

New Fungal Records for the Iran Mycota from Hyrcanian Forests

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Abstract: This study was based on the macrofungal collected from Shast Kalate forest (Gorgan, North of Iran) between 2010 and 2011. As a result of field and laboratory studies, totally 48 taxa belonging to 25 genera, 16 families and 5 classes have been identified and are presented as a list. All taxa belong to *Basidiomycota*. Identified macrofungal classified to *Agaricales*, *Boletales*, *Cantharellales*, *Geastrales* and *Russulales* genera. Thirteen of these (*Cystoderma amianthinum*, *Lepiota brunneoincarnata*, *Lepiota hystrix*, *Macrolepiota gracilentia*, *Hygrocybe laeta*, *Coprinus extintorius*, *Psathyrella artemisiae*, *Psathyrella gracilis*, *Mycena rosea*, *Mycena abramsii*, *Collybia butyracea*, *Boletus queletii* and *Lactarius camphorates*) are new records for the Iran macromycota. Twenty one species are edible, Twenty two species are inedible and five taxa are poisonous. In finally, this publication represents the first comprehensive checklist of macrofungi for Shast Kalate forest.

Key words: Macrofungi • New Records • *Basidiomycota* • Iran Macromycota • Taxonomy

INTRODUCTION

Hyrcanian vegetation zone is a green belt that stretches over the northern slopes of Alborz mountain ranges and covers the southern coasts of the Caspian Sea. This area is approximately 800 km long and 110 km wide and covers a total area of 1.85 million ha comprising 15% of the total Iranian forests and 1.1% of the country's area [1]. In the lower altitudes it is represented by a number of relict Arcto-Tertiary thermophilous species such as *Parrotia persica*, *Gleditsia caspica*, *Zelkova carpinifolia* and *Pterocarya fraxinifolia* [2]. There are only four genera of endemic softwood trees including *Taxus* sp., *Juniprus* sp., *Thuja* sp. and *Cupressus* sp. in this area [1].

Study of fungi in Iran was initiated by foreign mycologists. The first publication on Iranian fungi is published by two European botanists, E. Boissier and F. Buhse, where 33 fungal species, mostly cap fungi, are

named [3]. Most of these mycologists have not visited Iran but they received fungal material from botanists who came to Iran for plant collections. These botanists also collected fungi separately or their plant material was examined by mycologists for epiphytic/parasitic fungi. As the result the list of fungi separately or together with the list of plants was published in European literature [4].

Recently many taxonomic studies of the macrofungal flora of Iran have been carried out and many others are in progress. The studies carried out on macrofungal species until 2009 have been reviewed and as a result it was determinate that there are approximately 3229 macrofungi species on 1893 host species in Iran (Table 1) [5]. New additions were also made to this data by Borhani *et al.*, [6] and other researchers (Table 2). The aim of present study was to identify macrofungi species in the research area and provide additional data on the macrofungal diversity of Iran.

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Table 1: In order to summarize the history of mycology in Iran three periods are described here [4]

Period	Total Taxa	Host species
1860-1977	1324	1283
1977-1995	2056	1442
1995-2009	3229	1893

Table 2: Similarity percentages of many neighbouring studies with Hyrcanian Forest, North of Iran

Study	Number of Identical Taxa	Total Taxa	Similarity Percentage (%)
Asef (2008a) [7]	4	4	100
Asef (2009) [8]	5	5	100
Borhani et al. (2010) [6]	11	100	11
Asef and Muradov (2012) [9]	5	14	35.7

MATERIALS AND METHODS

This investigation was carried out in Shast Kalate (Bahram Nia) forest (Figure 1), experimental forest of Gorgan University of Agricultural Sciences and Natural Resources, a virgin mixed deciduous forest covering an area of about 1 713.3 ha and located in the north of Iran ($36^{\circ}43'$ to $36^{\circ}48'$ N and $54^{\circ}21'$ to $54^{\circ}24'$ E), with an average annual precipitation of about 649 mm and an altitude ranging from 210 to 995 m above sea level. The study region has an average temperature of 12°C and average humidity of 76.5% (Figure 2). The aforementioned site is a permanent plot for long term studies, established on brown forest soil with mostly sandstone as bedrock [10].

