

# Tropical banana information kit

Reprint – information current in 1998



## REPRINT INFORMATION – PLEASE READ!

For updated information please call 13 25 23 or visit the website [www.deedi.qld.gov.au](http://www.deedi.qld.gov.au)

This publication has been reprinted as a digital book without any changes to the content published in 1998. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research:

- Chemical recommendations—check with an agronomist or Infopest [www.infopest.qld.gov.au](http://www.infopest.qld.gov.au)
- Financial information—costs and returns listed in this publication are out of date. Please contact an adviser or industry body to assist with identifying more current figures.
- Varieties—new varieties are likely to be available and some older varieties may no longer be recommended. Check with an agronomist, call the Business Information Centre on 13 25 23, visit our website [www.deedi.qld.gov.au](http://www.deedi.qld.gov.au) or contact the industry body.
- Contacts—many of the contact details may have changed and there could be several new contacts available. The industry organisation may be able to assist you to find the information or services you require.
- Organisation names—most government agencies referred to in this publication have had name changes. Contact the Business Information Centre on 13 25 23 or the industry organisation to find out the current name and contact details for these agencies.
- Additional information—many other sources of information are now available for each crop. Contact an agronomist, Business Information Centre on 13 25 23 or the industry organisation for other suggested reading.

Even with these limitations we believe this information kit provides important and valuable information for intending and existing growers.

**This publication was last revised in 1998. The information is not current and the accuracy of the information cannot be guaranteed by the State of Queensland.**

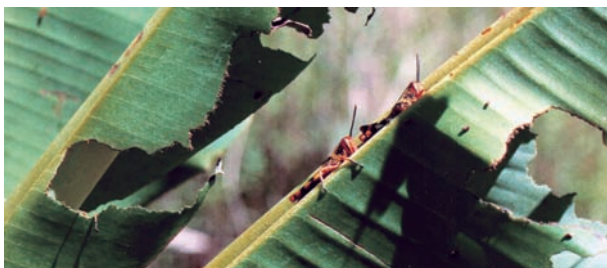
This information has been made available to assist users to identify issues involved in the production of tropical banana. This information is not to be used or relied upon by users for any purpose which may expose the user or any other person to loss or damage. Users should conduct their own inquiries and rely on their own independent professional advice.

While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained in this publication.



Queensland Government

## Tattered or holey leaves



### Grasshopper

**Cause.** Feeding by grasshoppers *Valanga* spp.

**Solution.** The damage is mostly cosmetic as plants will rapidly compensate for any leaf loss. It is usually only a problem on young plants, especially on new plant crops. No treatment is required.



### Wind

**Cause.** Strong winds tearing the leaf lamina.

**Solution.** Retaining existing vegetation or planting specific windbreak trees can reduce the damage caused by strong winds.

## Deformed or variegated fruit



### Mokillo

**Cause.** The bacterium *Pseudomonas* sp. It occurs naturally on flowers and may be transferred to other flowers by insects. Frequently only one finger per hand is infected. The problem is more prevalent in the wet season.

**Solution.** Control is not warranted.



### Tissue-cultured off-type

**Cause.** A genetic abnormality occurring in tissue-cultured plants.

**Solution.** Destroy affected plants and set additional following suckers on nearby plants.

## Deformed or variegated fruit



### Cold weather

Fruit are usually short, straight and darker green.

**Cause.** Temperatures below 6°C lead to abnormal growth. The more hours of exposure and the lower the temperature, the greater the damage.

**Solution.** Very early bunch covering before bract lifting will raise the bunch temperature by 1 to 2°C.



### November dumps

**Cause.** Bunch initiation coinciding with night temperatures below 6°C in winter. These bunches normally emerge in October and November.

**Solution.** Seldom a problem in north Queensland. Plant crops are affected more than ratoons, so time planting to avoid bunch initiation during mid-winter.



### Genetic abnormality (variegated fruit)

**Cause.** A genetic abnormality that occurs in tissue-cultured plants.

**Solution.** Destroy affected plants and set additional following suckers on nearby plants.

## Scabs on fruit



### Scab moth

Surface feeding by the larvae causes scarring.

