

ADDITION TO THE KNOWLEDGE OF *AMANITA* (AGARICALES, PLUTEACEAE) FROM IRAN

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Abstract

Six species of the genus *Amanita* are reported from Iran. Among them *A. aspera*, *A. caesarea* and *A. crocea* are new members for Iranian fungus flora. Three previously reported species viz. *A. battarae*, *A. ceciliae* and *A. rubescens* var. *rubescens* are studied in details. All species are redescribed and illustrated with microphotographs and drawings.

Key words: *Amanita*, Agaricales, Basidiomycota, Fungi, Iran

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Introduction

Identification of mushrooms in Iran began by BUHSE (1860) and RABENHORST (1871) followed by other fungal taxonomists. Within the last 146 years, some species of fungi belonging to Agaricales have been identified from different geographical regions of Iran, among them 14 species of *Amanita* have been also recorded viz. *A. phalloides* (Vaill. ex Fr.) Link (FALLAHYAN 1973), *A. pantherina* (DC.) Krombh., *A. spissa* (Fr.) P. Kumm., *A. vaginata* (Bull.) Lam., *A. verna* (Bull.) Lam. (SABER 1991), *A. eliae* Quél., *A. gemmata* (Fr.) Gillet (SABER 1995), *A. umbrinolutea* Secr. (SABER 1997), *A. strobiliformis* (Paulet ex Vittad.) Bertill. (SABER & ZANGENEH 2000), *A. codinae* (R. Mre.) Sing. (SABER & MEHRAVARAN 2001), *A. atkinsoniana* Coker (SABER & ZANGENEH 2004), *A. ceciliae* (Berk. & Broome) Bas, *A. fulva* (Schaeff.) Fr. and *A. rubescens* Pers (MUSAZADEH *et al.* 2005).

Some species of the genus *Amanita* Pers. are of the causal agents of mushroom poisoning and others are from good edible and ectomycorrhizal fungi.

Material and Methods

All specimens recorded here were collected during several field trips in 2004-2005 in the forest areas in northern Iran (Gilan and Mazanaran Provinces) by the first author. This area is dominated by some tree species like *Parrotia persica* (DC.) C.A. Mey., *Quercus castaneifolia* C.A. Mey., *Fagus orientalis* Lipsky, *Carpinus betulus* L. and *Acer platanoides* L. Exact information on the locality including ecology and altitude from Sea level and on the substrate on which the specimens grow along with accompanying tree species has been registered.

Spore size obtained from measurement of about 15 spores for each specimen using Olympus BH2 microscopy. Amyloidy of spores were tested using Melzer reagent.

Several digital photographs of each specimen were prepared in field. The specimens were prepared for deposition in the herbaria following the standard herbarium methods (using a Dorex dehydrator, Switzerland) commonly used for macro-fungi. Voucher specimens were deposited in fungus reference collection of the Ministry of Jihad-e-Agriculture (IRAN). The specimens were determined using

the standard literatures (PEGLER 1977, MOSER 1978, LARGENT 1986, LARGENT *et al.* 1986, PEGLER 1986, SINGER 1986, BON 1988, BREITENBACH & KRÄNZLIN 1995, JORDAN 1995, PEGLER & SHAH-SMIT 1997, PACE 1998, HORAK 2005). Terminology of microscopic and macroscopic features follows KIRK *et al.* (2001).

Results and Conclusions

1. *Amanita aspera* Fr., Syst. mycol. (Lundae) 1: 18, 1821 (Fig. 1)

Pileus 40-80 mm across, hemispherical when young, then convex, finely plane, surface covered with gray- yellow universal veil, then break into regular pale yellow conical warts on yellow lemon background, flesh white, thin, thick toward centre, taste mild, odor not distinctive; Lamellae white, broad, free; Stipe 60 × 10 mm, cylindrical, enlarged toward the base, solid, surface smooth, whitish to cream above annulus , below with yellow downy zones on whitish background, base without a membranous volva but girdled with scaly zones; Spores hyaline, smooth, elliptical, 6-9 × 5-7 µm; amyloid, spore print white. This is a new record for Iranian fungus flora.

Mazandaran Prov.: Nowshahr, Neirang forest, 0-70 m, on soil, in mixed woods of *Quercus castaneifolia* and *Parrotia persica*, 11.10.2006, M. Bahram (IRAN 5522 F).