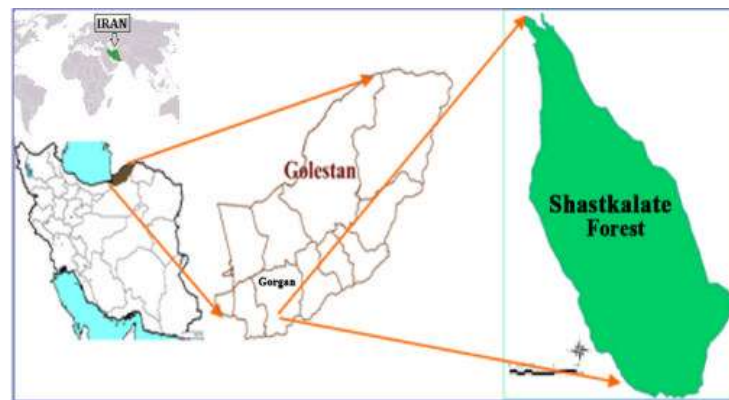


Fig. 1: Location of the study site in Golestan forests, North of Iran [7]

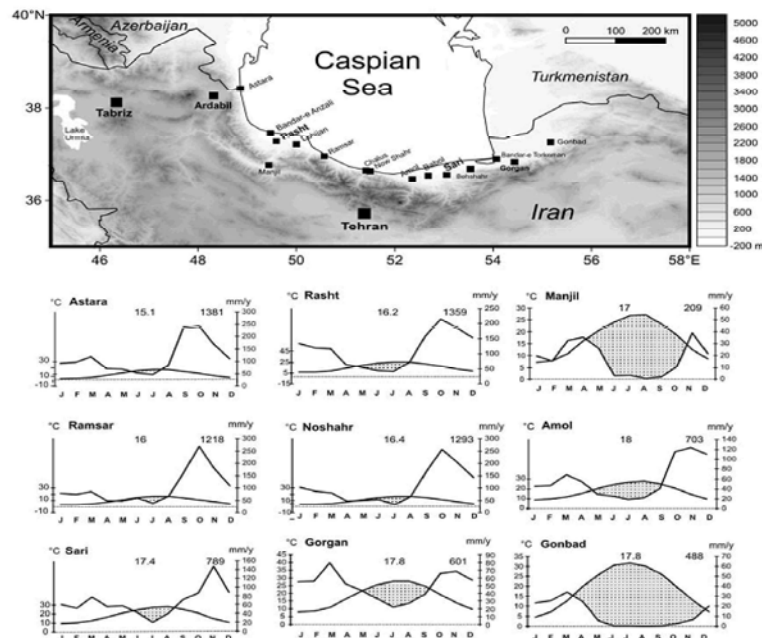


Fig. 2: Relief map of northern Iran and climatic diagrams of nine stations along the south Caspian forests [2].

The morphological and ecological characteristics of the macrofungi were recorded and photographed in their natural habitats. The specimens were brought to the laboratory where spore prints were taken and the spores photographed. Dried specimens were numbered and placed in sealed bags. In addition, they were placed in a deep freeze for a week to kill internal and external colonists [11]. The specimens were identified by using the following references [12-19].

