Capsicum and chilli information kit

Reprint – information current in 1999

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 1999. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research: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- Financial information—costs and returns listed in this publication are out of date.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 1999. 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 capsicum and chilli. 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 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.

Seedlings die in the nursery

Damping-off

Left: in seedling tray. Right: healthy plants in middle.

Cause. Soil-borne fungi, usually *Pythium, Phytophthora* and *Rhizoctonia* species. Damping-off is more common in the field than in hygienically run nurseries. Worse when potting mix is too wet and growing conditions are unfavourable.

Solution. Maintain a high standard of nursery hygiene. Raise trays at least 1 m above soil level. Add to the potting mix an appropriate chemical from the *Problem solver handy guide*. Do not over water. Use sterile potting mix.

Spotty leaves yellow and drop

Cause. Bacterial spot caused by the bacterium *Xanthomonas campestris* pv. *vesicatoria*. Worse in wet, windy weather. Can also occur on stems. It can be introduced on the seed.

Solution. Maintain a high standard of nursery hygiene. Hot water treat seed. Grow resistant varieties. Irrigate in the morning to allow plants to dry by evening. Protect from wind. Do not handle plants. At the first true leaf stage, spray with an appropriate chemical from the *Problem solver handy guide*.

Plants chewed off

Cause. Mice eating the tops of seedlings or cutworm damage.

Solution. Place mouse baits around nursery. Spray to control cutworm with an appropriate chemical from the *Problem solver handy guide*.

Poor growth in nurseries

Burnt leaf edges

Cause. Poor quality water. Water conductivities above 1000 microSiemens per centimetre (µS/cm) will affect growth.

Solution. Use better quality water.

Poor growth in nurseries

Leaf spots and burnt edges

Cause. Incorrectly applied pesticides. Either the concentration of pesticide or the temperature was too high.

Solution. Read the label and apply the chemicals at the recommended rate. Do not apply chemicals when the weather is excessively hot or plants are under stress.

Stunted yellow plants

Cause. Nitrogen (N) deficiency caused by over irrigation or high nitrogen drawdown by the potting mix.

Solution. Do not over water. Apply a foliar nitrogen spray, for example urea at 5 g/L, or a commercial foliar nutrient spray.

Tall lanky plants

Cause. Either low light intensity in the nursery or the cells in the trays used were too small, creating competition for light. Losses will be high unless seedlings are carefully hardened off before planting out.

Solution. Grow seedlings in full sun. Use trays with a cell size no smaller than 98's. Reduce the nitrogen rate used.

Stunted healthy plants

Cause. Cold weather or insufficient fertiliser.

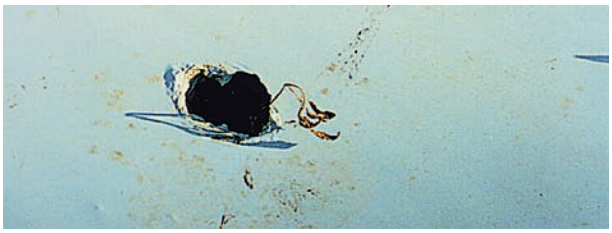
Solution. Grow in plastic houses to keep seedlings warm. Maintain your standard fertiliser schedule.

Poor establishment after transplanting

Stem rots near the ground

Cause. Damping-off caused by a fungus of *Pythium* species, *Sclerotium rolfsii* or *Rhizoctonia solani*. These fungi occur naturally in the soil and are also carried over on undecomposed plant residue. Worse when the soil is too wet, in hot humid weather, and when growing conditions are unfavourable.

Solution. Improve land preparation to ensure organic matter is completely broken down. Handle seedlings carefully to avoid injury when removing them from trays for planting. Do not plant too deep, soil should just cover potting mix.



Soft plants

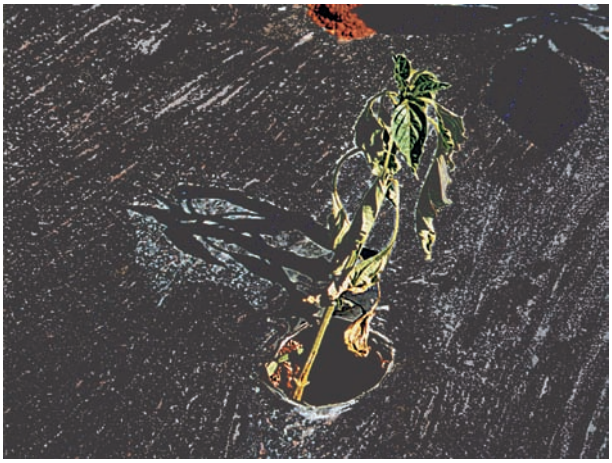
Cause. Plants not hardened off in the nursery.

Solution. Grow seedlings in full sun. Water less near transplant stage. Reduce fertiliser applications until immediately before planting.

Leaves distorted on one side

Cause. Wind damage.

Solution. Provide wind protection.

