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Research note

Second world record of *Glomus trufemii* (Glomeromycota: Fungi), an arbuscular mycorrhizal fungus from a Mexican savanna

Segundo registro mundial de Glomus trufemii *(Glomeromycota: Fungi), un hongo micorrízico arbuscular de una sabana mexicana*

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Abstract

In Mexico, studies of diversity of arbuscular mycorrhizal fungi (AMF) are still scarce. Here we report the second record in the world, and the first record in Mexico of *Glomus trufemii* (Glomeraceae) from a tropical humid savanna. These results provide an incentive to increase inventories of AMF in savannas, as well as to preserve this endangered ecosystem.

Keywords: Diversity; Oaxaca; Glomoid species; Sporocarpic species

Resumen

En México, los estudios de la diversidad de hongos micorrízicos arbusculares (HMA) aún son escasos. Se reporta el segundo registro de *Glomus trufemii* (Glomeraceae) para el mundo y el primero para México, de una sabana tropical húmeda. Estos resultados incitan a incrementar los inventarios de HMA en las sabanas y a preservar estos ecosistemas amenazados.

Palabras clave: Diversidad; Oaxaca; Especies glomoides; Especies esporocárpicas

More than 260 species of arbuscular mycorrhizal fungi (AMF) have been described and almost 25% of them (ca. 70 species) correspond to the genus *Glomus* (Glomerales, Glomeraceae) which forms glomoid spores with a single wall with few layers (Schüßler & Walker, 2010); it is distributed from xeric to humid environments worldwide. During a survey of the diversity of AMF in the Bajo Mixe region, Oaxaca, at the Gulf of Mexico coastal plain (17°29' N, 95°37' W; 100-300 m asl), Mexico, rhizospheric soil samples were collected from natural savannas (*fide*, A. Gómez-Pompa). This savanna is recognized by the herbaceous stratum dominated by the grasses *Paspalum* spp., *Panicum* spp., *Hyparrhenia* spp. (Poaceae) and *Cyperus* spp. (Cyperaceae) (Reyes & Zamora, 1977), with isolated trees of *Quercus oleoides* Schltdl. & Cham., *Byrsonima crassifolia* (L.) Kunth, and *Curatella americana* L.

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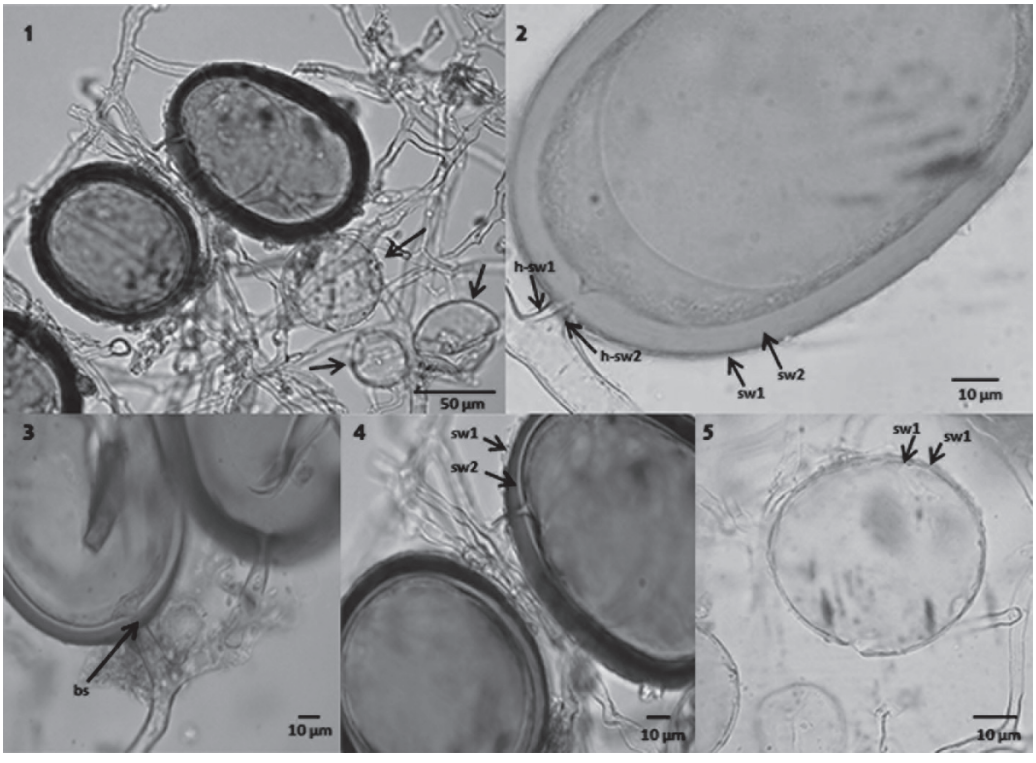
Spores were extracted from the soil by wet sieving followed by sucrose gradient (20-60% w/v) centrifugation. Morphological characteristics and subcellular structures of the specimens were described from spores mounted in polyvinyl alcohol-lactic acid-glycerol with and without Melzer´s reagent. Observations were made with a Nomarski interference contrast microscope (Nikon Optiphot-II), and photographs were taken with a Toupcam camera (UCMOS02000KPB; ToupTek ToupView software version x64.3.7.1460). The taxonomical identification was made by comparison and contrast of morphological characters of the spores and with glomoid species at the International Collection of Vesicular and Arbuscular Mycorrhizal Fungi (INVAM) (http://invam.wve.edu/), the web page of Prof. Janusz Blaszkowski (http://www.zor.zut.edu.pl/Glomeromycota/), and *Glomus* species newly described (Goto et al., 2012). Voucher specimens have been deposited at the TLXM Herbarium, Centro de Investigación en Ciencias Biológicas, Universidad Autónoma de Tlaxcala.

