerine dayanarak yapılmıştır. *Ascomycetes* sınıfına ait 5, *Basidiomycetes* sınıfına ait 54 taksonun tanımlandığı bu çalışmada taksonların familyalara sayısal dağılımı aşağıdadır; *Ascomycetes*: *Helvellaceae*: 1, *Morchellaceae*: 3, *Nectriaceae*: 1, *Basidiomycetes*: *Lycoperdaceae*: 3, *Sclerotermataceae*: 1, *Tremellaceae*: 1, *Ganodermataceae*: 1, *Rhizopogonaceae*: 1, *Polyporaceae*: 8, *Schizophyllaceae*: 1, *Nidulariaceae*: 1, *Pleurotaceae*: 2, *Boletaceae*: 5, *Tricholomataceae*: 8, *Agaricaceae*: 9, *Coprinaceae*: 7, *Strophariaceae*: 1, *Cortinariaceae*: 2, *Russulaceae*: 3. *Coprinus fimetarius* (L.) Fr., *Coprinus silvaticus* (L.: Fr.) Fr., *Cortinarius violaceus* (L.: Fr.) Fr. Türkiye mikrofiorası için yeni kayıttır.

**Anahtar Sözcükler:** Taksonomi, Makrofungus, Tokat, Türkiye, Yeni kayıt

### Introduction

The city of Tokat has an area of 10,470 km<sup>2</sup> and is located in the Central Black Sea region of Turkey. The city is surrounded by the provinces of Ordu and Sivas to the south, Amasya to the west, Sivas and Yozgat to the east, and Samsun and Ordu to the north (Fig. 1).

The humid forest area is mainly characterised by *Fagus orientalis* Lipsky and partly by *Quercus* L. The forest floor is characterised by *Rhododendron ponticum* L. and *Ilex aquifolium* L. *Quercus* forests are widely distributed in the humid forest area to the north of Canik, south of Deveci and south-east Dumanlı Mountain and surroundings. The climate of Tokat is semi-arid and the annual average temperature is 11-12 °C. The main rivers of the region are the Çekerek, Kelkit, Gököy, Kaz and Zinav. The Almus Dam lake is another prominent feature.

### Materials and Methods

The macrofungi were collected during field trips in the province of Tokat between 1998 and 2000. Various specimens at different stages of macrofungal development were collected. The different species were packed separately in order to prevent contamination by spores. The ecological and morphological features of the specimens were noted in the field.

The specimens were then taken to the laboratory. Their spore prints were prepared and dried so that they would be suitable herbarium samples. When photographing *Coprinus fimetarius* (L.) Fr., *Coprinus silvaticus* (L.: Fr.) Fr. and *Cortinarius violaceus* (L.: Fr.) Fr. spores, scanning electron microscopy (SEM) was used.

