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 We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research: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- Financial information—costs and returns listed in this publication are out of date.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

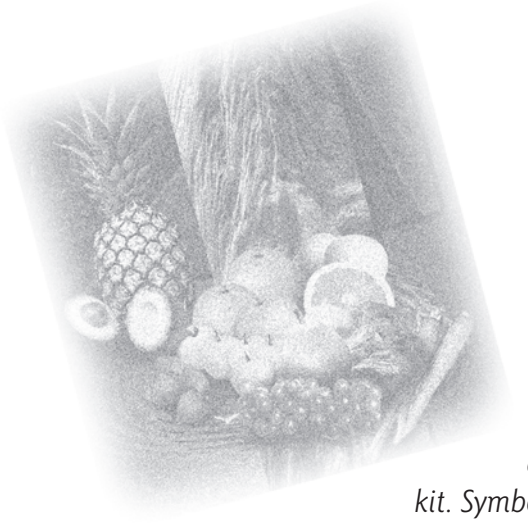
Even with these limitations we believe this information kit provides important and valuable information for intending and existing growers.

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 tomatoes. 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



Common QUESTIONS

This section contains the most commonly asked questions about growing tomatoes. The answers are as brief as possible. Where this is difficult and more detail is required, we refer you to other sections of the kit. Symbols on the left of the page will help you make these links.

Contents

Varieties

What's the best variety to plant?

Varieties
Section 4 page 16

Almost all tomatoes grown in Queensland are hybrid varieties. New varieties are frequently being introduced. The variety you choose depends on your planting time and whether you are growing in north, central or south Queensland. Because there are many varieties, planting times and growing areas we refer you to the section on varieties in Section 4, *Key issues*.

In north Queensland, in the Bowen–Burdekin area, the main varieties grown are the normal round types Tornado, Tempest and Eagle. They all have resistance to race 3 fusarium wilt which is necessary for that area. There has been increasing interest in gourmet and egg or Roma tomatoes recently. Most of these types, however, do not have resistance to race 3 fusarium wilt and gourmet types require trellising. Daniella is the main gourmet variety grown. Few cherry tomatoes are grown.

Around Bundaberg there has been a big swing to the gourmet types by almost all the main growers. Celzus, Daniella, Red Bluff and Redcoat are the main gourmet varieties grown. Smaller areas of the round varieties Flora-Dade, Tempest and Troppo are also grown. Early Peel is the main egg type grown. The main plantings of cherry tomatoes are Bite Size, Cocktail, Cocktail Supreme, Sweet Bite and Super Sweet 130.

In the Lockyer Valley Daniella, Red Bluff and Thunder are the main gourmet varieties. The main round types grown are Indy, Red Setter, Tempest, Troppo and Zola. Few egg and cherry types are grown, with Futura and Super Sweet 130 respectively being the main ones.

On the Granite Belt, Tempest, Starfire and Zola are the main round types and Daniella is the main gourmet type. Egg tomato varieties grown include Colt, Early Peel Improved, La Rossa and Rhomba (SPS 901). Few cherry types are grown.

Transplants

Where can I buy transplants?

Nurseries
Section 6 page 5

Numerous seedling nurseries grow transplants for sale.

Why aren't my transplants growing properly?

The most common reasons for poor transplant growth in the nursery are poor water management and over fertilising.

Under watering is the most common cause of poor seedling growth. Irrigate until water just starts to drip out of the cell. Over watering leaches out fertiliser and also induces poor root health.

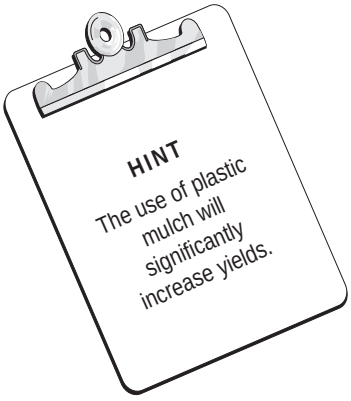
If this occurs, increase the fertiliser and reduce the amount of water applied.

Over fertilising could occur if:

- too much fertiliser is added to the mix used to produce the seedlings;
- too much foliar fertiliser is applied in cool weather for example, if growers are trying to push their seedlings;
- a combination of too much fertiliser in the seedling mix and too much foliar fertiliser sprayed over the plants.

