

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

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 We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research: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
- Financial information—costs and returns listed in this publication are out of date.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 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



Problem SOLVER

Every crop will inevitably have a problem or two. The key to dealing with problems is prompt identification, and where appropriate, prompt treatment. This section helps you with both of these decisions. The common problems are shown in a series of pictures, grouped according to the main symptom. From the contents, find the symptom that best fits your problem. On that page you will find the causes and the solution, if there is one.

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Abnormal bunches



Stress before bunch emergence (distorted bunches)

Cause. Bunches initiated during extremely hot weather show twisting of the tail of the bunch, which is caused well before the bunch has emerged. Flooding can also lead to abnormal bunch development.

Solution. If possible, avoid production in flood-prone areas.



2,4-D damage (distorted bunches)

Cause. Spray drift onto the plant from nearby herbicide application.

Solution. Plants may grow out of the problem if they are growing vigorously. Severely affected plants will die, but the following suckers may grow out of the problem. Always be extremely careful with chemical applications.



Tissue-cultured off-type (bracts retained)

Note that the dark flower bracts have not fallen off. If left in the bunch they can rot, creating problems with fruit quality.

Cause. Bract retention is a genetic trait and is usually associated with dwarfness. It is most commonly noticed in dwarf off-types in tissue-cultured plantings.

Solution. Remove bracts by hand at bagging. Cull dwarf off-types and set additional following suckers on nearby plants.



Choke throat (poor bunch emergence)

The distorted and misshapen fruit produced is unmarketable and the bunch is prone to sunburn.

Cause. Stresses (water-logging, cold, water or nutrient shortage, 2,4-D damage, banana streak virus and bunchy top) that limit the normal elongation of the true stem and extrusion of the emerging bunch. Some varieties and tissue-cultured off-types are more sensitive.

Solution. Choose varieties less prone to choke throat and cull tissue-cultured off-types showing these symptoms. Improve management to limit stresses suffered by plant. Always be extremely careful with chemical applications.

Abnormal bunches



Wind damage (poor bunch emergence)

Cause. Cyclonic strength winds damaging the pseudostem before the bunch emerges.

Solution. No control is possible. Windbreaks may reduce the severity of wind damage slightly.



Bunchy top (poor or no emergence)

The bunch hasn't emerged because of choking of the leaves. For close-up of leaf symptoms, see page 7.

Cause. The banana bunchy top virus (BBTV) which is spread on 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.

Colours on leaves



Sooty mould (blackened leaves)

Cause. A fungus growing on the honeydew secretions produced by insects such as aphids, scales and bugs.

Solution. Natural control by parasites and predators usually provides adequate control of these pests. Chemical sprays specifically to reduce insects which promote honeydew and sooty mould are seldom required.



Juvenile plants (red-purple blotches on leaves)

Cause. The juvenile stage of young Cavendish bananas and some other varieties usually has red-purple blotches on the leaves. This is normal.

Solution. No control is needed and plants grow out of this symptom.

Colours on leaves



Mite damage (bronzed leaves)

Cause. Feeding of the banana spider mite, *Tetranychus lambi*, or the two-spotted mite, *Tetranychus urticae*, on the underside of leaves.

Solution. Treatment is usually not necessary because predatory beetles *Stethorus* spp. maintain adequate natural control. If these beetles are not present, and monitoring results show the level of damage is severe, treat with an appropriate miticide from the *Problem solver handy guide*. Ensure adequate coverage to the underside of the leaves. Refer to *Key issues*.

Spots on leaves



Leaf spot (yellow Sigatoka)

Upper: early stage. Lower: later stage.

Cause. The fungus *Mycosphaerella musicola*. In the early stages of development, leaf spot appears as a light yellow streak 1 to 2 mm long which darkens to a rusty brown. Streaks enlarge in time to become spots.

Solution. Ensure the leaf spot control program is carried out effectively. The program involves cultural (deleafing, drainage) and chemical (fungicides, oils, application timing, coverage) practices. Refer to *Key issues* and the *Problem solver handy guide*.



