FOOT ROT OF SWEET POTATO IN BRAZIL[1]

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ABSTRACT - Foot rot, an increasingly important disease of sweet potato especially in the southern states of Brazil, was determined to be caused by *Plenodomus destruens*. It is proposed that this name be maintained for the time being until the taxonomy of the *Phomopsis* - related species to which *P. destruens* might belong - is resolved. Yield losses due to foot rot were found to be as high as 80% when symptomless stem cuttings of a susceptible variety obtained from an infested field were used for planting.

Index terms: *Ipomoea batatas*, *Plenodomus destruens*, etiology.

MAL-DO-PÉ DA BATATA-DOCE NO BRASIL

RESUMO - Mal-do-pé, também conhecido como peste-negra ou murchadeira, é doença da batata-doce que vem aumentando de gravidade nos últimos anos, principalmente no sul do Brasil. Seu agente etiológico foi identificado como sendo *Plenodomus destruens*, epíteto que é proposto até que o impasse relacionado com a taxonomia do gênero *Phomopsis*, ao qual *P. destruens* parece pertencer, seja resolvido. Esta doença pode provocar perdas de até 80% quando ramas de cultivares aparentemente sadias, porém, obtidas de campo naturalmente infestado, são utilizadas para plantios comerciais.

Termos para indexação: *Ipomoea batatas*, *Plenodomus destruens*, etiologia, murchadeira.

INTRODUCTION

The sweet potato (*Ipomoea batatas*) (L.) Lam.) is one of the main vegetables in Brazil with approximately 65,000 ha cultivated (Miranda et al., 1989). The crop is grown mainly in the South and Northeast Regions, representing for 47% and 37% of the country's production, respectively.

Although it has been observed in the southern states for more than a decade, it was in the last five years that foot rot has reached the condition of a major disease of sweet potato in Brazil. For several years, the disease etiology has been attributed to fungi belonging to *Phoma* sp. and *Phomopsis* sp. (Garcia et al., 1989), *Phomopsis batatae* (Peters et al., 1989), or *Plenodomus destruens* (Miranda et al., 1989).

In the states of Rio Grande do Sul and Santa Catarina, foot rot epidemics were responsible for crop substitution by many small growers, as soil infestation made sweet potato production non viable. In Brasilia, DF, central Brazil, where the disease was introduced via infected clones in the national germplasm collection, losses were as high as 80% when symptomless stem cuttings of a susceptible variety, Brazlandia Branca, obtained from an infested field, were used for commercial plantings. Disease spread occurred mainly through infected stem cuttings taken from old crops or from neighbouring farms. Moist cool weather occurring during the growing seasons probably favoured the high intensity of disease in the southern states, although symptoms also developed under high moisture at high greenhouse temperatures or in the summer in the central region of Brazil.

Foot rot has been reported causing severe losses since 1963-64 in Argentina (Mitidieri, 1990) and since 1974 in Uruguay (Vilaro et al.,

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1981), both countries bordering Brazil in the south.

The disease has not been recorded in the Northeast Region of Brazil, where sweet potato is one of the main food crops for the low-income populations. The absence of foot rot in this region is believed to be related to the local exchange of planting material, avoiding the importation of diseased tissue from other regions, rather than to climatic constraints to the disease.

The objetcive of this work was to clarify the etiology of foot rot in Brazil in order to orient researchers on experimentation on disease management strategies.

MATERIALS AND METHODS

Isolations were made from 23 diseased stems collected from local sweet potato collections and/or commercial fields in Pelotas (RS), Ituporanga (SC), Campo Grande (MS), and Brasília (DF). Sections of 5 to 10 cm, excised from stems where disease was developing upwards, were thoroughly washed in soapy water, dipped in 70% alcohol for 1 min., slightly flamed and peeled with a scalpel. Small sections were then taken from the margin between healthy and diseased tissue with a flamed scalpel and plated in water agar. After a 4-5 day incubation at 25°C, hyphal tips were aseptically transferred to PDA.

Inoculum was produced on PDA after incubation for 30 days at 25°C in the dark. On malt agar, under UV light at the same temperature, pycnidia are produced earlier and more abundantly; however, PDA was preferred since spore oozing was seldom observed on pycnidia formed on malt agar.

Pathogenicity tests were performed on sweet potato plants of cv. Brazlandia Branca, very susceptible to foot rot. Stem cuttings were planted in plastic boxes (40 x 30 x 10 cm) containing a sterile soil mixture; after 20 days, when plants had developed four to five leaves, 200 ml of a suspension containing approximately 10^4 spores/ml was poured onto the soil in equal dispensation to the 12 plants in a box. The aerial parts of the plants were also inoculated in another trial by spraying leaves with the same spore suspension and maintaining the plants for 48 hours in a moist chamber.

RESULTS AND DISCUSSION

Field symptoms

Whenever symptomless infected stem cuttings were used for planting commercial fields, foot rot symptoms consisted of vine wilting and plant death due to girdling of the base of the stem. Infection usually reached the storage roots, causing them to rot before harvesting time (Fig. 1 A) or during storage. When infection occurred in established plants, black stem lesions developed on the stem at soil level (Fig. 1 B), where pycnidia were produced abundantly (Fig. 1 C), often oozing pycniospores (Fig. 1 D) under high soil moisture. Sometimes, plants did not die because of secondary rooting of vines in contact with the soil.

