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Research article

CLAVARIADELPHUS PISTILLARIS: A NEW MYCORRHIZAL SPECIES OF JBEL BOUHACHEM'S FOREST IN THE RIF (NORTHERN MOROCCO).

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ABSTRACT: *Clavariadephus pistillaris* (L.) Donk., is described for the first time in the forest of Dardara (Jbel Bouhachem) north of Morocco, under *Quercus suber*. The macroscopic and microscopic characters are presented. Ecology, the chorology and the systematic of this taxa are briefly discussed.
Key words: Morocco, forest, Dardara, Jbel Bouhachem, *Clavariadelphus.*

INTRODUCTION

Dardara' forest integral part of Jbel Bouhachem, is located in the province of Chefchaouen (Morocco Rif). The natural park of Jbel Bouhachem was ranked between 1992 and 1994 as a site of biological and ecological interest (SIBE) priority in Morocco. The full surface of this park is between 70,000 and 80,000 ha, whose 40-50% of the total surface area belongs to the forest domain. [5].
The park of Jbel Bouhachem contains a large and diverse biodiversity. But, nevertheless threatened by grazing, fires, timber exploitation and land clearing. In fact, the forest massif of Bouhachem is characterized by precipitations which exceeds 2,000 mm/year on the mountains [4] and through three types of bioclimates according to an altitudinal gradient [3]: sub-humid, humid and per-humid. In general, the area is considered among the wettest areas of Morocco and present all very favorable ecological conditions for the fungi development. The Clavaires are Basidiomycetes fungi whose basidia, non-septate, are generally tetrasporous, but could in some cases be only bisporous. The clavaires representatives are leathery, more or less woody, or also simply fleshy and never having a neither real cap, nor blade or pore [16].

The first studies about the clavaires of Morocco were realized by Mayor and Werner [12]. These authors have signaled five species of the genus, but without giving any descriptions: (*Calvaria acuta, C. cristata, C. cinerea, C. pistillaris* and *C. truncata*) in different regions of Morocco (Tangier, Mamora forest, Azrou and Ifrane).

In the purpose of contributing to the study of the fungal diversity of the Jbel Bouhachem Park and to complete the studies carried in the area by Aguil [1]. We describe a ectomycorrhizal species of Clavariadelphaceae, *Clavariadelphus pistillaris* (L.: Fr.) Donk, reported for the first time in northern Morocco, under *Quercus suber* in Dardara' forest.

DESCRIPTION

Clavariadelphus pistillaris (L.) Donk, (1933), harvest in November 2011 and 2012.

This mushroom grows solitary or in groups, generally 2 to 10 exemplary, under *Quercus suber* in Dardara' forest, on a humus-rich soil and dug by wild boar, very common in this area. The hooves of these animals cause considerable damage of the fungal flora.

The 'fructification', in clavate, up to 12 cm high and 2.5 cm wide, present a rounded summit, thinned downwardly, yellowish and brownish yellow, to staining brown-purple to the touch, whitish below. The surface of these fructifications is smooth, pleated length, glabrous, full. The fertile hymenium is immersed in the surface, except the lower part that remains sterile (Figure 1 A, B and C). The carpophore has neither pores nor blades and neither prods. The flesh is white, becoming brownish when we cut it, soft, spongy.

Shapes of the spores ranged from 3.33 to 13.33 x 5 µm, are elliptical, hyaline, smooth and not amyloid (Figure 2, D). The basidia, 53.28 x 4.32 µm, are tetrasporic sometimes bisporous, and whose the sterigmata are thick and long (3,33 µm on 9,99 µm) (Figure 2, B & C). The cystidia: 45, 6 µm (Figure 2, A).

Clavariadelphus pistillaris (L.) Donk, has been previously reported in Azrou (Middle Atlas) by Maire and Werner [12]. We found it under *Quercus suber* in Dardara' forest (Rif). Several specimens have been collected in autumn, in the same locations in 2011 and 2012, after an imporante rain and on humus-rich soil.

