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Contribution to the basidiomycetes inventory of Gourougou and Tizirene's forests (Northern Morocco)

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ABSTRACT

A list of 32 species of higher fungi belonging to 11 families is given for the Rif region in the forests of Gourougou and Tizirene. In this list 21 species have been identified and described for the first time in this region. These new identification will enrich the fungal catalog of the Rif and bear the specific richness of this fungal flora to 1282 species.

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KEYWORDS

List;
Fungi;
Rif;
Gourougou;
Tizirene;
Morocco.

INTRODUCTION

Structurally, Morocco is subdivided into four areas: meridional, Atlasic mountainous, Meseta and Rif^[3]. The latter region is bounded on the north by the Mediterranean Sea, to the south by the northern central Morocco, to the west by the Tangier region and the western northern Morocco, and on the east by the Beni Znassen and low Moulouya. It extends to the whole of the mountain regions of the North^[15], and forms a concave arc along near the Mediterranean Sea and deploying from west to east^[7].

The climate of the Rif is characterized by a long hot dry summer season which may last two to six months, with a seasonal and daily photoperiodism. The rains are grouped between autumn and the beginning of the spring, and the number of the precipitation days (including snow but excluded condensations) remains low and may not exceed 100 days^[10].

Floristically, the typical Mediterranean climate

of the Rif, typically Mediterranean, generated a typical and diverse flora^[2]. Fifty endemic species that are specific to this region are present in addition to many other common endemic species with the Betic chain in Andalusia. Rare species in Morocco and present in the Rif are types, *Acer granatense*, *Alnus glutinosa*, *Betula celtiberica*, *Prunus lusitanica*, *Pinus pinaster* var. *iberica*, *Quercus pyrenaica*, *Castanea sativa*, *Teline hosmariense*, *Origanum grosii*^[3]

In Morocco, most of the fungal richness is an extension of the temperate Europe mycoflora, which found here their most meridional territories before fading to approach the continental or the desert regions^[10]. However, the fungal flora of the rif remains poorly studied so far.

The present work aims to study the higher fungi of Rif and particularly those of two forests: Gourougou and Tizirene. This work probably contributes to enrich catalogs carried out on fungi in

Morocco^[5,8,13,6,14]. All information is given as a list with the range and the ecology of each fungal species.

MATERIALS AND METHODS

The forest massif of Gourougou is located in the zone between the Rif and Atlas systems, is characterized by small mountains that dominate of large depressions more or less flat and open on the Mediterranean Sea^[4]. This space extends over an area in the order 1800 ha^[1]. It has a vegetation cover consisting of pine and Eucalyptus plantations, natural vegetation is represented only by small islands based on arbutus and Kermes oak tree on tops, the mastic and oleaster on the east and south facades of the mountain^[12].

The forest of Tizirene is part of the massive Bab Barred and covers an area in the order of 4655 ha^[11].

This forest is under the influence of geographical factors, the most important in plant ecology are the altitude, terrain (slope and aspect) and the degree of Continentality^[9]. Annual rainfall varies between 1630 to 2000 mm / year with 70-90 days of rain per year and snow that can persist 4-5 months^[11].

The forest of Tizirene is characterized by vegetation with a great diversity that reflects the potential of the environment. Forest formations are essentially based on cedar and Pyrenean oak^[11]. At a lower portion of the forest, we found the cork oak that occupies well-defined stations, the Pyrenean oak dominates from 1400-1500 m and enter into association with the cedar form pure stands at high altitudes. Tizirene forest contains the most oceanic cedar forest and most mesophilic. Artificial plantations have been made since 1968. In clearings stands and Pyrenean oak and cork oak degraded are composed of softwoods such as maritime pine, *Pinus radiata* and *Cedrus*^[11].