Isolation of pathogen and pathogenicity tests

Isolations from infected tissues usually yielded diverse fungi, including pycnidium-forming species and bacteria, which might have contributed to the misidentification of the disease/pathogen in the past. However, *Plenodomus destruens* was, by far, the most consistently isolated organism, being the only one to cause typical foot rot upon artificial inoculation, 20 to 25 days after inoculation. Reisolations from inoculated plants always yielded pure cultures of *P. destruens*, satisfying Koch's postulates. No symptoms were observed on the leaves up to 30 days after inoculation on the aerial parts of the plants.

Pathogen identification

The identity of the pathogen was confirmed at the International Mycological Institute, Egham, England where three isolates have been deposited and at present filed under *Phomopsis* sp. Since the isolates have not been determined to species level in *Phomopsis* at IMI, and since they closely match the description of *Plenodomus destruens* Harter, it has been decided, for the time being, to refer to the foot rot fungus by the latter name, which has been used in several publications (Clark & Moyer, 1988; Martin, 1984).

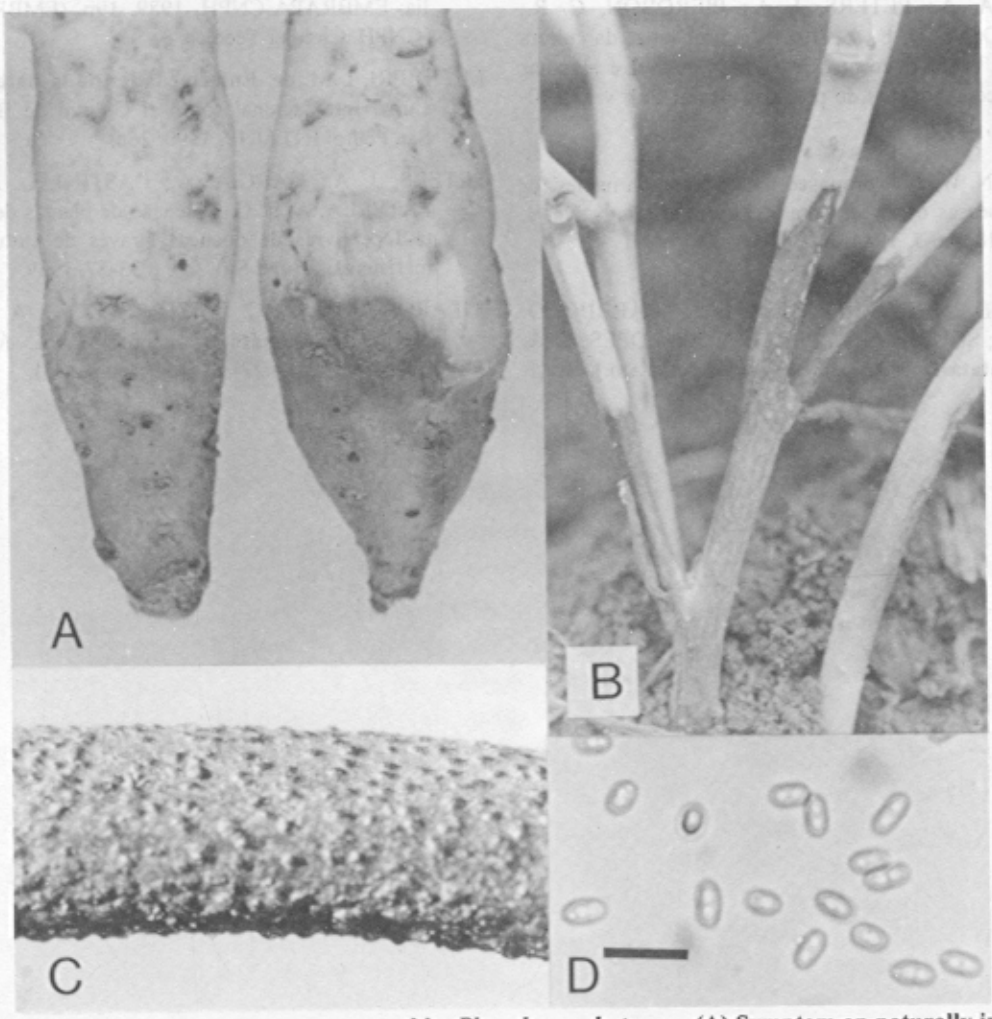

FIG. 1. Foot rot of sweet potato caused by *Plenodomus destruens*. (A) Symptom on naturally infected storage roots. (B) Symptom on the stem beginning at the soil level. (C) Pycnidia on infected stem. (D) Pycnidiospores of the pathogen (Bar = 20 um).

CONCLUSIONS

1. *Plenodomus destruens* Harter was identified as the main pathogen involved with foot rot of sweet potato, a serious disease especially in southern Brazil.

2. Even though there is a recommendation that the pathogen should belong to the genus *Phomopsis*, it is proposed that *Plenodomus destruens* name be maintained until the taxonomy of this group of fungi is completely resolved.

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