

PANAMA DISEASE TROPICAL RACE 4

Surveillance Field Guide



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Surveillance Field Guide

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Panama TR4 Program_0034_Version 1, June 2016

Some photos represented in this field guide are of plants affected by Panama disease race 1. However, these symptoms are the same as those found in plants affected by Panama disease tropical race 4. Cultivars affected by race 1 are also affected by tropical race 4.

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Parts of a healthy banana plant

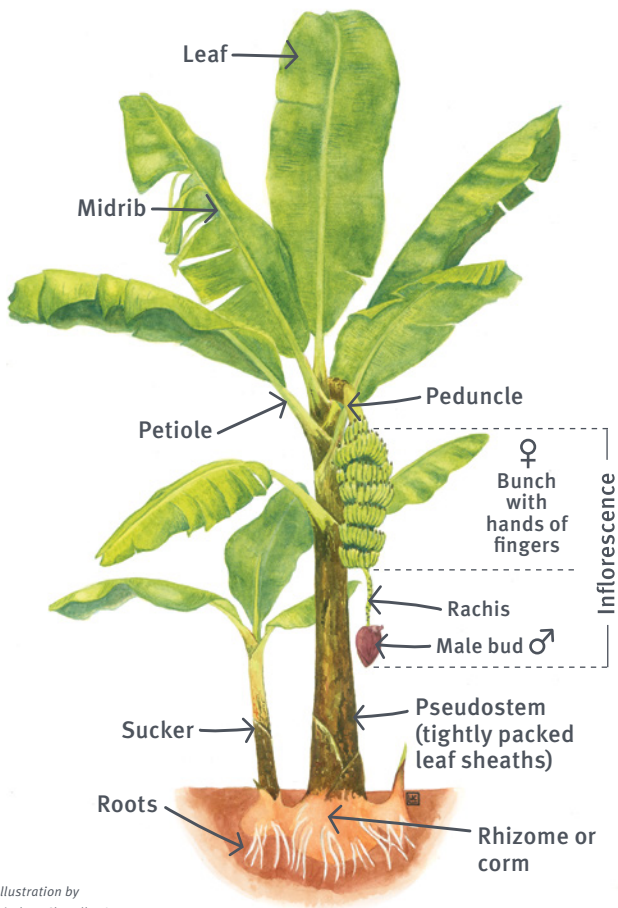


Illustration by
Lindsay Chandler-Jentz

Healthy banana plants



A healthy banana plant has lush green leaves and a semi erect canopy. There is little to no leaf yellowing, and no signs of wilt or stem splitting.

Photo credit: Simone Newman-Webster (DAF)



This image illustrates a healthy, creamy white cross section of a pseudostem. Once cut, the internal plant tissue will oxidise and become more darkly discoloured, but when first cut, it is creamy white.

Photo credit: Dr Suren Samuelian (DAF)

External symptoms of Panama disease - Yellowing and wilting



Early signs of yellowing of leaf margins and leaf base.

Photo credit: Dr Altus Viljoen (Stellenbosch University)



Leaf yellowing and leaf edge death in a young plant.

Photo credit: Dr Tony Pattison (DAF)



Yellowing and browning of leaf margins progressing to cover whole leaves.

Photo credit: Wayne O'Neill (DAF)



Note leaf yellowing and leaf edge death (browning) in this Panama infected plant.

Photo credit: Dr Suren Samuelian (DAF)



Yellowing leaf margin with yellowing leaves starting to collapse from wilt.

Photo credit: DAF



Whole leaves becoming yellow and dying off.

Photo credit: Wayne O'Neill (DAF)



Advancing external symptoms – whole leaves beginning to turn yellow and starting to die off. Affected leaves collapse and fall around the pseudostem from wilt.

Photo credit: Wayne O'Neill (DAF)



Discoloured leaves stand out against the surrounding healthy plants. As the disease progresses, the leaf margin yellowing progresses to cover whole leaves with the margins dying and turning brown. The affected leaves collapse or wilt to form a skirt around the pseudostem.