Glomus trufemii B.T. Goto, G.A. Silva & Oehl, 2012

Sporocarps formed as loose clusters, 364-572 µm in diameter; orange-red (2.5YR5/8: Munsell Soil Color Chart) (U.S. Department of Agriculture, 1975) by reflected light, peridium and amorphous material absent. Spores formed apically on short branches of straight hyphae, elliptic, 67-94 × 90-103 µm, to subglobose, 69-97 µm, orange to orange-red (2.5YR6/8) to dark reddish brown (10R4/4) by transmitted light. Spores abortive globose, 34-63 µm, hyaline to light yellow (≈ 2.5Y8/3) when examined with transmitted light, spore wall with 2 layers sw1 and sw2 flexible. Spore wall on mature spores consisting of 2 layers, the sw1 is hyaline, fragile, 1- < 2 µm wide; the sw2 is orange brown (2.5YR7/8) to lighter orange-brown (5YR7/8) at its inner surface, 6-15 µm, laminated. Both layers continued through hyphae at the base of the spore. Pore closure a bridging septum from the sw2. Melzer's reaction absent. Supporting hyphae light yellow (≈ 2.5Y8/4), 5-12 µm wide at the base of the spore, hyaline and narrowing to 4-10 µm beyond spore, wall 2-4 µm wide (Figs. 1-5).

The orange-brown sporocarps without peridium or amorphous material, spores abortive and 2 layered spores without Melzer's reaction are the outstanding features of



Figs. 1-5. *Glomus trufemii*. 1, Sporocarp with mature and abortive spores (arrows); 2, mature spore showing the 2 layers of the spore wall (sw1, sw2) and hyphal wall (h-sw1, h-sw2); 3, mature spores showing closure of the bridging septum (bs); 4, wall layer showing the external hyaline layer (sw1) and the innermost laminated layer (sw2); 5, yellowish abortive spore showing 2 flexible walls (sw1, sw2).

Glomus trufemii. Similar glomoid sporocarpic species are *G. aureum* Oehl & Sieverd., which contains amorphous material, and the layer sw1 of the spore wall staining with Melzer's reagent (Oehl et al., 2003); *Funneliformis badium* (Oehl, D. Redecker & Sieverd.) C. Walker & Schüßler which forms a central mass of hyphae with cystidia-like projections; *G. brohultii* Herrera-Peraza, Ferrer & Sieverd., which has hyphae recurved, semi-bulbose or bifurcated at the base of the spores (Herrera-Peraza et al., 2003).

Glomus trufemii was described from spores recovered from soils of sand dune shrub land in Brazil (Goto et al., 2012). Until now, this species had not been recorded from anywhere else; however, it now appears that it may have a broader tropical distribution in the Americas. The host species of *G. trufemii* are still unknown; however, they are likely grasses (Poaceae and Cyperaceae), due to their dominance in savanna ecosystems.

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