

Citrus information kit

Reprint – information current in 1997



REPRINT INFORMATION – PLEASE READ!

For updated information please call 13 25 23 or visit the website www.dpi.qld.gov.au

This publication has been reprinted as a digital book without any changes to the content published in 1997. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research: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- Financial information—costs and returns listed in this publication are out of date.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.dpi.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 1997. 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 citrus. 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 citrus. The answers are as brief as possible. Where this is difficult and more detail is required, reference is made to other sections of the kit. Symbols on the left of the page will help you make these links.

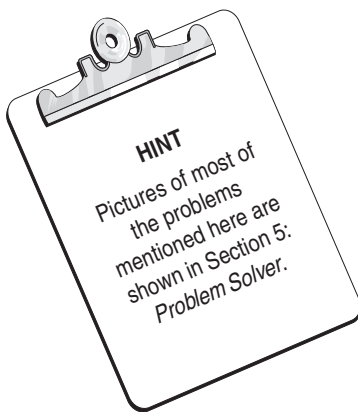
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Problems

My leaves are turning yellow. What's the problem?

If all the leaves on the tree are turning yellow, the problem is most likely root rot or collar rot caused by the *Phytophthora* fungus. Winter yellows is another but less common alternative. If the yellowing leaves are accompanied by some dieback of the twigs on Hickson mandarin, the problem will most likely be crotch rot. If only some leaves are going yellow, the problem is most likely to be a deficiency of either zinc, magnesium, manganese or iron.



My fruit are falling off. What's causing this?

Fruit fall is most common in Navel orange. This variety can't tolerate water stress very well. As a result, very hot conditions in November, December and January will regularly cause fruit drop. Too much water can also cause Navels to drop fruit. Fruit drop in Ellendale and Murcott mandarins generally occurs because trees are either too heavily laden or fruit are over-mature. Remember that a drop of young fruit in November/December is natural as the tree sheds excess fruit.

Why are my Imperial mandarin fruit very dry?

This is a somewhat natural thing for Imperial mandarins. Young trees on Troyer rootstock may have a fair number of dry fruit under hot dry conditions. If older trees for some reason set a very light crop, quite a large number of the fruit will be dry and misshapen. Excess nitrogen fertiliser makes the problem worse. It is important in Imperials to carefully monitor nitrogen by leaf and soil analysis. Also manage thinning very carefully to avoid alternate heavy and light crops.

What causes irregular dark marks on the skin?

There are a lot of things that can cause marks on the skin of your fruit. These include wind rub, spray damage, oleocellosis, sun-burn and styler end rot. Symptoms of each of these conditions are shown in Section 5, *Problem Solver*.

I've got borers in my trees. How do I treat them?

There are two types of borers with different treatment methods. First, identify which type of borer you have. If it is the more superficial trunk and branch damage from the fig and speckled longicorn beetles, first scrape away any insect frass and sawdust. Then spray affected areas with an appropriate chemical.

While there is no chemical specifically registered for borer control, the methidathion spray used for white louse scale control also controls borers. Apply the spray in sufficient volume of water to thoroughly wet the affected area.

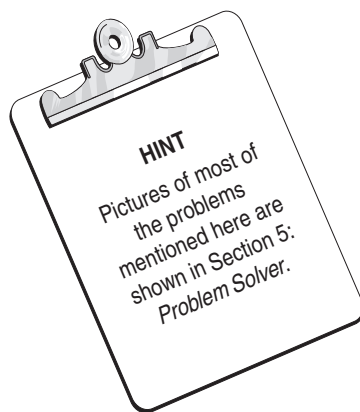
The other type of borer is branch borer. This borer kills individual branches and leaves distinct holes in the wood. It is worse in wetter coastal areas in orchards adjacent to rainforest. With this type of borer, it is important to identify the problem early by regularly checking trees for signs of slight branch wilting. When observed, remove affected branches promptly. Trees in a vigorous healthy condition are also less susceptible to attack.

Why aren't my Navel trees setting much fruit?

It is part of the nature of Navel trees. The problem is that they are very sensitive to water stress. If this occurs in September/October, few fruit will be set. Similarly, if water stress occurs during November, December and January, young fruit that has set will drop off.

Why are limes getting this brown end on the fruit?