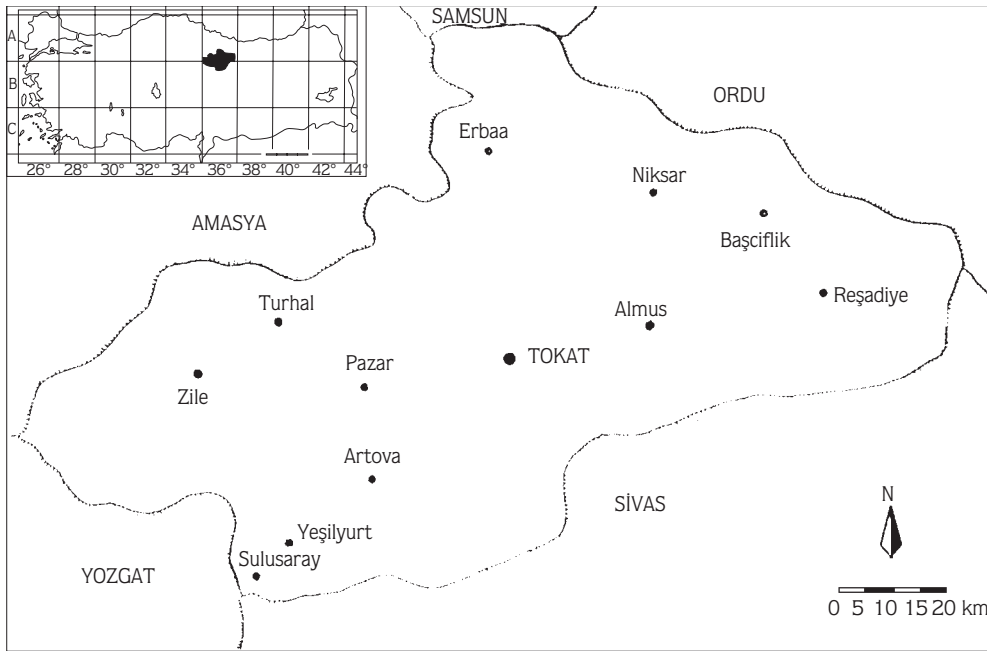


Figure 1. The study area.

Finally, the fruit bodies were dried with an electrical drying apparatus for preservation and deposited in plastic boxes in the Herbarium of the Biology Department of Gaziosmanpaşa University, Tokat.

At the end of our field and laboratory studies, all the taxa were identified with the help of relevant literature (Breitenbach & Kränzlin, 1984, 1986, 1991; Marchand, 1972; Phillips, 1981; Courtenay & Burdsall, 1982).

#### Ascomycetes

##### Fam. Helvellaceae

###### 1- *Helvella lactea* Boud.

Tokat: Topçam, in conifer forest, 12.06.1999, Türk 090.

##### Fam. Morchellaceae

###### 2- *Mitrophora semilibera* (DC.: Fr.) Leivelli

Tokat: Pazar-Üzümören, on soil among leaf litter in broad-leaved wood, 18.04.2000, Türk 272.

###### 3- *Morchella conica* Pers.

Tokat: Kaşiyaka, near the river in sandy soil, 20.04.1999; Nebiköy, 24.04.2000, Türk 159.

###### 4- *Morchella esculenta* Pers.: St.

Tokat: Yağmurlu, near the river in sandy soil, 20.04.1999; Karşiyaka, near the river in sandy soil, 12.04.2000, Türk 158.

##### Fam. Nectriaceae

###### 5- *Nectria cinnabarina* (Tode.: Fr.) Fr.

Tokat: Zile-Yalnızköy, on branches of dead *Cerasus microcarpa*, 14.06.2000, Türk 139.

#### Basidiomycetes

##### Fam. Lycoperdaceae

###### 6- *Calvatia utriformis* (Bull.: Pers) Jaap.

Tokat: Almus-Ormanbeyli, in grass, 16.06.1998; Niksar-Musapınarı, in grass, 21.06.1999, Türk 227.

###### 7- *Bovista plumbea* Pers. ex Pers.

Tokat: Pazar-B. Bağlar, amongst short grass on lawn, 14.05.1999; Erbaa-Karayaka, in short grass, 21.05.1999; Zile-Emirören, on short grass and pasture, 18.06.2000, Türk 228.

###### 8- *Lycogola epidendron* Fr.

Tokat: Topçam, on trunks of conifer, 12.06.1999; Artova-Çamdere, on trunks of pine, 08.06.2000, Türk 129.

**Fam. Sclerotermatacea****9- *Astraeus hygrometricus* (Pers.) Morg.**

Tokat: Almus-Serince, sandy soil in woods, 16.05.1998; Turhal-Sütlüce, amongst *Quercus* in woods, 21.06.1999; Erbaa-Ballıbağ, in open spaces in mixed forest, 05.10.1999, Türk 055.

**Fam. Tremellaceae****10- *Tremella mesenterica* Retz. ex Hook.**

Tokat: Artova-Alanköy, on dead deciduous branches, 09.10.1999; Erbaa-Demirtaş, 13.11.1999, Türk 208.

**Fam. Ganodermatacea****11- *Ganoderma applanatum* (Pers. ex Wallr.) Pat.**

Tokat: Sulusaray-Ilica, on dead trunks of *Salix* sp. 12.06.1998; Turhal-Hacılar, in conifer and deciduous woods, 23.10.1999, Türk 306.

**Fam: Rhizopogonaceae****12- *Rhizopogon luteolus* Fr.**

Tokat: Turhal-Hacılar, sandy conifer woods, 12.06.1999, Türk 113.

