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Pisolithus albus (*Sclerodermataceae*), a new record for Tunisia

Abstract

Jaouni, A., Gargano, M. L., Ouali, Z., Sbissi, I., Compagno, R. & Venturella, G.: *Pisolithus albus* (*Sclerodermataceae*), a new record for Tunisia. — Fl. Medit. 25: 73-78. 2015. — ISSN: 1120-4052 printed, 2240-4538 online.

Pisolithus albus was recently collected for the first time in Tunisia. This ectomycorrhizal fungus is found associated with *Eucalyptus occidentalis*, a new symbiotic relationship, in the urban area of Tunis. The new record of this fungus on this tree permit to expand our knowledge on the ecology and distribution of *P. albus* in Tunisia. The finding is also important since this fungal symbiont has great potential in forestation efforts. Data on the morphology, molecular identification, distribution and, ecology for *P. albus* in Tunisia are presented for the first time.

Key words: *Pisolithus*, ecology, distribution, N. Africa.

Introduction

Reports on *Pisolithus albus* (Cooke & Massee) Priest (*Sclerodermataceae*) are widely scattered in the literature. Bougher & Syme (1998) reported *P. albus* as common species and also highlights that the name *P. arhizus* (Scop.) Rauschert has been used incorrectly for Australian species. In the Global Biodiversity Information Facility, several records of *P. albus* from Australia are also reported. Moyersoen & Beever (2004) pointed out the presence of *P. albus* in New Zealand geothermal areas. *P. albus* is included in the checklist of the Brazilian gasteroid fungi (Trierveiler-Pereira & Baseia 2009) and also reported from the Brazilian State of Santa Catarina by Giachini & al. (2000). According to Hosaka (2009) and Jourand & al. (2010) *P. albus* is also distributed in New Caledonia.

Eucalypt plantations are widespread in the African continent and cover approximately 1,8 Mha (FAO 2000). Besides some *Eucalyptus* species are widely used in Tunisia as ornamental plants (Franclet 1973). Furthermore one of the hypotheses on the possible origins of ECM fungi in eucalypts plantations is the chance introductions from Australia of compatible ectomycorrhizal fungi like *Pisolithus* spp. (Ducousso & al. 2012).

According to the list of ectomycorrhizal fungi associated with eucalypts in Africa (Ducousso & al. 2012), *Pisolithus* species are often dominant particularly in *Eucalyptus* plantation of the West African dry tropics.

P. albus is reported as ectomycorrhizal fungus found associated with *E. camaldulensis* Dehnh from Burkina Faso, Chad, Côte d'Ivoire, Morocco, Niger and, Senegal (Ducousso & al. 2012). *P. albus* was also recorded from Morocco associated with *E. gomphocephala* DC. and *E. grandis* W. Hill ex Maiden (Ducousso & al. 2012), while the same authors reported *P. albus* on *Eucalyptus* sp. in Ruwanda and Burundi and in parallel they reported the same fungus on *E. pantoleuca* L.A.S. Johnson & K.D. Hill, *E. robusta* Sm. and, *E. apodophylla* Blakely & Jacobs in Senegal. Ducousso & al. (2012) found *P. albus* in Anjozorobe (Madagascar) associated with *Eucalyptus robusta* Sm. and Fanjahira (Madagascar) associated to *Eucalyptus* ssp. *P. albus* is also reported from Tunisia associated with *E. camaldulensis* but the indication given in the publication of Ducousso & al. (2012) is misleading since we could not find any material of *P. albus* in the herbarium of the "Muséum National d'Histoire Naturelle" (PC, our request: dossier 35619, COLHID92938).

In addition, the presence of many unexplored areas and different problems in the assessment of fungal diversity still limited the full knowledge of the macromycetes in Africa (Watling 1995).

The number of fungi recorded in Tunisia is very low and only 60 taxa were recently recorded in the forest of Jbel elbir (Ben Hassine Ben Ali & Aschi-Smiti 2014).

This paper deals with the first record of *P. albus* recently collected by G. Venturella in Tunisia and associated with a *Eucalyptus* species never recognized so far as symbiont of *Pisolithus* species in Africa.