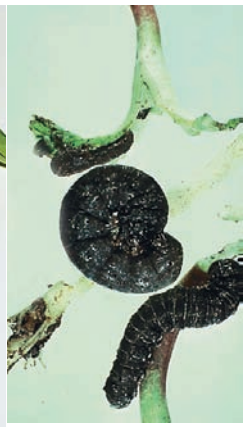


Seedlings die

Cause. Heat from black plastic mulch can damage plant stems and roots under very hot conditions.

Solution. Use white or grey plastic mulch if planting when high temperatures can be expected.

Poor establishment after transplanting



Plants chewed off

Left: cut off plants. Right: close-up of cutworms (up to 40 mm long).

Cause. Larvae of the brown cutworm *Agrotis munda* and the black cutworm *Agrotis ipsilon*. Areas that were weedy just before planting are most affected. Plants are often damaged during the first night of planting and damage may continue for up to three weeks.

Solution. Cultivate to remove weed growth well before planting. Cultivation exposes larvae and pupae to predators, for example birds. If you suspect cutworms are present, spray the area to be planted using a boom spray, or before evening of the day of planting drench the soil around the base of the plant with a chemical from the *Problem solver handy guide*.

Wireworms and false wireworms

Upper: wireworm (20 mm). Lower: false wireworm (adult 10 mm, larva 15 to 20 mm long).

Cause. Larvae of the click beetle, family Elateridae, and larvae and adults of the beetle Gonocephalum spp., the false wireworm or northern false wireworm. Larvae feed on roots and stems, while the adults of the false wireworm chew the stems just below the soil. Worse in winter and spring.

Solution. Cultivate well before planting. Cultivation exposes larvae and pupae to predators, for example birds.

Crickets

Upper left: damaged plants. Upper right: black field cricket (25 mm). Lower: mole cricket (30 mm).

Cause. Feeding by adults and nymphs of the black field cricket *Teleogryllus commodus* and the African mole cricket *Gryllotalpa africana*. Field crickets feed on the above-ground parts of the plant, while the mole cricket feeds on below ground parts. Worse in summer. Crickets also chew holes in thin plastic trickle irrigation tube.

Solution. Place baits in the field before planting, and/or under plastic before laying, and in the crop if crickets are a problem. Refer to the *Problem solver handy guide*. Use a heavier gauge irrigation tube if tubing is being damaged.

Spots or marks on leaves

Bacterial spot

Upper: leaf symptoms from a plant with no resistance to bacterial leaf spot. Lower: symptoms on a Race 1,2 and 3 resistant plant.

Cause. The bacterium *Xanthomonas campestris* pv. *vesicatoria*. Infected leaves yellow and fall. It can be carried on seed and survives on capsicum and tomato plant residues in the soil and on solanaceous weeds. It is spread in wet, windy weather and by overhead irrigation. Worse in wet weather.

Solution. Grow resistant varieties. Maintain good farm hygiene, destroy host weeds before planting and destroy old crops. Hot water treat seed. Refer to Section 4, *Key issues,* for details of treatment. Use trickle irrigation so plants are not wet and protect them from wind. Do not handle plants. Spray with a copper-based chemical from the *Problem solver handy guide*.

Herbicide damage

Cause. Spray drift from interrow herbicide application. Damage is usually on one side of the plant.

Solution. Use shielded spray nozzles. Do not spray in windy weather.

Yellow to brown spots

Photo shows fungal spores on the underside of the leaf, the top side will be a yellow to brown spot.

Cause. Powdery mildew caused by the fungus *Leveillula taurica*. Tomatoes are also a host. Spores are spread by wind. It is worse in warm, dry weather.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

Raised corky spots

Cause. Bacterial canker, caused by the bacterium *Clavibacter michiganense* pv. *michiganense*. It can be carried on seed and spread from infected tomato crops.

Solution. Use hot water treated seed. Refer to Section 4, *Key issues,* for details of treatment. Avoid handling plants. Spray with an appropriate chemical from the *Problem solver handy guide*.

Older leaves yellow and drop

Bacterial spot

Note the heavy leaf drop. Inset: close-up of yellow leaves.

Cause. Bacterial spot caused by the bacterium *Xanthomonas campestris* pv. *vesicatoria*. Infected leaves yellow and fall. It can be carried on seed and survives on capsicum and tomato plant residues in the soil. It is spread in wet, windy weather and by overhead irrigation, and is worse in wet weather.