Black Sigatoka

Quarantine Alert

Upper: early stage. Lower: later stage.

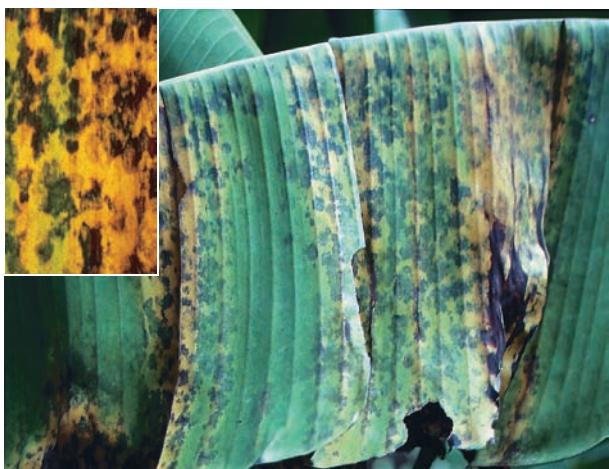
Cause. The fungus *Mycosphaerella fijiensis*. In the early stages of development, black Sigatoka appears as rusty red streaks 1 to 2 mm long, which can increase to 5 to 15 mm and darken from brown to black.

Solution. If you suspect black Sigatoka you must notify a DPI banana inspector immediately. Black Sigatoka poses a serious quarantine threat to the banana industry. It is a notifiable disease and you must report all suspicious outbreaks to DPI plant health inspectors. Refer to *Key issues*.

Quarantine. Importation of all banana material (fruit, leaves, planting material) is prohibited without approval. A biological barrier free of all susceptible bananas has been established between the Torres Strait/Papua New Guinea, where the disease exists, and the north Queensland banana production areas.



Spots on leaves



Leaf speckle

Speckle symptoms are mainly seen on the underside of the leaves. Inset: close-up.

Cause. Several fungi, including *Mycosphaerella musae* (common speckle), *Veronaea musae* (light northern speckle) and *Perconiella musae* (dark northern speckle), can cause speckle symptoms. These fungi are spread by wind in moist weather and are more tolerant of cool conditions than the leaf spot fungus.

Solution. The leaf spot control program normally provides control of speckle. If better control is needed, apply the fungicide under the canopy.



Cordana leaf spot

Commonly seen surrounding leaf spot lesions or along the leaf margin.

Cause. The fungus *Cordana musae*. Large numbers of spores produced on the underside of lesions are spread during wet windy weather. The fungus mainly enters the leaf through injuries. It is common on plants weakened as a result of water-logging or drought.

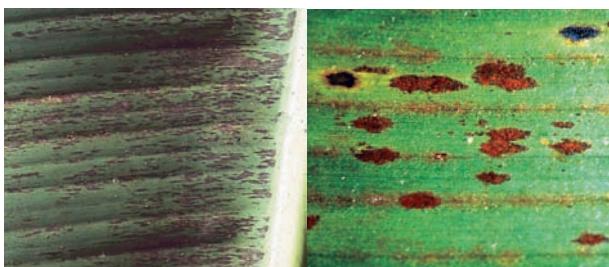
Solution. The leaf spot control program provides adequate control of cordana leaf spot.



Southern cordana leaf spot

Cause. The fungus *Cordana johnstonii*. This is a new disease in the tropics and present distribution is limited. Frequently seen on unsprayed Ducasse plants.

Solution. The leaf spot control program should control this disease.



Banana rust

Right: close-up of the lesions.

Cause. The fungus *Uredo musae*. A relatively new disease with limited distribution, it is frequently seen near tree lines and buildings which reduce spray coverage.

Solution. The leaf spot control program provides adequate control of rust.

Spots on leaves



Herbicide drift

Cause. Spray drift of contact herbicides such as paraquat onto the plant.