This is a problem called blossom end rot or styler end rot. It is mainly caused by the fruit being over-mature on the tree. As limes are meant to be harvested green, harvest the fruit before the colour begins to lighten off towards yellow. Also avoid any water stress near the green harvest time.



Why are the tips of outside branches of my trees dying back?

The most likely cause is a condition known as blight. As yet, there is no treatment for this condition. Another cause on Navel oranges and Imperial mandarins is a disease called anthracnose. This is a stress related problem and can only be minimised by using the copper sprays recommended for control of black spot and melanose. Root rot and collar rot can also cause twig dieback.

Planting

What varieties and rootstocks should I plant?

This is a difficult question to answer, as variety and rootstock choice depends on many factors. The choice of variety depends largely on which part of the state you are in, and which market you are targeting. The choice of rootstock will depend on your soil type and the variety you select.

Space here does not permit us to elaborate more and we refer you to other sections of this kit. We also recommend that serious intending commercial growers discuss variety and rootstock selection with an experienced citrus consultant.

more info



Variety and rootstock suggestions
Section 3 pages 5–7

more info



Names of citrus consultants
Section 6 page 6

What mandarin variety should I plant in this area?

On the coast, Emperor is probably the most suitable with Imperial as the next best choice. Murcott is not recommended because of disease problems associated with the wetter conditions. In the drier inland areas, varieties that do well are Ellendale, Murcott, Hickson and Imperial. You should plant more than one variety so that you have as long a harvest period as possible.

What lemon varieties should I plant?

On the coast, Meyer is the best variety to try, although it is not a true lemon. In the drier inland areas, use Eureka, Lisbon and Villa Franca.

How close can I plant citrus?

The standard spacing for citrus is 7.3 metres between the rows and 5.5 metres between the trees in the rows. For oranges, lemons, grapefruit and Ellendale mandarins, the space between the trees in the rows can be reduced to 3.6 metres but alternate trees will have to be removed later on. For mandarins other than the Ellendale variety, the space between the trees in the rows can be further reduced down to about 2 metres, again with alternate tree removal later on. However, this very close spacing requires a high level of management.



Spacings for citrus
Section 3 page 8, 9

Tree management

Should I mulch my citrus trees?

Yes, but keep the mulch about a hand span from the trunk. If you are mulching trees on heavy soils, adjust the amount and frequency of your irrigation so that trees are not overwatered.

How do people grow lemons and limes out of season?

By following what we call the Verdelli system developed in Italy. This means withholding water from the tree until you want it to flower. At that time you water and fertilise with urea. This system is not practical in the wetter coastal areas because the rainfall is unpredictable and is likely to come when you don't want it. In these areas, the best system is to use the Meyer variety which harvests in November, December and January.

How much irrigation water should I apply to citrus?

This depends on the age of the trees, the time of year, the variety and the amount of rain that you get. As a general rule, it may vary from about 1000 litres per tree per month in winter to about 5000 litres per tree per month in summer. The most reliable way to

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Irrigation management
Section 3 page 17,25

work out how much water to apply is to use a soil moisture monitoring device. The three most common ones are tensiometers, neutron probes and Enviroskans.

Is there any control for Phytophthora root rot disease?

Yes. The best way to minimise the problem is to spray the foliage of the tree with a chemical called phosphorous acid. Details of registered products are contained in the *Problem Solver Handy Guide*. Two sprays a year are recommended—the first just before flowering and the second in the autumn around late March or early April. Use the higher label rates of the chemical if you have prolonged wet weather, susceptible rootstocks, marginal soils or overwatering problems. Apply the chemical in at least 8000 litres of water per hectare. Trunk injection of the chemical is impractical and soil application is not recommended.

What sort of sprayer should I purchase for citrus?

For young trees up to two metres high, a high volume airblast machine without tower is satisfactory. As the trees grow larger and older, an oscillating hydraulic boom sprayer is preferred. Air blast machines with towers can be used but must be operated effectively in well pruned orchards.

How do I know when my fruit is ready to harvest?

Fruit has to reach a specified maturity standard before it can be harvested. This is determined by taking a sample of your fruit and having it tested. It cannot be determined by purely looking at the fruit.

Can you help me interpret my leaf and soil analysis results?