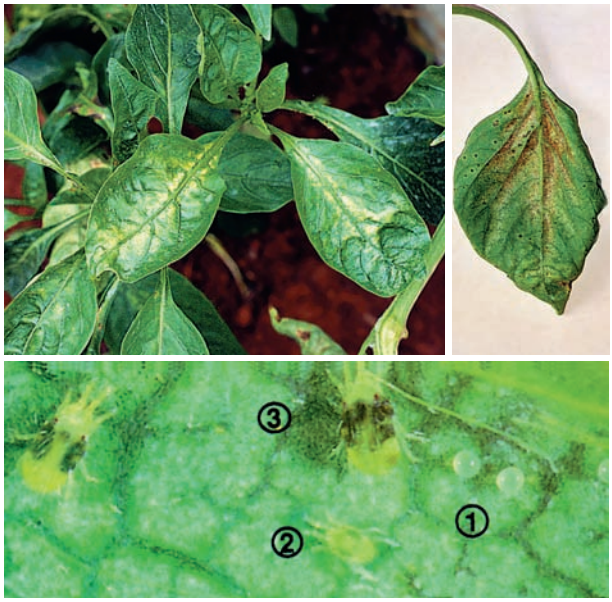
Solution. Maintain good farm hygiene and destroy old crops. Grow resistant varieties; refer to variety descriptions, Section 4, *Key issues*. Use trickle irrigation so plants are not wet. Protect from wind. Do not handle plants. Spray with an appropriate chemical from the *Problem solver handy guide*.

Powdery mildew

Leaf drop typical of mildew-affected plants.

Cause. The fungus *Leveillula taurica*. Tomatoes are a host. Spores are spread by wind. Worse in warm, dry weather.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.



Spider mites

Upper left: yellow mottling on upper side of leaves. Upper right: close-up of underside of leaf which may be covered by fine webbing. Lower: 1. Close up of eggs (about 0.15 to 0.2 mm in diameter). 2. Nymphs. 3. Adult (about 0.5 mm long)—can also be red-orange.

Cause. Feeding by spider mites, usually twospotted mites *Tetranychus urticae*. Tomato russet mite *Aculops lycopersici* can also cause leaf drop. All mites spread from old crops and are worse in warm, dry weather.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

White cottony lumps on leaves and stems

Cottony scale

Left: these scale are about 3 to 5 mm long. Right: larvae of predatory ladybird.

Cause. The scale insect *Pulvinaria urbicola*. Most commonly seen on old chilli crops. Not usually a problem in crops sprayed regularly to control other pests.

Solution. Maintain good farm hygiene and destroy old crops. Some beneficials, for example ladybirds, will help control this pest.

Sparse white powder under leaves

Powdery mildew

Cause. Powdery mildew caused by the fungus *Leveillula taurica*. Tomatoes are a host. Spores are spread by wind. Worse in warm, dry weather.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

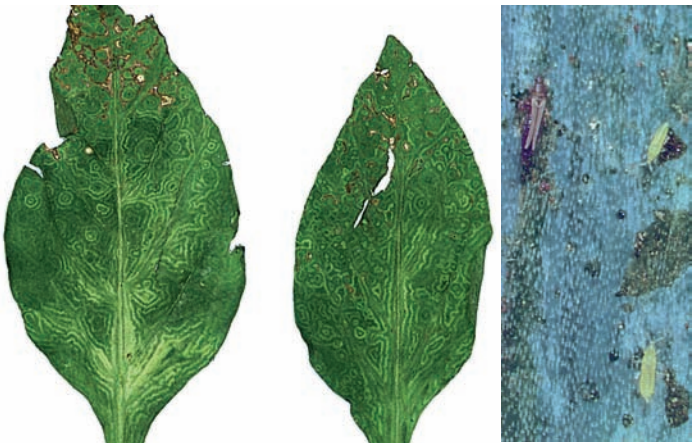
Patterned and distorted leaves

Potato virus Y (PVY)

Cause. The virus potato virus Y. This virus also causes leaf shrivel in tomatoes and infects solanaceous weeds. It is spread by aphids. Worse in cool weather.

Solution. Grow resistant varieties; refer to variety descriptions, Section 4, *Key issues*. Ensure good farm hygiene, for example plough in old capsicum and tomato crops as soon as harvesting is completed and destroy solanaceous weeds. Use silver-coated plastic and oil sprays to deter aphids. Spray to control aphids with an appropriate chemical from the *Problem solver handy guide*.

Patterned and distorted leaves



Spotted wilt (TSWV)

Left: patterned leaves. Right: adult thrips (left) and nymphs.

Cause. Tomato spotted wilt virus. It is spread by thrips from many crop and weed plants. In south Queensland it is most common in spring when thrip numbers increase rapidly. In north Queensland it is worst in autumn and winter.

Solution. Ensure good farm hygiene and destroy old crops and weeds. Destroy affected plants. Spray to control thrips with an appropriate chemical from the *Problem solver handy guide*.

Capsicum mosaic

Cause. Pepper mild mottle virus (PMMV). Spread by leaf contact, handling plants, in contaminated seed and in water. No insect carrier is known.

Solution. Treat seed to destroy seed-borne virus, see Section 4, *Key issues*, and avoid unnecessary handling.

Puckered leaves

Upper left: puckered leaves. Upper right: aphids under a leaf; note winged adults (1.5 to 3 mm). Centre: larva of predatory ladybird. Lower: pupae of predatory ladybird.

