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A new record of the desert truffle *Picoa lefebvrei* in Saudi Arabia

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Abstract — A new record of *Picoa lefebvrei* from Saudi Arabia is reported accompanied by notes on its taxonomy, ecology, and distribution.

Key words — truffle, drip irrigation, Arar

Introduction

Hypogeous mushrooms named desert truffles are commercialized in Saudi Arabia under the local name of faqaa [including khalasi, which belongs to *Terfezia* (Tul. & C. Tul.) Tul. & C. Tul., and zubaidi, which is used for species of *Tirmania* Chatin]. Local populations appreciate desert truffles for their nutritional and sensory qualities (Bokhary & Parvez 1988). *Picoa lefebvrei* or bird truffle (known locally as hober) was first reported by Bokhary & Parvez (1988; as *Phaeangium lefebvrei* Pat.) from Harrat al Harra in Al Jouf Province (northern Saudi Arabia). During winter and spring field excursions in the eastern sector of Northern Borders Province, the senior author (A. Bawadekji) discovered a new locality in Saudi Arabia for *P. lefebvrei*.

Materials & methods

The investigation was carried out from November to March during 2010–12. The habitat was recorded and the collected samples were identified by examining the peridium and gleba. Ascospores were examined in water under a Leica DMLB microscope. Nomenclature follows MycoBank (http://www.mycobank.org). The collection is deposited in the newly established Herbarium of the Department of Biological Sciences, Northern Borders University, Kingdom of Saudi Arabia (here cited as KSA); a duplicate is stored in the Herbarium Mediterraneum Panormitanum in Palermo (PAL).

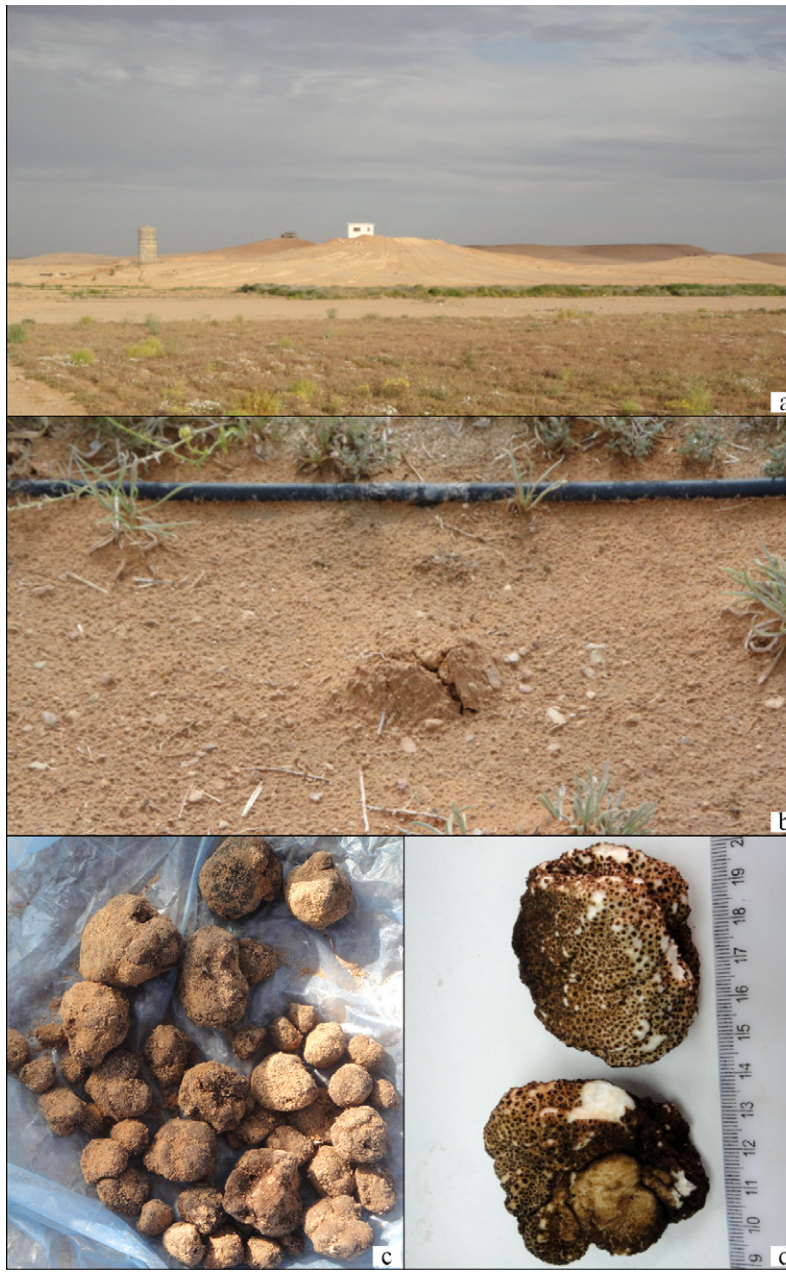

Fig. 1: *Picoa lefebvrei*.
a. Habitat of growth. b. A typical outgrowth of the soil. c. Ascomata. d. Detail of peridium.

