

1. PaDIL Species Factsheet



Scientific Name:

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

Common Name

Panama disease of banana

Live link: <http://www.padil.gov.au:80/pests-and-diseases/Pest/Main/136609>

Image Library

Australian Biosecurity

Live link: <http://www.padil.gov.au:80/pests-and-diseases/>

Partners for Australian Biosecurity image library



Museum Victoria

<http://museumvictoria.com.au/>



CRC National Plant Biosecurity

<http://www.crcplantbiosecurity.com.au/>



Plant Health Australia

<http://www.planthealthaustralia.com.au/>



Department of Agriculture, Fisheries and Forestry

<http://www.daff.gov.au/>



Department of Agriculture and Food, Western Australia

<http://www.agric.wa.gov.au/>

2. Species Information

2.1. Details

Specimen Contact: Dr Jose R. Liberato - jose.liberato@dpi.qld.gov.au

Author: Liberato JR, Gasparotto L, Henderson J, Smith LJ, Daly AM & Shivas R

Citation: Liberato JR, Gasparotto L, Henderson J, Smith LJ, Daly AM & Shivas R (2006) Panama disease of banana (*Fusarium oxysporum f.sp. cubense*) Updated on 10/21/2011 Available online: PaDIL - <http://www.padil.gov.au>

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2.2. URL

Live link: <http://www.padil.gov.au:80/pests-and-diseases/Pest/Main/136609>

2.3. Facets

Status: Exotic Regulated Pest - absent from Australia

Group: Fungi

Commodity Overview: Horticulture

Commodity Type: Fresh Fruit

Distribution: Cosmopolitan

2.4. Other Names

Fusarium cubense E.F. Sm.

2.5. Diagnostic Notes

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 formed singly or in pairs, but also may be found in clusters or in short chains. They may be either terminal or i

2.6. References

Beer Z, Hernandez JM & Sabadel S (2001) False Panama disorder on banana. Musa Disease Fact Sheet No. 9. (Montpellier, France: INIBAP). CABI/EPPO (1999). Distribution maps of plant diseases. *Fusarium oxysporum* f.sp. *cubense* (E.F. Sm.) W.C. Snyder & H.N. Hansen. Map No. 31. Ed 6. (CAB International: Wallingford, UK) Crop Protection Compendium 2005 Edition. *Fusarium oxysporum* f.sp. *cubense* (Panama disease of banana). (CAB International: Wallingford, UK). Hennessy C, Walduck G, Daly A & Padovan A (2005). Weed hosts of *Fusarium oxysporum* f. sp. *cubense* tropical race 4 in northern Australia. Australasian Plant Pathology 34: 115-117. Hwang SC, Ko WH (2004) Cavendish banana cultivars resistant to *Fusarium* wilt acquired through somaclonal variation in

2.7. Web Links

APS net: <http://www.apsnet.org/online/feature/panama2/>

Department of Agriculture – Western Australia:

<http://www.agric.wa.gov.au/pls/portal30/docs/folder/ikmp/pw/ph/dis/fn/fs01200.pdf>

Department of Agriculture, Fisheries and Forestry:

<http://www.daff.gov.au/content/output.cfm?ObjectID=B62DA0F6-C61C-4B38-A7521CDDA7566308>

Department of Primary Industry, Fisheries and Mines – Northern Territory:

[https://transact.nt.gov.au/ebiz/dbird/TechPublications.nsf/3743BB6BF78E7C2169256EFE004F62BA/\\$file/786.pdf?OpenElement](https://transact.nt.gov.au/ebiz/dbird/TechPublications.nsf/3743BB6BF78E7C2169256EFE004F62BA/$file/786.pdf?OpenElement)

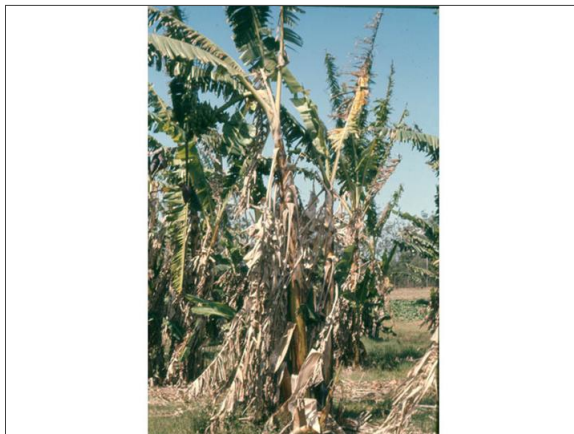
Plant Health Progress: <http://www.plantmanagementnetwork.org/pub/php/management/bananapanama/>

PBT link: <http://www.pdil.gov.au/pbt/index.php?q=node/46&pbtID=137>

3. Diagnostic Images



Symptoms of tropical race 4
Host Symptoms: Dr J. Henderson DPI&F



Symptoms on plant (copyright DPI&F, for use contact email address)
Host Symptoms: DPI&F Archives DPI&F



Symptoms on plant (copyright DPI&F, for use contact email address)
Host Symptoms: DPI&F Archives DPI&F



Leaf yellowing caused by tropical race 4 (copyright DPI&F, for use contact email address)
Host Symptoms: Dr J. Henderson DPI&F