Cause. Feeding on the underside of leaves by aphids, often the green peach aphid *Myzus persicae*.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

White insects under leaves

Silverleaf whitefly

Upper: whiteflies under leaf. Lower left: adult (0.8 to 1.2 mm). Lower right: nymph (0.3 to 0.6 mm). Red-eyed nymphs will soon become adults.

Cause. The sap sucking insect *Bemisia tabaci* biotype B. It feeds on the underside of the leaf and can transmit geminiviruses and excrete honeydew that becomes covered with black sooty mould.

Solution. Ensure all transplants are free of whitefly. Keep the farm weed-free and plough in the crop immediately after harvest. Plant new crops upwind of old crops. Whitefly quickly develop resistance to chemicals. Spray with an appropriate chemical from the *Problem solver handy guide*.

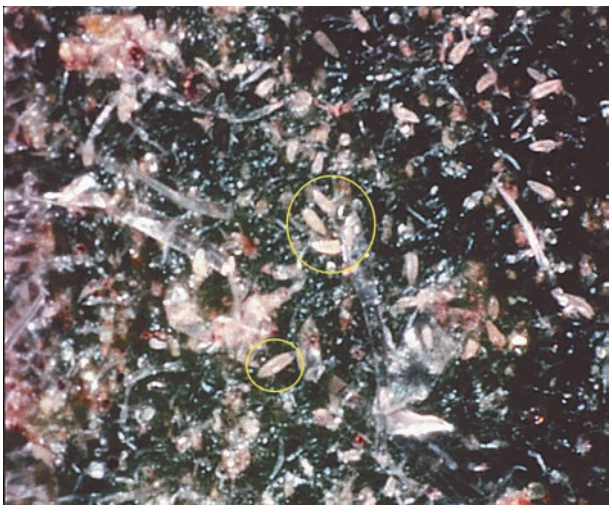
Leaves change colour

Sticky, black leaves

Left: black sooty mould. Right: honeydew with sooty mould developing.

Cause. Black mould growing on the sticky secretions (honeydew) of aphids or silverleaf whitefly, *Bemisia tabaci*, feeding on the undersides of the leaves.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.



Bronzing of stems and leaves

Russet mites (0.15 to 0.2 mm long, 0.05 mm wide). A hand lens is needed to see the mites.

Cause. Feeding by tomato russet mite, *Aculops lycopersici*. Spreads from old capsicum or tomato crops. Worse in warm, dry weather.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

Mottled leaves

Magnesium (Mg) deficiency

Older leaves yellow as magnesium transfers to young leaves.

Cause. Low magnesium levels in the soil. High levels of potassium and calcium through trickle irrigation can induce a deficiency. Deficiencies of calcium and zinc can also cause leaf mottling.

Solution. Get a soil analysis done six to eight weeks before planting. Apply dolomite instead of lime if pH is low. Do not apply high rates of potassium or calcium. Apply magnesium sulphate through the trickle irrigation at 20 kg/ha after every second application of potassium nitrate. Apply magnesium sulphate as a foliar spray at 2 kg/100 L.

Capsicum mosaic

Cause. Pepper mild mottle virus (PMMV). Spread by leaf contact, handling plants, in contaminated seed and in water. No insect carrier is known.

Solution. Treat seed to destroy seed-borne virus, see Section 4, *Key issues*, and avoid unnecessary handling.

Potato virus Y (PVY)

Cause. The virus potato virus Y. This virus also causes leaf shrivel in tomatoes and infects solanaceous weeds. It is spread by aphids. Worse in cool weather.

Solution. Grow resistant varieties; refer to variety descriptions, Section 4, *Key issues*. Ensure good farm hygiene, for example plough in old capsicum and tomato crops as soon as harvesting is completed and destroy solanaceous weeds. Use silver-coated plastic and oil sprays to deter aphids. Spray to control aphids with an appropriate chemical from the *Problem solver handy guide*.

Spotted wilt (TSWV)

Cause. Tomato spotted wilt virus. It is spread by thrips from many crop and weed plants. In south Queensland it is most common in spring when thrip numbers increase rapidly. In north Queensland it is worst in autumn and winter.

Solution. Ensure good farm hygiene and destroy old crops and weeds. Destroy affected plants. Spray to control thrips with an appropriate chemical from the *Problem solver handy guide*.

Holes in leaves

Leaves chewed

Cause. Grasshoppers or grubs.

Solution. Maintain good farm hygiene and keep surrounding areas, for example headlands, clear of vegetation. Spray with an appropriate chemical from the *Problem solver handy guide*.

Bacterial spot

Cause. The bacterium *Xanthomonas campestris* pv. *vesicatoria*. Infected leaves yellow and fall. It can be carried on seed and survives on capsicum and tomato plant residues in the soil and on solanaceous weeds. It is spread in wet, windy weather and by overhead irrigation. Worse in wet weather.

Solution. Grow resistant varieties; refer to variety descriptions, Section 4, *Key issues*. Hot water treat seed. Maintain good farm hygiene and destroy old crops. Use trickle irrigation so plants are not wet and protect from wind. Do not handle plants. Spray with a copper-based chemical from the *Problem solver handy guide*.