It occurs solitary to gregarious in deciduous woodland, more rarely in coniferous forests. It is also distributed in western and eastern North America and Europe. This species is inedible and could be confused with *A. excelsa*. However the latter has gray to gray-brown pileus and with a veil which is white or gray-white everywhere (never yellowish-ocherich-brownish), another close species is *A. pantherina* which shows a striate pileal margin and marginate-bulbous stipe base (BREITENBACH & KRÄNZLIN 1995).

2. *Amanita battarrae* (Boud.) Bon, Documents Mycologiques 16: 16, 1985 (Fig. 1)

Pileus 46-72(-86) mm across, ovoid when young, then campanulate-convex, finely plane, zonate with three zones (with darkest zones over disc and marginal striations), over disc umber to grayish umber-brown, rather dark gray-brown but sometimes paler, flesh white, membranous approximately in area of striations, margin sulcate-striate, non-appendiculate, usually free of volval remnants; stipe 115-155(-185) × 6-11 mm, pale cream to pale beige or pale grayish brown, narrowing upward, slightly or markedly flaring at apex, context hollow, universal veil as saccate volva, white to dingy white; flesh thin, soft, white; taste sweet, odor weak; lamellae free and leaving narrow groove around stipe apex, crowded, off-white to pale cream, up to 6 mm broad, with thin rather straight gray-brown to yellowish gray-brown edge; spores hyaline, thin-walled, smooth, almost subglobose to (occasionally) broadly ellipsoid; apiculus sublateral, truncate-conic to cylindrical, inamyloid, $9.6-15.3 \times 9.4-14 \mu\text{m}$.

Mazandaran Prov.: Nowshahr, Neirang forest, 0-70 m, on soil, in mixed woods of *Quercus castaneifolia* and *Parrotia persica*, 14.10.2005, M. Bahram (IRAN 3588 F).

The species is closely allied to *A. vaginata* (Bull.) Lam., which is common also in Hyrcanian forests in N. Iran, but differs from it in pileus color (layered and brownish against homogeneously grayish to gray-brownish in *A. vaginata*), stipe surface (mottled brownish instead of homogeneously colored in *A. vaginata*) and spore size ($9.6-15.3 \times 9.4-14$ instead of $9.6-11.8 \times 8.9-11.5 \mu\text{m}$ in *A. vaginata*) (BREITENBACH & KRÄNZLIN 1995). *Amanita battarrae* is widely distributed in Europe and its range extends eastward at least to North-Western Pakistan and northern India. In Iran the species was found in a forest dominated by *Parrotia persica* and *Quercus castaneifolia*. Our sample was attached to *Q. castaneifolia* trees. The species was solitary or in small groups in a dark forest.

A. umbrinolutea Secr. recorded by Saber (1977) from Kurdistan, has been considered as a synonym of *A. battarrae* (www.indexfungorum.org). A reexamination of the specimen of *A. umbrinolutea* (IRAN 9547 F) showed almost broadly ellipsoid spores and cap without zones which differ from protologue and sample of *A. battarrae*.