**Fam. Polyporaceae****13- *Bjerkandera adusta* (Willd.: Fr.) Karst**

Tokat: Niksar-Güvenli, on dead wood of broad-leaved trees, 07.11.1998, Türk 071.

**14- *Coriolus versicolor* (L.: Fr.) Pilat.**

Tokat: Erbaa-Köplüce, on living trunks of *Salix* sp. 26.11.1998; Turhal-Gökdere, on living trunks of *Populus* sp. 13.11.1999, Türk 017.

**15- *Fomes fomentarius* (L.: Fr.) Fr.**

Tokat: Yeşilyurt-Karacaören, on branches of tree, 16.10.1998; Artova-Aktaş, on dead wood of broad-leaved trees, 21.06.1999, Türk 174.

**16- *Funalia trogii* (Berk.) Bend. & Sing.**

Tokat: Pazar-Tepeçaylı, on dead twigs, 09.10.1998; Artova-Aktaş, 24.11.1999; Türk 056.

**17- *Polyporus brumalis* Pers.: Fr.**

Tokat: Pazar-Balıca, dead wood of deciduous trees, 20.04.1998; Turhal-Arzupınar, dead wood of deciduous trees, 26.04.1999; Zile-Palanlı, dead wood of deciduous trees, 03.05.1999; Erbaa-Evciler, dead wood of deciduous trees, 18.04.2000, Türk 154.

**18- *Polyporus frondosus* Mich.: Fr.**

Tokat: Almus-Gevrek, on trunks of *Salix* sp. 14.10.1998, Türk 143.

**19- *Polyporus squamosus* Huds.: Fr.**

Tokat: Pazar-Dereköy, on living trunks of *Salix* sp. 15.04.2000, Türk 051.

**20- *Trichaptum pargemenum* (Fr.) Cunn.**

Tokat: Erbaa-Evciler, on living trunks and dead broad-leaved trees, 15.04.2000, Türk 142.

**Fam. Schizophyllaceae****21- *Schizophyllum commune* Fr.**

Tokat: Merkez, on dead *Prunus* stump, 28.09.1998; Turhal-Kazancı, on stump of *Salix* sp., 21.10.1998; Artova-Çamdere, on stump of *Salix* sp., 17.11.1998; Niksar-Avlunlar, on stump of *Salix* sp., 27.12.1999, Türk 002.

**Fam. Nidulariaceae****22- *Cyathus olla* (Batsch) Pers.**

Tokat: Niksar-Sanayii, on organic debris, 14.11.1998; Gümenek, on soil, on twigs, 21.11.1999, Türk 045.

**Fam. Pleurotaceae****23- *Pleurotus ostreatus* (Jacq.: Fr.) Kummer**

Tokat: Turhal-Hacılar, on *Salix* sp. stump, 03.10.1998; Pazar-Balıca, on *Populus* sp. stump, 13.11.1999; Pazar-Üzümlü, on organic debris, 18.11.1999, Türk 121.

**24- *Lentinus tigrinus* (Bull.: Fr.) Fr.**

Tokat: Artova-Çamdere, around *Salix* stump, 12.05.2000; Almus-Ormandibi, 23.06.2000, Türk 319.

**Fam. Boletaceae****25- *Suillus luteus* (Fr.) S.F.Gray.**

Tokat: Almus-Armutalan, on soil with conifers, especially pines, 24.10.1998; Zile-Emirören, under *Pinus* sp. 02.11.1999, Türk 510.

**26- *Boletus chrysenteron* Bull.: St.-Amans.**

Tokat: Pazar-Tepeçaylı, 11.10.1998; Almus-Kınık, 23.10.1999, Türk 146.

**27- *Boletus erythropus* (Fr.: Fr.) Pers.**

Tokat: Erbaa-Üzümlü, in mixed wood, 02.09.1999; Bakışlı, in pinus and deciduous woods, 13.06.1999, Türk 181.

**28- Boletus satanas** Smotlacha.

Tokat: Artova-Mertekli, in oak forest, 15.05.1999, Türk 118.

**29- Leccinum oxydabile** (Sing.) Sing.

Tokat: Niksar-Çamiçi, in oak forest, 18.06.1999, Türk 150.