Stunted plants

Environmental stress or disease damage

Note healthy plants in the background. Upper: water logging. Lower: virus infection.

Cause. Stunting is a response to environmental stress (dry or waterlogged conditions, compacted soil, high salt levels from fertiliser or irrigation) or diseases (discussed elsewhere in this section) such as root-knot nematode; bacterial wilt; sudden wilt; pythium root rot; sclerotium base rot; and some viruses. Cold weather also reduces the size of plants.

Solution. Ensure good drainage and maintain adequate soil moisture. Water with a conductivity above 1000 microSiemens per centimetre (µS/cm) can cause leaf damage and lower yields, particularly if overhead irrigation is used. Do not apply excessive amounts of fertiliser at one time, or place fertiliser too close to plants. Use a good crop rotation and control pests and diseases if possible. Do not allow the seedling plug to dry out.

Plants collapse suddenly

Bacterial wilt

Cause. The bacterium *Ralstonia (Pseudomonas) solanacearum*. It is common in soil and is carried over in crop residues and weed hosts. It spreads rapidly with soil wash in irrigation and rainwater, by soil movement during cultivation, and may spread by root contact.

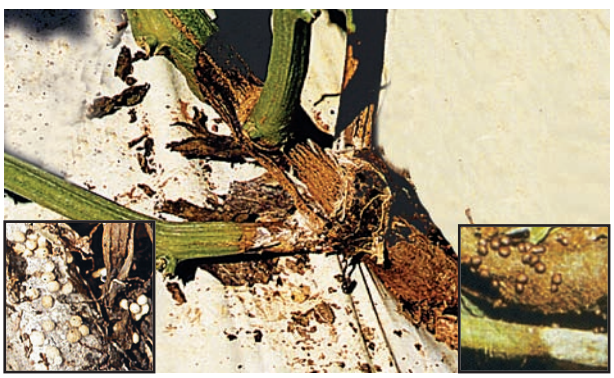
Solution. Plant resistant or tolerant varieties. Bacterial wilt is worse in hot, wet weather and wilting is quick, though not as fast as in tomatoes. Do not crop infested soil through summer.

Sudden wilt

Upper: wilted plant. Lower: note decaying root tips.

Cause. Species of the soil-borne fungi *Pythium* and *Fusarium*. Plants tend to collapse when loaded with fruit. It is sporadic and sometimes severe, especially in warm weather. Worse in poorly drained soil. Root-bound seedlings seem more susceptible than younger plants.

Solution. Use a good crop rotation. Ensure seedlings are disease-free. Encourage the development of a good root system. Do not plant in poorly drained soils. Schedule irrigation to maintain good water management.



White growth at base (base rot)

Upper: wilted plant. Lower: white fungal growth on stem. Inset left: immature, magnified creamy sclerotes. Inset right: mature brown sclerotes (1 mm) on stem.

Cause. The fungus *Sclerotium rolfsii*. It is carried over in the soil as small hard sclerotes. It affects many plants and is worse in warm, moist conditions, particularly in soil containing undecomposed plant residue.

Solution. Good land preparation to ensure all organic matter is decomposed before planting. Deep plough to bury sclerotes and plant residue. Crop rotations should include non-susceptible crops, for example maize or small grains. Drench with an appropriate chemical from the *Problem solver handy guide* one to two weeks after transplanting.

Broken or dying branches

Broken plants with ragged leaves

Cause. Wind damage. Plants can also be broken during harvest. Fruit on the broken branches is usually sunburnt.

Solution. Use windbreaks and trellises. Supervise pickers to reduce damage during harvesting.

Single branches die

Right: note black sclerotes (2 to 10 mm long) inside stem.

Cause. The fungus *Sclerotinia sclerotiorum*. It can survive in the soil for years as hard black sclerotes. Infection is sporadic and usually occurs in cool, moist conditions through injury or dead tissue, for example spent flowers lying on leaves or stems. Infected stems become hollow.

Solution. Do not grow in infested soil during the cooler months. Reduce plant damage, for example during harvesting. Spray with an appropriate chemical from the *Problem solver handy guide*, particularly during blossom set.

Bleached areas on fruit

Soft, tan bleached area

Cause. Sunburn due to exposure to sun, bleaching develops on the exposed side of the fruit. Leaves may also turn silver if the underside is exposed to the sun.

Solution. Put plants closer together in warm weather. Induce more vigour in plants. Trellis the crop. Harvest at the green mature stage instead of leaving fruit to colour. Take care not to damage plants during harvest.

Thin, brown bleached area

Note on the green fruit the dark spores of *Alternaria,* which often develops on the affected area.

Cause. Blossom-end rot, the result of a calcium deficiency. Either not enough calcium is available in the soil, or calcium is not being taken into the fruit because water stress limits the uptake of nutrients with the transpiration stream.

Solution. Take soil samples to check calcium (Ca) and pH levels six to eight weeks before planting and check the water conductivity. Maintain good water management, particularly in hot, windy weather, by scheduling irrigation, for example use tensiometers. Do not use acidifying fertilisers, for example sulphate of ammonia.