Material and Methods

Basidiomata were identified while fresh and microscopic features were observed in H_2O using a Leica microscope DMLB; spore measurements were based on 50 observations (100× magnification). Nomenclature follows Index Fungorum (http://www.indexfungorum. org/ Names/Names.asp). The identification of *Pisolithus* is mainly based on the distinctive basidiome and basidiospores ornamentation according to Marx & al. (1977). The description is also based both on personal observation and on characters cited in Bougher & Syme (1998). The collection is curated in the fungal dried reference collection of the Herbarium SAF of the Department of Agricultural and Forest Sciences (University of Palermo, Italy, SAF 00039).

The internal transcribed spacer (ITS) region was amplified and sequenced as previously described by Jaouani & al. (2014). The obtained sequences were compared to ITS gene sequences in the UNITE database (https://unite.ut.ee/) dedicated to ectomycorrhizal fungi (Kõljalg & al. 2005).

Taxonomy

Pisolithus albus (Cooke & Massee) Priest, in Bougher & Syme, *Fungi of Southern Australia* (Nedlands): 122 (1998), Fig. 1B

Basidiomata epigeous, with irregular shape, club-shaped, subglobose, piriform or capitulate, 3-12 cm in diameter. Peridium thin, membranous, smooth, single-layered (Fig. 1D), dry, white to cream, brownish in ripe basidiomata. Gleba developing within peridioles, 1-4 mm long, elliptic-ovoid, lens shaped. The peridioles are encased by a very thin dry, yellow-ochre membrane, embedded in and separated by a gelatinous or sticky, tar-like, dark brown or blackish matrix. The peridioles are smaller and tightly towards stem. In ripe basidiomata the peridiole walls collapse, the tar-like material dries out, and the gleba transforms into powdery mass. Stem up to 30 mm wide or shorter, solid, yellow to mustard. Base usually deeply rooting. Basidiospores (Fig. 1C) bright yellow-brown, 9-12 µm diam. (including ornament), globose, densely spinose with erect or slightly curved spines up to 1 µm tall, base of each spine isolated from others. Basidia not observed. Clamp connection present.

The molecular identification based on ITS sequence showed a 99% similarity to *P. albus* (UDB009008) according to UNITE database.

Specimen examined: TUNISIA. Tunis, 4 m asl, flower-bed inside the Faculty of Sciences of Tunis, University of Tunis El Manar, burnt litter of *Eucalyptus occidentalis* Endl. (Fig. 1A), 15 Oct 2014, coll. G. Venturella (SAF 0048).

Discussion

As known many areas of the world are still virtually unexplored from a fungal point of view and the magnitude of fungal diversity can currently only be estimated (Hawksworth 2001).

In Tunisia there is a need to conduct basic surveys and inventories of fungal species and also the finding of species of easy identification can currently provide a contribution to the knowledge of the distribution and ecology of macrofungi in the country.

P. albus is an ectomycorrhizal fungus found in litter and open ground near eucalypts in natural, farming and urban areas. It is common in dry or distributed sites such as gravelly roadsides (Bougher & Syme 1998).

The first record in Tunisia of *P. albus* on burnt litter of *E. occidentalis* expands the list of ectomycorrhizal fungi found associated with eucalypts in Africa. The information on a new tree symbiont of *P. albus* is useful to expand the practical use of this fungus in forestry already experimented on other *Eucalyptus* and *Acacia* species (Jourand & al. 2014). In fact there are many trees which are in danger of extinction because of uncontrolled deforestation in Tunisia (El Khorchani & al. 2007; Ayari & al. 2011; Myeong & al. 2011). It is estimated that no more than 1500 trees occur in Tunisia a clear indication of the serious extinction danger of forest species in the country. As known mycorrhizal fungi associated with plant roots increase the absorption of nutrients, particularly phosphorus, and thus enhance the growth of crop plants and trees (Peterson & al. 1984). Valuable examples of large-scale ectomycorrhizal (ECM) fungus inoculation in *Eucalyptus* species with hypogeous (truffle-like) fungi, performing better than sequestrate genera, such as *Pisolithus* and *Scleroderma*, were conducted in plantation forest tree nurseries in Australia and China (Bundrett & al. 2005). For the reasons given above we believe that there are interesting perspectives for the potential application of the *P. albus* in afforestation and reforestations programs in Tunisia.