**Fam-Tricholomataceae**

**30- Armillaria mellea** (Vahl.: Fr.) K.H.

Tokat: Erbaa-Çamdibi, on trunks of *Salix* sp. 21.11.1998; Turhal-Gökdere, on trunks of *Salix* sp. 11.10.1999; Niksar-Ormandibi, on living trunks and dead broad-leaved trees 13.11.1999, Türk 074.

**31- Laccaria laccata** (Scop.: Fr.) Bk. & Br.

Tokat: Bakışlı, on soil in conifer forest, 03.10.1998; Pazar-Üzümören, under conifer, 16.06.1999, Türk 072.

**32- Lepista nuda** (Bull.: Fr.) Cooke.

Tokat: Merkez, on soil in conifer forest, 06.09.1998; Topçam, 18.10.1998; Çamlıbel, in pine forest, 21.10.1999; Artova-Tahtoba, under conifer, 12.11.1999, Türk 117.

**33- Marasmius oreades** (Bolt.: Fr.) Fr.

Tokat: Turhal-Hacılar, in open place of mixed forest, 07.05.1999; Pazar-Balıca, 25.10.1999; Niksar-Çamiçi, in pasture, 21.11.1999, Türk 170.

**34- Mycena rosea** (Bull.) Gramberg.

Tokat: Niksar-Ormanbeyli, under beech trees, 24.10.1999, Türk 219.

**35- Tricholoma terreum** (Schaff.: Fr.) Kummer.

Tokat: Erbaa-Ağaçalan, under *Pinus* sp. 16.10.1998; Turhal-Kayacık, in conifer forest, 24.06.1999; Niksar-Avınlular, among broad-leaved trees, 14.11.1999, Türk 104.

**36- Xeromphalina fellea** Mre. & Miç.

Tokat: Almus-Armutalan, beech and oak forest, 24.10.1999, Türk 218.

**37- Omphalotus olearius** (Dc.: Fr.) Sing.

Tokat: Zile-Akdoğan, on trunks of *Salix* sp. 14.9.1998; Almus-Armutalan, stump of *Salix* sp. 06.10.1999, Türk 138.

**Fam. Agaricaceae**

**38- Agaricus bisporus** (Lge.) Sing.

Tokat: Turhal-Gökdere, among grass, 12.11.1998; Niksar-Işıklar, in pasture, 12.6.1999; Niksar-Çamiçi, in pasture, 20.10.1999, Türk 124.

**39- Agaricus bitorquis** (Quél.) Sacc.

Tokat: Artova-Ağmusa, in pasture, 20.4.1999; Niksar-Işıklar, in pasture, 15.10.1999, Türk 161.

**40- Agaricus campestris** L.: Fr.

Tokat: Niksar-Çamiçi, on soil among grass in field, 15.08.1998; Beşören, 14.09.1998; Artova-Tahtoba, in pasture 13.05.1999; Niksar-Gökdere, amongst grass, 08.10.1999; Almus-Ormandibi, in pasture, 13.10.1999, Türk 036.

**41- Agaricus macrosporus** (Møller & Schaeff) Pilát

Tokat: Artova-Taşpınar, on sandy soil in garden, 28.10.1998, Türk 061.

**42- Agaricus silvicola** Schaeff.: Sec.

Tokat: Beşören, in mixed forest, 17.04.1999, Türk 128.

**43- Macrolepiota procera** (Scop.: Fr.) Sing.

Tokat: Niksar-Çamiçi, in open spaces in mixed forest, 14.09.1999, Türk 096.

**44- Lepiota brunneo-incernata** Chodat & Martin.

Tokat: Gümenek, in pasture, 21.10.1998; Niksar-Merkez, in garden, 16.10.1999, Türk 089.

**45- Lepiota cristata** Kummer.

Tokat: Niksar-Esence, on soil among plant debris in garden, 21.11.1998; Niksar-Şeyhler, in pasture, 06.10.1999, Türk 103.

**46- Lepiota konradii** Huijman.: Orton

Tokat: Almus-Sahilköy, under *Quercus* sp. 14.09.1998; Turhal-Gökdere, in conifer and *Quercus* woods, 18.09.1999, Türk 057.