You must be careful about how much fertiliser, particularly nitrogen, goes into the seedling mix and how much is applied thereafter. One way of finding out what is happening is to have a conductivity measurement done on the seedling mix. Very often, when seedling growth is poor, the conductivity of the mix is too high. Poor quality water will produce similar symptoms. Conductivity for water used on seedlings should be less than 1200 microSiemens per centimetre (mS/cm).

Planting



Should I use plastic mulch?

Almost all commercial crops of tomatoes are grown on plastic mulch. Plastic mulch makes crop management a lot easier. It helps control weeds, aids in maintaining soil moisture and reduces nutrient leaching, so fertiliser stays in the raised bed. Plastic mulch can also be used to modify soil temperatures. Better root and plant growth can be achieved by using reflective or white plastic mulch during summer to reduce soil temperature and black plastic mulch in winter to warm the soil. Disposal of plastic mulch at the end of its use may be a major problem.

Why do I need to trellis my tomatoes?

Trellising is necessary in growing districts where humid or moist growing conditions cause an unacceptably high level of fruit disease and blemish. Training the crop onto a trellis allows plants to dry out faster, and fruit are lifted away from the soil where fruit rots occur.

In dry growing districts like the Bowen–Burdekin areas it is not necessary to lift the bush. Plastic mulch is generally all that is required to reduce the incidence of fruit rots in these areas.

Cherry tomatoes and gourmet types should be trellised because the vines are very indeterminate or sprawling and fruit losses are high if they are not grown on a trellis.

Pests and diseases

What's causing my plants to collapse in the field?

Plant collapse soon after planting out can be due to damping-off organisms such as *Pythium*, *Phytophthora* and *Rhizoctonia*, or from attack by insects such as crickets, cutworms or wireworms. High temperatures heat the plastic mulch which can burn the plant stem around the level of the plastic.

Once the plants are established, collapse can be caused by sclerotium base rot (*Sclerotium rolfsii*). This fungus appears around the base of the plant as a thick white growth with small radish-seed-like resting bodies at the advanced stage of the infection. Drenching around the base of the plants with quintozene may be worthwhile if heavy losses are expected.

more info Sclerotium base rot: *Problem solver handy guide*

Plant collapse can also be due to target spot on the stem, bacterial wilt, or attack by white ants (termites).

What causes plants to wilt in the field?

A common cause of plants wilting in the field is lack of water. Diseases such as verticillium, fusarium and bacterial wilts and bacterial canker can also cause plants to wilt. To check for these diseases, slice into the tissue just under the bark near the base of the plant and look for discolouration as shown in the table. Plants affected by bacterial wilt collapse rapidly, while the other wilt diseases are slower and more progressive.

more info *Problem solver* Section 5

	Discolouration of tissue under bark near plant base	Leaf colour
Verticillium wilt	very slight discolouration	blotchy yellow
Fusarium wilt	reddish-brown	yellowing
Bacterial wilt	brown	remain green

Heavy infestations of nematodes, indicated by small galls on the roots, can also cause wilting, as can over fertilising, particularly with urea.

Sudden wilt or a root rot complex occurs when the roots grow into wet, poorly aerated soil and can cause extensive plant losses.

more info *Problem solver* Section 5

Why have the bottom leaves died?

Attack by russet mite is the most likely cause of death of the lower leaves. It is associated with bronzing of the stems and loss of hairs. The mites are very small and cannot be seen by the naked eye, so use a x10 hand lens. Russet mites have small, clear to yellow, oblong bodies.

Loss of lower leaves may also be due to bacterial canker, target spot, leaf mould, fusarium or verticillium wilts, leafminer or leaf shrivel virus.

How do I adopt an integrated pest management approach to tomatoes?

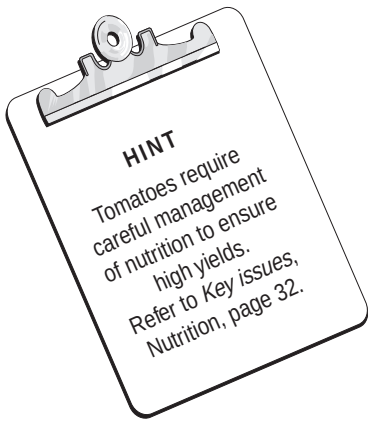
Integrated pest management
Section 4 page 56

Crop monitoring consultants are generally very good at integrated pest management (IPM), so in areas that have monitoring consultants we suggest you employ them to monitor your crops and make IPM decisions. Better results will be achieved if integrated pest management programs are carried out on a 'whole district' basis.

Fertiliser

What fertilisers do I need?

