Persimmon information kit

Reprint – information current in 2005

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 2005. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research: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- Financial information—costs and returns listed in this publication are out of date.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 2005. 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 persimmon production. 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.

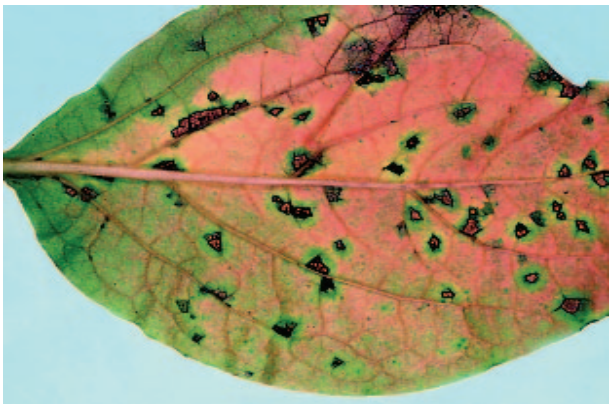
Queensland Government

Problem SOLVER

Every crop will have a problem or two. The key to dealing with problems is prompt identification, and where appropriate, prompt treatment. This section helps you with 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. There, you will find photos of the causes and the solutions.

Contents

Spots or marks on leaves

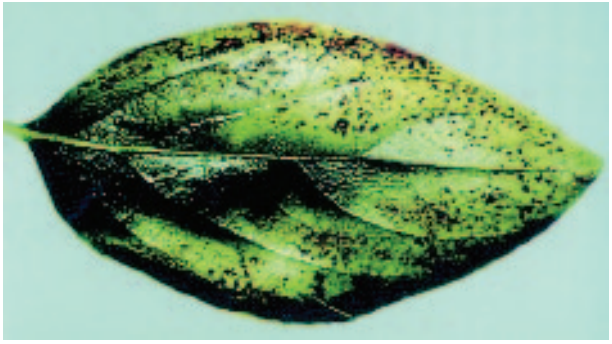


Cercospora leaf spot disease

Cause: The fungus *Pseudocercospora* sp.

Identification notes: Small, dark brown spots on both leaf surfaces. The spots are limited by the veins and so become angular in shape. Severely affected leaves fall readily. Upper: field symptom. Lower: close-up of affected leaves.

Treatment and prevention: Once significant leaf spot symptoms are evident, it is generally too late to apply treatments. However, spraying with an appropriate chemical from the *Problem Solver Handy Guide* will help prevent build-up of the fungus. In future seasons, apply four protective sprays two weeks apart, starting when half of the flowers are open. Use an appropriate chemical from the *Problem Solver Handy Guide*. Spraying the prunings and the leaf litter under the tree in winter helps to prevent carry-over of the disease from one season to the next.



Manganese toxicity

Cause: High uptake of manganese from the soil. Occurs in soils with high manganese levels when pH falls below 6.5 (1:5 water test).

Identification notes: Affected leaves have an irregular pale yellow margin with many small dark spots on the leaf surface.

Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Apply lime or dolomite to raise soil pH to 6.5 (1:5 water test). In future, do regular leaf and soil analyses to monitor nutrient levels. In high manganese soils, maintain soil pH at 6.5 or above (1:5 water test).

Spray burn

Cause: Damage from emulsifiable concentrate insecticides or mixtures applied under hot or slow drying conditions.

Identification notes: Spots have a glassy appearance and are scattered unevenly over the leaf surface.

Treatment and prevention: Check the labels of chemicals in use to make sure they are compatible and are being used at the correct rates. Spray during the morning when the spray dries more quickly. Avoid spraying on very hot days. Regularly calibrate the sprayer and check nozzles for wear and tear.

Yellow leaves

Nitrogen deficiency

Cause: Insufficient nitrogen available to the tree.
Identification notes: The older leaves are generally affected, becoming small, narrow, pale green and often with slight inward rolling.

Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Adjust the fertiliser program according to the leaf analysis results. In future, do regular leaf and soil analyses to monitor nutrient levels. Apply appropriate amounts of nitrogen fertiliser throughout the growing season.

Potassium deficiency

Cause: Insufficient potassium available to the tree. Generally caused by an imbalance of potassium, calcium and magnesium in the soil.

Identification notes: Yellowing begins at the margin of the leaf and spreads towards the veins. Brown spots develop within affected areas. Upper: field symptom. Lower: close-up of affected leaves.

Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Adjust the fertiliser program according to the leaf analysis results. In future, do regular leaf and soil analyses to monitor nutrient levels. Apply appropriate amounts of potassium fertiliser throughout the growing season.

Magnesium deficiency

Cause: Insufficient magnesium available to the tree.
Identification notes: Yellowing progresses inwards from the leaf margins and tips towards the main veins, leaving a band of dark green along the main veins. Most common in acid sandy soils.

Treatment and prevention: Get a leaf and soil analysis done to check soil pH and magnesium levels. Apply dolomite or magnesium oxide (choice depends on pH level). In future, do regular leaf and soil analyses to monitor soil pH and nutrient levels. Apply magnesium to the ground under the trees according to leaf and soil analysis results.

Yellow leaves

Zinc deficiency

Cause: Insufficient zinc available to the tree**.** Generally caused by high soil pH or high levels of soil phosphorus.

Identification notes: Affected leaves show uneven blotchy yellowing between the veins. With a mild deficiency, leaf size is only marginally reduced and leaf distortion is minimal. With a more severe deficiency, significant leaf distortion and reduction in size may accompany the yellowing.

Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Apply zinc to the ground under the tree. In severe cases, also spray chelated zinc onto the spring leaf flush. In future, do regular leaf and soil analyses to monitor nutrient levels. Apply zinc to the ground under the trees annually according to leaf and soil analysis results.

Manganese deficiency

Cause: Insufficient manganese available to the tree. Only a problem where too much liming material has been applied.

Identification notes: Affected leaves are slightly pale green, with most of the colour loss between the veins.

Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Treatment is generally not necessary as affected leaves normally grow out of the problem. In future, do regular leaf and soil analyses to monitor nutrient levels. Calculate liming rates carefully to avoid over-liming.

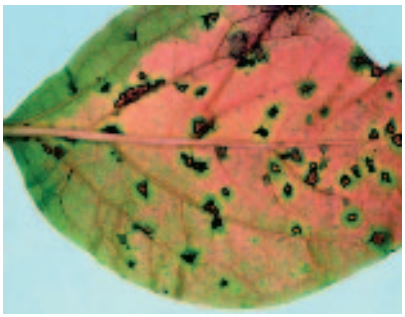
Red leaves

Premature defoliation

Cause: Inadequate applications of nitrogen fertiliser during the growing season, severe water stress after harvest, or very low temperatures. Note that persimmon is a deciduous tree and leaves normally go from green to yellow to red in late autumn. In Queensland, premature defoliation is only a problem if it occurs before fruit are harvested.

Identification notes: Causes an overall even reddening of leaves without the distinct spots of Cercospora leaf spot.

Treatment and prevention: There is no immediate treatment. In future, use leaf and soil analyses to ensure that fertiliser applications are adequate. Maintain adequate soil moisture levels after harvest to maintain healthy leaves.



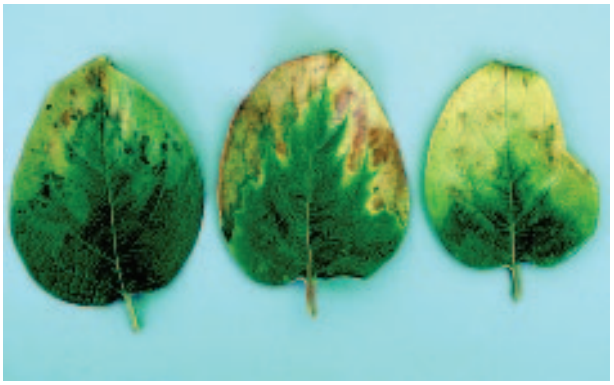
Cercospora leaf spot disease

Cause: The fungus *Pseudocercospora* sp.

Identification notes: Severe leaf spotting may cause pronounced reddening of leaves and premature leaf fall. See also symptoms of Cercospora leaf spot on page 2.

Treatment and prevention: Follow recommendations on page 2 of this section.

Brown margins on leaves



Severe magnesium deficiency

(Salt burn may cause similar symptoms).
Cause: Insufficient magnesium available to the tree. Salt burn is caused by irrigation with salty water or over-use of fertilisers.

Identification notes: With magnesium deficiency, the marginal burn starts at the leaf tip and extends in towards the veins. With salt burn, damage is generally confined to the margins of the leaf. Magnesium deficiency is most common in acid sandy soils.

Treatment and prevention: For magnesium deficiency, follow the recommendations on page 3 of this section. For salt burn, do not apply fertiliser until the problem has been investigated. Get analyses done on soil, plant tissue and irrigation water. Also check the rates of fertiliser being applied and re-adjust if excessive. Water heavily to leach the salt out of the root zone. If water analysis confirms salty water, use another water source. In future, get a water analysis done before the start of each season, and follow the recommended fertiliser program to avoid over-fertilising.

Distorted leaves

Calcium deficiency

Cause: Insufficient calcium available to the tree**.** Generally caused by a combination of low available soil calcium and dry soil conditions. Availability of calcium from the soil is often restricted by an imbalance of potassium, calcium and magnesium.

Identification notes: Upper: a mild deficiency produces a slight distortion of the young leaves. Tips of affected leaves may also blacken. Lower: a severe deficiency produces significant distortion of older leaves and a major reduction in the size of younger leaves.

Treatment and prevention: Get leaf and soil analyses done to confirm the diagnosis. Apply lime, dolomite or gypsum according to the analysis results. A foliar spray of calcium provides a short-term response. Spray to thoroughly wet the young leaves. In future, do regular leaf and soil analyses to monitor nutrient levels. Apply appropriate amounts of liming materials as required. Ensure adequate water is applied during the leaf development period.

Distorted leaves

Boron deficiency

Cause: Insufficient boron available to the tree.

Identification notes: Upper: field symptom showing the distortion of young leaves. Lower: close-up of affected leaf showing the rolling and twisting of the leaf blade. Brown corky tissue is sometimes present. Boron deficiency is difficult to distinguish from calcium deficiency.

Treatment and prevention: Get leaf and soil analyses done to confirm the diagnosis. Apply borax or Solubor to the ground under the trees at rates according to the analysis results. These must be applied very evenly otherwise toxicity may result. The best method is to mix the required amount in water and spray it on the ground under the trees. In future, do regular leaf and soil analyses to monitor nutrient levels. Apply appropriate amounts of boron as required. Ensure adequate water is applied during the leaf development period.

