

Lasiodiplodia theobromae is the causal agent of a damaging root and collar rot disease on the biofuel plant *Jatropha curcas* in Brazil

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Abstract. A damaging root and collar rot disease caused by *Lasiodiplodia theobromae* was observed on adult plants of *Jatropha curcas* in the states of Minas Gerais and São Paulo, Brazil. This is the first report of this disease in Brazil, previously only known from India.

Jatropha curcas L. (commonly known as physic nut in English and ‘pinhão manso’ in Portuguese), is a shrub belonging to the Euphorbiaceae family and is considered to be an important energy crop due to the production of vegetable oil, that can be utilised as a suitable alternative fuel resource (Dias *et al.* 2007). A great amount of pharmacological studies have also been undertaken with this species for multiple purposes. Recently, the planted area of this crop is increasing in Brazil due to government and industry incentives for suitable alternative fuel production for use in diesel engines. *Jatropha curcas* is considered to be resistant to drought. However, a new disease has been observed in Brazil, especially on plants undergoing drought stress. In 2008, adult plants of *J. curcas* grown in Jales (state of São Paulo), Nova Porteirinha and Barbacena (state of Minas Gerais) showed similar symptoms of yellowing (Fig. 1A), wilting (Fig. 1B), decaying of the collar region and rotted roots (Figs 2, 3),

followed by the deaths of the plants, especially those undergoing drought stress. Black erumpent pycnidia were seen on the collar region (Fig. 4A) and black necrotic patches were observed when the bark was removed from the collar region (Fig. 4B). A blackening of the vascular region was consistently observed on collar and root regions of diseased plants (Fig. 5).

Associated with these symptoms was a fungus that had the following morphology: solitary pycnidia, pyriform, black, 150–175 × 190–210 µm, glabrous, with an apical ostiole, stromatic wall, composed of several layers of dark brown, thick-walled cells; conidia ellipsoidal, one-celled, hyaline when immature (Fig. 6A), becoming dark brown, striate and didymospore with age (Fig. 6B), 22.0–28.5 × 12.5–14.0 µm. The fungus fits the description of *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl. (Punithalingam 1976). The fungus was isolated in culture (Fig. 6C).



Fig. 1. (A) Adult *Jatropha curcas* plant showing an initial yellowing symptom in Nova Porteirinha (Minas Gerais) and (B) severe wilting of adult plant in Jales (São Paulo).

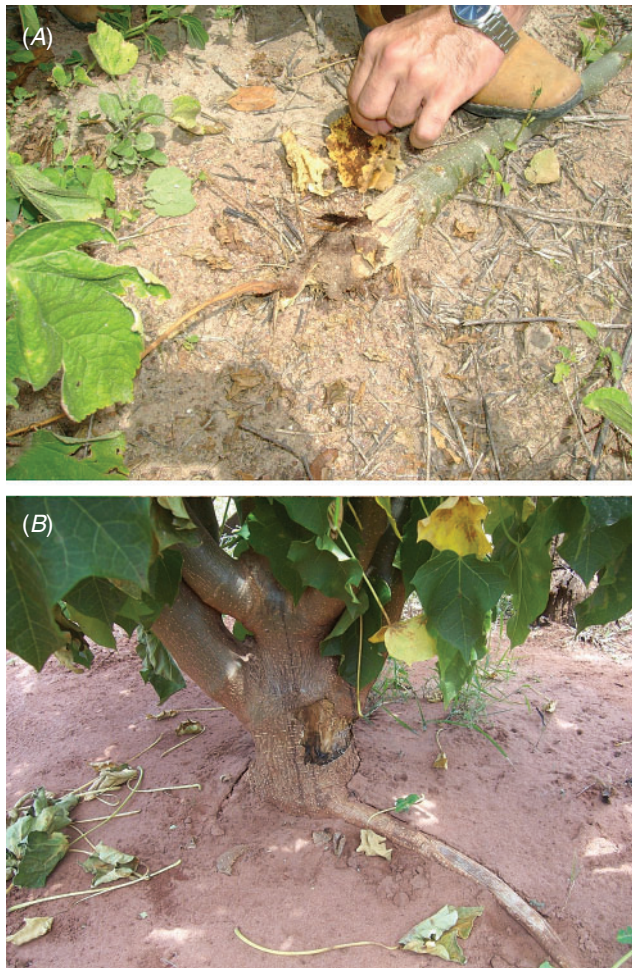


Fig. 2. (A) Collar rot disease on a young *Jatropha curcas* plant in Nova Porteirinha (Minas Gerais) and on an (B) adult plant in Jales (São Paulo).



Fig. 3. (A) Root rot and (B) internal collar rot of *Jatropha curcas* in Jales (São Paulo).



Fig. 4. (A) Black erumpent pycnidia on the collar region and (B) black necrotic patches on the collar region of *Jatropha curcas* plant from Barbacena (MG).