Sap testing
Section 4 page 40



A fertiliser application schedule should be based on the results of a complete soil analysis taken six to eight weeks before planting. This will also indicate if lime or dolomite is required to increase the pH to the optimum of between 6 and 6.5. These products should be applied at least four weeks before the crop is planted.

If no soil analysis is available and the soil is low in phosphorus, a basal fertiliser that contains 40 to 60 kg/ha of nitrogen, 60 to 70 kg/ha of phosphorus and 50 to 60 kg/ha of potassium is commonly used. On soils high in phosphorus 40 to 60 kg/ha of nitrogen, 10 to 30 kg/ha of phosphorus and 50 to 60 kg/ha of potassium may be required.

Once the crop is growing, sap testing is used to indicate how much nitrogen fertiliser should be applied through the trickle irrigation.

Irrigation

What water is suitable to irrigate tomatoes?

Tomatoes are moderately tolerant of saline irrigation water, but seedlings should preferably be grown using water with a conductivity of less than 1200 microSiemens per centimetre (mS/cm). In the field the effects of salinity on the plants will be noticeable and there may be a significant reduction in yield at conductivity levels from 2000 to 3000 mS/cm.

Overhead irrigation at these levels is risky and needs careful management to ensure that the crops do not dry out, allowing the salts to accumulate within the root zone. Severe leaf burn may result from salt deposits on the leaves and blossom end rot may occur. Trickle irrigation allows higher salinity water to be used because the salts are pushed to the outside of the wetting zone, however, yield can be reduced significantly and blossom-end rot may occur.

How do I know when to irrigate and how much to apply?

Irrigation
Section 4 page 43

To accurately manage irrigation you need a scheduling instrument for example, tensiometers or Enviroscan.

Tensiometers are relatively cheap instruments that measure the availability of soil moisture to plants. Two tensiometers should be installed per site, one with the tip in the main root zone 20 cm deep and one with the tip below the main root zone at about 45 cm deep. Tensiometer readings of between 10 and 25 on sandy loams indicate optimum soil moisture, readings above 25 indicate the need to irrigate. On clay soils optimum levels of moisture occur between 10 and 40 before fruit set and between 10 and 30 during fruit filling. Higher levels indicate a need to irrigate. Two sets of tensiometers per block or five hectares generally give adequate indication of soil moisture. Where different soil types occur within a block, a set should be used in each soil type.

Enviroscan is much more expensive and is usually operated by consultants.

Trickle irrigation is ideal for tomatoes as it allows adequate soil moisture to be continuously available to the plant throughout the cycle of the crop.

Harvesting

How do I know when my fruit is mature green?

Assessing maturity
Section 3 page 48

When a mature green fruit is sliced through with a knife no seeds are cut, the seeds will move around the knife in the amber or green jelly. Seeds in immature green fruit do not move and are cut where the knife slices through the fruit. The fruit has a glossy sheen on the shoulders and develops a yellow tint on the blossom end. Fruit will noticeably fill out on the shoulders and blossom end. Size does not indicate maturity.

Postharvest problems

How do I control postharvest breakdown of my fruit?

Postharvest handling of fruit
Section 3 page 51

Control methods include good shed hygiene and dipping fruit in water chlorinated to 50 mg/L (milligrams per litre or parts per million) of available chlorine before it goes into the ripening room. A postharvest wash with chlorine, particularly during wet weather, helps reduce most postharvest breakdown organisms. The temperature of water used in washing dips is critical in reducing infection. Water temperature should be maintained at least 5°C higher than the fruit temperature to prevent water being sucked into the fruit through the stem scar.

Registered chemicals
Problem solver handy guide

In north Queensland the main causes of breakdown are yeasty rot, alternaria rot and bacterial soft rot. The organism enters through physical damage to the fruit, often during wet weather, and the fruit breaks down rapidly. In south Queensland grey mould (*Botrytis*) can also be a problem. A postharvest fungicide application will help control grey mould, yeasty rot and alternaria rot.

A solution containing chlorine or some other disinfectant agent, for example quaternary ammonia compounds, should also be used for washing down equipment in the shed and cleaning harvesting equipment and buckets to reduce the level of infection.

Ripening fruit

Why isn't my fruit colouring up in the ripening room?

Artificial ripening
Section 4 page 92

Fruit may fail to colour if it has been picked at the mature green stage when the field temperature is low, then put into the ripening room. If the temperature inside the room is too low to induce ripening you will need to heat the room. The best remedy is to leave the fruit on the plants until it is showing some colour. Immature fruit will be slow to develop colour and the skin will be too yellow.