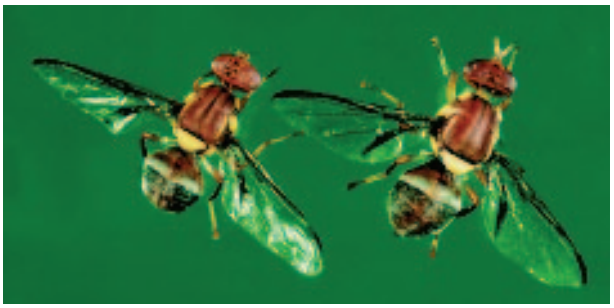
Herbicide damage

Cause: Uptake of glyphosate herbicide. Generally results from drift of herbicide onto low-hanging leaves.

Identification notes: The herbicide is translocated upwards to other leaves where it causes leaf distortion. Left: affected shoot. Lower: close-up of affected leaves.

Treatment and prevention: Apply herbicides very carefully, avoiding contact with the leaves. Prune tree skirts to remove low-hanging branches. Also use shielded, low-pressure fan or flood nozzles when applying herbicides.

Spots or marks on fruit

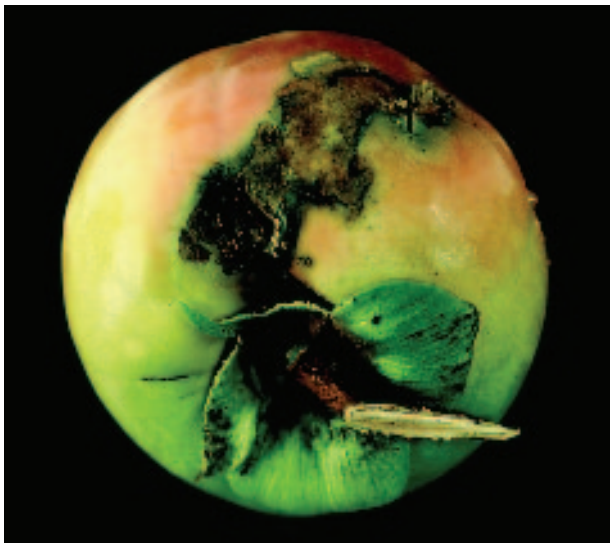


Fruit fly damage

Cause: The insect *Bactrocera tryoni.*

Identification notes: Upper: spots are irregular in shape, dark and sunken. In near-ripe fruit, fruit soften around the egg-laying sites. Larvae (maggots) of the fly may be found in the tissue of affected fruit. Lower: adult Queensland fruit flies (actual length about 20 mm). Izu is the variety most affected.

Treatment and prevention: Apply a bait spray using an appropriate bait spray chemical from the *Problem Solver Handy Guide* mixed with yeast autolysate. Follow label directions. An alternative treatment is an overall cover spray of an appropriate insecticide from the *Problem Solver Handy Guide.* Follow label directions. However, a cover spray is less preferred because of its effects on beneficial insects. In future, start bait spraying in November–December and continue at weekly intervals until harvest. Regularly monitor fruit fly levels using lure traps so that the efficiency of bait sprays can be monitored.



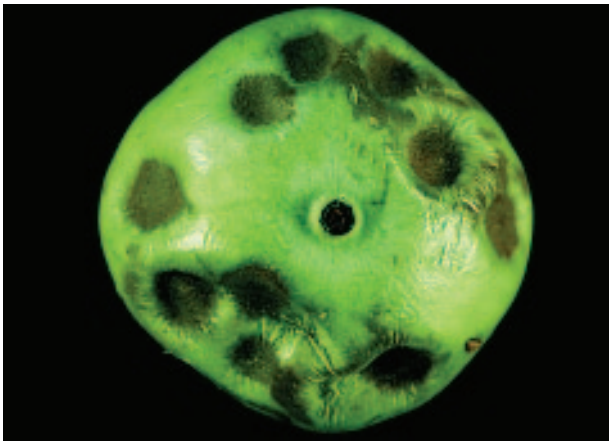
Yellow peach moth damage

Cause: The insect *Conogethes punctiferalis.*

Identification notes: Upper: typical appearance of infestation showing the large, irregularly shaped, dark areas that form over feeding areas. Note the webbed insect droppings around the entry hole into the fruit. Lower: adult moth (actual size about 25 mm wingspan).

Treatment and prevention: First make sure that the damage is serious enough to warrant treatment. At least 5% of sampled fruit needs to be infested to make it worth spraying. Where required, spray with an appropriate chemical from the *Problem Solver Handy Guide*. Follow label directions. In future, regularly monitor pest levels during the season so that appropriate treatments can be applied before the problem gets too severe. Regularly collect infested fruit from the orchard and around the packing shed and bury it.

