

First Report of Black Rot of *Colocasia esculenta* Caused by *Ceratocystis fimbriata* in Brazil

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ABSTRACT

Ceratocystis fimbriata was found sporulating in gray to black discolored areas on edible corms of *Colocasia esculenta* found in supermarkets in the states of São Paulo, Rio de Janeiro, Bahia, Rondônia and the Distrito Federal. In most cases the corms were grown in the state of São Paulo. The black rot appeared to occur post-harvest. Sequences of rDNA indicated that the *Colocasia* sp. isolates belong to the Latin American clade of the *C. fimbriata* complex, but the isolates were more aggressive than isolates from *Ficus carica* and *Mangifera indica*, in pseudopetioles of *C. esculenta*.

Additional keywords: *Aracerae*, inhame, taro.

RESUMO

Primeiro relato de *Ceratocystis fimbriata* causando podridão negra em inhame no Brasil

Ceratocystis fimbriata foi encontrado em tubérculos de inhame (*Colocasia esculenta*), apresentando lesões escuras, pouco profundas, contendo estruturas de reprodução do fungo, cuja coloração variava do cinza ao negro. As amostras foram coletadas em supermercados, quitandas e varejões nos Estados de São Paulo, Rio de Janeiro, Bahia, Rondônia e Distrito Federal que, na maioria dos casos, comercializavam inhame produzido no Estado de São Paulo. Os sintomas de podridão negra indicam se tratar de uma doença de pós-colheita. Sequências de rDNA indicam que os isolados de *Colocasia* sp. pertencem ao clado da América Latina do complexo *C. fimbriata*, embora esses isolados sejam mais agressivos em pseudo-pecíolos de *C. esculenta* do que os isolados de *Ficus carica* e *Mangifera indica*.

Palavras-chave adicionais: *Aracerae*, inhame, taro.

The ascomycete fungus *Ceratocystis fimbriata* Ellis & Halsted was found sporulating (Figure 1A) on edible corms of *Colocasia esculenta* Schott for sale in distribution centers, farmers' markets, and supermarkets in the states of São Paulo, Rio de Janeiro, Bahia, Rondônia and the Distrito Federal in 2001 and 2002. The sporulating areas included numerous conidiophores producing chains of cylindrical conidia, dark-walled aleurioconidia, and black perithecia with sticky drops of ascospores accumulating at the apex of the long necks. Most of the affected corms had a relatively superficial black rot, often only a few millimeter deep, sometimes with pink-to-orange discoloration in the starchy interior (Figure 1B).

In all, 55 pure cultures of *C. fimbriata* were obtained by transferring masses of ascospores from perithecia on the corm tissue to malt extract agar or by first incubating pieces of the rot between slices of fresh carrot root (Moller & DeVay, 1968). Sequences of the internal transcribed spacer region (ITS) of rDNA were obtained from 39 of these cultures using the procedures of Harrington *et al.* (2001). The ITS sequences (GenBank accessions AY526286-AY526290) varied but were typical for those of the Latin American clade of *C. fimbriata* (Harrington, 2000; Baker *et al.*, 2002). The ITS sequences of

Brazilian isolates from *Colocasia* sp. differed from those of *Colocasia* spp. and isolates from China and Hawaii (GenBank accessions AY526304-AY526307), which represent an undescribed species in the Asian clade of *C. fimbriata* (Harrington, 2000).

When the origin of the infected corms was known, the material was exported from the south of São Paulo, specifically from the vicinity of Piedade and Tapiraí. However, one local grower in the Distrito Federal with *C. fimbriata* reported that she had had the disease each rainy season for many years, but the source of her initial planting material was not known. The fungus is soilborne (Laia *et al.*, 1999), and it is believed that the corms become infected in the field and the rot progresses post-harvest.

To confirm pathogenicity, three isolates from *C. esculenta* and one isolate each from *Ficus carica* L. and *Mangifera indica* L., also from São Paulo, were wound-inoculated into two-month-old plants of *C. esculenta*. Approximately 0.2 µl of a conidial suspension (2.0 x 10⁵ conidia per ml) was injected into the pseudopetiole of the youngest, fully-expanded leaf of five replicate plants (Figure 1C), which were maintained for up to 28 days in a growth chamber at 25 °C

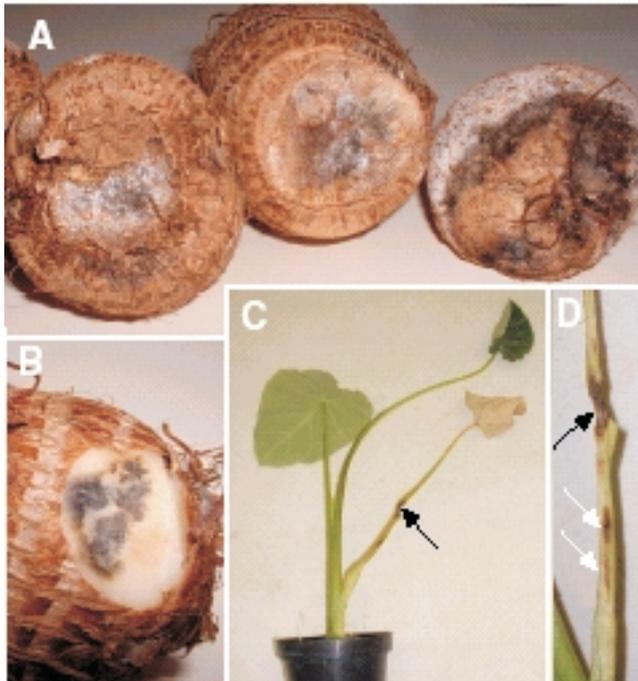


FIG 1 - A. Corms of *Colocasia esculenta* with gray, sporulating areas of *Ceratocystis fimbriata*. The corm on the right also has bacterial soft rot. B - A dry, black rot in the starchy tissue below sporulation by *C. fimbriata*. C - Dying leaf of an inoculated plant of *C. esculenta*. The black arrow indicates the site of inoculation. D - Necrosis in the pseudopetiole at the site of inoculation (black arrow) and internal discoloration below the site of inoculation (white arrows).

and 16/8 h light/day. The linear extent of discoloration in the pseudopetioles averaged 7.8, 7.3, and 6.2 cm for the three *Colocasia* sp. isolates (Figure 1D), and all 15 inoculated leaves died. The *M. indica* and *F. carica* isolates and the controls averaged 2.0, 1.4, and 0.5 cm discoloration, respectively, and only one of the leaves, inoculated with the *Mangifera* isolate, died. Duncan's multiple range test indicated that the discoloration caused by the *Colocasia* sp. isolates was greater than that caused by the other isolates and the control ($P = 0.05$). The fungus was successfully re-isolated from the inoculated pseudopetioles.

Ceratocystis fimbriata is well known on *M. indica*, *F. carica*, *Eucalyptus* spp., *Gmelina arborea* Roxb., *Theobroma cacao* L. and other hosts in Brazil (Bastos & Evans, 1968; Ribeiro & Coral, 1968; Muchovej *et al.*, 1978; Valarini & Tokeshi, 1980; CABI, 2001; Zauza *et al.*, 2004), but there is some host

specialization seen in isolates from these and other hosts (Harrington 2001; Baker *et al.*, 2003). It has been reported on *C. esculenta* (taro) in Asia and the Pacific, and there are also reports of the fungus on *Xanthosoma* spp. (also in the family Araceae) in the Caribbean region (CABI, 2001). However, to our knowledge this is the first report of *C. fimbriata* on *C. esculenta* in South America

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