Photo credit: Wayne O'Neill (DAF)



Advanced symptoms of whole yellowing leaves, dying and beginning to collapse and form a skirt.

Photo credit: DAF



Advanced external symptoms including leaf yellowing and wilt. Note the extensive skirt of dead leaves around the pseudostem. Evidence of these leaves may be removed by farm deleafing practice.

Photo credit: Dr Suzy Perry (DAF)



Discolouration and wilting at leaf stem base.

Photo credit: Daniel Merretz

External symptoms of Panama disease - Stem splitting



Early signs of stem splitting near the base of the pseudostem. Stem weevil borers may also cause bore holes or small splits in the pseudostem.

Photo credit: Daniel Merretz



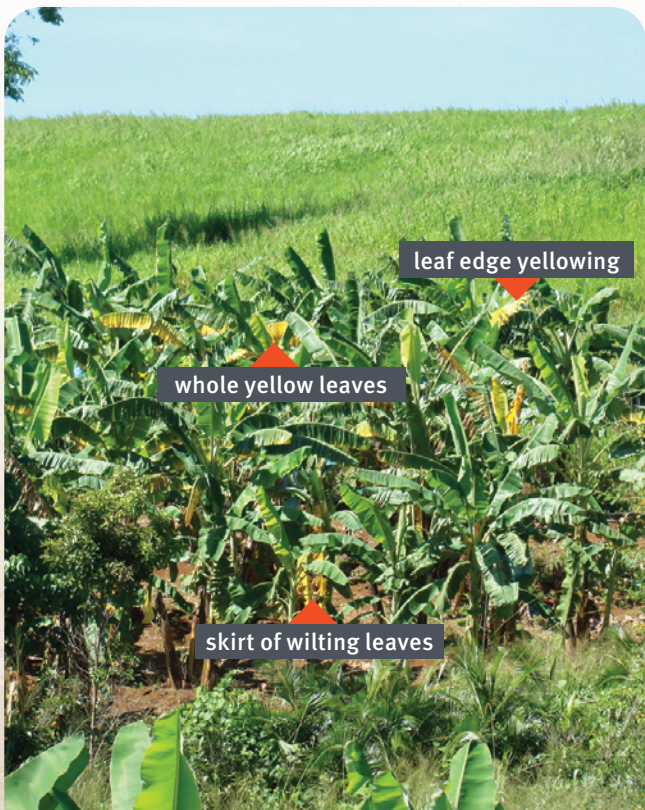
More extensive stem splitting at the base of the pseudostem.

Photo credit: Andrew Daly (Northern Territory DPIF)



Advanced stem splitting in a Panama disease infected plant.

Photo credit: Wayne O'Neill (DAF)



leaf edge yellowing

whole yellow leaves

skirt of wilting leaves

This block of banana plants has yellowing leaves and wilt. Closer investigation is required to identify each plant with Panama symptoms for sampling.

Photo credit: Kevin Leutton (DAF)

Internal symptoms of Panama disease



This cross section of the pseudostem shows early signs of infection with localised areas of internal discoloration.

Photo credit: DAF



Pseudostem cross section illustrating internal discoloration from Panama disease.

Photo credit: Jeff Daniells (DAF)



