



Panama disease: on-farm management



Agnote DPI-353, Second Edition, March 2002

**Neil Treverrow, Technical Specialist (Tropical Fruit),
Tropical Fruit Research Station, Alstonville**

Panama disease is a fungal infection that can devastate banana plantations. It kills infected plants, leaving behind spores that can survive for decades in the soil to infect any new planting of susceptible varieties. There are no economical cures for affected plants and no successful methods to get rid of the spores in the soil. This means prevention is the only approach to the disease.

Growers who take responsibility for their plantation security have a much greater chance of keeping Panama disease out of their plantations than growers who do not introduce a management system.

This Agnote provides information on:

- How to keep Panama out of your plantation,
- How to manage Panama if it infects your plantation.

ABOUT THE DISEASE

Panama disease, also known as Fusarium wilt, is caused by the fungus *Fusarium oxysporum* f. sp. *cubense*.

There are four races of the disease recognised around the world and they affect different ranges of banana varieties. Two races are important in NSW.

The most common race in NSW is Race 1, which affects Lady Finger and other varieties such as Ducasse. It does not affect Cavendish bananas. The second race is Subtropical Race 4, which can affect stressed Cavendish bananas as well as Lady Finger. This means Panama is a disease that all banana growers need to be wary of, not just Lady Finger growers.

HOW TO KEEP PANAMA OUT OF YOUR PLANTATION

The main ways Panama enters banana plantations are:

- on infected planting material,
- in soil contaminated with disease spores,
- in water contaminated with disease spores.

Do not use infected planting material

Infected planting material is the main source of spreading Panama disease. Suckers from infected plants can look healthy, so the appearance of the planting material is no guarantee it is not infected. Other banana plant material can also transmit the disease. This includes bunch stalks but not fruit. Because bunch stalks can spread the disease, it is best not to scatter them through the plantation.

Only tissue-cultured planting material from a reputable nursery can be used with confidence. These plants are a practical source of planting material. While there have been concerns in the past about off-types - particularly in Lady Finger tissue cultured plants - many growers are now using this planting material successfully.

If the cost of using tissue culture plants to establish the whole block is too high, nursery blocks are a good way of multiplying tissue culture plants on your own land.

Do not bring in contaminated soil

Soil from infected farms can contain Panama spores. If these mingle with the soil on your plantation and contact banana roots, infection will occur.

There are many ways soil can be moved:

- footwear,
- vehicles,
- heavy machinery,
- potting mixes,
- second hand cartons.

Footwear is a major threat because boots and shoes can easily pick up infected soil and carry it on to, and throughout, your home plantation. The best solution for your own footwear is to keep one set for your plantation and another set for wearing off the farm.

Otherwise, if you plan to visit other banana plantations clean your footwear before you go out - as a courtesy to the other growers - and before you leave to come home. Once your footwear is clean of mud, sterilise it with a solution of copper sulphate, methylated spirits.

Use the same system to clean any shovels or mattocks and soil sampling gear that you have used off-farm, in case there is soil on them. Sterilise implements such as knives if you use them in other plantations. This is a useful guard against contamination from small amounts of soil on the knives. (Infection from the sap of Panama-infected plants on knives does not pose a serious threat.)

If you have visitors coming on to your land, insist that they clean their footwear before they leave home, and get them to step into a dish of bleach solution before they enter your plantation.

Cars, 4-wheel drives and trucks are all possible sources of infection because they carry soil on tyres, wheels, under wheel hubs and under the chassis. Wherever possible, do not drive your vehicles on other banana plantations, and make sure others do not drive on your plantation unless absolutely necessary. This is particularly important during wet weather, when picking up mud is more likely to happen.

If a vehicle has to come on to your plantation make sure it is clean of soil. Tyres, wheels and the underside of the vehicle generally can be effectively cleaned with Truckcleanse®. It is important that gross soil is not left on the vehicle after cleaning, as the disinfectant may not penetrate through all the soil.

It is a good idea to have a dedicated wash-down area for your own and other vehicles. A concrete area is best but it is important to locate it well away from the plantation. If this is not possible, choose an area where the water will not drain into the plantation or into areas on which you are likely to drive.

Heavy machinery, such as bulldozers, are a

DISCLAIMER

The information contained in this publication is based on knowledge and understanding at the time of writing (Matrch 2002). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Agriculture or the user's independent adviser.

The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product name does not imply endorsement by NSW Agriculture over any equivalent product from another manufacturer.