**Cause.** Larvae of *Nacoleia octasema* feeding on the fruit between the bunch stalk and the hand. Only occurs from bunch emergence to bract fall.

**Solution.** Newly emerged bells require pesticide injection while they are still upright. When the plants are growing quickly during summer, treat blocks at least weekly. Select a suitable pesticide from the *Problem solver handy guide*.

## Scabs on fruit



### Sugarcane bud moth

Surface feeding by the larvae causes scarring.

**Cause.** Small grey larvae of *Opogona glycyphaga*. They feed and pupate mainly towards the tips of the fingers and where the flower end of a lower finger meets a finger in the hand above.

**Solution.** This pest lays its eggs on fruit after all the bracts have fallen. Treat bunches with insecticide during bunch covering. Refer to the *Problem solver handy guide*.



### Banana fruit caterpillar

**Cause.** Larvae of *Tiracola plagiata* feeding on leaves and fruit. Damage is usually confined to a few bunches and feeding on fruit is confined to the outside of fingers.

**Solution.** Although attack to a single bunch can be very severe, only a few bunches are damaged and specific treatments are not usually needed. Standard treatments for rust thrips and sugarcane bud moth help to control fruit caterpillar. If damage is noted on more than 5% of bunches, treat with a pesticide from the *Problem solver handy guide*.



### Corky scab

**Cause.** Scarring from feeding and egg-laying by flower thrips, *Thrips hawaiiensis* on young fruit when still covered by the bracts.

**Solution.** Insecticide injection at bell emergence for control of scab moth also controls flower thrips.



### Rub

**Cause.** Rubbing between the bag and young fingers due to prolonged strong winds. Leaves rubbing against the fruit cause similar symptoms.

**Solution.** Retaining existing vegetation or planting specific windbreak trees can reduce the damage caused by strong winds.

## Spots on fruit



### Banana spotting bug

Note slightly sunken black circular spots up to 5 mm in diameter. Inset: banana spotting bug (about 2 cm long).

**Cause.** Feeding (sucking) by banana spotting bug, *Amblypelta lutescens lutescens*, usually on the exposed outer curve of the fingers.

**Solution.** Damage is more severe on blocks adjacent to rainforest. No specific treatments required. If more than 5% of bunches are affected, spot spray with a chemical from the *Problem solver handy guide*.



### Deightoniella

**Cause.** The fungus *Deightoniella torulosa*. Spores are produced in large numbers on dead leaf material during wet conditions and are spread in air currents to the fruit.

**Solution.** *Deightoniella* is generally a minor disease in well managed plantations that use a full leaf spot control program.



### Pin-head black spot

**Cause.** Rupturing of lenticels, most likely a reaction to environmental conditions, particularly water-logging and extended wet weather. This is often confused with infection by *Deightoniella torulosa*.

**Solution.** Ensure adequate surface and internal drainage for plants. Avoid planting in poorly drained soils.



### Fruit flies

Note stings (minute pinholes) on the surface. A small drop of sap usually forms at the sting site.

**Cause.** Banana fruit fly, *Bactrocera musae*, and Queensland fruit fly, *Bactrocera tryoni*, laying eggs (stinging) in the pulp of banana just below the skin. The banana fruit fly can sting green fruit but the Queensland fruit fly only stings ripening or yellow fruit.

**Solution.** Chemical control should not be required since fruit is harvested at the hard green stage before either of the fruit flies can complete their life cycles. Do not leave over ripe fruit in the field. If mixed ripe fruit causes hot spots in the plantation, spot spray with a chemical from the *Problem solver handy guide*.

## Spots on fruit



### Flower thrips

Note raised 'pimples' on the skin.

**Cause.** Scarring from egg-laying by flower thrips, *Thrips hawaiiensis* on young fruit when still covered by the bracts.

**Solution.** Insecticide injection at bell emergence for control of scab moth also controls flower thrips.



### Spray burn

The spots or rings are usually on the lowest points of fingers where chemical runs if the bunch is oversprayed.

**Cause.** Spraying with excessive volumes of chemical or inappropriate chemical use.

**Solution.** Use only registered chemicals and apply according to the label directions.



### Sooty blotch

**Cause.** The fungus, *Chaetochyrena musarum* plus various fungi (moulds/mildews) growing on dead plant material during moist weather.