TABLE 1 : Species collected in the forest of Gourougou

species	Family
<i>Agaricus augustus</i> Fr., (1838)	
<i>Agaricus bernardii</i> Quél., (1878)	
<i>Agaricus bisporus</i> (J.E. Lange) Imbach, (1946)	
<i>Agaricus campestris</i> Schwein., (1822), Scop., (1772), L., (1753)	
<i>Agaricus comtulus</i> Fr., (1838)	
<i>Agaricus iodosmus</i> Heinem, (1965)	Agaricaceae
<i>Agaricus spissicaulis</i> F.H Møller, (1950)	
<i>Agaricus romagnesii</i> Wasser, (1977)	
<i>Lepiota clypeolaria</i> (Bull.) P. Kumm., (1871)	
<i>Lepiota cristata</i> Barla, (Bolton) P. Kumm., (1871)	
<i>Lepiota procera</i> (Scop.) Gray, (1821)	
<i>Leucoagaricus leucothites</i> (Vittad.) Wasser, (1977)	
<i>Laccaria amethystina</i> Cooke, (1884)	Hydnangiaceae
<i>Marasmius oreades</i> (Bolton) Fr., (1836)	Marasmiaceae
<i>Rhodopaxillus nudus</i> (Bull.) Maire, (1913)	Tricholomataceae
<i>Suillus granulatus</i> (L.) Roussel, (1796)	Boletaceae
<i>Lactarius deliciosus f. rubescens</i> J.Aug. Schmitt, (1974)	
<i>Lactarius deterrimus</i> Gröger, (1968)	
<i>Lactarius sanguifluus</i> (Paulet) Fr., (1838)	
<i>Lactarius vellereus</i> (Fr.) Fr., (1838)	Russulaceae
<i>Russula amoena</i> Quél., (1881)	
<i>Russula delica</i> Fr., (1838)	
<i>Russula ochroleuca</i> (Pers.) Fr., (1838)	
<i>Clathrus ruber</i> P. Micheli ex Pers., (1801)	Phallaceae

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TABLE 2 : Species collected in the forest of Tizirene

Species	Family
<i>Melanoleuca grammopodia</i> (Bull.) Murill, (1914)	
<i>Melanoleuca subpulverulenta</i> (Pers.) Singer, (1939)	
<i>Mycena rosella</i> (Fr.) P. Kumm., (1871)	Tricholomataceae
<i>Tricholoma caligatum</i> (Viv.) Ricken, (1915)	
<i>Cantharellus cibarius</i> Fr., (1821)	Cantharellaceae
<i>Craterellus cornucopiodes</i> (L.: Fr.) Pers., (1825)	
<i>Hydnum repandum</i> L., (1753)	Hydnaceae
<i>Russula queletii</i> Fr., (1872)	Russulaceae

RESULTS AND DISCUSSION

The final list contains 32 species belonging to 11 families is given for the Rif region in the forests of Gourougou and Tizirene. (TABLE 1 & 2).

Surveys in Gourougou and Tizirene forests, have helped to highlight, the identification of 32 species. Among the latter 21 species have been identified and described for the first time in this region, and are as follows: 17 species in Gourougou forest, and 4 others in Tizirene forest. These new identifications, adding to the Rif fungal biodiversity are as follows: For the forest of Gourougou, the new species are: *Agaricus augustus* Fr, *Agaricus bernardii* Quél, *Agaricus bisporus* (J.E. Lange) Pilát, *Agaricus comtulus* Ces., *Agaricus iodosmus* Heinem, *Agaricus spissicaulis* Moeller, *Agaricus romagnesii* Wasse, *Lepiota clypeolaria* (Bull.) Quél., *Lepiota cristata* (Bolton) P. Kumm., *Lepiota procera* var., *Leucoagaricus leucothites* (Vittad.) M.M. Moser ex Bon, *Laccaria amethystina* Cooke, *Marasmius oreades* (Bolton) Fr., *Lactarius deliciosus* var. *rubescens* Schmidt., *Lactarius deterrimus* Gröger, *Russula ochroleuca* (Pers.) Fr., *Clathrus ruber* P. Micheli. For the Tizirene forest, we mention: *Hydnum repandum* (L.), *Russula queletii* Fr., *Mycena rosella* (Fr.:Fr) Kummer, *Melanoleuca subpulverulenta* (Pers.) Singer.

These new identifications (21 species) will enrich the catalog of the Rif fungal flora^[14] and shall bear the richness of this fungal flora to 1282 species.

However, it should be noted that the Gourougou forest has not been explored since the work Mayor

and Werner (1937), and whether in a space for very limited time, equivalent to the development period of this work, our study identified 25 new species in this forest. Although the findings were more, if we had continuity of the fungal flora inventory work of the Gourougou forest. For this, it is certain that our forests, yet unexplored, are rich and diverse in fungi, and that programming on a regular basis, an inventory of the flora would certainly be a great contribution to the knowledge of the biodiversity of the Rif fungal flora.

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