ALWAYS READ THE LABEL

Users of agricultural chemical products must always read the label and strictly comply with directions on the label. Users are not absolved from compliance with the directions on the label by reason of any statement made, or omitted to be made, in this publication.

particular Panama risk as they tend to be used for contract work on a number of plantations.

Insist that any machinery entering your property is clean. Keeping the transporter out of the plantation will also reduce the risk of contamination. If possible, arrange to have earthwork contractors from outside banana growing areas to do your earthworks.

Potting mixes. Only use QBAN accredited sources of banana planting material. These nurseries use soil-less or sterilised mixes to pot banana plants from tissue culture, and they make sure the pots are free from contact with spore-infected soil or water. If you are buying other plants for the plantation - such as avocados, or ornamentals for a home garden close to the plantation - remember that the soil in these pots may contain Panama spores.

Secondhand cartons contaminated with soil or infected plant material - but not banana fruit - can spread Panama disease.

Avoid using contaminated water

Panama spores can be moved by water, either suspended in the water or attached to contaminated soil in the water.

When plantations high in the catchment area become infected by Panama disease, the soil with spores can move down watercourses, posing a risk to lower plantations. For this reason, avoid planting bananas close to watercourses and keep these areas well grassed to avoid contact with the soil, and to prevent erosion and movement of the soil.

The risk of contamination is much higher if contaminated water is collected in a dam and used for irrigation. To reduce this threat, ensure the pump inlet is floated well above the sediments on the dam floor.

HOW TO MANAGE PANAMA ON-FARM

Having done all you can to keep Panama out, it is important to stay on the lookout for signs of an infestation on your plantation. It could turn up because of an old infestation site - such as a windbreak planting of Ducasse, a practice that was common years ago. Finding an infection of Panama is the start of a new phase of managing the disease, but it does not have to be the end of productive growing.

Look for symptoms

The classic symptom of Panama disease is yellowing of the leaf margins of the older leaves. The yellowing progresses from the oldest to the youngest leaves, and the leaves gradually collapse to form a skirt around the pseudostem. The youngest leaves can survive longest, staying erect and giving the plant a spikey appearance. Sometimes the pseudostem splits from near the base.

The plants must be suspect if the leaves are yellow and they are wilting when simple water stress is not likely - ie. only one or two plants are affected rather than most of the patch.

Have the suspect plant tested

To confirm a suspect Panama infection cut the pseudostem about 1m above the ground, across then down. If the pseudostem has distinct continuous yellow to red-brown colour, take a 20cm section of it and put it in a strong plastic bag. Try not to scatter the plant material around while taking the sample. Put this bag in a second bag so that you do not drop sap or fine plant material when carrying the sample.

Take your sample to your nearest New South Wales Agriculture office. NSW Agriculture staff will prepare samples for verification of Panama presence and race identification and send them to the Division of Plant Protection, Queensland

Department of Primary Industry, Indooroopilly, for analysis.

Ensure that no one disturbs the soil until the sample is analysed by quarantining the suspect area in your plantation - for example, rope off the area.

If Panama is confirmed

Fence off the area. Secure the infected area to reduce the chances of moving contaminated soil from the site of the infestation - preferably with an animal-proof fence. Sow the infected area to grass and, if possible, divert water away from the site. Destroy the plant with a glyphosate treatment to ensure there is no regrowth of suckers from the infected plant.

Do not use water that has drained from the infected area. If the infected site is within the watershed area of your dam, this water is a threat to the rest of the plantation. Irrigating from dams contaminated with Panama spores can spread the disease rapidly through the plantation.

Do not sell suckers. Infected suckers can introduce Panama on otherwise clean plantations, so do not sell any suckers from your plantation, even if they seem to be outside the infected area.

Notify NSW Agriculture. Panama disease is a notifiable disease - that means you must, by law, inform NSW Agriculture if you find Panama in your plantation.

SUMMARY

These actions will help you extend the life of your plantation. Unfortunately, the disease is likely to have moved from the initial infection site before you notice the first infection, so further outbreaks may occur.

If the situation becomes unmanageable, planting Panama-resistant banana varieties is your best option. Goldfinger is a resistant variety currently available.

Panama management is very much a self-help job. There are no iron clad guarantees your efforts will keep Panama at bay forever. However these risk reduction activities will leave you in a far better position than doing nothing and taking your chances.

FURTHER INFORMATION

For further information on Panama disease in bananas, contact the nearest office of NSW Agriculture.



NSW Agriculture

Edited by Geof Murray
for the NSW Agriculture
Horticultural Products and Plant Protection Program

d:\Plants\Hort\dpi353.p65 job 2693

Agdex 217/633