RESULTS AND DISCUSSION

By the end of the study 48 taxa belonging to 25 genera, 16 families and 5 classes have been identified. Identified macrofungal classified to *Agaricales*, *Boletales*, *Cantharellales*, *Geastrales* and *Russulales* genera. Among them, (76%) belong to *Agaricales* and (1%) to *Geastrales*. All taxa belong to *Basidiomycota*. Thirteen of these (*Cystoderma amianthinum*, *Lepiota brunneoincarnata*, *Lepiota hystrix*, *Macrolepiota gracilentia*, *Hygrocybe laeta*, *Coprinus extensorius*, *Psathyrella artemisiae*, *Psathyrella gracilis*, *Mycena rosea*, *Mycena abramsii*, *Collybia butyracea*, *Boletus queletii* and *Lactarius camphorates*) were added to the Iran macromycota. Edible, inedible and poisonous species are 21, 22 and 5 respectively. *Agaricus xanthodermus*, *Lepiota brunneoincarnata*, *Lepiota cristata*, *Hebeloma sinapizans* and *Paxillus involutus* are poisonous mushrooms and can be dangerous for native peoples if consumed. These taxa and their localities, distribution, collection dates are given below.

New records for the Iran macromycota are indicated by an asterisk.

Basidiomycota

Agaricales

Agaricaceae:

- *Agaricus silvicola* (Vitt.) Peck.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Edible.
- *Agaricus xanthodermus* (Genevier).
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Poisonous.
- **Cystoderma amianthinum* (Scop. Fr) Fayod.
Shast Kalate, Gorgan, in *Alnus subcordata* forest, 07.11.2010, Edible.
- **Lepiota brunneoincarnata* (chod and Marti).
Shast Kalate, Gorgan, in *Alnus subcordata* forest, 30.10.2010, Poisonous.

- *Lepiota cristata* (Fr.) Kumm.
Shast Kalate, Gorgan, in *Cupressus sempervirens* forest, 30.10.2010, Poisonous.
- **Lepiota hystrix* F. H. Moller and J. E. Lange
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Inedible.
- *Lepiota naucina* (Fr.) kum.
- Shast Kalate, Gorgan, in *Parrotia*, *Alnus* and *Cupressus sempervirens* forest, 07.10.2010, Edible.
- **Macrolepiota gracilentia* (Fries) Wasser
- Shast Kalate, Gorgan, in *Parrotia*, *Alnus subcordata* forest, 07.12.2010; 17.01.2011; 04.04.2011, Edible.

Amanitaceae:

- *Amanita rubescens* (pers.: Fr.) S.F. Gray.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 30.10.2010, Edible.

Coprinaceae:

- *Panaeolus sphinctrinus* (FR.) QueL.
- Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 26.12.2010, Inedible.

Hydnangiaceae:

- *Laccaria amethystine* (Bull).
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 26.12.2010, Edible.
- *Laccaria laccata* (Scop. Fr) Cke.
- Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Edible.

Hygrphoraceae:

- **Hygrocybe laeta* (pers.: Fr.) Kummer.
- Shast Kalate, Gorgan, in *Cupressus sempervirens* forest, 07.11.2010, Inedible.
- *Hygrocybe unguinosa* (Fr.) Karst.
- Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 17.01.2011, Inedible.

Psathyrellaceae:

- *Coprinus atramentarius* (Bull.: Fr) Fr.
- Shast Kalate, Gorgan, in *Parrotia*, *Alnus* and *Cupressus sempervirens* forest, 05.05.2011, Edible.

- *Coprinus disseminates* (Pers: Fr) S F Gray.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.10.2010, Edible.
- **Coprinus extincorius* (Bull.) Fr.
Shast Kalate, Gorgan, in *Cupressus sempervirens* forest, 04.04.2011, Inedible.
- *Coprinus lagopides* (karst).
Shast Kalate, Gorgan, in *Parrotia, Alnus, Cupressus sempervirens* forest, 04.04.2011, Inedible.
- *Coprinus micaceus* (Bull.: Fr) Fr.
Shast Kalate, Gorgan, in *Alnus subcordata* forest, 07.10.2010, Edible.
- **Psathyrella artemisiae* (pass.) Korand and Mauble
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 17.01.2011, Inedible.
- *Psathyrella candolleana* (Fr.)
Shast Kalate, Gorgan, in *Parrotia, Alnus, Cupressus sempervirens* forest, 30.10.2010; 26.12.2010; 05.05.2011, Edible.
- **Psathyrella gracilis* (Fr.) Quel.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 26.12.2010; 05.05.2011, Inedible.
- *Psathyrella vernalis* (J Lange) Moser
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 26.12.2010, Inedible.