Symptoms on plant
Host Symptoms: Dr Luadir Gasparotto Embrapa



Leaf yellowing
Host Symptoms: DPI&F Archives DPI&F



Internal symptoms in cv. Lady finger (copyright DPI&F, to reproduce images email Linda.smith@dpi.qld.gov.au)
Host Symptoms: Dr Linda Smith DPI&F



Symptoms on rhizome (copyright DPI&F, to reproduce images email Linda.smith@dpi.qld.gov.au).
Host Symptoms: Dr Linda Smith DPI&F



Pseudostem splitting (copyright DPI&F, to reproduce images email Linda.smith@dpi.qld.gov.au).
Host Symptoms: Dr Linda Smith DPI&F



Infected Cavendish Wamuran (copyright DPI&F, to reproduce images email Linda.smith@dpi.qld.gov.au).
Host Symptoms: Dr Linda Smith DPI&F



Advanced external symptoms in banana cv. Lady finger (copyright DPI&F, to reproduce images email Linda.smith@dpi.qld.gov.au).
Host Symptoms: Dr Linda Smith DPI&F



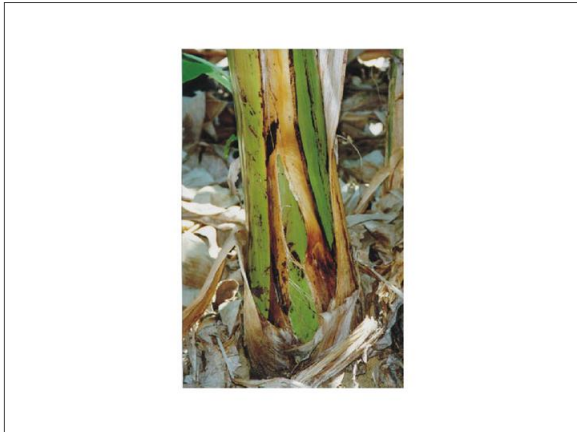
Vascular discolouration (early symptoms) in the pseudostem caused by *Fusarium oxysporum* f.sp. *cubense* TR4 (copyright, to reproduce images email Andrew.Daly@nt.gov.au).
Host Symptoms: Andrew M Daly DPI&F&M



Vascular discoloration in the rhizome caused by *Fusarium oxysporum* f.sp. *cubense* TR4 (copyright, to reproduce images email Andrew.Daly@nt.gov.au).
Host Symptoms: Andrew M Daly DPIF&M



Vascular discoloration in the bunchstalk caused by *Fusarium oxysporum* f.sp. *cubense* TR4 (copyright, to reproduce images email Andrew.Daly@nt.gov.au).
Host Symptoms: Andrew M Daly DPIF&M



Splitting of the base of pseudostem
Host symptoms - stem: Dr Luadir Gasparotto Embrapa



Vascular discoloration on pseudostem
Host symptoms - stem: Dr Luadir Gasparotto Embrapa



Vascular discoloration on pseudostem (copyright DPI&F, for use contact email address)
Host symptoms - stem: DPI&F Archives DPI&F



Vascular discoloration on pseudostem (copyright DPI&F, for use contact email address)
Host symptoms - stem: DPI&F Archives DPI&F



Vascular discoloration on pseudostem
(copyright DPI&F, for use contact email address)

Host symptoms - stem: DPI&F Archives
DPI&F



Vascular discoloration on pseudostem
(copyright DPI&F, for use contact email address)

Host symptoms - stem: Dr J. Henderson
DPI&F



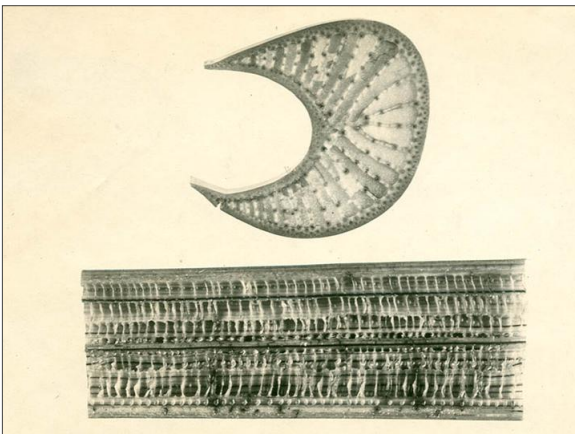
Vascular discoloration on pseudostem
(copyright DPI&F, for use contact email address)

Host symptoms - stem: DPI&F Archives
DPI&F



Vascular discoloration on pseudostem

Host symptoms - stem: Dr Luadir
Gasparotto Embrapa



Vascular discoloration

Host symptoms - stem: DPI&F Archives
DPI&F



Vascular discoloration on rizhome

Host symptoms - stem: DPI&F Archives
DPI&F



Vascular discoloration on rhizome
Host symptoms - stem: DPI&F Archives
DPI&F



Appearance of a positive VCG test to confirm *Fusarium oxysporum* f.sp. *cubense* TR4 (copyright, to reproduce images email Andrew.Daly@nt.gov.au).
In vitro test: Andrew M Daly DPI&F&M

Results Generated:

Tuesday, January 6, 2015