Solution. Avoid spray drift onto leaves. Affected plants should grow out of the symptoms.



Mite damage

Cause. Feeding by the banana spider mite, *Tetranychus lambi*, or the two-spotted mite, *Tetranychus urticae*, causes tissue to die, resulting in bronzed areas under leaves.

Solution. Treatment is usually not necessary because predatory beetles *Stethorus* spp. maintain adequate natural control. If these beetles are not present and monitoring results show the level of damage is severe, treat with an appropriate miticide from the *Problem solver handy guide*. Ensure adequate coverage to the underside of the leaves. Refer to *Key issues*.



Transparent scale

Cause. The scale insect *Aspidiotus destructor* sucking nutrients from the leaf cells.

Solution. Natural predation by beetles, parasitism by wasps and oil sprays used for leaf spot help to suppress scale. For small outbreaks, cut off affected leaves. Avoid the use of foliar sprays that will interfere with natural control agents. Specific insecticide treatments are not recommended or required.



Spiralling whitefly

Quarantine Alert

Inset: close-up of the white trail and the whitefly.

Cause. The insect spiralling whitefly (*Aleurodicus dispersus*). The white adults and nymphs occur on the underside of the leaf. The name comes from the white trail in which the eggs are laid. Its sap-sucking reduces vigour, and the production of honeydew supports the growth of sooty mould which can cover fruit and leaves.

Current quarantine action. Report all suspicious outbreaks to DPI plant health inspectors. Refer to *Key issues*.

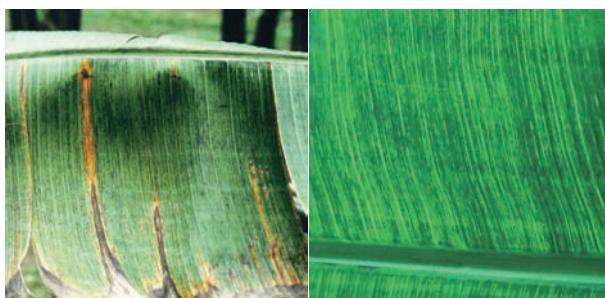
Streaks on leaves



Variegation

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

Solution. Destroy affected plants and set additional following suckers on neighbouring plants.



Banana streak virus

Cause. The banana streak virus (BSV). The pale streaks or flecks on the leaves become darker with age. Symptoms of cucumber mosaic virus are similar.

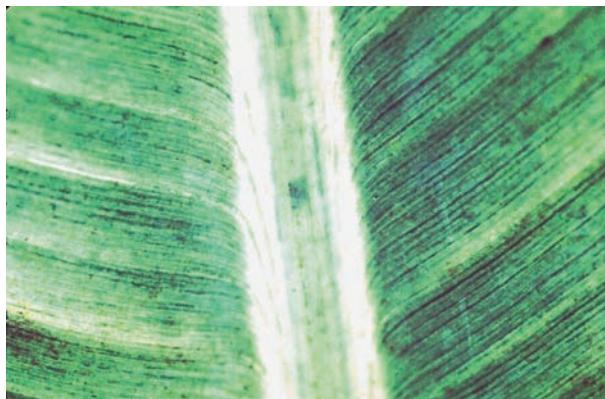
Solution. Eradicate infected plants and set additional following suckers on neighbouring plants. Do not take planting material from infected plants.



Zinc deficiency

Cause. Insufficient zinc available to the plant.

Solution. First confirm the diagnosis with a leaf analysis test. Apply zinc fertiliser at the rate recommended on your analysis result.



Bunchy top

Note dark green flecks develop along the veins of the leaves, producing a 'dot-dash' pattern which 'hooks' into the midrib from the leaf blade. See page 3 for a whole plant photo of the problem.

Cause. The banana bunchy top virus (BBTV) which is spread in infected planting material and by the banana aphid, *Pentalonia nigromaculosa*. 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*.



Cucumber mosaic virus

Cause. Cucumber mosaic virus (CMV). This virus has a wide host range and can be spread to bananas by aphids.