**Fam. Coprinaceae**

**47- Coprinus atramentarius** (Bull.: Fr.) Fr.

Tokat: Tahtoba, in pasture, 13.12.1998; Emirseyit, in pasture, 17.03.1999; Artova-Çamdere, in gardens, 18.11.1999; Pazar-Kazova, in pasture, 21.03.2000, Türk 078.

**48- *Coprinus comatus* (Müll.: Fr.) S.F.Gray**

Tokat: Merkez, road side, 24.04.1998; Niksar-Ormanbeyli, under *Salix* sp. in gardens, 06.09.1998; Artova-Kayaönü, in pasture, 02.11.1998; Zile-Akdoğan, 13.11.1999, Türk 079.

**49- *Coprinus disseminatus* (Pers.: Fr.) S.F. Gray.**

Tokat: Bedestenlioğlu, under *Salix* sp. 30.10.1998; Erbaa-Tosunlar, on soil among plant debris, garden, 18.04.1999; Niksar-Örenler, 15.05.2000, Türk 015.

**50- *Coprinus fimetarius* (L.) Fr. (Syn: *Coprinus cinereus* Fr.)**

Cap 1-2 cm before expansion, later cylindrical, surface initially covered by universal veil, becoming soft, slippery, decurrent scales (Fig. 2a). Stem 1-5 x 0.3-1 cm, surface tomentose, generally breaking easily if turgid. Gills free, margin entire, cystidia present, finally black. Taste raw, bland; cooked, rich and mellow. Smell, farinaceous. Spore print black. Spores black, smooth, 5.6-7.5 x 4-5  $\mu$  (Fig. 2b-c). On dung, Topçam-Tokat, 12.6.1999, Türk 110.

**51- *Coprinus impatiens* (Fr.) Quel.**

Tokat: Pazar-B. Bağlar, in mixed trees, 19.10.1999, Türk 194.

