

Panama disease

What is Panama disease?

Panama disease (also known as fusarium wilt) is caused by the soil-borne fungus *Fusarium oxysporum* f. sp. *cubense*.

There are four races of the fungus:

- Race 1 infects Lady Finger, Sugar and Ducasse, but not Cavendish
- Race 2 generally infects cooking bananas like Bluggoe and Blue Java
- Race 3 infects only *Heliconia* species and not bananas
- Race 4 infects most varieties including Cavendish. There are two important strains of this race:
 - Subtropical Race 4 usually produces symptoms in Cavendish after a period of cold stress
 - Tropical Race 4 is a serious threat to the Australian Cavendish banana industry

Panama disease is considered to be the most destructive disease of banana in modern times. Subtropical race 4 has been under quarantine control in south east Queensland, northern New South Wales and Western Australia for some time. Tropical race 4, which has rapidly spread throughout South East Asia, has been detected in the Darwin area, and is currently under strict quarantine control. Both strains represent a significant risk to the North Queensland production area, but Tropical race 4 is particularly devastating.



What does it look like?

The first external symptom of Panama is the irregular yellowing of the margins of older leaves, which later turn brown and dry out. These leaves eventually collapse along the leaf stalk or at the junction of the stalk and stem, resulting in a skirt of dead leaves forming around the lower part of the plant. Heart leaves may remain unusually upright giving the plant a spiky appearance. Following this, plants can take on a generally wilted appearance. The stem may split, which is often followed by death of the parent stem, but suckers do not necessarily die.

Internal symptoms of Panama include discolouration of the inner tissue in the corm and pseudostem. The easiest way to observe these symptoms is to cut through the pseudostem near ground level. The discolouration is usually seen as reddish-brown or black lines running up and down the pseudostem, or rings running around the cross section of tissue.

Affected plants rarely produce marketable bunches.



Jeff Daniels

Internal browning of stems and corms is the key diagnostic symptom of Panama disease



Jeff Daniels

Initial external symptoms of Panama disease include yellowing leaf margins on older leaves

What could it be confused with?

In the early stages Panama disease can be mistaken for nutritional problems or water stress.

Panama disease can also be confused with endemic bacterial wilts and exotic bacterial diseases such as Moko or blood disease. However, neither of these diseases currently occur in Australia.

What distinguishes Panama from nutritional problems, water stress, Moko or blood disease?

Nutritional problems and water stress do not normally cause internal discolouration of vascular tissues.

Panama disease can be differentiated from Moko in that Panama does not discolour fruit.

Panama disease does not cause the production of bacterial (blood-like) ooze from cut stems.

How is it spread?

The disease is most commonly introduced in infected planting material. Panama disease can also spread over short distances via root to root contact, and through soil. Spread from an infected parent plant into the suckers can also occur. It can also spread with soil and water movement or on contaminated pruning tools. Once established, the fungus persists in the soil for many years.



As the disease progresses, older leaves die and form a skirt around the lower part of the plant

Jeff Daniels



Splitting of the pseudostem associated with Panama disease infection

Jeff Daniels



Where is it now?

Race 1 – under quarantine control in banana production areas of Queensland, New South Wales and Western Australia.

Race 2 – under quarantine control in banana production areas of Queensland, and New South Wales.

Race 3 – Northern Territory.

Subtropical Race 4 – under quarantine control in banana production areas of south east Queensland, northern New South Wales and Western Australia.

Tropical Race 4 – under strict quarantine management in the Darwin area.

How is it controlled?

The most effective control measure for Panama disease is the exclusion of the pest and simple farm hygiene procedures.

Prompt detection is essential, and affected plants must be destroyed because the disease cannot be cured. Minimal site disturbance after the affected plants have been destroyed (e.g. by herbicide injection) is crucial to avoid further spread of the pest via movement of soil or plant material. There are strict quarantine regulations to prevent spread of infected material to clean areas through movement of soil, water or plant materials.



Aerial view of Panama affected banana plants

How do I protect my farm from Panama disease?

Prevention and farm hygiene

- Protect land currently free of the pest.
- Use clean planting material, such as tissue culture plants.
- Avoid sharing farm machinery and equipment with other growers. A common way of spreading Panama disease is in soil attached to equipment.
- Remove all plant material and soil from all machinery, equipment, vehicles and footwear upon entry to the farm.
- Erect signs at your front gate to notify visitors of your farm biosecurity requirements.
- Train your staff and family about your farm biosecurity requirements.

Early detection of outbreaks

- Regularly examine your crop for signs of Panama disease.
- Immediately report any suspect plants to the Exotic Plant Pest Hotline on 1800 084 881.

Containment of outbreaks

- If you suspect you have Panama disease, it is important that a specimen is taken by a trained person for diagnostic analysis. Please contact a plant health inspector in your state or call the Exotic Plant Pest Hotline on 1800 084 881 to arrange for a sample to be taken and for advice on pest management.
- Inject affected plants and adjacent healthy plants with glyphosate to kill the plants.
- Leave plants to die in place – no chopping!
- Fence infected areas to restrict movement of workers, machinery and equipment.
- Sow infected sites with a persistent ground cover to reduce movement of infected soil and drainage water.
- Do not replant with susceptible varieties.
- If Panama disease is confirmed, an inspector will issue an Inspector's Approval outlining strict hygiene measures that must be met to allow movement of anything that has been in contact with plant material or soil. These measures are necessary to help prevent the spread of Panama disease to unaffected areas.

Have you seen Panama disease symptoms?

Early detection and reporting of symptoms are the key elements in controlling the pest.

For more information about Panama disease contact Queensland Primary Industries and Fisheries on 13 25 23 or visit the website at www.dpi.qld.gov.au.

If you see anything unusual, call the Exotic Plant Pest Hotline on 1800 084 881.

**EXOTIC PLANT PEST HOTLINE
1800 084 881**

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