The results from leaf and soil analysis show levels of nutrients in your leaf tissue or soil. These can then be compared with critical levels established from extensive research. If your levels are above the critical levels, you don't normally need to apply much fertiliser. If your levels are below the critical levels, you need to apply fertiliser to get your levels back up to the critical levels. Interpretation of the figures is a complex process and should be done by trained agronomists or consultants.

more info



Nutrition management
Section 3 page 22

Money

What is an economical area of citrus to grow?

If it is to be your sole source of income, then you need a minimum of 18 to 20 hectares of trees. Space for roads, houses, sheds and fences is extra. A farm size of about 50 hectares is recommended

to allow the planting of replacement blocks every ten years or so and the introduction of new varieties. If you intend to become an individual exporter, then a minimum of 50 hectares is generally required.

What does it cost to grow citrus?

By the time you have bought a suitable farm of 20 hectares or more, purchased the necessary machinery, developed the water supply, planted the trees, looked after them and built an equipped packing shed, you will have a capital outlay approaching a million dollars by about the fifth year. Capital costs can be significantly reduced by purchasing second-hand equipment, using specialist machinery contractors and joining a packing and marketing cooperative. After the orchard has been set up, it generally costs up to \$20 000 per hectare per year to grow and market the crop.



a key issue

Economics of
growing citrus
Section 4 page 6

What yield can I expect from my trees?

This varies widely depending on the size of the tree, the variety and the planting density of the orchard. For an orchard of normal density (7.3 metres between rows and 3½ to 5 metres between trees), average yields range from about 9 kg (half a citrus carton) per tree in the third year to about 150 to 180 kg (8 to 10 citrus cartons) for a mature tree in the tenth year. Using these figures, a mature orchard should be expected to produce approximately 2500 to 3000 citrus cartons per hectare per year.

Higher per-hectare yields up to about the sixth year can be obtained with high density planting. This makes much better use of available land but requires a higher level of management.

Degreening



more info

Degreening
Section 3 page 39

What is the system and chemical used for colouring fruit?

The system for colouring fruit is called degreening, the chemical used is ethylene and the method used is called trickle degreening.

How much ethylene do I use for degreening citrus?

The concentration of ethylene required is between 3 and 10 parts per million of the fresh air intake. Air intake is between 1 and 2% of the room volume per minute.

What are the brown marks on the skin of fruit after they come out of the degreening room?

This is a condition known as 'degreening burn' and is believed to be associated with the anthracnose fungus. Several factors are

known to predispose the fruit to damage. These include picking fruit when immature, abnormal degreening conditions and moisture and nutrient imbalances close to harvest. What happens is that growth of the anthracnose fungus in the skin is triggered by ethylene during the degreening process. Some of the marking develops during degreening but it often occurs during and after packing.

Starting an orchard

I'm thinking of growing limes. What do you think of the idea?

Limes have good potential but you first need to do some market research. Carefully study the price and throughput data for the major markets. Then research your ability to produce limes in your area during the period of higher prices. The only reliable way to do this is by following the Verdelli system. This means withholding water from the trees until you want them to flower. At that time you water and fertilise with urea. This system is not practical in many areas of Queensland because the rainfall is unpredictable and is likely to come when you don't want it. Proceed only if you are confident of your ability to get this system to work.



Names of citrus nurseries
Section 6 page 5

Where do I buy good planting material?

Buy your citrus trees from a specialist citrus or fruit tree nursery. These nurseries generally have access to virus free budwood and seed for propagation.

Where do I get citrus seed and budwood?

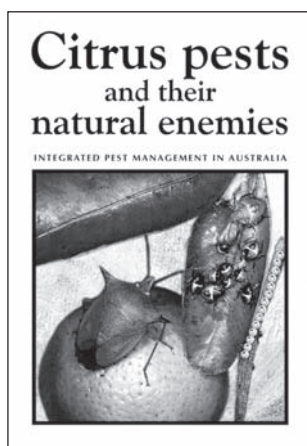
Seed may be purchased from the Queensland Citrus Improvement Committee (QCIC). Contact details are PO Box 48, Gayndah 4625 (Phone 071 611 116). Budwood should always be obtained from the Australian Citrus Propagation Society Inc, 15 Bowen Crescent, West Gosford, NSW 2250 (Phone 043 250 247).

Spraying

How much of chemical xyz do I need to mix in a tank of water?