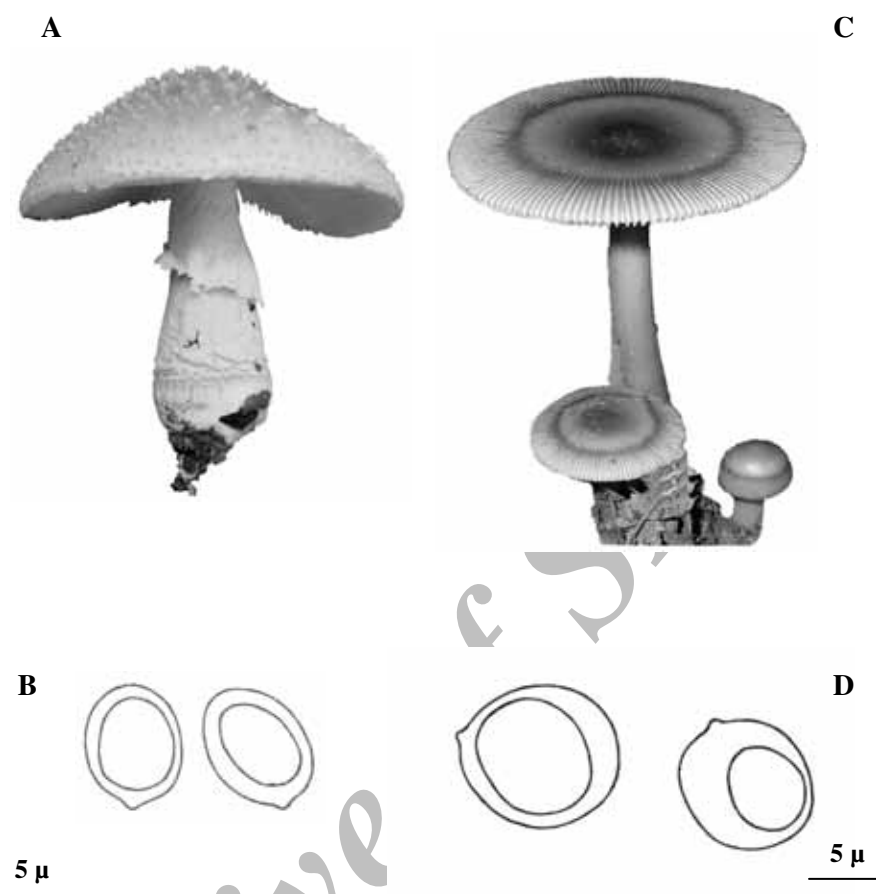


Fig. 1. *Amanita aspera*: A. Basidiocarp, B. Spores and *A. battarrae*: C. Basidiocarp, D. Spores.

3. *Amanita ceciliae* (Berk. & Broome) Bas, Persoonia 12(2): 192, 1983 (Fig. 2)

Pileus 80-15-(200) mm across, ovoid when young, then campanulate-convex, finely plane, surface dull to satiny when dry, slightly lubricous-viscid when moist, to gray- or dark brown, darker toward center, translucent-striate, covered with thick dingy gray-white remnant when young and brownish when old, flesh white, thin, odor not distinctive, taste mild, nutty; lamellae white, slightly brownish when old, broad, free; stipe 120-200(250) × 20-40 mm, cylindrical, enlarged toward the base, solid when young, hollow when old, fragile, surface whitish, apex finely striate, base without a vaginate volva but girdled with 2-3 scaly zones; spores hyaline, smooth, globose, inamyloid, $10.4-14.1 \times 9.7-14.0 \mu\text{m}$; spore print white.

Mazandaran Prov.: Nowshahr, Neirang forest, 0-70 m, on soil, in mixed woods of *Quercus castaneifolia* and *Parrotia persica*, 14.10.2005, M. Bahram (IRAN 3589 F).

The species was collected in the same locality as *A. battarrae*, but is more frequent in that area compared with the latter. It is also similar to *A. vaginata* which shows smaller pileus (50-100 mm), two to more zones in stipe base (doubly vaginate) and thick patch of veil remnant on the pileus (BREITENBACH & KRÄNZLIN 1995).

The only previous report of this species from Iran was that of MUSAZADEH *et al.* (2005) who reported the species as *A. eciliae*!

4. *Amanita caesarea* (Scop.) Pers., Syn. meth. fung. (Göttingen) 2: 252, 1801 (Fig. 2)

Pileus 60-180 mm across, ovoid or hemispherical when young, convex to plan at maturity, orange-red, more yellowish with age, smooth and slightly viscid, finely striate at margin; stipe 50-140 × 15-25 mm, yellow, with a yellow to orange, skirt like annulus often striate, the basal bulb encased in a large 40-70 × 4 mm, white and sac-like volva; young fruit bodies completely enveloped into the white volva; context whitish, distinctly yellow below the pileipellis, taste mild, odor weak and mild; lamellae free, dense, yellow; spores hyaline, smooth, broadly elliptical, inamyloid, $6-10 \times 4-6 \mu\text{m}$, spore print white to yellowish. This species is newly recorded for Iranian fungus flora.

