



First report of frosty pod rot caused by *Moniliophthora roreri* on cacao in Bolivia

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Frosty pod rot (FPR) is a devastating cacao disease caused by the basidiomycete *Moniliophthora roreri* (Aime & Phillips-Mora, 2005). The disease is confined to 13 countries in Central and South America and constitutes a permanent threat for cacao cultivation worldwide. In July 2012, FPR was detected in Alto Beni, La Paz Department, Bolivia where 85% of cacao production is produced by approximately 3000 small-holders. Typical FPR symptoms and signs were observed in the villages of San Luis, Villa Prado y 3 de Mayo (Area III) and Litoral, San Antonio and Porvenir (Area IV). Symptoms included premature ripening, deformation, chocolate brown lesions and mummies (dehydrated, sporulated pods). Some lesions were covered by the distinctive mycelium. When cut in half, infected pods showed internal necrotic lesions. The fungus was aseptically isolated from necrotic lesions and grown on 20% modified V8 agar. Cultures of six isolates were sent to the USDA-ARS Sustainable Perennial Crops Lab in Beltsville, MD (Collection Accessions B1a, B1b, B1a, B2b, B3, and B4). Initially, the colonies had white growth that rapidly became cream coloured. After roughly 12 days, cultures became dark brown at the centre as they bore a massive amount of spores. Spores were examined microscopically. Spores were thick-walled and produced in chains with most being globose/subglobose (87%) and some ellipsoid (12%) in shape. Spores ranged in size from 7-11 x 8-11 µm, with the average being 9.4 x 9.6 µm. The morphological observations agree with the descriptions by Cifferi & Parodi (1933) and Evans (1981).

PCR amplification was done with fungal specific primers ITS1-F/ITS4 (ITS) and LSU4-B/LR6pf *roreri* (Aime & Phillips-Mora, 2005) to amplify

the internal transcribed spacer region (ITS) and 28S - large ribosomal subunit (LSU). Sequencing of the isolates (GenBank Accession Nos. JX315272-JX515298) confirmed the presence of *M. roreri* in Bolivia (Fig. 1) and their genetic affinity to the Orientalis group, which also comprises isolates from Colombia, Venezuela, Ecuador and Peru (Phillips-Mora *et al.* (2007). Current average losses are estimated in 54% in Alto Beni, but many other wild and cultivated cacao populations are now threatened by the disease.

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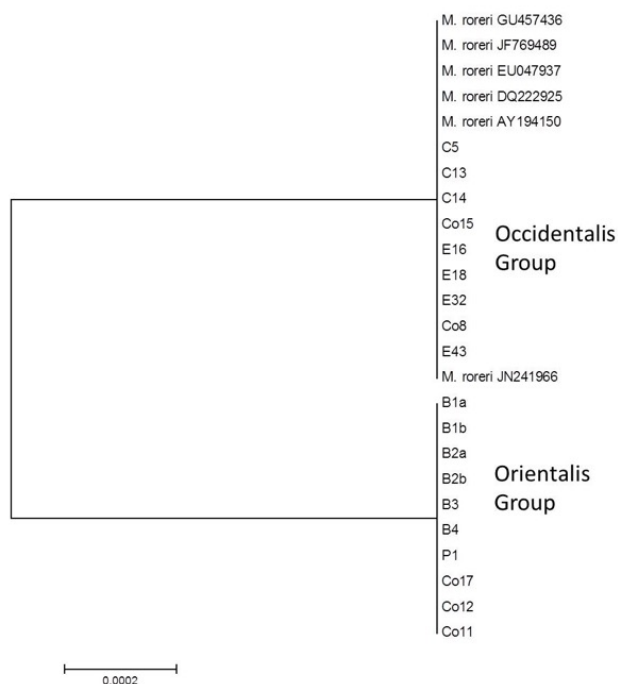


Figure 1

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