**Solution.** Lady Finger and Ducasse are more prone to sooty blotch than Cavendish-type bananas. A postharvest dip of sodium hypochlorite at 100 ppm for 5 minutes followed by immediate rinsing is highly effective in removing sooty blotch.



### Sooty mould

**Cause.** Sooty mould fungi that develop on the honeydew secretions of the banana aphid, *Pentalonia nigronervosa*.

**Solution.** Natural control by parasites and predators provides adequate suppression. Infestations are more obvious during cooler weather in autumn and spring. Spot treatment with a suitable pesticide from the *Problem solver handy guide* is occasionally required as the mould can be difficult to remove from fruit.

## Rust or bronzing on fruit



### Rust thrips

Left: early damage appears as a water-soaked area on the skin between touching fingers. Right: later development showing typical reddish-brown rust.

**Cause.** Feeding by *Chaetanaphothrips signipennis* from bract fall to harvest causes a rusty brown skin discoloration. This symptom should not be mistaken for maturity bronzing, which is more prevalent on the outer exposed areas of the fingers.

**Solution.** Soil treatments for banana weevil borer will help control the soil thrips population. Treat bunches at the time of bunch covering using the recommended chemical from the *Problem solver handy guide*.



### Maturity bronzing

The bronze-red blemish on the curved fruit surface first appears at the 'three-quarter full' stage and becomes more intense and extensive as the bunch fills.

**Cause.** Oxidation of cell contents, possibly from a water and nutritional imbalance, causes the epidermal cells to discolour, lift and break.

**Control:** In the short term, bunches should be harvested early before symptoms become more severe. Avoid water and nutrient stresses in the plant.



### Spray burn

Symptoms are similar to maturity bronzing but are associated with chemical burn from injection for scab moth. Symptoms are commonly seen on lower hands and may cross to fruit ridges.

**Cause.** Incorrect chemical application rates, problems with compatibility or environmental conditions.

**Solution.** Check that you are using registered chemicals and are applying them at the correct rates. Make sure that your spray application equipment is cleaned regularly.



### Silvery thrips

Note irregular silvery patches speckled with black spots. In severe cases the skin splits, causing longitudinal cracks.

**Cause.** Feeding by *Hercinothrips bicinctus*.

**Solution.** This is a minor and rare pest of north Queensland bananas. No specific treatments are required.

## Rust or bronzing on fruit



### Mites

Upper: banana (strawberry) spider mite causes red to purple-black surface discolouration to cushion end. Lower: two-spotted mite damage; webbing is usually present.

**Cause.** Banana (strawberry) spider mite, *Tetranychus lambi*, feeding on the fingers. More severe infestation will result in the damage spreading over the entire fingers.

Two-spotted mites, *Tetranychus urticae*, feed primarily on the tips of fingers, causing silver-grey superficial damage. Webbing forms 'bridges' between heavily infested fingers.

**Solution.** Severe mite outbreaks are usually the result of poor insecticide management, especially foliar application of disruptive pesticides that destroy beneficial species such as the *Stethorus* spp. beetle. Treatments with a suitable miticide may be required during periods of hot, dry weather when mite build-up can be rapid. Refer to the *Problem solver handy guide*.

## Punctures or splits on fruit



### Birds or bats

**Cause.** Birds and bats landing on the bunch to feed on the nectar from immature flowers.

**Solution.** Cover bunches promptly and use thick covers. For Lady Finger apply covers before any bracts lift on the bunch.



### Bell injection

**Cause.** Incorrect bell injection technique.

**Solution.** Train staff to inject slightly above one-third from the top of the bell. Refer to *Growing the crop* for instructions on bell injection techniques.



### Diamond spot

Symptoms show as slightly raised yellow spots on small fruit or longitudinal cracks on growing fruit. The exposed tissue collapses and turns black.

**Cause.** The fungus *Cercospora hayi*. Spores are produced on dead banana material.

**Solution.** Diamond spot is a minor disease especially where control of leaf spot is effective.



## Fruit rotting in field



### Sunburn

**Cause.** Insufficient bunch shading during prolonged high temperatures.

**Solution.** There is no cure for affected fruit. Maintain good canopy cover and ensure bunch covers are applied properly. It may be necessary to pull a leaf down over the bunch for protection.