Spots or marks on fruit

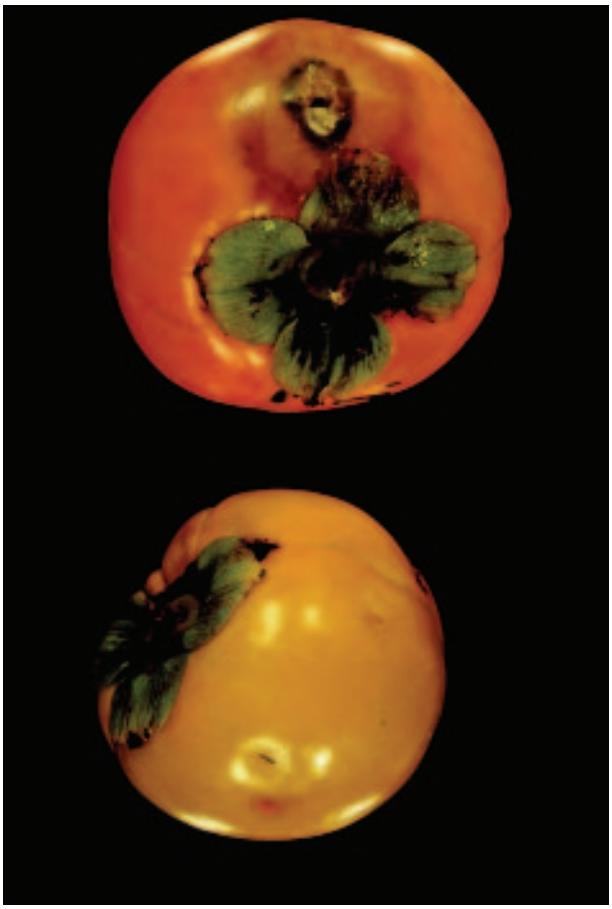


Fruitspotting bug damage

Cause: The insect *Amblypelta nitida.*

Identification notes: Upper: small, black, round spots on young fruit. Lower: an adult bug at left (actual size about 15 mm long), and a nymph at right.

Treatment and prevention: First make sure that the damage is serious enough to warrant treatment. At least 2% of sampled fruit need to have fresh bug damage to make it worth spraying. Remove damaged fruit at each monitoring to avoid confusing the results at the next monitoring. Where required, spray with an appropriate chemical from the *Problem Solver Handy Guide*. Follow label directions. In future, regularly monitor pest levels during the season so that appropriate treatments can be applied before the problem gets too severe. Fruit are at most risk from attack before they reach about golf-ball size.



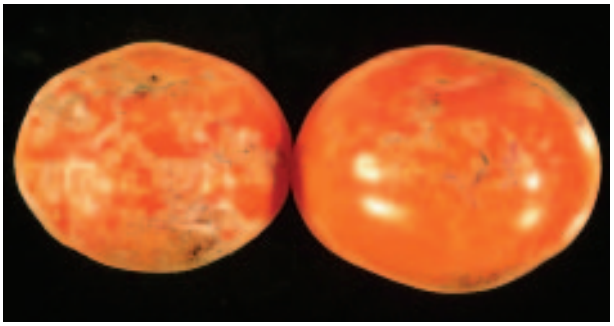
Fruitpiercing moth damage

Cause: The fruitpiercing moths (*Othreis fullonia, Othreis materna* and *Eudocima salaminia*).

Identification notes: Left: advanced damage at top showing rotting around the feeding site. Early damage at bottom showing collapse of underlying tissue around the feeding site. Note that there is often a noticeable hole at the feeding site. Below: close-up of adult moth (actual size about 100 mm wingspan).

Treatment and prevention: Harvest fruit promptly when mature. Netting is currently the only effective preventative measure.

Spots or marks on fruit

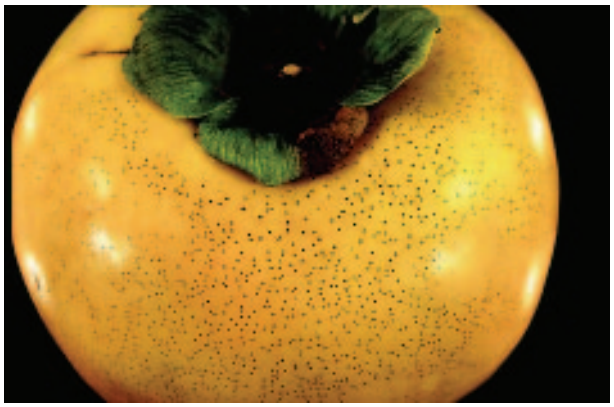


Greenhouse thrips damage

Cause: The insect *Heliothrips haemorrhoidalis*.

Identification notes: Damage consists of an uneven, silvery-grey scarring of the fruit surface.

Treatment and prevention: First make sure that the damage is serious enough to warrant treatment. At least 2% of sampled fruit need to be infested to make it worth spraying. Where required, spray with an appropriate chemical from the *Problem Solver Handy Guide*. Follow label directions. In future, regularly monitor pest levels during the season so that appropriate treatments can be applied before the problem gets too severe.



Pepper spot

Cause: Unknown, but thought to be associated with high humidity during fruit maturation.

Identification notes: Tiny, dark, peppery spots over the fruit surface.

Treatment and prevention: Not generally serious enough to warrant treatment or preventative measures.

Spray damage

Cause: Damage from emulsifiable concentrate insecticides or mixtures applied under hot or slow drying conditions.

Identification notes: Spots have a glassy appearance, are unevenly shaped and may be scattered unevenly over the fruit surface.

Treatment and prevention: Check the labels of chemicals in use to make sure they are compatible and are being used at the correct rates. Spray during the morning when the spray dries more quickly. Avoid spraying on very hot days. Regularly calibrate the sprayer and check nozzles for wear and tear.

Wire marking

Cause: Damage caused by fruit growing too close to trellis wires.

Identification notes: Damage varies widely, but generally consists of thin, depressed corky areas corresponding to the position of the wire.

Treatment and prevention: When thinning fruit, do not leave fruit close to trellis wires.