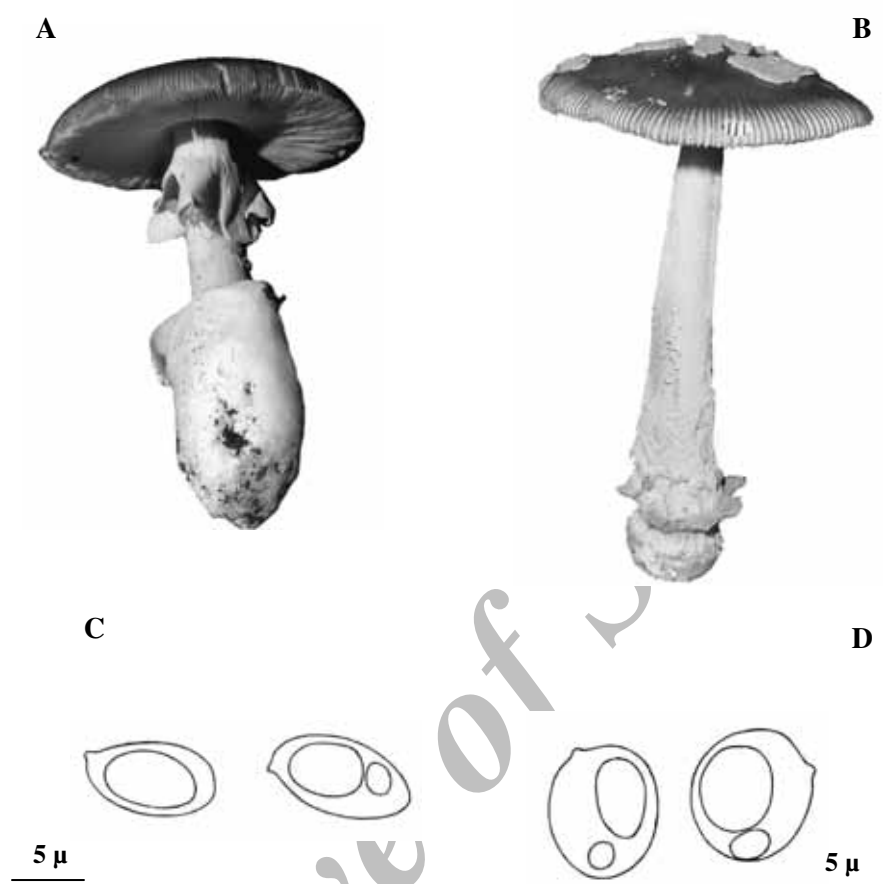


Fig. 2. *Amanita caesarea*: A. Basidiocarp, B. Spores and *A. ceciliae*: C. Basidiocarp, D. Spores.

Mazandaran Prov.: Nowshahr, Neirang forest, 0-70 m, on soil, in mixed woods of *Quercus castaneifolia* and *Parrotia persica*, 14.10.2005, M. Bahram (IRAN 3590 F).

Amanita caesarea occurs mostly solitary, rarely in groups, favoring open deciduous woodlands, especially with oaks, in warm (temperate) regions. The species is known from Europe and Asia (recorded from Turkey by STEKCÜ *et al.* 2005). It is an excellent edible mushroom and has been a prized esculent since Roman times. Due to its orange-red pileus and yellow smooth skin and gills, fresh specimen are easily distinguishable from other *Amanita* species. Dried specimens may be very similar to those of *A. muscaria* (L.) Lam., but can surely be distinguished by the microscopic features of volva and marginal cells as already shown in HAHN *et al.* (2000).

5. *Amanita crocea* (Quél.) Singer, Lilloa 22: 386, 1951 (Fig. 3)

Pileus 60-100 mm across, ovoid when young, then plano convex with umbo at centre, surface, orange, translucent-striate, smooth and shiny when dry, sometimes covered with thick white remnant, margin acute, striate. flesh white, thin; taste and odor not distinctive; lamellae cream colored, free; stipe 85-230 × 7-14 mm, without annulus, cylindrical, almost equal, solid when young, hollow when old, fragile, surface cream colored, with banded mottled yellow-orange, floccose-squamose on a whitish background, base with a membranous volva; spores hyaline, smooth, globose, inamyloid, 8-10 × 7-9.5 µm; spore print white. This is a new record for Iranian fungus flora.

Mazandaran Prov.: Nowshahr, Neirang forest, 0-70 m, on soil, in mixed woods of *Quercus castaneifolia* and *Parrotia persica*, 11.10.2006, M. Bahram (IRAN 5517 F).

It occurs solitary to gregarious in deciduous woodland. It is also distributed in North America and Europe. This species is inedible and could be confused with *A. fulva*. However, the latter has an orange volva and whitish, longitudinally fibrillose-floccose and non mottled stipe. (BREITENBACH & KRÄNZLIN 1995).