### Cigar end

Affected areas are dark and in later stages are covered by ashy grey spores.

**Cause.** The fungus *Verticillium theobromae*. It enters the fruit from the dead floral parts and extends 10 to 20 mm into the fruit.

**Solution.** Cigar end is a minor disease and specific control measures are not warranted.



### Mixed ripe

Bunch ripens prematurely in the field, making the bunch unmarketable.

**Cause.** Various stresses (severe leaf spot, pest damage, water and nutrition) reduce the rate of fruit filling.

**Solution.** Improve crop management to limit stresses on the plant.

## Fruit rotting after harvest



### Anthracnose

**Cause.** The fungus *Colletotrichum musae*. Spores are produced on dead banana material and are spread to young fruit in water droplets. The fungus remains dormant in the tissue until the onset of ripening.

**Solution.** Handle harvested banana fruit with care to avoid damage. When the problem occurs, apply a postharvest treatment. Refer to *Problem solver handy guide*.

## Fruit rotting after harvest



### Crown rot

**Cause.** The fungus *Colletotrichum musae*.

**Solution.** Handle harvested banana fruit with care to avoid damage. When the problem occurs apply a postharvest treatment. Refer to the *Problem solver handy guide*.

## Plants kink, bend or fall over



### Burrowing nematode (plants fall over)

**Cause.** Burrowing nematode feeding on roots weakens the plant's root system.

**Solution.** Check roots over the whole field to determine if nematodes are the problem and if a nematicide treatment is necessary. Refer to *Key issues*. Propping or tying string between plants may prevent some losses.



### Banana weevil borer (plants fall over)

**Cause.** Tunnelling by larvae of *Cosmopolites sordidus* in the corm. Severe infestation reduces plant vigour.

**Solution.** Use stem baits (traps) to establish the severity of the infestation. If numbers exceed an average of four weevils per trap, treat with the required insecticide from the *Problem solver handy guide*. Follow label directions regarding application method and timing to maximise the effectiveness of the treatment.



### Poor tying (plants bend or kink)

Note the trees in the background have been tied or propped.

**Cause.** Incorrect bunch and tree support.

**Solution.** Ensure tying or propping is done correctly, as outlined in *Growing the crop*.

## Plants kink, bend or fall over



### Heat stress/lack of water (plants bend or kink)

**Cause.** Extreme heat and or dry conditions.

**Solution.** Use water scheduling techniques to supply sufficient water to meet the plants' requirements. Refer to *Key issues*.

## Plants turn yellow and die



### Erwinia corm rot

**Cause.** The bacteria *Erwinia* spp. that are common soil inhabitants. Plants that are stressed during the dry season can succumb to invasion during the wet season.

**Solution.** No chemical treatments are available. Ensure adequate moisture levels are maintained during the dry season and provide good drainage during prolonged wet seasons.



### Water-logging

Water-logging after planting can also cause small and stunted plants.

**Cause.** Not enough oxygen for the roots caused by too much water in the soil from rainfall or irrigation.

**Solution.** Avoid planting in areas that are often water-logged and in heavy soils. Install and maintain the drainage system for your plantation. Seek advice on improving drainage from Department of Natural Resources' land conservation officers.

## Plants turn yellow and die



### Panama disease (*Fusarium wilt*)

Left: early stage showing the yellowing of leaves. Right: late stage after the leaves have dropped.

**Cause.** The fungus *Fusarium oxysporum* f. sp. *cubense* which is a soil-borne organism. It is spread in water, soil and planting material. The fungus enters the plant through the roots and blocks the conducting tissue, resulting in wilting, yellowing of leaves and death of plant.

**Solution.** There is no cure for affected plants. Plant only approved planting material and do not plant in previously infested areas. Panama is a notifiable disease and outbreaks must be reported to DPI plant health inspectors. Refer to *Key issues*.