Marasmiaceae:

- *Micromphale brassicolens* (Romangn.) P Orton.
Shast Kalate, Gorgan, in *Parrotia* and *Alnus subcordata* forest, 26.12.2010; 05.05.2011, Inedible.
- *Micromphale foetidum* (Sow: Fr) Sing.
Shast Kalate, Gorgan, in *Parrotia* and *Alnus subcordata* forest, 26.12.2010, Inedible.

Mycenaceae:

- *Mycena pure* (pers.: Fr.) Kummer
Shast Kalate, Gorgan, in *Cupressus sempervirens* forest, 07.11.2010, Inedible.
- **Mycena rosea* (Bull.) Gramberg.
Shast Kalate, Gorgan, in *Alnus subcordata* forest, 07.11.2010, Inedible.
- **Mycena abramsii* (Murr).
Shast Kalate, Gorgan, in *Alnus subcordata* forest, 07.10.2010, Inedible.
- *Mycena polygramma* (bull: Fr.) SF Gray.
Shast Kalate, Gorgan, in *Cupressus sempervirens* forest, 30.10.2010, Inedible.

Strophariaceae:

- *Agrocybe praecox* (Pers.: Fr) Fayod.
Shast Kalate, Gorgan, in *Parrotia* and *Alnus subcordata* forest, 04.04.2011, Edible.
- *Agrocybe semiorbicularis* (Bull.: Fr) Fayod.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 04.04.2011, Inedible.
- *Gymnopilus spectabilis* (Fr.) Gill.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.12.2010, Inedible.
- *Hebeloma sinapizans* (Paulet: Fr) Gill.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Poisonous.

Tricholomataceae:

- *Clitocybe gibba* (pers.: Fr) Kummer.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Edible.
- *Clitocybe vibecina* (Fr) Quel.
Shast Kalate, Gorgan, in *Alnus subcordata* forest, 07.10.2010, Inedible.
- **Collybia butyracea* (Bull.: Fr) Kummer.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.11.2010, Edible.
- *Collybia Confluence* (pers.: Fr) kumme.
Shast Kalate, Gorgan, in *Cupressus sempervirens* forest, 07.11.2010, Edible.
- *Collybia dryophila* (Bull. ex) Kummer.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 04.04.2011, Edible.

Boletales

Boletaceae:

- **Boletus queletii* (Schulz).
Shast Kalate, Gorgan, in *Parrotia carpinetum* and *Cupressus sempervirens* forest, 30.10.2010, Inedible.
- *Xerocomus badius* (Fr.) Giil
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.10.2010, Edible.
- *Xerocomus chrysenteron* (Bull) Quell
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 07.10.2010, Edible.

Paxillaceae:

- *Paxillus involutus* (Batsch: Fr.) Fr
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest, 04.04.2011, Poisonous.

Sclerodermataceae:

- *Scleroderma verrucosum* (pull.) pers
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest,
07.10.2010, Inedible.

Cantharellales

Cantharellaceae:

- *Cantharelluse cibarius* Fr.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest,
07.10.2010, Edible.

Gastrales

Gastraceae:

- *Geastrum triplex* (jungh).
Shast Kalate, Gorgan, in *Alnus subcordata* forest,
04.04.2011, Inedible.

Russulales

Russulaceae:

- *Russula delica* (Fr)
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest,
07.11.2010 Inedible.
- *Russula heterophylla* (Fr.) Fr
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest,
30.10.2010, Edible.
- **Lactarius camphorates* (Bull.: FR) FR.
Shast Kalate, Gorgan, in *Parrotia carpinetum* forest,
07.11.2010, Edible.

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