Spots on fruit

Dark brown to black scabs

Spots are often concentrated on the shoulders and may join up.

Cause. Bacterial spot caused by the bacterium *Xanthomonas campestris* pv. *vesicatoria*. It can be carried on seed, and survive on capsicum and tomato plant residues in the soil. It is spread in wet, windy weather and by overhead irrigation. Worse in wet weather.

Solution. Maintain good farm hygiene and destroy old crops. Grow resistant varieties. Use trickle irrigation so plants are not wet. Protect from wind. Do not handle plants. Spray with an appropriate chemical from the *Problem solver handy guide*.

Raised corky spots

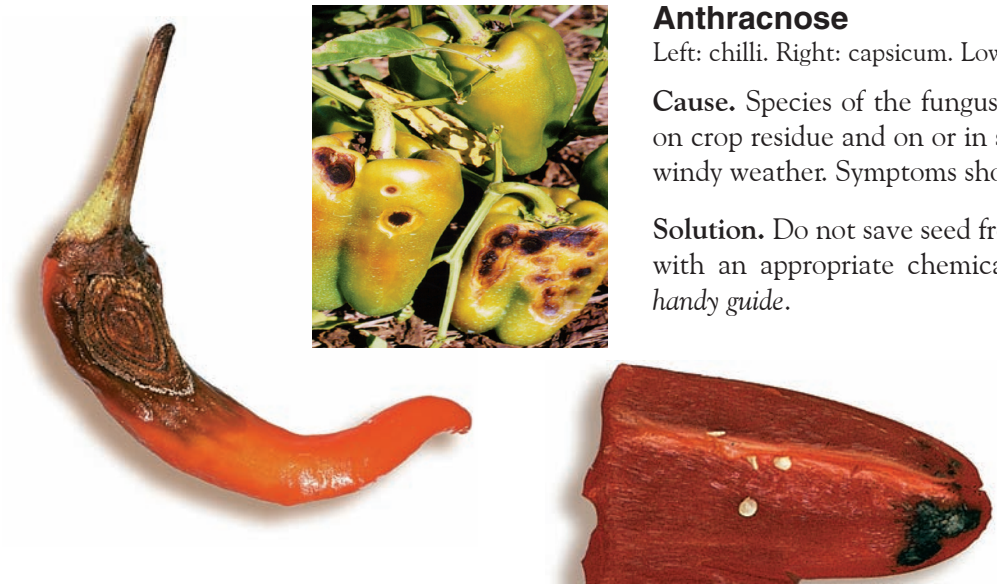
Cause. Bacterial canker caused by the bacterium *Clavibacter michiganense* pv. *michiganense*. It can be carried on seed and spread from infected tomato crops.

Solution. Use hot water treated seed. Refer to Section 4, *Key issues,* for details of treatment. Spray with an appropriate chemical from the *Problem solver handy guide*.

Ghost spot (*Botrytis*)

Cause. Restricted infection by the fungus *Botrytis cinerea*. Worse in cool, dewy or foggy weather. Spores are spread by the wind.

Solution. Spray with an appropriate chemical from the *Problem solver handy guide*.



Anthracnose

Left: chilli. Right: capsicum. Lower: internal symptoms.

Cause. Species of the fungus *Colletotrichum*. It survives on crop residue and on or in seed. Spores spread in wet, windy weather. Symptoms show as fruit starts to ripen.

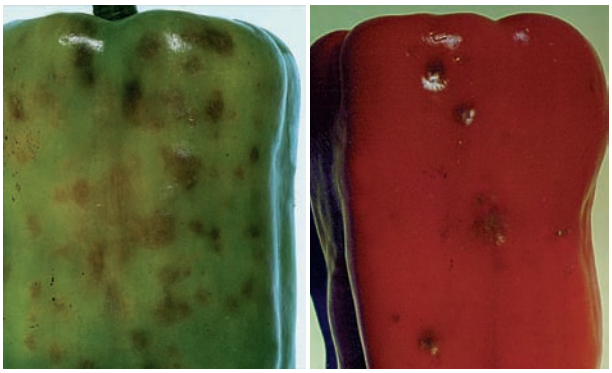
Solution. Do not save seed from an infected crop. Spray with an appropriate chemical from the *Problem solver handy guide*.

Spots on fruit

Spotted wilt (TSWV)

Cause. Tomato spotted wilt virus spread by thrips from many plants. In south Queensland it is most common in spring when thrip numbers increase rapidly. In north Queensland it is worst in autumn and winter.

Solution. Ensure good farm hygiene and destroy old crops and weeds. Destroy affected plants. Spray to control thrips with an appropriate chemical from the *Problem solver handy guide*.



Green or brown sunken spots

Cause. Yolo spot, the cause of which is unknown. It seems to be associated with calcium deficiency, particularly in varieties related to Yolo Wonder.

Solution. Do not plant susceptible varieties. Most new hybrids are less susceptible.