### Herbicide damage (glyphosate)

**Cause.** Glyphosate spray drift onto green parts of the plant. The first symptom is yellowing of leaves.

**Solution.** No cure for damaged plants. Be extremely careful when using glyphosate.

## Small and stunted plants



### Tissue-cultured off-type

**Cause.** A genetic abnormality found in tissue-cultured plants.

**Solution.** Remove affected plants and set additional following suckers on nearby plants.

## Small and stunted plants



### Burrowing nematode

There are several causes of small and stunted plants but two important ones are burrowing nematode and banana weevil borer.

**Cause.** Severe root damage caused by burrowing nematode affects the plant's ability to take up water and nutrients from the soil.

**Solution.** Check a random sample of roots over the whole field to determine if nematodes are the problem and if a nematicide treatment is necessary. Refer to *Key issues*.



### Banana weevil borer

**Cause.** Tunnelling by larvae of *Cosmopolites sordidus* in the corm. Severe infestation reduces plant vigour.

**Solution.** Use stem baits (traps) to establish the severity of the infestation. If numbers exceed an average of 4 weevils per trap, treat with the required insecticide from the *Problem solver handy guide*. Follow label directions regarding application method and timing to maximise the effectiveness of the treatment.



### Bunchy top

**Cause.** The banana bunchy top virus (BBTV) which is spread in infected planting material and by the banana aphid, *Pentalonia nigronervosa*. BBTV is not present in tropical Australia, and movement of planting material is controlled by legislation.

**Solution.** There is no cure for this disease and all infected plants must be eradicated. Outbreaks must be reported immediately to DPI plant health inspectors. Refer to *Key issues*.



### Not enough water/dry conditions

**Cause.** Insufficient water for plant growth.

**Solution.** Use water scheduling techniques to supply sufficient water to meet the plant's requirements (refer to *Key issues*).

## Stem shatters



### Panama disease (*Fusarium wilt*)

**Cause.** The fungus *Fusarium oxysporum* f. sp. *cubense* which is a soil-borne organism. It is spread in water, soil and planting material.

**Solution.** There is no cure for affected plants. Plant only approved planting material and do not plant in previously infested areas. Panama is a notifiable disease and outbreaks must be reported to DPI plant health inspectors. Refer to *Growing the crop*.



### 2,4-D damage

Photo shows extreme symptoms.

**Cause.** Injection of 2,4-D will kill the plant. Overspray or drift from herbicide application may cause lesser symptoms.

**Solution.** Be extremely careful with chemical applications.



### Tissue-cultured off-type

**Cause.** A genetic abnormality that occurs in tissue-cultured plants.

**Solution.** Cull affected plants and set additional following suckers on nearby plants.



### Banana streak virus

**Cause.** The banana streak virus (BSV). Symptom expression is sporadic. Symptoms of cucumber mosaic are similar.

**Solution.** Do not propagate from infected plants. Eradicate infected plants as they are identified. Confirm diagnosis by looking for yellow black streaks or flashes on leaves or by laboratory tests.

## Stem shatters



### Frost

**Cause.** Frost during the growing season.

**Solution.** No cure for damaged plants. Slightly damaged plants may grow out of it.

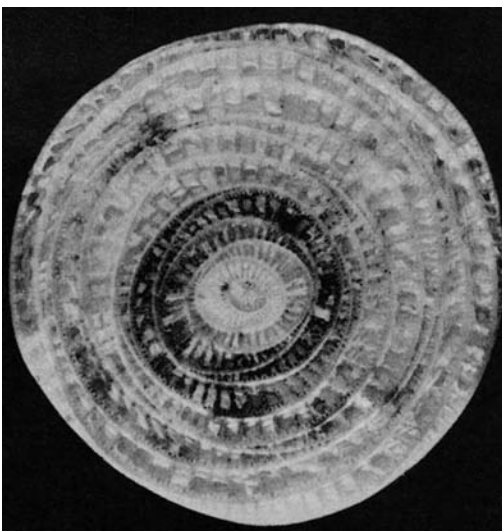
## Internal stem discolouration



### Panama disease (Fusarium wilt)

**Cause.** The fungus *Fusarium oxysporum* f. sp. *cubense*. This soil-borne organism is spread in water, soil and planting material.