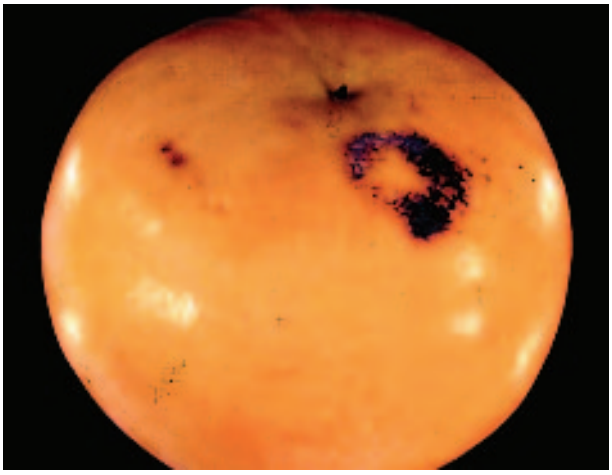
Spots or marks on fruit

Water or humidity marking

Cause: Exposure of the fruit to prolonged wet weather or high humidity conditions.

Identification notes: Symptoms may vary widely from small dark spots to larger smudges. Upper: symptom on young fruit. Lower: symptom on mature fruit.

Treatment and prevention: There are no available practical treatment or preventative measures for this problem.



Wind rub

Cause: Leaves or twigs rubbing against the surface of the fruit during wind. This causes rupturing of the skin cells.

Identification notes: Two types of damage are shown. Upper: rub damage from leaves. Note how the damage is a honey-brown colour. Lower: rub damage from a twig. Note the more distinct darker damage confined to one part of the fruit.

Treatment and prevention: Thin fruit to set as much fruit as possible clear of possible abrasive branches. Keep laterals clipped to the trellis wires to avoid excessive movement. Establish effective windbreaks.

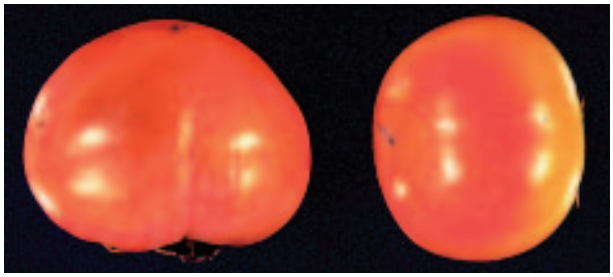
Spots or marks on fruit

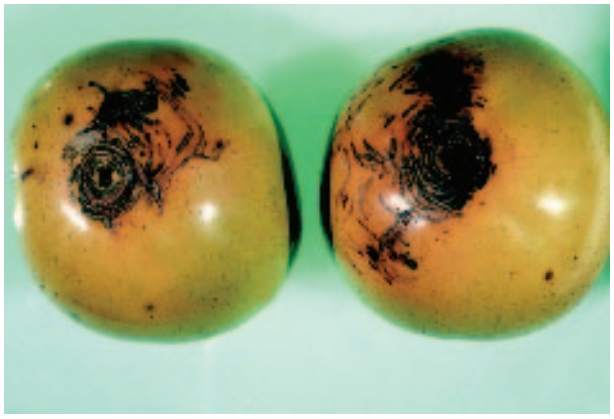
Sunburn

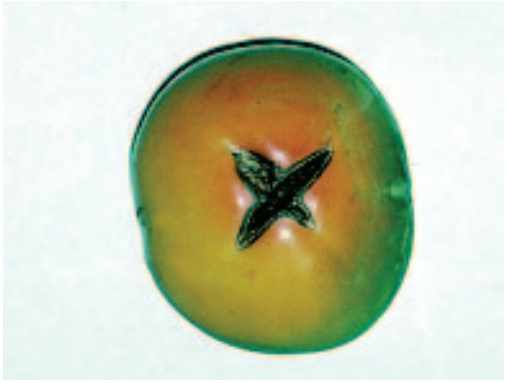
Cause: Exposure of fruit to the sun during hot weather. Sunburn is generally only a problem in unhealthy trees that have lost their leaf cover or in trees where pruning and thinning have been poorly managed.

Identification notes: Upper and lower left: symptoms on green fruit. Affected fruit have large, brown areas on exposed surfaces. Below: symptoms on ripe fruit. Affected fruit have large, brown blotchy areas, sometimes with bleaching of the skin colour.

Treatment and prevention: Keep trees in a healthy condition to maintain good leaf cover. This means paying attention to nutrition, irrigation, pruning, pest and disease control, mulching and weed control. Manage crop load through careful pruning and fruit thinning to prevent branches bending and exposing fruit to the sun. Take care with summer pruning to avoid excessive exposure of fruit to the sun. Overhead netting of orchards reduces the risk of sunburn.







Basal cracking

Cause: Rapid growth in fruit following earlier water stress at fruit set. Some varieties, such as Oku Gosho, are more susceptible.

Identification notes: Two distinct symptoms occur. Upper: concentric cracking symptom. Lower: star cracking symptom. The problem is worse on large fruit.

Treatment and prevention: Improve irrigation, particularly during fruit set and early fruit growth. Use soil moisture monitoring devices to improve the accuracy of watering. Plant only recommended varieties, such as Fuyu, Izu and Ichikikei Jiro, as these are less susceptible to damage.

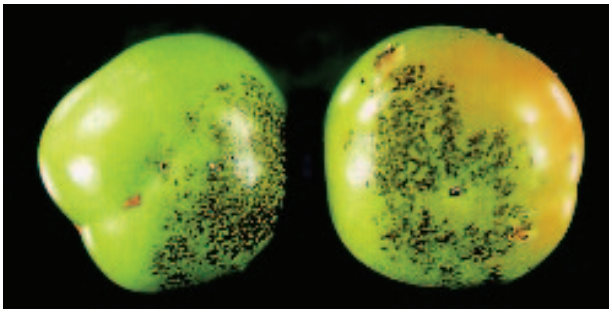
Spots or marks on fruit

Bird scratches

Cause: Damage from bird claws.