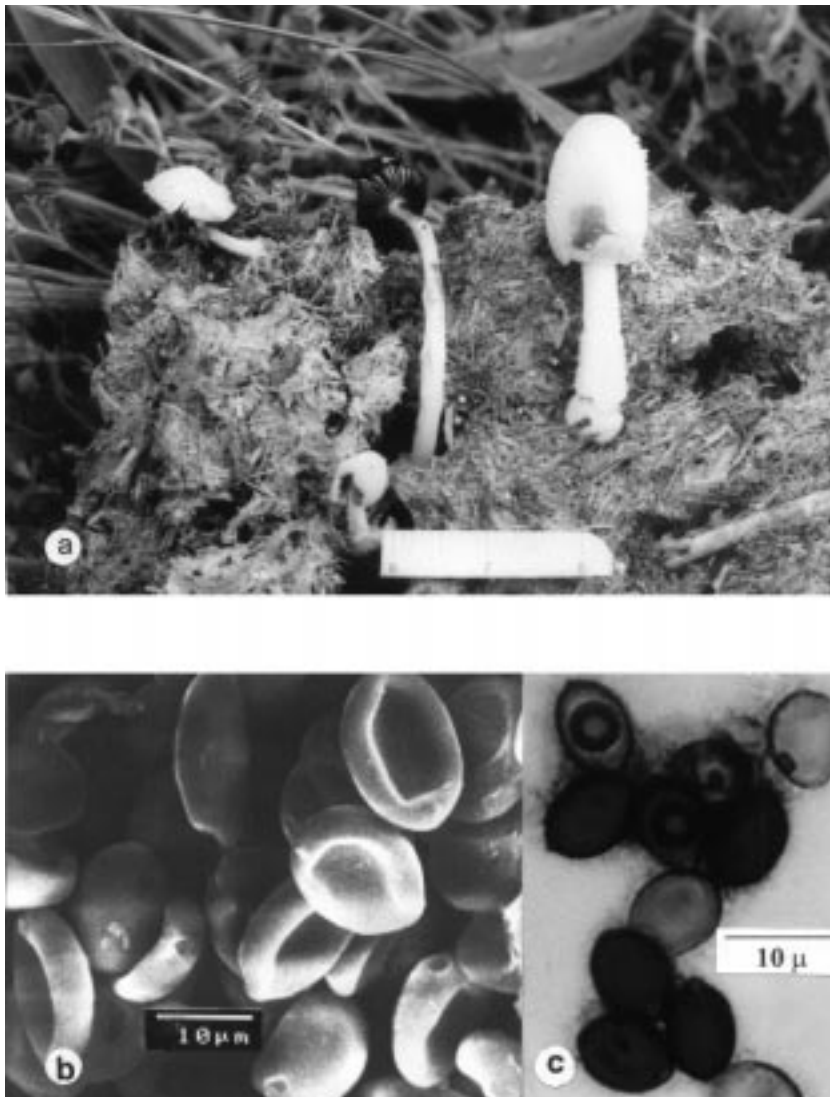


Figure 2. *Coprinus fimetarius* a. Fruit bodies b. spores (SEM) c. spores (light microscope).

**52- *Coprinus micaceus* (Bull.: Fr.) Fr.**

Tokat: Turhal-Kayacık, under *Salix* sp, 16.04.1998; Erbaa-Tosunlar, under *Populus* sp. 07.05.1999; Turhal-Kazova, in pasture, 27.09.1999; Sulusaray-Alanyurt, on dead wood of broad-leaved trees, 21.11.1999; Yeşilyurt-Damlalı, in pasture, 24.04.2000, Türk 153.

**53- *Coprinus silvaticus* (L.: Fr.) Fr. (Syn: *Coprinellus tardus* Karst.)**

Cap 1-3 cm high, ovoid expanding to conical-convex, cream buff with darker sienna or cinnamon centre (Fig. 3a). Often becoming grey, grooved from margin inwards. Stem 40-85 x 3-6 mm, white, the discolouring pale buff,

fragile. Smell none. Gills crowded white grey-umber, finally black. Spore print black. Spores almond-shaped possibly ornamented with low warts and ridges, 11-15 x 8-10  $\mu$  (Fig. 3b-c). Dermatozystidia 90-180 x 16-25  $\mu$ , lageniform. On soil attached to buried wood. Tokat-Işıklar, 14.9.1999, Türk 107.

**Fam. Strophariaceae**

**54- *Pholiota aurivella* (Batsh.: Fr.) Kummer.**

Tokat: Başçiftlik-Karacaören, on *Salix* sp. stump, 16.10.1998; Sulusaray-Ilica, on *Salix* sp. stump, 24.10.2000, Türk 190.