**Solution.** There is no cure for affected plants. Plant only approved planting material and do not plant in previously infested areas. Panama is a notifiable disease and outbreaks must be reported to DPI plant health inspectors. Refer to *Growing the crop*.



### Moko disease

### Quarantine Alert

**Cause.** The bacteria *Pseudomonas* spp. Moko is a soil-borne disease and is spread with soil, in water, on implements, in planting material and by insects from flower to flower. The infection enters the plant through the roots and spreads through the host, blocking conducting tissue and resulting in plant yellowing, wilting and death.

**Solution.** There is no chemical control for Moko. All plants plus an adequate buffer zone around the diseased plants must be destroyed. The area must be quarantined and only non-host plants grown. Report suspected outbreaks immediately to DPI plant health inspectors. Refer to *Key issues*.

## Green leaves dropping



There are three common causes of this problem. Photo shows initial symptoms.

### Panama disease

**Cause.** The fungus *Fusarium oxysporum* f. sp. *cubense*. The organism is soil-borne and spread in water, soil and planting material.

**Solution.** To confirm this disease, cut the plant and check for internal colour (see photo page 27). There is no cure for affected plants. Plant only approved planting material and do not plant in previously infested areas. Panama is a notifiable disease and outbreaks must be reported to DPI plant health inspectors. Refer to *Growing the crop*.

### Erwinia corm rot

**Cause.** The bacteria *Erwinia* spp. that are common soil inhabitants. Plants that are stressed during the dry season can succumb to invasion during the wet season.

**Solution.** No chemical treatments are available. Ensure adequate moisture levels are maintained during the dry season and provide good drainage during prolonged wet seasons. See page 31 for confirmation.

### Water stress

**Cause.** Mild water stress during periods of high evaporation.

**Solution.** Apply more water during these periods. Refer to *Key issues*.

## Leaves bunching at top of plant



### Choking of leaves

**Cause.** Choking can be due to a genetic abnormality related to a particular variety or off-type, or from stresses (water-logging, cold, water or nutrient shortage, 2,4-D, banana streak virus and bunchy top). These causes limit the normal elongation of the true stem so that the leaves appear 'bunched up'.

**Solution.** Choose varieties less prone to choking and cull tissue-cultured off-types showing these symptoms. Check for diagnostic virus indicators. Improve management to limit stresses on plant.



## Damaged roots or no root hairs



### Fertiliser burn, drought or water-logging, poor drainage, air burn, soil compaction

Note burnt root tips.

**Cause.** There are several causes of root tip burn. They include fertiliser burn from too much fertiliser or poor placement; aluminium or manganese toxicity caused by low soil pH; and soil drying out or staying too wet for too long. As well as these causes, air burn or soil compaction can cause root hairs to be lost.

**Solution.** Determine the cause with soil and tissue analyses. Broadcast fertiliser evenly and at recommended rates. Watering heavily to leach salts out of the root zone can alleviate problems of excess fertiliser. Maintain soil pH between 5 and 6 and avoid planting in areas with poorly drained soils.



### Greyback cane beetle

Note chewed roots.

**Cause.** Chewing by larvae (cane grubs) of *Dermolepida albohirtum*.

**Solution.** Correct timing of insecticide application is crucial. The chemical must be applied when larvae are close to the surface between November and January. Refer to the *Problem solver handy guide*.



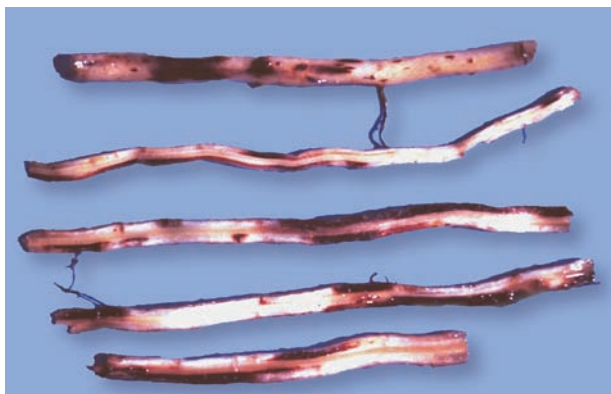
### Root-knot nematode

Note lumps (galls) within roots and missing root hairs.