Identification notes: Marks are thin streaks of variable size and shape.

Treatment and prevention: Net the orchard to exclude birds from the crop.



Manganese toxicity (green blotch)

Cause: High uptake of manganese from the soil. Occurs in soils with high manganese levels when pH falls below 6.5 (1:5 water test).

Identification notes: Affected fruit have uneven colouring with small black spots in the green blotchy areas.

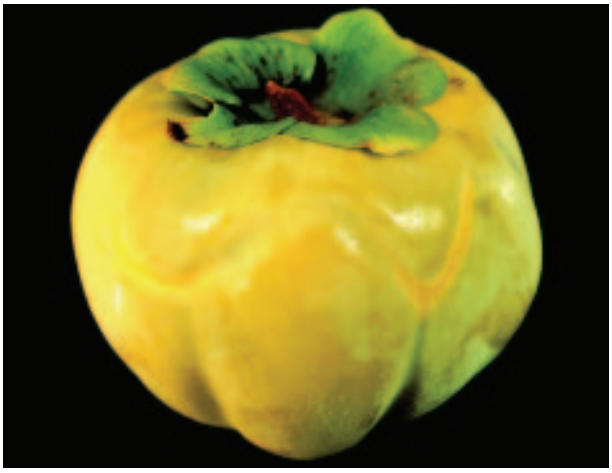
Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Apply lime or dolomite to raise soil pH to 6.5 (1:5 water test). In future, do regular leaf and soil analysis to monitor nutrient levels. In high manganese soils, maintain soil pH at 6.5 or above (1:5 water test).

Petal adherence

Cause: Flower petals sticking onto the young fruit as the petals dry and wither. Generally more common in trees suffering from water stress.

Identification notes: Because the flower petals stay attached to the fruit, tannins from the petals may leach onto the skin, causing stains, spots or bands around the circumference of the fruit. A square-shaped mark at the point of petal adherence is the most common symptom.

Treatment and prevention: Ensure that there is adequate soil moisture when trees are setting fruit. Where air blast sprayers are used to apply leaf spot sprays, these are relatively effective in removing spent petals from the young fruit.



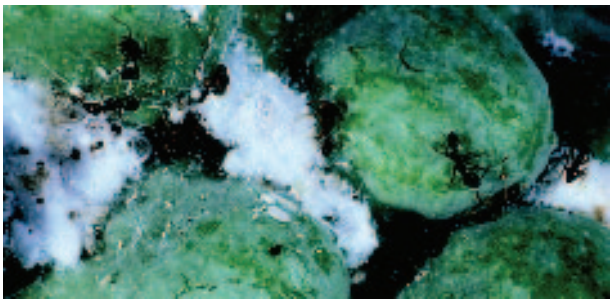
Calyx mark

Cause: A tight calyx, which restricts growth of the young fruit where it contacts the outer edge of the calyx. More common in varieties with a naturally tight calyx, for example Suruga.

Identification notes: Affected fruit show a slightly depressed yellowish line, corresponding to the shape of the calyx, around the top of the fruit.

Treatment and prevention: The damage is cosmetic and does not affect the eating quality of the fruit. There are no practical preventative measures, apart from avoiding any variety with a naturally tight calyx.

White fluffy lumps on fruit



Citrus mealybug

Cause: The insect *Planococcus citri.*

Identification notes: Upper: small mealybugs generally inhabit the calyx of the fruit where they can shelter under its protection. Lower: the coastal brown ant (*Pheidole megacephala*), shown here on custard apple, tends the mealybugs for their honeydew. They move the mealybugs around and fend off their natural enemies. Sooty mould, dark coloured fungi that grow on the honeydew secretions of the mealybugs, is commonly associated with infestation of the fruit (see 'Sooty mould' on page 14).

Treatment and prevention: First make sure that the damage is serious enough to warrant treatment. At least 5% of sampled fruit need to be infested to make it worth treating. Where treatment is required, introduce commercially available beneficial insects such as *Cryptolaemus* or *Leptomastix*.

In future, mealybug infestation can almost always be avoided by controlling ants. Monitor ant activity in August, December and February, and spray where required. Spray the tree trunk and the soil for about half a metre around the trunk, as well as the base of trellis posts. Use an appropriate chemical from the *Problem Solver Handy Guide*. Follow label directions. To avoid other 'ant bridges' occurring, prune tree skirts to keep all leaves clear of the ground, and control grasses and weeds to prevent them growing up into the tree. Regularly monitor mealybug levels during the season to check the efficacy of the ant control program. The main period of risk is from December to March.

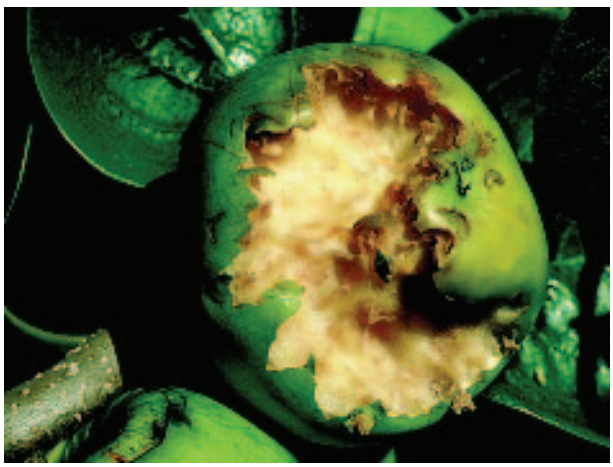
Chewed fruit

Bird or flying fox damage

Cause: Feeding damage from birds or flying foxes.