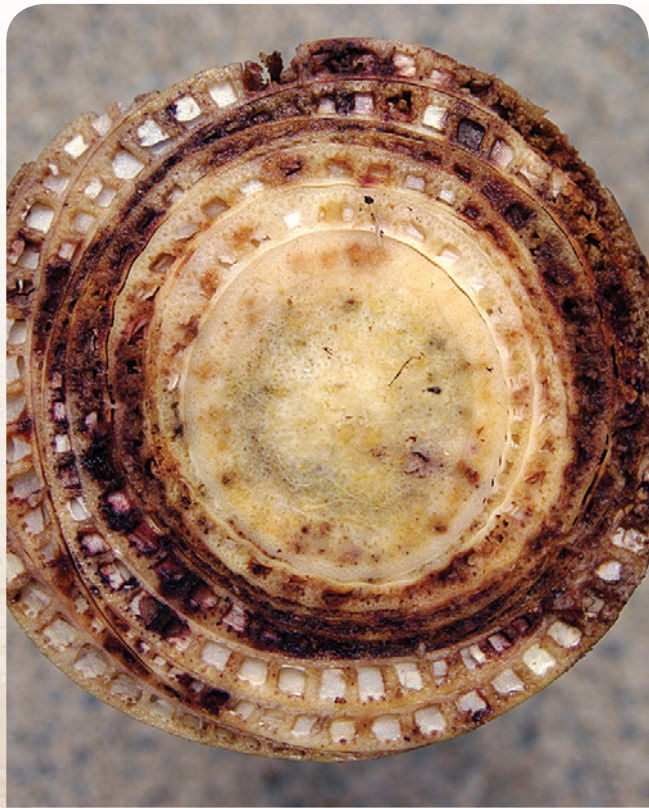
This is a cross section of a plant with Panama disease. Note the discolouration of the pseudostem.

Photo credit: Dr Tony Pattison (DAF)



This is a cross section of a plant with Panama disease. Note the discolouration of the pseudostem.

Photo credit: Wayne O'Neill (DAF)



This is a cross section of a plant with Panama disease. Note the discolouration of the pseudostem.

Photo credit: Wayne O'Neill (DAF)



This cross section shows very advanced internal discoloration and blackening of the pseudostem due to Panama disease.

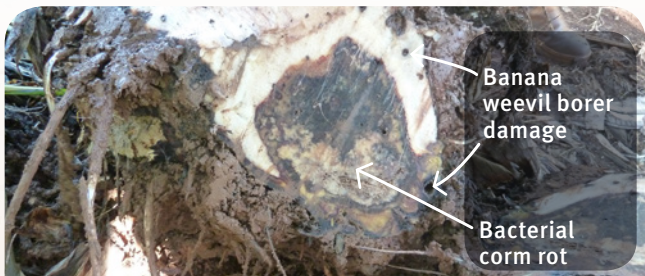
Photo credit: DAF



Banana weevil borer damage. Banana weevil borer is a vector for Panama disease. Plants infected with banana weevil borer can also have Panama disease.

Photo credit: Donna Chambers (DAF)

Photo credit (inset): Bruno Pinese



This section of a corm shows banana weevil borer damage and bacterial corm rot. Note plants with banana weevil borer and bacterial corm rot can also have Panama disease.

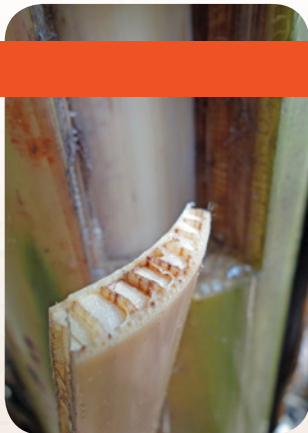
Photo credit: Jeff Daniells (DAF)



This section of corm has bacterial corm rot. Banana plants can have bacterial corm rot and Panama disease. Both can cause external wilt symptoms.

Photo credit: Jeff Daniells (DAF)

Window sampling



Internal discolouration of vascular tissue caused by Panama disease and detected during window sampling.

Photo credits: Wayne O'Neill (DAF)

Symptoms in young potted plants



Early signs of internal discoloration in a young plant.

Photo credits: Tegan Kukulies (DAF)



More advanced internal discoloration in a very young plant.

Top picture - Photo credit: Sharon Hamill (DAF)

Bottom picture - Photo credit: Tegan Kukulies (DAF)

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