**Cause.** *Meloidogyne* spp. Root-knot nematode invades the root when young. When mature the females form special feeding cells that appear as galls within the roots.

**Solution.** Root-knot nematode is not usually an economic problem to banana production in the tropics. Most mature banana plants with adequate irrigation and fertilising can compensate for any damage. Root-knot nematode may become a problem in very young plants, or on very sandy soils.

## Roots discoloured internally



### Burrowing nematode, other nematodes

**Cause.** Burrowing nematode *Radopholus similis* feeding on the cells in the root cortex. Many species of nematodes in the soil also parasitise the roots of bananas.

**Solution.** Nematodes other than burrowing nematode are not usually a problem in the tropics. Check a random sample of roots over the whole field to determine the extent of the problem and if a nematicide treatment is necessary. Refer to *Key issues*.

## Roots on soil surface



### Water-logging

**Cause.** Soil erosion or too much water in the soil from rainfall or irrigation.

**Solution.** Avoid planting in wet areas and heavy soils. Install and maintain a drainage system for your plantation. Seek advice on improving drainage from Department of Natural Resources' land conservation officers.

## Tunnelling in corm



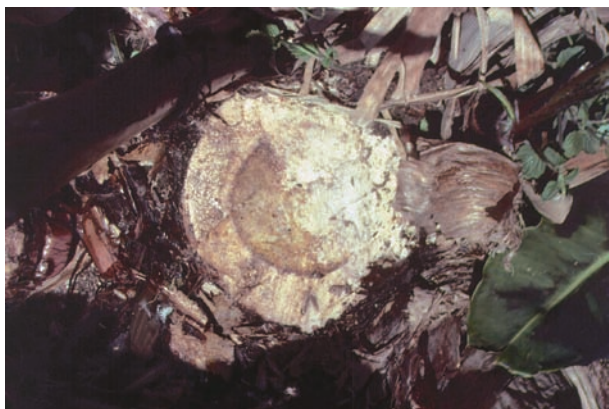
### Banana weevil borer

Severe infestation reduces plant vigour and the tunnelling allows the entry of rot organisms, which result in faster corm breakdown.

**Cause.** Tunnelling by larvae of *Cosmopolites sordidus*.

**Solution.** Use stem baits to establish the severity of the infestation. If necessary treat with an appropriate chemical from the *Problem solver handy guide*. Follow label directions regarding application method and timing to maximise the effectiveness of the treatment.

## Corm smelly, rotting or discoloured



### Panama disease (*Fusarium* wilt) (discoloured)

**Cause.** The fungus *Fusarium oxysporum* f. sp. *cubense*. This soil-borne organism is spread in water, soil and planting material.

**Solution.** There is no cure for affected plants. Plant only approved planting material and do not plant in previously infested areas. Panama is a notifiable disease and outbreaks must be reported to DPI plant health inspectors.

Refer to *Growing the crop*.

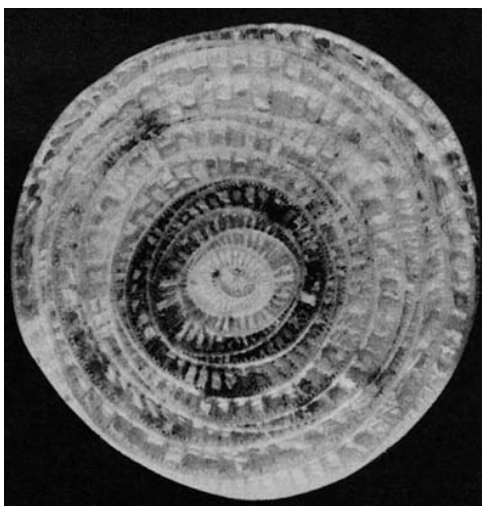


### Erwinia corm rot (smelly, rotting, discoloured)

The rotting corm has a strong odour.

**Cause.** The bacteria *Erwinia* spp. that are common soil inhabitants. Plants that are stressed during the dry season can succumb to invasion during the wet season.