Identification notes: The surface of the fruit is eaten away in irregular patches. Left: minor damage. Below: severe damage.

Treatment and prevention: Net the orchard to completely exclude birds and flying foxes during the fruiting season.



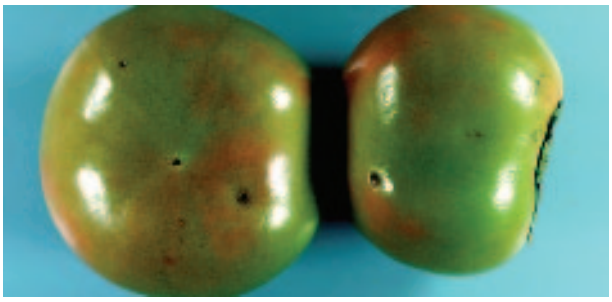
Discoloured fruit

Sooty mould

Cause: Dark coloured fungi that grow on the honeydew secretions of mealybugs and scale insects.

Identification notes: Sooty mould from mealybug infestation. The mould is superficial and may grow on leaves, twigs and fruit. As most of the mealybugs reside under and around the calyx, the sooty mould here is most prominent on the calyx and the shoulders of the fruit. See also 'Citrus mealybug' on page 13.

Treatment and prevention: Treat the mealybug infestation and the sooty mould will disappear. For appropriate treatments, see 'Citrus mealybug' on page 13. Regularly monitor mealybug levels during the season so that appropriate treatments can be applied before the problem gets too severe. Follow the recommendations for 'Citrus mealybug' on page 13.



Manganese toxicity (green blotch)

Cause: High uptake of manganese from the soil. Occurs in soils with high manganese levels when pH falls below 6.5 (1:5 water test).

Identification notes: Upper: affected fruit showing uneven colouring. Lower: close-up of affected fruit. Note that dark spotting may also occur within the green blotchy areas (see 'Manganese toxicity' symptom on page 12).

Treatment and prevention: Get a leaf analysis done to confirm the diagnosis. Apply lime or dolomite to raise soil pH to 6.5 (1:5 water test). In future, do regular leaf and soil analyses to monitor nutrient levels. In high manganese soils, maintain soil pH at 6.5 or above (1:5 water test).

Distorted fruit

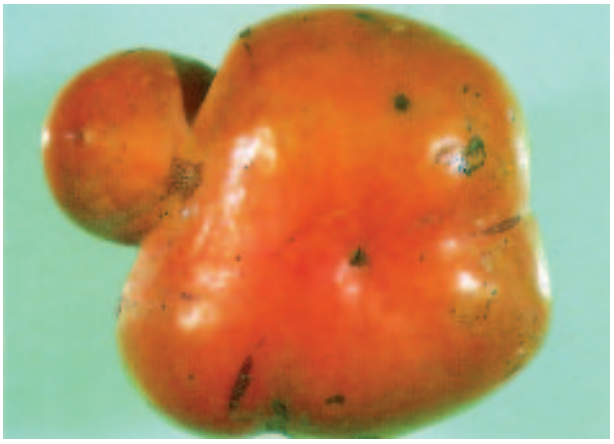
Calyx cavity

Cause: Rapid growth in fruit following an earlier period of stress during fruit development. More common in some varieties, for example Suruga.

Identification notes: A space or cavity develops beneath the calyx. Note that the calyx has been trimmed to clearly show the damage. The cavity may become a habitat for mealybugs and fungal rots. The problem is more serious in large fruit on young vigorous trees.

Treatment and prevention: Manage crop load by careful pruning and fruit thinning to avoid the development of excessively large fruit. Carefully manage nutrition and irrigation to avoid stress periods during fruit development.

Distorted fruit



Carpelloidy

Cause: Uneven pollination of fruit due to either wet weather or a lack of bees. The varieties Suruga and Ichikikei Jiro are the worst affected.

Identification notes: Affected fruit may show a range of symptoms from mild side creasing (upper) to an overall misshape (centre). Individual fruit on occasions show grotesque shapes (lower).

Treatment and prevention: Ensure maximum pollination of susceptible varieties by carefully managing bee numbers. Also ensure that there is an adequate number of polliniser trees within the orchard.

Mature fruit fall

Carbohydrate stress

Cause: Either nitrogen imbalance (too much or too little), or cloudy weather, or a combination of the two. The cloudy weather effect is generally associated with partially pollinated fruit.

Identification notes: Mature fruit fall refers to fruit fall from about January onwards. Note that fall of smaller fruit is generally natural thinning of excess fruit or fruit that is poorly pollinated.

Treatment and prevention: By the time mature fruit fall occurs, there is little that can be done to treat the problem. In future, do regular leaf and soil analyses to monitor nitrogen levels and apply appropriate amounts of fertiliser as indicated by the results. Ensure maximum pollination of developing fruit.

Trees die or grow poorly


1

Stem girdler damage

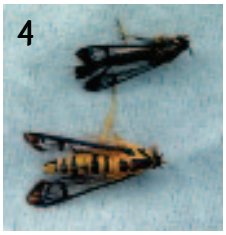
Cause: The clearwing moth *Carmenta chrysophanes*.

