

## Full Length Research Paper

# New records of fungi from Iran

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Three species of fungi were recorded for the first time from Iran (*Amanita virosa*, *Russula vesca* and *Russula persicina*). The species was collected from the forests of Asalem and Talesh in Gilan Province. Gilan province is located in north of Iran and southwest of Caspian Sea. The three specimens of macroscopic fungi belonged to the Amanitaceae and Russulaceae classes, which are new records for Iranian fungus flora. These species also belonged to the subdivision Basidiomycotina. In this study, the morphological characteristics of these three species are presented.

**Key words:** *Amanita*, *Russula*, Gilan, Iran.

## INTRODUCTION

The first exploration and collection of fungi in Iran was initiated by Bohse in 1860 and Rabenhorst in 1871 and was followed by other taxonomists like Petrak (1939), Esfandiary (1948), Heim (1960), Fallahyan (1973), Walting and Sweeney (1977), Soleimani (1976), Nimela and Voltila (1977), Watling and Gregory (1977), Erashad (1995) and Saber (1990, 1993, 1995). Iranian northern forest (Caspian region) is a large area in north of Iran and not well known in scientific world (Marvi Mohager, 2003). In these forests, there are the parasitic, saprophytic and mycorrhizal fungi. The most common types of fungi in these forests are the members of Basidiomycetes and Ascomycetes. Gilan province is one of northern Coast Provinces of Iran including 40% plain and 60% mountain. Gilan province is located in north of Iran and south west of Caspian Sea (36°34' N, 50°34' E). Gilan's climate is humid, which is an impact of Alborz Mountain climate and Caspian Sea. Its average humidity is between 40 to 100, while temperature is 17.5°C. Asalem and Talesh are located in the province. Because of suitable weather conditions for fungi growth in the forest, different types of fungi are known to grow there. Fungi flora was investigated in two stages between April to December, 2010, from which many microscopic mushrooms were gathered from this area. These mushrooms consisted of 9 species belonging to Amanitales (*Amanita battarrae*,

*A. fulva*, *A. muscaria*, *A. pantherina*, *A. rubescens*, *A. spissa*, *A. strobiliformis*, *A. verna* and *A. virosa*) and 5 species belonging to Russulales (*Russula emetica*, *R. nigricans*, *R. virescens*, *R. vesca* and *R. persicina*). Among these 14 species, three specimens consisting of *A. virosa*, *R. vesca* and *R. persicina* are considered as new records in Iran and have been described.

## MATERIALS AND METHODS

The specimens were collected between April and December, 2010. The photographs of specimen were taken in their natural habitat. Some morphological characteristics such as spore print, gill and pileus color, habitat etc were examined in the field. The specimens dried in shade were sent to the laboratory of Azad University for microscopic study and identification. The collected fruiting bodies were identified according to Garnweidner (1985), Svrcek (2000), Carluccio (2003) and Ershad (2009).

## Morphological analyses

All microscopic observations and measurements except for basidiospores were made in ammonical Congo red preparations from dried material, after a short aqueous KOH pretreatment to improve tissue dissociation and matrix dissolution. Basidiospores and their ornamentation were examined in Melzer's reagent. All measurements were with the oil-immersion microscope objective at ×1000 magnifications. Randomly selected spores from each specimen and the largest and smallest spore sizes were measured. The fresh caps were examined with a drop KOH; a change to yellow showed in *A. virosa* helped to identify species of *Russula*.

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Figure 1. *Amanita virosa*.

## RESULTS AND DISCUSSION

### *Amanita virosa* Fr.

Cap was 5 to 12 cm length; almost oval, becoming convex, then broadly convex to nearly flat in age. Gills in fungus were attached or free from the stem with white color and closed. The crowded free gills are white, as was the stipe and volva. The thin stipe was up to 15 cm (6 inch) tall, with a hanging grooved ring. The spore print was white and the spores are egg-shaped conical and 7 to 10  $\mu$ M long (Figure 1). They were stained blue with iodine. The flesh was white, with a taste reminiscent of radishes and turns bright yellow with sodium hydroxide. *A. virosa*, is highly toxic, and has been responsible for severe mushroom poisonings (Benjamin, 1995). It contains the highly toxic amatoxins, as well as phallotoxins. Amatoxins are frequently lethal, and

responsible for 90% of fatal human mushroom poisonings worldwide (Benjamin, 1995). Amatoxins are also potent inhibitors of RNA polymerase II (RNA polymerase B), indirectly halting protein synthesis (Wieland, 1986).

### *Russula vesca* Fr.

Cap was 5 to 10 cm across, somewhat globose at first, then later flattened convex. It was rather variable in color, often with pastel tints, from dark or pale wine-colored to buff, sometimes with olive or greenish tints, fleshy, firm, the skin half peeling, tending to retreat from the margin leaving the underlying flesh visible. Stem was 30 to 100  $\times$  15 to 25 mm, white, rather hard and often with somewhat pointed base. Flesh was white, taste mild and nutty. Gills were adnexed, whitish to very pale cream, rather closely spaced, narrow and forked, especially near stem. Gills





**Figure 2.** *Russula vesca*.

and stem surface were rapidly deep salmon when rubbed with an iron salt. Spore print was whitish. Spores were ovoid with small warts up to  $0.5\ \mu$  high, very occasionally with short lines attached or joining pairs,  $6\text{ to }8 \times 5\text{ to }6\ \mu\text{M}$ . Cap was cylindrical or spindle-shaped, without septa, hyphae with cylindrical or tapering terminal cells or sometimes a long, tapering, thick-walled hair; supporting cells rectangular. This fungus is edible (Figure 2).

### ***Russula persicina* Krombh**

Cap was shallowly convex, depressed in the centre and 3

to 8 cm. Flesh was firm, margin smooth, later shortly grooved; it was colored pink or vivid blood red, pale pink with yellow patches. Cuticle was full and detachable only at the margin.

Gills are pale yellowish and spores are creamy yellow,  $7\text{ to }9 \times 6\text{ to }7\ \mu\text{M}$ , broadly ellipsoid, tuberculate and spiky with an incomplete network of veins, amyloid. Stipe was 3 to 6 cm long and 1 to 2 cm thick, white or partly pinkish. *R. persicina* is, however, inedible (Figure 3).

The Russulaceae are a family of ectomycorrhizal basidiomycetes. The species belonging to the Russulales were found in parts of the old and destroyed Asalem Forests, which were formerly abundant with these species.





**Figure 3.** *Russula persicina*.

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