Solution. Disease incidence is sporadic and generally low. Control measures are not warranted. Do not take planting material from infected plants.

Streaks on leaves



October to November streak

Cause. A physiological disorder of unknown cause which generally occurs during October and November.

Solution. There is no known cure. Plants will grow out of it.



Chlorotic patching

Cause. A physiological disorder that indicates the plant is suffering stress. It usually occurs in spring and can be related to water-logging.

Solution. Determine the exact cause of plant stress. Check for corm or root damage from banana weevil borer or nematodes.

Leaves with dead edges or patches



Manganese toxicity (dead edges)

Cause. Excess manganese in the plant due to the presence of manganese nodules in the soil profile and water-logging.

Solution. Confirm the diagnosis with a leaf analysis. Improve soil drainage and soil structure. Avoid planting bananas in poorly drained soils.



Salt toxicity (dead edges)

Cause. A build-up of salt in the plant from high soil or water salinity.

Solution. Confirm the diagnosis with tissue or water analysis. Water heavily to leach salt out of the root zone. Seek alternative sources of water. Avoid excessive applications of fertilisers containing chloride.



Mites (dead edges)

Cause. Feeding of the banana spider mite *Tetranychus lambi*, or the two-spotted mite, *Tetranychus urticae* on the underside of leaves. Severe outbreaks are usually the result of poor insecticide management which has destroyed beneficial insects.

Solution. Treat with an appropriate miticide from the *Problem solver handy guide*. Ensure adequate coverage to the underside of the leaves. Refer to *Key issues*.

Leaves with dead edges or patches



Water stress (dead patches)

Cause. Severe water stress during hot, dry periods.

Solution. Apply more water during periods of high demand. Water scheduling devices help to plan irrigation. Refer to *Key issues*.



Herbicide damage

Cause. Spray drift of contact herbicides such as paraquat onto the plant.

Solution. Avoid spray drift onto leaves. Affected plants should grow out of the symptoms.

Curled or distorted leaves



Spike leaf

Cause. A temporary shortage of calcium caused by rapid growth. Most common in spring and early summer.

Solution. Avoid sudden bursts of growth by using regular, light fertiliser applications. A foliar application of calcium nitrate at 10 g/L in early spring will reduce the problem.



2,4-D damage

Left: damage to leaf. Note twists in leaf tip. Right: close-up of damage. Note the cracked and raised veins.

Cause. Spray drift of 2,4-D onto green parts of the plant.

Solution. Take efforts to avoid spray drift onto leaves. Plants should grow out of it.

Curled or distorted leaves



Tissue-cultured off-type

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

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



Banana streak virus

Cause. The banana streak virus (BSV). The streaks or flecks on leaves become progressively darker with age and the leaves may die. Symptom expression is sporadic. Symptoms of cucumber mosaic are similar.

Solution. Do not take planting material from infected plants. Eradicate infected plants where symptoms are observed.

Yellow leaves



Bunchy top

Cause. The banana bunchy top virus (BBTV) which is spread on infected planting material and by the banana aphid (*Pentalonia nigromaculosa*). 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.



Nitrogen deficiency

Yellowing appears first on the older leaves but all leaves quickly become affected.

Cause. Insufficient nitrogen available for the plant due to inadequate fertiliser applications or leaching and gaseous loss of the nitrogen fertiliser applied.

Solution. Appropriate application of nitrogen fertiliser. You need to know your soil type, climate, past fertiliser program, and soil and leaf analysis results when determining the fertiliser rate.