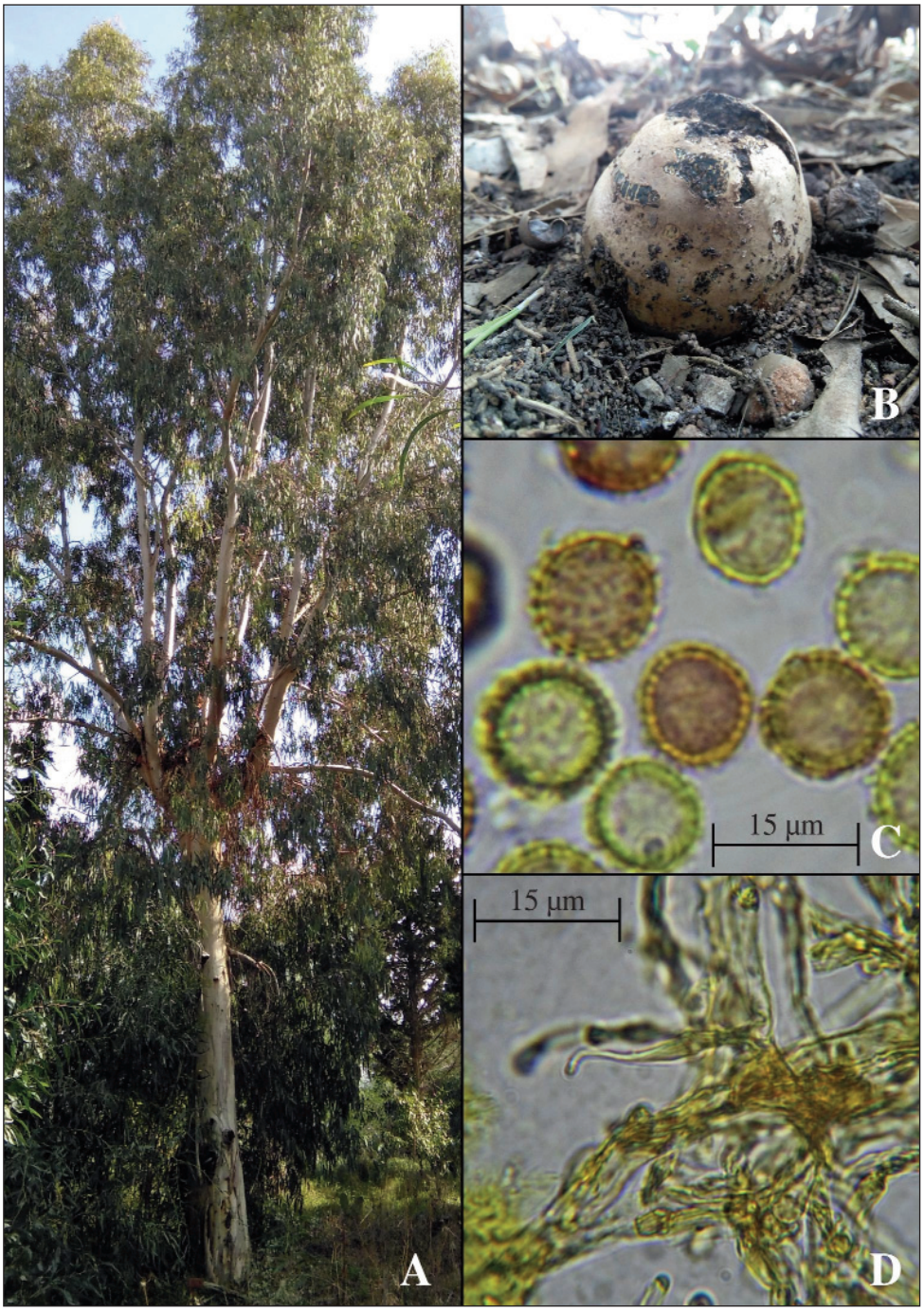

Fig. 1. **A**. *Eucalyptus occidentalis* in El Manar (Tunis), **B**. Basidioma of *Pisolithus albus*, **C**. Basidiospores, **D**. Peridial hyphae.

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