The optimum temperature for ripening tomatoes in a ripening room is about 20°C. Above 21°C you start to get fruit yellowing from high temperature ripening, below 18°C ripening is slower because it is too cool. The room will not operate efficiently if much of the thermostat wiring is exposed outside.

What is involved in ripening my fruit with ethylene?

Fruit picked mature green or at the breaker (just starting to change colour) stage are moved into a ripening room operating at 18 to 21°C. Ethylene gas is produced naturally by most fruit to trigger ripening. It is introduced into the room to start the natural ripening process at 10 mg/L (milligrams per litre or parts per million) for a trickle system and 250 mg/L for the shot method, over a 24 to 48 hour period. Ripening starts during this period and continues afterwards. Tomatoes that have not started to colour during this period should be rejected as they are too immature.

Ethylene-ripening is a very good management tool to help growers modify the marketing window for their tomatoes and gives them a greater degree of control of harvest operations. Results will be poor, however, if the fruit is immature.

What causes blotchy ripening of fruit?

The most common cause of blotchy ripening in tomatoes is damage caused by twospotted mite and russet mite. It can occur at any stage of fruit development. Other causes can be mosaic and tomato spotted wilt viruses, silverleaf whitefly, high temperature ripening, fruit developing in cold cloudy weather and potassium deficiency.

more info
Blotchy ripening
Section 5
pages 29–30

Marketing

What are the quarantine restrictions in selling fruit interstate?

The quarantine treatments required vary from state to state. No treatments are required for tomatoes going into New South Wales, except into the Fruit Fly Exclusion Zone (FFEZ) which includes the Murrumbidgee Irrigation Area (MIA), New South Wales Sunraysia and the mid-Murray region. All other states require that tomatoes are treated to control fruit fly, either under DPI supervision or under an Interstate Certification Assurance scheme.

more info
Quarantine
Section 3 page 61

What are the requirements for exporting tomatoes?

For overseas export you need to have your shed registered with the Australian Quarantine and Inspection Service (AQIS). Our main markets are South-East Asia and New Zealand. New Zealand is very restrictive in what they will accept, whereas South-East Asia is comparatively easy to get into. Information on the requirements of any overseas country is available from AQIS officers.

more info
AQIS offices
Section 6 page 12

General

What is the best spray equipment to use?

There is no one best type of spray equipment to use in tomatoes, so buy equipment that suits your situation. Select equipment based on its ability to give good coverage, so droplet size is very important, as is the volume of active ingredient per hectare to be applied. Boom sprays with droppers down between the rows are commonly used for trellis crops. In some instances airbags are shrouded over these booms to give air assistance into the crop. In north Queensland, aeroplanes are still used extensively. Boom mounted Micronair sprayers and standard boom sprays are also used.

What is a withholding period (WHP)?

The withholding period is the number of days that must pass between the last chemical application and harvest. It will be on the pesticide label. Produce at the markets is randomly tested for pesticide residue. Farmers have been prosecuted when chemical residues were above the maximum acceptable level, or residues of non-registered chemicals were found.

Residues should be below the maximum acceptable level if the chemicals are used at the registered rate and frequency and the withholding period is observed.

Hormone damage photos
Section 5 page 7

Is this hormone damage on my plants?

Symptoms of hormone damage are twisting and distortion of leaflets, and roots protruding from splits in the stem.

What has caused misshapen fruit on my bush?

Fruit is generally misshapen because there is insufficient seed in part or all of the fruit. This is the result of poor pollination, which can be caused by very hot or very cold weather and on some occasions wet weather. Some varieties have a greater tendency to produce misshapen fruit. A well shaped tomato requires the development of seeds evenly throughout the fruit.

Do tomatoes need bees for pollination?

No. Tomatoes are self pollinating, the flower never opens to expose the style and stigma. In the field, bush movement due to wind is sufficient for pollination but in enclosed growing houses shaking the bush is necessary.

Should I prune tomatoes?

Determinate, semi-determinate and cherry tomatoes are generally not pruned. Indeterminate gourmet types need pruning to increase fruit size to an acceptable market standard.

Pruning involves the removal of all lateral shoots to at least the lateral immediately below the first flower truss, and some growers prune harder than that. The tops are also cut off above the top trellis wire. Tomatoes grown under cover are usually pruned to a single stem. Pruning increases fruit size but reduces yield. It can also lead to disease infection, either fungal diseases through the damaged tissue, or tomato mosaic virus spread by contact during pruning.