Fig. 1: *Picoa lefebvrei*.
a. Ascus and ascospores. b. Peridial hyphae.

Species description

Picoa lefebvrei (Pat.) Maire, Ann. Mycol. 4: 332. 1906. Figs 1, 2

Ascomata irregularly globose, surface shining when ripe, hypogeous and semi-hypogeous, growing in groups, 0.5–8 cm diameter, brown-ochre, covered by numerous and small irregular warts, 1–2 mm wide, ca. 1 mm tall, sparse. Peridium 0.5 mm thick, pseudoparenchymatic, with angular-subglobose elements bearing septate hairs, ochre-brown to brown, filled with fine granules,

thick-walled, 100–120 × 8–10 µm. Cylindrical hyaline hyphae are present under the subglobose cells layer. Odour *Terfezia*-like, not as strong at the beginning of fruiting season (November to mid-January), becoming more intense as the air and soil temperatures increase. Gleba firm, whitish, veins more or less evident. Asci ellipsoidal, with 6–8 spores, 50–110 × 50–75 µm, encompassed in the trama, with a long peduncle, then subglobose and shortly pedunculate. Ascospores disorderly arranged in the ascus (Fig. 2), subglobose to broadly ellipsoidal, 25-30 × 20-25 µm, hyaline with a big guttule when unripe, then pale olive and covered by tiny, rounded, cyanophilous warts.

Specimens examined: **SAUDI ARABIA**. **Northern Borders Province**, Muayala Natural Reserve, 15 km south of Arar, 30°54′24″N 40°59′56″E, 552 m, on pastures, on calcareous and sandy soils with neutral pH reaction and low levels of organic matter, 10 Jan 2010 (provisional number KSA 001), 20 Dec 2011 (provisional number KSA 002), 13 Jan 2012 (PAL 001/KSA), coll. A. Bawadekji.

Ecology

Picoa lefebvrei fruits from January to April in North Africa and Middle East during years of adequate rainfall (Alsheikh & Trappe 1983). In Kuwait the species is confined to gypsiferous and calcareous gravelly deserts, where it is dug out and eaten by several species of migrating birds (Alsheikh & Trappe 1983).

Bokhary & Parvez (1988) regarded some ecological factors as favorable for production of desert truffles. In particular they considered rainfall as important for fructification of *Terfezia* and *Picoa* species. Morte et al. (2009), who stressed the importance of irrigation in cultivating desert truffles, pointed out that irrigation should be applied first at the end of the summer during dry years when rainfall is less than 150 mm and next at the beginning of the fruiting season in very dry years. It is interesting to note that the collection sites for *P. lefebvrei* in Muayala Natural Reserve experience drip irrigation of ca. 150 mm of water per year, while the mean annual rainfall value for this locality is only 40 mm.

Discussion

Picoa lefebvrei was originally placed in the genus *Phaeangium* Pat. because of spore ornamentation and tomentose peridium not present in other *Picoa* species (Alsheikh & Trappe 1983). Ammarellou et al. (2011) through phylogenetic ITS and 28s rDNA sequence analyses demonstrated that *P. lefebvrei* belongs to the *Geopora–Tricharina* clade of the *Pyronemataceae* (*Pezizales*, *Ascomycota*), placing *Phaeangium lefebvrei* in *Picoa* Vittad. based on its close morphological and genetic relationship with the type species, *Picoa juniperis* Vittad. Our macro- and micro-morphological observations of *P. lefebvrei* are in accord with Ammarellou et al. (2011) and confirm its placement in *Picoa*.

The new collection locality for *P. lefebvrei* is 15 km south of the city of Arar, in Northern Borders Province. Because the locality reported by Bokhary & Parvez (1988) is 400 km away in Al Jouf Province, our new finding constitutes a significant extension to the distribution of *P. lefebvrei* in Saudi Arabia.

Furthermore, the ecological features of the investigated area help identify a correct and sustainable management protocol for establishing good practices for commercial cultivation of *P. lefebvrei* for trade and to halt desertification processes.

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Literature cited

Alsheikh AM, Trappe JM. 1983. Taxonomy of *Phaeangium lefebvrei*, a desert truffle eaten by birds. Canadian Journal of Botany 61(7): 1919-1925. http://dx.doi.org/10.1139/b83-204

Ammarellou A, Smith ME, Tajick MA, Trappe JM. 2011. The phylogenetic placement of *Picoa*, with a first report on *Picoa lefebvrei* (Pat.) Maire (= *Phaeangium lefebvrei*) from Iran. International Journal of Environmental Research 5(2): 509–514.

Bokhary HA, Parvez S. 1988. Desert truffles "Al-Kamah" of the Kingdom of Saudi Arabia. 2. Additional contributions. Arab Gulf Journal of Scientific Research, B. Agricultural and Biological Sciences 86(1): 103–112.

Morte A, Zamora M, Gutiérrez A, Honrubia M. 2009. Desert truffle cultivation in semiarid Mediterranean areas. 221–233, in: C Azcón-Aguilar et al. (eds). Mycorrhizas. Functional processes and ecological impact. Springer-Verlag, Berlin, Heidelberg. http://dx.doi.org/10.1007/978-3-540-87978-7_15