The specimens exhibit a remarkable variation in the size of fructifications (varies between 3.5 cm and 12 cm). But in general, the size of carpophores not exceeding 12 cm high, the European specimens can reach 30 cm high [6]. This variation is probably due to precipitation. Indeed, the appearance of carpophores remains suspended narrowly to the caprice of seasonal rains. Elsewhere in other regions of Morocco, with the exeption of the Middle Atlas, wettest region, the species of this genus, have not been signaled in the coastal plateau between 2000 and 2010 [9, 15] and in the central plateau [7]. The average annual precipitation in these zones are in the order of 600 mm in the western part, 500 mm in the center and less than 400 in the eastern part, barely reaching the water needs of the cork oak [2].

Ectomycorrhizal fungi like clavaires, exist in natural forests and constitute a selected population and balanced with the environment. Organisms that live in symbiosis cannot generally live isolated from one to another. Indeed more than 90% of vascular plants are mycorrhizal and cannot grow in the absence of their fungal partner [8].

According to Ait Aguil [1], the Rif of Morocco is home to about 1282 species. The discovery of *Clavariadelphus pistillaris* (L.) Donk, encountered for the first time in the Rif (Northern Morocco), adds to fungal species reported in this region by Ait Aguil [1].

Figure1: Carpophores (A, B and C) of *Clavariadelphus pistillaris*

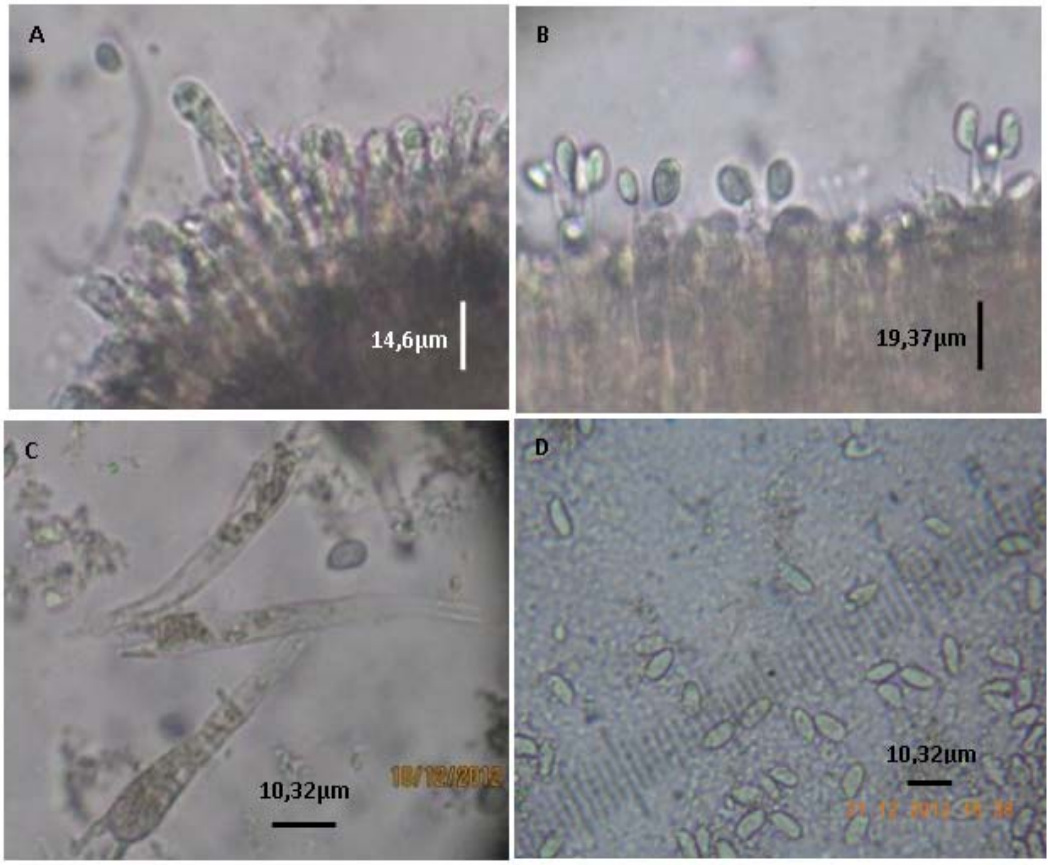

Figure 2: Cystidia (A), Basidia (B & C) and Basidiospores of *Clavariadelphus pistillaris*

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