Yellow leaves

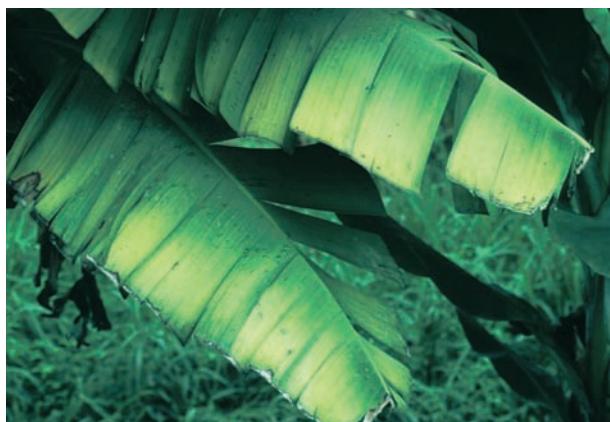


Potassium deficiency

Yellowing starts in the oldest leaves.

Cause. Reduced availability of potassium for plant uptake. Enhanced by leaching losses of potassium and/or inappropriate fertilisation.

Solution. Appropriate application of potassium fertiliser. Knowledge of your soil type, climate, past fertiliser program, and soil and leaf analyses need to be considered in determining fertiliser rate.



Magnesium deficiency

Leaf margins of the older leaves remain green and the area between the leaf margin and the midrib yellows.

Cause. Reduced availability of magnesium for plant uptake. Usually due to inappropriate fertilisation causing an imbalance.

Solution. Appropriate application of magnesium fertiliser. Knowledge of your soil type, climate, past fertiliser program, and soil and leaf analyses all need to be considered in determining fertiliser rate.



Water-logging

Cause. Poor soil aeration which reduces root function and leads to water and nutrient stress.

Solution. Depends on soil type and situation but usually involves surface and subsurface drainage works.



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. It enters the plant through the roots, and blocks the conducting tissue within the plant, resulting in wilting, yellowing of leaves and death of the plant.

Solution. There is no cure for affected plants. Use 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.

Yellow leaves



Erwinia corm rot

Cause. The bacteria *Erwinia* spp. which are widespread in most soils. Plants that are stressed from heat or lack of water during the dry season can succumb to bacterial invasion during the early part of the wet season.

Solution. There is no cure for infected plants. Avoid stress conditions. Ensure adequate moisture levels are maintained during the dry season.

Discoloured leaf petioles

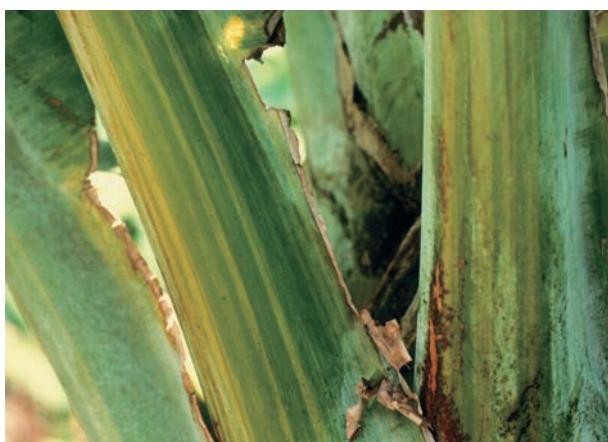


Banana streak virus

Note vein flecking in the leaf petiole caused by banana streak virus.

Cause. The banana streak virus (BSV).

Solution. Do not take planting material from infected plants. Eradicate infected plants where symptoms are observed.

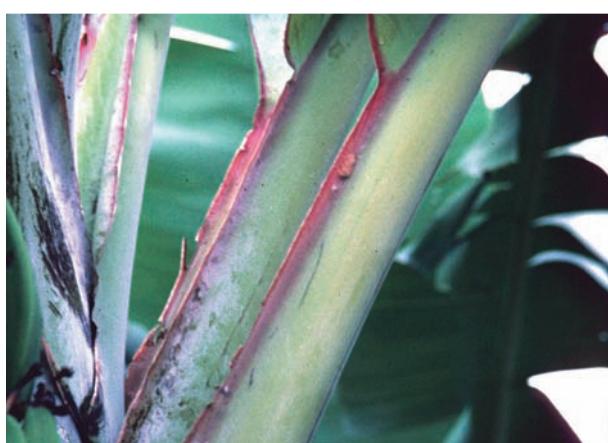


Bunchy top

Note vein flecking in the leaf petiole caused by banana bunchy top virus.