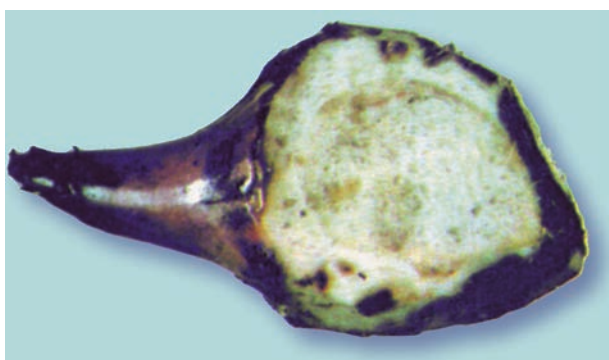
**Solution.** No chemical treatments are available. Ensure adequate moisture levels are maintained during the dry season and provide good drainage during prolonged wet seasons.



### Moko disease (discoloured) **Quarantine Alert**

**Cause.** The bacteria *Pseudomonas* spp. Moko is a soil-borne disease and is spread with soil, in water, on implements, in planting material and by insects from flower to flower. The infection enters the plant through the roots and spreads through the host, blocking conducting tissue and resulting in plant yellowing, wilting and death.

**Solution.** There is no chemical control for Moko. All infected plants plus an adequate buffer zone around the diseased plants must be destroyed. The area must be quarantined and only non-host plants grown. Report suspected outbreaks immediately to DPI plant health inspectors. Refer to *Key issues*.



### Burrowing nematode (discoloured)

Note discoloured edge of corm.

**Cause.** Burrowing nematode feeding in the banana corm. Planting nematode-infected corm pieces is the most common method of spread to new areas.

**Solution.** Do not use banana corms with visible signs of nematode damage as planting material. Treat corms as described in *Key issues*.

## Stages of leaf spot disease



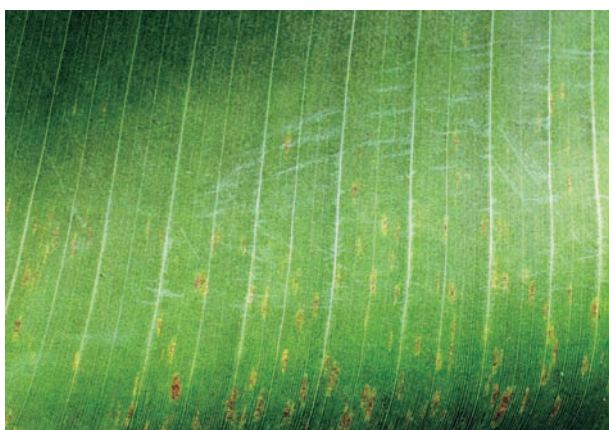
### Stage 1 (speck/dot)

Yellowish green specks less than 1 mm long.



### Stage 2a (early streak)

Specks become 3 to 4 mm x 1 mm long streaks, increase in length and turn yellowish.



### Stage 2b (late streak)

Streaks darken to a rusty brown.



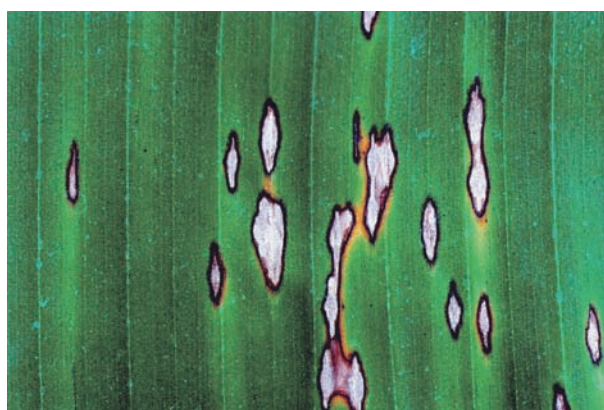
### Stage 3 (early spot)

Streaks broaden to a spot. They become longer and wider, with indefinite margins, which may be water-soaked in appearance and darken to brown.



### Stage 4 (brown spot)

Spots have definite dark brown edges, the centre becomes sunken and is sometimes surrounded with a yellow halo. Conidia are produced on the surface.



### Stage 5 (mature spot)

The sunken centre of spots turns grey and is surrounded by a dark brown to black border, sometimes with a yellow halo. Ascospores are produced within the grey central area of the mature spots.