Sting marks on fruit

Stings

Upper left and lower: sting marks on capsicum and chilli. Upper right: Queensland fruit fly (adults 8 mm long).

Cause. Damage by egg-laying of Queensland fruit fly *Bactrocera tryoni*. Feeding by the white maggots results in fruit breakdown. Worse in mid to late summer, particularly after rain. This quarantine pest restricts the movement of capsicums and chillies into most states and overseas countries.

Solution. Maintain good farm hygiene and destroy old crops. Field spray with an appropriate chemical from the *Problem solver handy guide*. A postharvest flood spray is required for most states. Refer to Section 6 for contacts for quarantine requirements.

Dry pit marks

Left: white pit mark near bug. Right: adult (18 mm) and nymphal stages.

Cause. Green vegetable bug *Nezara viridula*. Adults and nymphs feed on the fruit. Hosts include a wide range of crops and weeds.

Solution. Maintain good farm hygiene and destroy old crops and weeds. The parasite *Trissolcus basalis* has some control in coastal areas. Spray with an appropriate chemical from the *Problem solver handy guide*.

Small, distorted fruit

Poor pollination

Cause. This is due to temperature extremes, for example above 32°C or below 15°C.

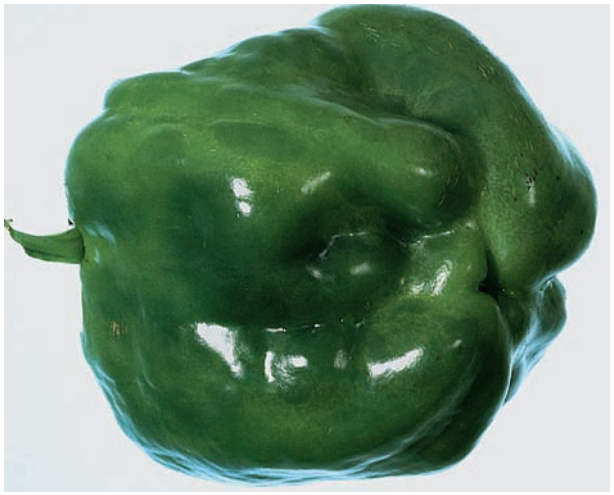
Solution. Do not plant when fruit set will coincide with temperature extremes.

Potato virus Y (PVY)

Fruit from affected plants has a flattened appearance.

Cause. The virus potato virus Y. This virus also causes leaf shrivel in tomatoes and infects solanaceous weeds. It is spread by aphids. Worse in cool weather.

Solution. Grow resistant varieties. Ensure good farm hygiene, for example plough in old capsicum and tomato crops as soon as harvesting is completed and destroy solanaceous weeds. Spray to control aphids with an appropriate chemical from the *Problem solver handy guide*.



Capsicum mosaic

Cause. Pepper mild mottle virus (PMMV). Spread by leaf contact, handling plants, in contaminated seed and in water. No insect carrier is known.

Solution. Treat seed to destroy seed-borne virus, see Section 4, *Key issues*, and avoid unnecessary handling.

Spotted wilt (TSWV)

Cause. Tomato spotted wilt virus. It is spread by thrips from many crop and weed plants. In south Queensland it is most common in spring when thrip numbers increase rapidly. In north Queensland it is worst in autumn and winter.

Solution. Ensure good farm hygiene and destroy old crops and weeds. Destroy affected plants. Spray to control thrips with an appropriate chemical from the *Problem solver handy guide*.

Holes in fruit

Corn earworm (Heliothis))

Upper left: hole in fruit. Upper right: larvae (35 mm) in fruit. Lower left: moth, 30 to 40 mm wingspan. Lower right: eggs (0.4 mm).

Cause. Feeding by larvae of *Helicoverpa armigera*. Eggs are laid on terminal leaves, flowers and young fruit. Tomatoes and many crops and weeds are hosts. Worse from spring to autumn.

Solution. Monitor for eggs or larvae twice a week from late winter to autumn and weekly during winter. If necessary spray with an appropriate chemical from the *Problem solver handy guide*. Ensure the spray rig gives good coverage. Available beneficial insects include a predator, the green lacewing *Mallada signata*, and the egg parasites *Trichogramma* wasps.

Eggfruit caterpillar

A mature larva is about 20 mm long.

Cause. Larvae of *Sceliodes cordalis*. Other hosts include tomatoes and the thornapple weed. Eggs are laid on the calyx. It is worse in spring and early summer.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

Tunnels under skin

Upper: larva (10 to 15 mm) and mine damage. Lower: adult moth, 10 to 12 mm wingspan.

Cause. Larvae of the potato tuber moth (leafminer) *Phthorimaea operculella*. Larvae enter where two fruit touch or the stem scar. Hosts include tomatoes, potatoes and solanaceous weeds. Not normally a major pest of capsicums. Most severe in summer and autumn, but survives through mild winters if cropping is continuous.