Cause. The banana bunchy top virus (BBTV) which is spread on 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*.



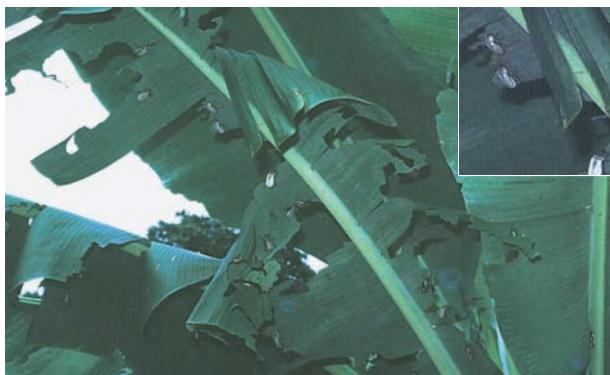
Nitrogen deficiency

Pink discolouration of the petioles first appears on the older leaves but all leaves quickly become affected.

Cause. Insufficient nitrogen available for the plant due to inadequate fertiliser applications or leaching and gaseous loss of the nitrogen fertiliser applied.

Solution. Appropriate application of nitrogen fertiliser. You need to know your soil type, climate, past fertiliser program, and soil and leaf analysis results when determining the fertiliser rate.

Tattered or holey leaves



Greyback cane beetle

Inset: close-up of the feeding beetles.

Cause. Feeding by adults of *Dermolepida albohirtum*. Damage is seldom severe, but extensive feeding on older leaves of bunched plants can lead to sunburnt fruit.

Solution. There are no recommended foliar chemical treatments as these will interfere with biological control and will result in serious mite infestation. This will be more damaging and costly than greyback cane beetle damage.



Swarming leaf beetles

Feeding on the young cigar leaf results in 'shot hole' type damage as the leaf unfurls. Inset: close-up of the feeding beetles.

Cause. Leaf feeding of large numbers of adult *Monolepta australis* or *Rhyparida* spp. beetles. They swarm in spring and summer.

Solution. Damage is sporadic and no specific treatment is required.



Cluster caterpillar

When feeding on the rolled-up cigar leaf, larger (older) cluster caterpillars can produce evenly spaced holes in the leaf blade when the leaf unfurls.

Cause. Young larvae of *Spodoptera litura* feeding in groups on either the top or bottom of leaves, leaving the opposite side intact. Large larvae are solitary.

Solution. Damage is sporadic and most often concentrated on the tender leaves of plant crops. Fruit damage is usually restricted to a few isolated bunches and seldom requires specific treatment. If required refer to the *Problem solver handy guide*.



Banana skipper

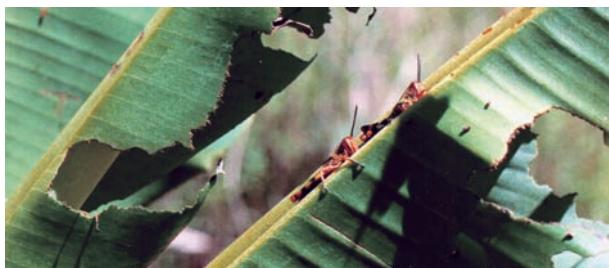
Inset: close-up of rolled leaf.

Quarantine Alert

Cause. Larvae of *Erionota thrax* feed on the leaf blade and strip and roll it to form a shelter in which the larva develops. In heavy infestations, the entire leaf lamina is destroyed, leaving only the midrib.

Current quarantine action: This leaf pest has not been found in Australia or Torres Strait Islands but is well established in Papua New Guinea. It is widely distributed throughout China, India, South East Asia, Mauritius and Hawaii. Report all suspicious outbreaks to DPI plant health inspectors. Refer to *Key issues*.

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.