6. *Amanita rubescens* var. *rubescens* Pers., Tent. disp. meth. Fung.: 71, 1797 (Fig. 3)

Pileus 5-15 cm wide, young subglobose, then convex to plan with age, margin smooth, surface separable, reddish brown to flesh color, initially coated by the whitish to grayish universal veil which disrupts on expansion to form concentric grayish brown squamules; stipe 60-140 × 10-25 mm, diameter more or less with equal, sometimes slightly swollen at base, hollow at maturity, concolorous with pileus, white above the striate membranous pendulous annulus, becoming reddish near the bulbous base, occasionally with slight granulation from the remnants of volva; flesh white, gradually becoming rosy to reddish when bruised or exposed to air, taste mild at first then somewhat acrid, odor not distinctive; lamellae free, white, becoming spotted with red where damaged; spore hyaline, smooth, long elliptical to cylindric, amyloid, $8-9 \times 4.5-5.5 \mu\text{m}$., spore print white.

Gilan Prov.: Asalem to Khalkhal, 20 km to Khalkhal, ca. 1900 m, under *Quercus castaneifolia*, 22.9.2005, M. Bahram (IRAN 3591 F).

It occurs solitary to gregarious in deciduous woodland under *Quercus castaneifolia*. It is also distributed in America and Europe, although not as frequently as *A. muscaria* (L.) Pers. and *A. phalloides* (Fr.) Link. This species is edible when cooked, but may be poisonous if eaten raw. It is very characteristic by its flesh colored stipe and by the red color reactions when touched or hurt.

The only pervious report of this species from Iran was that of MUSAZADEH *et al.* (2005) who reported the species as *A. rubescens*!

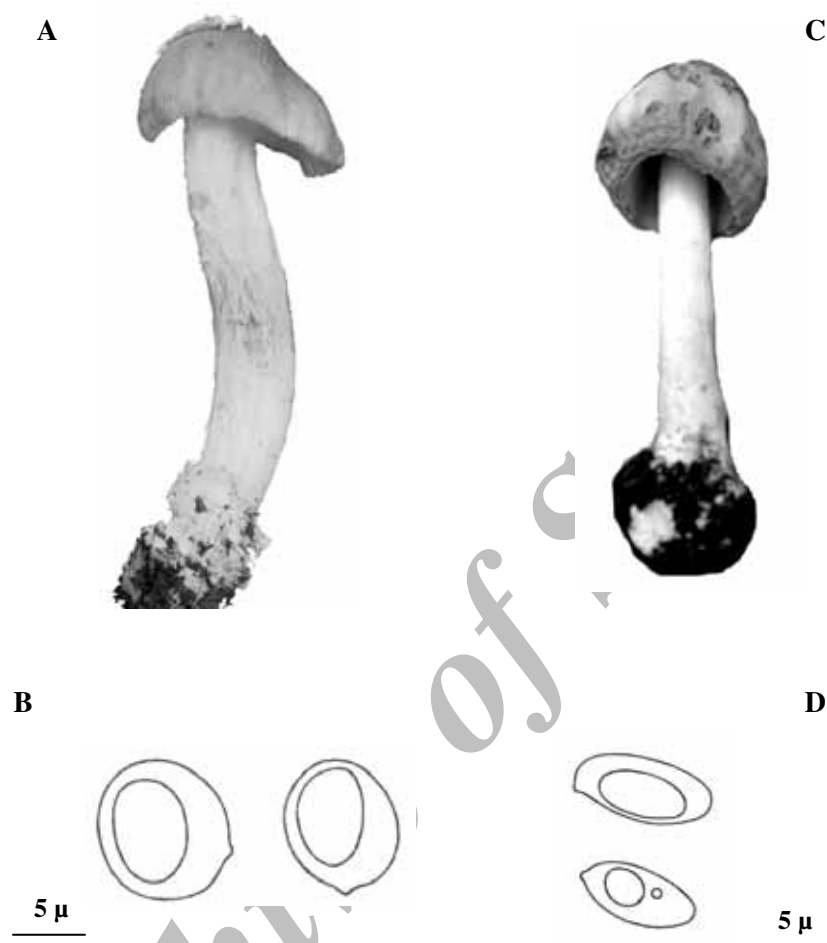


Fig. 3. *Amanita crocea*: A. Basidiocarp, B. Spores and *A. rubescens* var. *rubescens*: C. Basidiocarp, D. Spores.