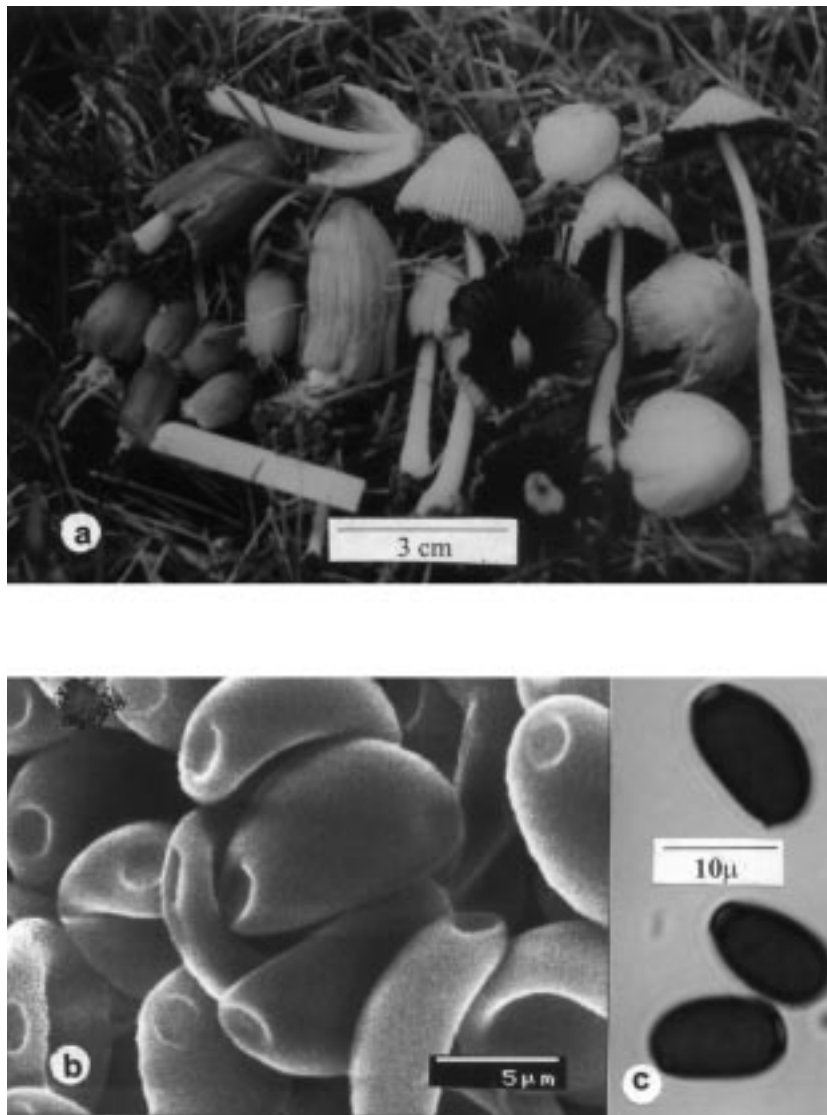


Figure 3. *Coprinus silvaticus* a. Fruit bodies b. spores (SEM) c. spores (light microscope).

Fam. Cortinariaceae

55- *Cortinarius violaceus* (L.: Fr.) Fr.

Cap 3.5-15 cm across, convex, margin incurved, dark violaceous to blue-black (Fig. 4a). Stem 60-120 x 10-20 mm (20-40 mm at base), swollen bulbous at base dark blue-violaceous, covered in woolly fibrils. Flesh violaceous, more strongly so below cap cuticle and in stem. Taste mild, smell slight, of cedar wood. Gills dark violet becoming purplish brown. Spore print rust. Spores elliptic to almond-shaped (Fig. 4b-c), 12-15 x 7-8.5  $\mu$ . Also found occasionally with conifers. Yeşilirmak-Tokat, 26.10.1999, Türk 069.

56- *Inocybe fastigiata* (Schf.: Fr.) Quel.

Tokat: Döllük, under beech, 15. 05. 1999; Artova-

Bedirkale, under *Quercus*, 08.06.1999, Türk 182.

Fam. Russulaceae

57- *Lactarius acerrimus* Biritz.

Tokat: Reşadiye-Yeniköy, under *Quercus*, 24.5.1999, Türk 178.

58- *Lactarius deliciosus* (L.: Fr.) S.F.Gray.

Tokat: Turhal-Sütlüce, in conifer forest, 21.09.1998; Niksar-Çamiçi, in deciduous forest, 14.10.1998; Yeşilyurt-Karacaören, in pine forest, 12.06.1999, Türk 053.

59- *Russula sanguinea* (Bull.) Fr.

Tokat: Tekneli, under conifer, 25.05.1999; Artova-Bedirkale, 01.06.2000, Türk 176.

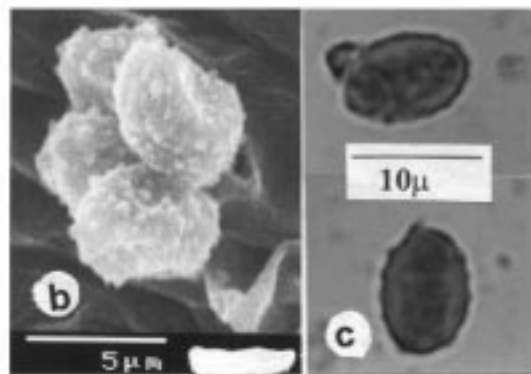


Figure 4. *Cortinarius violaceus* a. Fruit bodies b. spores (SEM) c. spores (light microscope).



## Results and Discussion

In this study, 59 macrofungi species were identified, five of which were Ascomycetes and 54 Basidiomycetes. *Coprinus fimetarius* (L.) Fr., *Coprinus silvaticus* (L.: Fr.

Fr., and *Cortinarius violaceus* (L.: Fr.) Fr. are new records for Turkish mycoflora. Of those macrofungi 50% are considered edible, 42% not edible and 2% poisonous; for 6% the edibility is unknown.

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