For inoculation, 5 mm diameter disks of bark (on the collar region of healthy plants) were taken with a sterile cork borer and replaced with 5 mm diameter disks containing reproductive

structures from the margins of a 7-day old colony growing on potato dextrose agar (PDA), covered with moist cotton and wrapped with Parafilm. Additional control plants were treated



Fig. 5. Black necrotic tissue of the vascular region of *Jatropha curcas* root in (A) Jales (São Paulo) and (B) Barbacena (Minas Gerais).

similarly but with PDA agar plugs instead of fungal inoculum. The inoculated plants were maintained in a greenhouse at 25°C. Browning of the collar region, similar to those described, were detected 1 month after the inoculation and the fungus was reisolated from the artificially inoculated plants. The control plants, on which only PDA plugs were placed on wounded stems, remained healthy. The fungus was reisolated in culture from the inoculated plants, thus satisfying Koch's Postulates.

Lasiodiplodia theobromae has been reported to cause gummosis of *Jatropha podagrica* in China (Fu *et al.* 2007) and also to cause root rot and collar rot disease on *Jatropha curcas* in India (Latha *et al.* 2009). In Brazil, *L. theobromae* is a well-known pathogen commonly associated with root, collar and stem rot, dieback and post-harvest diseases on *Anacardium occidentale* (cashew nut), *Annona* spp., *Carica papaya*, cocoa, coconut palm, *Hevea* spp., *Malpighia emarginata* (Barbados cherry), mango, *Ricinus communis* and others (Kimati *et al.* 2005), but not previously reported causing root and collar rot disease on *J. curcas*. This pathogen can become a serious problem for this biofuel crop, since it can lead to the deaths of adult production plants and also due to the lack of registered chemical products for this pathogen on *J. curcas* in Brazil.

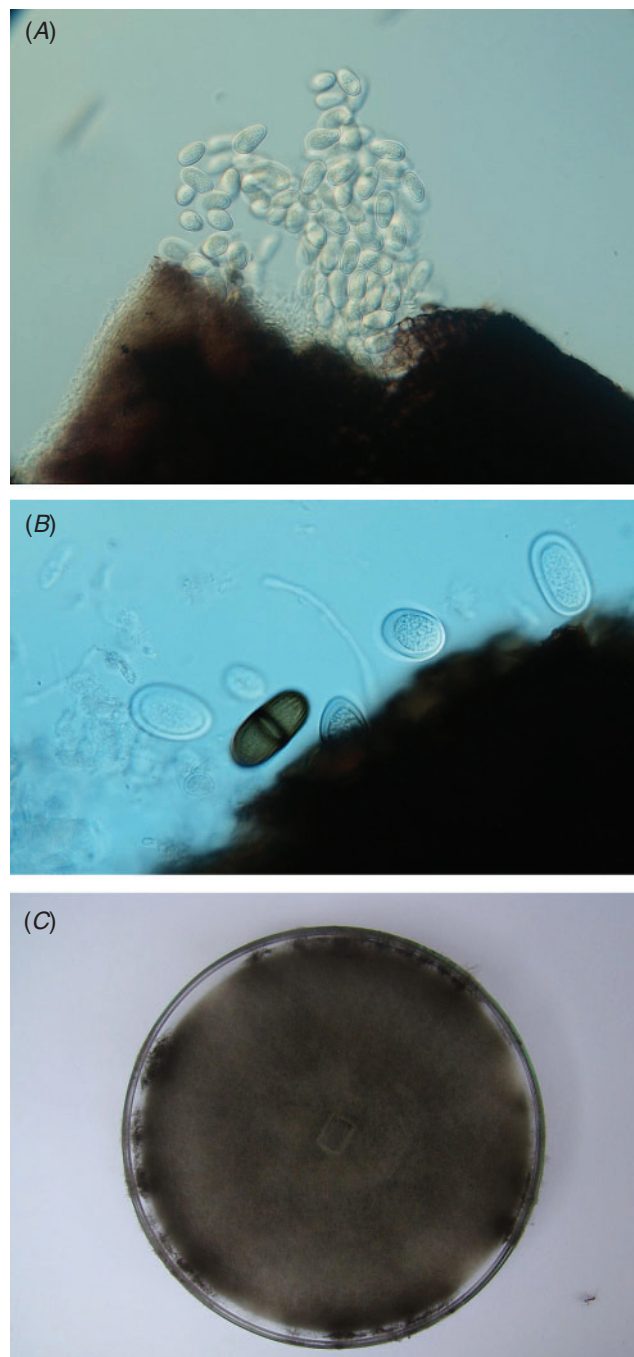


Fig. 6. *Lasiodiplodia theobromae* on *Jatropha curcas*. (A) Pycnidia releasing immature ellipsoidal, one-celled, hyaline ameroconidia, becoming (B) dark brown, didymospores and striate with age; (C) 30-day-old culture growing at 27°C on V-8 juice agar.

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