References

- BUHSE, F. 1860. Aufzählung der auf einer Reise durch Transkaukasien und Persien gesammelten Pflanzen (in gemeinschaft mit Dr. E. Boissier), Moskau, W. Gautier. 284 p., 10 tab., 1 mappa geogr.
- BON, M. 1987. The mushrooms and toadstools of Britain and North-Western Europe. German translation by Lohmeyer, T.R. 1988. Pareys Buch der Pilze. Hamburg, Berlin: Verlag Paul Parey.
- BREITENBACH, J. and KRÄNZLIN, F. 1995. Pilze der Schweiz, Band 4. Schweiz, Luzern. Mycologia.
- FALLAHYAN, F. 1973. L'étude de quelques champignons toxiques et comestible d'Azerbayjan-Iran. Bll. Faculty of Science, Tehran University Press, 5: 93-94.
- HAHN, C., RAIDL, S. and BEENKEN, L. 2000. Sind *Amanita muscaria* und *Amanita caesarea* eindeutig anhand von Herbarmaterial zu unterscheiden, Z. Mykol. 66: 173-180.
- HORAK, E. 2005. Röhrlinge und Blätterpilze in Europa. Germany, München: Elsevier.
- JORDAN, M. 1995. The encyclopedia of fungi of Britain and Europe. United Kingdom: A David & Charles Book.
- KIRK, P.M, CANNON, P.F., DAVID, J.C. and STALPERS, J.A. 2001. Ainsworth & Bisby's dictionary of the fungi. 9th ed. United Kingdom, Wallingford: CAB International.
- LARGENT, D.L. 1986. How to identify mushrooms to genus I: macroscopic features. 3rd ed. California: Mad River Press.
- LARGENT, D.L., JOHNSON, D., WATLING, R. 1986. How to identify mushrooms to genus III: microscopic features. California: Mad River Press.
- MOSER, M. 1978. Keys to Agarics and Boleti (Polyporales, Boletales, Agaricales, Russulales). 4th ed., translated to English by Simon Plant. R. Philips Publ. London.

- MUSAZADEH, S.A., ZOKAEI, M., BORHANI, A., KHORANKEH, S. and AREFIPOUR, M.R. 2005. Morphological and ecological study on species of genus *Amanita* Pers. On research forest of Vaz (Mazandaran). First International Iranian Congress of Biological Science. p. 835.
- PACE, G. 1998. Mushrooms of the world. Willowdale: Firefly Books.
- PEGLER, D.N. 1977. A preliminary Agaric flora of E. Africa. Kew Bull.
- PEGLER, D.N. 1986. Agaric Flora of Sri Lanka. London: Kew Bull.
- PEGLER, D.N. and SHAH-SMIT, D. 1997. The genus *Amanita* (Amanitaceae, Agaricales) in Zambia. Mycotaxon 61: 389-417.
- RABENHORST, L. 1871. Übersicht der von Herrn Prof. Haussknecht im Orient gesammelten Kryptogamen. Hedwigia 10: 17-27.
- SABER, M. 1991. Contribution to the knowledge of Amanitaceae and Pluteaceae (Agaricales) collected in Iran. Proceeding of 10th Plant Protection Congress of Iran. p. 135.
- SABER, M. 1995. The species of *Amanita* in Iran. Iran. J. Plant. Path. 31: 15-23.
- SABER, M. and MEHRAVARAN, H. 2001. *Amanita codinae*, a new record for Iran. Rostaniha 2: 59.
- SABER, M. 1997. *Amanita umbrinolutea*, a new record for Iran. Iran. J. Plant. Path. 33: 75-76.
- SABER, M. and ZANGENEH, S. 2000. *Amanita strobiliformis*, a new record for Iran. Rostaniha 1: 164-168.
- SABER, M. and ZANGENEH, S. 2004. New records of Macromycetes from Iran. Proceeding of 16th Plant Protection Congress of Iran. pp. 463.
- SINGER, R. 1986. The Agaricales in modern taxonomy. Koenigstein, Germany: Koeltz Scientific Books.
- STEKCÜ, H.K., YAMA, M. and SOLAK, M.H. 2005. Macrofungi of Türkmenbaba Mountain (Eskishehir). Turk. J. Bot. 29: 409-416.

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