Identification notes: 1. Typical damage. Larvae of the insect tunnel under the bark, causing it to crack and lift. Insect frass (or droppings) is often visible amongst the affected bark. Damage is often most severe in crotches where the insect is more sheltered. In severe cases, branches may be completely ringbarked, and trees killed. 2. Close-up of the damage, showing the tunnels and insect frass. Note the brownish larva (arrowed). Larvae are about 10 to 15 mm long. They remain in or under the bark and do not bore into the wood of the tree. 3. Advanced damage showing the complete loss of bark and girdling of the branch. 4. Close-up of the adult moth (actual size about 15 mm long). Moths have yellowish bodies and transparent wings. Adult moths may emerge year-round but most emerge in spring.

Treatment and prevention: Scrape clean infested areas to remove and kill the borers. Seal the wounds with plastic paint or a tree sealing compound to aid in recovery. Inspect trees regularly for signs of damage, so that treatment can be applied before the problem gets too severe. Check very thoroughly when trees are dormant, as it is much easier to see the damage. Where possible, check every crotch on every tree. The pest is generally well controlled naturally by beneficial insects unless affected by the over-use of disruptive chemicals.


2


3


4

Trees die or grow poorly

Rootstock incompatibility

Cause: Propagation onto incompatible rootstocks.

Identification notes: Affected trees may establish and grow to a reasonable size before the incompatibility takes effect and symptoms appear. Apart from tree decline, affected trees may show discolouration and swelling at the graft or bud union, and extensive suckering from the rootstock. Other symptoms include uneven thickness of the scion and rootstock and cracking of bark on either or both of the scion and rootstock. In strong winds, the graft union may snap apart.

Treatment and prevention: There is no cure for affected trees so they are best removed. In future, use only nursery trees propagated on a proven selection of *Diospyros kaki*.

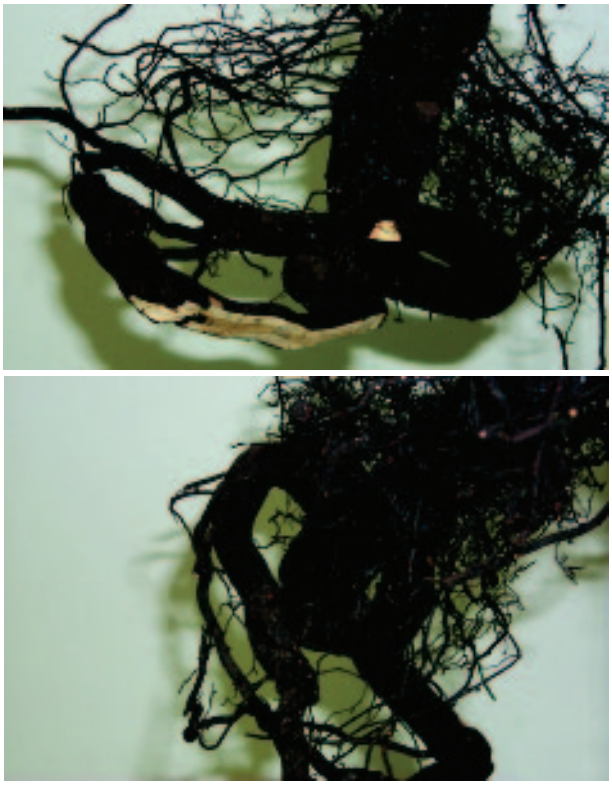
Bacterial wilt disease

Cause: The bacterium *Pseudomonas solanacearum*.

Identification notes: Affected trees slow down in growth, with leaves becoming pale or yellow. The disease is best diagnosed by examining the trunk at ground level for a dark discolouration of wood under the bark.

Treatment and prevention: There is no cure for affected trees so they are best removed. In future, avoid planting in areas that have grown tomatoes, potatoes or capsicums within the past two years. Avoid poorly drained sites.

Trees die or grow poorly



Twisted roots

Cause: Nursery trees that have been propagated in shallow pots or bags, or held too long in these containers.

Identification notes: Upper: the taproot twists around the bottom of the container. Lower: close-up of symptom. When trees are planted out, the enlarging roots may become constricted at the point of twisting. This may restrict root growth and uptake of water and nutrients. Diagnosis is generally not possible without digging up the tree.

Treatment and prevention: Ensure trees are purchased from nurseries using appropriate propagation techniques.

Note: other issues that should be investigated when trees are dying or growing poorly include:

- **Depth of available soil for root growth**

In areas where rock floaters occur, trees can inadvertently be planted above a rock floater where there is insufficient soil depth for sustained root growth and health. In these situations, trees may establish and grow well until soil moisture limitations take effect. Diagnosis involves checking soil depth with an auger or posthole digger in the vicinity of the roots.

- **Poor planting technique**

Where insufficient contact is established between the root ball of the young nursery tree and the surrounding soil, trees may establish and grow poorly. This may be a particular problem where light, sawdust-based potting mixes are used. These mixes dry out rapidly, and then become difficult to re-wet. If potting mix dries without any root growth into the surrounding soil, trees may suffer water stress despite frequent and adequate watering. The problem can be identified by pulling upwards gently on the lower trunk to check root anchorage. Trees with poor root growth outside the root ball can often be lifted easily out of the ground with the root ball and dry potting mix still largely intact.