Solution. Ensure good farm hygiene and destroy weeds and old crops. Separate crops to avoid having young and old crops close to each other at the same time. Use traps to monitor for moths. Spray the crop with a desiccant herbicide as soon as harvest is complete. Remove plastic as soon as possible and plough in crop residue. Crush any fruit in or around the field to prevent emergence of moths. Spray to control leafminer with an appropriate chemical from the *Problem solver handy guide*.

Brown, corky etches on fruit

Wind damage

Cause. Abrasion between fruit and stems, leaves or other fruit causing wind rub. No pathogen is involved. Similar to scabbing from boron deficiency but has much more irregular edges.

Solution. Provide windbreaks.

Cracks at end of fruit

Irregular irrigation or rain

Cause. Dry conditions where plants are stressed followed by heavy rain or excessive irrigation can cause splitting of the fruit (arrowed).

Solution. Better water management using scheduling techniques, for example tensiometers. Refer to the article on irrigation in Section 4, *Key issues*. Plastic mulch can improve the spread of water and reduce the influence of moderate rainfalls.

Fine cracking of skin

Boron deficiency

Cause. Insufficient boron available to the plant. More likely in sandy or alkaline (high pH) soils, recently heavily limed soil or soil low in nitrogen.

Solution. Apply a foliar spray of Solubor at 200g/100 L. Take leaf and soil tests before the next crop. If lime is required, apply at least four weeks before planting.

Mite damage

Note golden flecking and fine cracks.

Cause. Feeding by mites, which spread from old crops and are worse in warm, dry weather.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

Skin changes colour

Brown skin

Cause. This is part of the normal colour change from green to red.

Solution. Wait for full red colour to develop.

Black sooty skin

Cause. Black mould growing on the sticky secretions (honeydew) of aphids, or silverleaf whitefly *Bemisia tabaci* feeding on the undersides of the leaves.

Solution. Maintain good farm hygiene and destroy old crops. Spray with an appropriate chemical from the *Problem solver handy guide*.

Fruit rots in the field

Rotten end

Cause. Ends touching the ground allowing infection by soil-borne fungi.

Solution. Grow bigger plants by applying more nitrogen in early stages of plant growth. Select varieties that set fruit higher. Grow on firm, plastic mulch covered beds to reduce losses.

Grey, smelly waterbags

Note grub hole (circled).

Cause. Bacterial soft rot caused by the bacterium *Erwinia carotovora* var. *carotovora*. Infection is through injuries, for example grub holes or fruit fly stings. Also spread in recycled wash water in the shed. Worse in hot, wet weather.

Solution. Ensure strict hygiene in field and shed. Handle fruit carefully. Apply a treatment from the *Problem solver handy guide* to prevent postharvest breakdown.

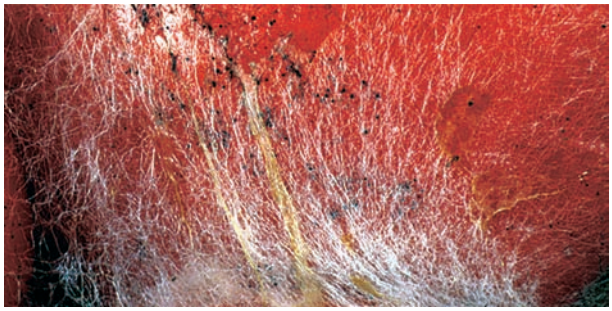
Fruit rots in the field

Grey mould (*Botrytis*)

Cause. The fungus *Botrytis cinerea*. Infection is usually through injury, and is worse in cool, dewy or foggy weather. Spores are spread by wind.

Solution. Apply a treatment from the *Problem solver handy guide* to prevent postharvest breakdown. Field spray with an appropriate chemical from the *Problem solver handy guide*.

Postharvest problems



Grey hairy growth

Cause. Rhizopus or transit rot, caused by the fungus *Rhizopus stolonifer*. Usually a postharvest problem. Infection is through injury or contact.

Solution. Ensure strict hygiene in the shed, remove all reject fruit from the area. Handle fruit with care. Apply a treatment from the *Problem solver handy guide* to prevent postharvest breakdown.

Small eggs under calyx

Note eggs on calyx and in crack in fruit. Lower left: close-up of eggs (1 mm). Lower right: adult fly (4 to 5 mm long).

Cause. Eggs laid by *Atherigona orientalis*, a small grey fly. It breeds in rotting fruit and organic matter. *Atherigona* is important only because of quarantine requirements for fruit exported to New Zealand.

Solution. Crush any fruit in or around the field and crush or bury rejects from the packing shed to reduce breeding sites for flies. Sprays applied to control other insect pests are believed to reduce *Atherigona* numbers.

Shrivelled, glassy skin

Cause. Chilling injury.

Solution. Increase room temperature to the optimum range of 7° to 13°C.

Fruit cracked at market

Cause. Fruit packed too high in the carton.

Solution. Alter packing pattern to reduce overfilling. The fruit should not be above the level of the carton, so that the weight of the stack of cartons is born by the carton, not the fruit.