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Pests and Diseases

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Fungi

Panama disease of banana
Fusarium oxysporum f.sp. cubense (E.F. Sm.) W.C. Snyder & H.N. Hansen Anamorphic fungi

Status

Exotic (but present in Australia)

Panama disease of banana ...
2006
SP-PP-S8427
CPRR-14760-1

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Host Symptoms

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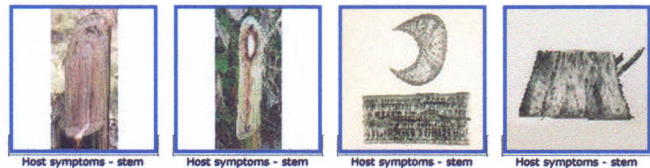
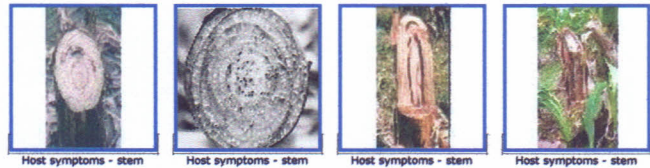
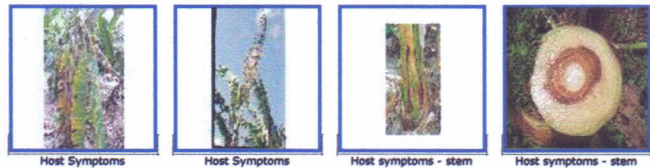
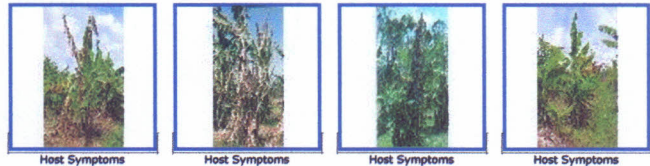
Caption: Symptoms of tropical race 4
Source: Dr J. Henderson [DPI&F](#)

Symptoms:

External symptoms including yellowing or collapse of the older leaves, occur on plants more than 4 months old. Sometimes the base of the pseudostem splits. Reddish to dark brown vascular discoloration occurs in the outer leaf sheaths, pseudostem, rhizome and fruit stalk. However fruits do not show symptoms. Usually all leaves collapse and the plant dies (Stover 1972). Other disorders on banana have similar symptoms to those of Panama disease (Beer et al. 2001, Kangire & Rutherford 2001). Fusarium wilt does not cause wilting and blackening of young suckers nor a dry rot in fruit as can be found in moko disease and blood disease.

The fungus:

Fusarium oxysporum Schldl. emend. W.C. Snyder & H.N. Hansen is a common soil inhabitant and produces three types of hyaline asexual spores: a) Macroconidia are usually 3-septate, straight to slightly curved, relatively slender and thin-walled, with a foot-shaped to pointed basal cell and a tapered and curved, sometimes with a slight hook, apical cell. They are produced abundantly on pale orange sporodochia and occasionally from hyphae growing on the agar surface. In some isolates, sporodochia may be sparse or non-existent; b) Microconidia are usually unicellular, oval, elliptical or kidney-shaped, produced in false heads, on short monophialides. They are abundant in the aerial mycelia; c) Chlamydospores are formed abundantly and quickly (2-4 weeks on carnation leaf agar) by most isolates, smooth or rough walled, usually

Overview Images

formed singly or in pairs, but also may be found in clusters or in short chains. They may be either terminal or intercalary in aerial, submerged, or surface hyphae. The teleomorph is unknown (Leslie & Summerell 2006). The characteristics of *F. oxysporum* on carnation leaf-piece agar and potato dextrose agar media were described by Leslie & Summerell (2006).

Four races of *F. oxysporum* f.sp. *cubense* have been described. Race 1 attacks cultivars in the 'Gros Michel' (AAA genome) and 'Pome' (AAB genome) subgroups and the 'Silk' (AAB genome) and 'Pisang Awak' (ABB genome) clones of banana; race 2 attacks 'Bluggoe' (ABB genome) and close relatives; race 3 attacks *Heliconia* spp.; and race 4 attacks cultivars in the Cavendish subgroup (AAA genome) and hosts of races 1 and 2 (Crop Protection Compendium 2005; Ploetz & Pegg 2000).

Until recently, race 4, the most destructive, had been detected on Cavendish cultivars only in subtropical production areas, where cold winter temperatures are presumed to predispose those cultivars to infection. However, a distinct population of pathogen, called tropical race 4, has caused considerable damage in Cavendish monoculture in tropical regions (Ploetz & Pegg 2000, Ploetz *et al.* 2003).

Identification

There is a large number of non-pathogenic or saprophytic strains of *F. oxysporum*, especially in soil, and they cannot be differentiated from the tens of *formae specialis* of pathogenic *F. oxysporum*. In order to make a sound diagnosis of Fusarium wilt, it is necessary to isolate the fungus; then to identify the species and finally to carry out pathogenicity tests. Leslie & Summerell (2006) described procedures and techniques for isolation, culture and identification of *Fusarium* species.

Although the morphological characteristics of the races are indistinguishable, race 4 of *F. oxysporum* f. sp. *cubense* from Taiwan is unique in that on modified Komada's medium it forms lacinate colonies distinct from those of races 1 and 2 (Sun *et al.* 1978).

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Citation: Liberato JR, Gasparotto L, Henderson J & Shivas R (2006) Panama disease of banana (*Fusarium oxysporum* f.sp. *cubense*) Pest and Diseases Image Library. Updated on 31/05/2006 2:47:13 PM. Available online: <http://www.padil.gov.au>

Created Date: 31/05/2006 2:47:13 PM

Last Updated: 31/05/2006 2:47:13 PM

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