Details on mixing rates of chemicals are contained on the product label. These are normally quoted as so much per 100 litres of water. If your tank holds 500 litres, all you need to do is multiply the label rate by five to determine how much of the chemical you put in your tank. Mixing rates of the most com-

monly used chemicals in citrus are also contained in the *Problem Solver Handy Guide*.



Use this book for more detail on IPM
See Section 6 page 13

Should I be going into IPM in citrus?

There is no simple answer to this question. IPM certainly has some very significant advantages and we would like to see all growers move into IPM as soon as possible. However, it does have some risks and is not foolproof. It requires a very high level of management to achieve the advantages on offer. We suggest you read the available material on IPM and then discuss your transition to IPM with a citrus pest consultant.

How do I control fruit fly?

The recommended control is the use of fruit fly bait sprays which are mixtures of an insecticide (chlorpyrifos), an attractant (yeast autolysate), and water. The mixture is sprayed low down on the foliage of trees as a coarse spray of about 50 mL per tree. Bait spraying should commence in October for Meyer lemons and in January for all other varieties.

Can I mix my chemicals together?

There is no short answer for this as there are a number of different chemicals used in citrus and their mixing ability varies widely. Look first on the label for mixing advice. If there is insufficient information there, check with your chemical retailer or IPM consultant.

Marketing

Can I send citrus fruit to other states?

Yes, citrus may be sent to all Australian states but requires treatment or special certification for all states except New South Wales and the Northern Territory. In New South Wales, fruit may not be consigned into the quarantine areas of the MIA, Sunraysia and mid-Murray without a special permit. Note that special restrictions apply to movement of citrus out of the Papaya Fruit Fly Quarantine Zone.

Home garden/hobbyist questions

My leaves are curling and going brown. What's the problem?

This is damage from the leafminer insect. You only need to control it in trees under four years of age and then only on significant growth flushes between January and March. Spray each of the new flushes when the new leaves are just emerging

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Interstate quarantine requirements
Section 3 page 46

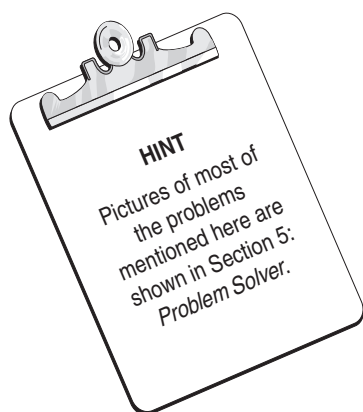
(10 to 20 mm long). Use an appropriate chemical selected from the *Problem Solver Handy Guide*. Follow label directions.

My citrus tree has died. What would have caused this?

There are a number of reasons why trees die. If the tree died without starting to grow, then the cause is most likely root rot disease. Other reasons for trees dying are forgetting to take the bag off the tree before it was planted, putting fertiliser into the hole at planting, leaving the hose running on the tree for too long, and mulching right up to the trunk. A heavy red scale infestation may also kill young trees and will kill branches on more mature trees.

I've planted a tree but it hasn't really grown since I planted it. What's wrong?

There are a number of possibilities. The most common is poor planting technique where there has been insufficient contact between the roots of the root ball and the surrounding soil. This means that the roots have not been able to grow out into the surrounding soil. This problem is often worse in older container-grown trees where roots have become pot-bound. Another common reason for trees not growing is root rot from heavy clay soils staying too wet after rain or watering.



I've got borers in my citrus tree. How do I treat them?

As the borers are generally inside the wood of the tree, they are often hard to get at. This means that chemical treatments may be ineffective. If the borers are in a branch or branches, cut off the affected branches at a point well below the visible area of borer attack. Burn the pruned branches. If the borers are in the trunk, there is little that can be done apart from poking a thin wire into the borer holes in the hope of killing the insect. Keep the area around the tree clear of weeds. Also check your neighbour's trees to see if you can identify the source of the borers. Keep your tree in a healthy vigorous condition as this makes it less susceptible to borer attack.

What is this black stuff on my leaves and fruit?

This is called sooty mould. It looks worse than it really is and doesn't in any way hurt the leaves or fruit. Sooty mould is a fungus growing on sugary deposits made by scale insects, mealybugs and some other insects. Scale insects are the most common culprit. Remove the scale and the black mould will disappear.

What's causing the yellow patterns in my leaves?

It is most likely a deficiency of either zinc, manganese or magnesium. Zinc and manganese deficiency cause yellow blotches

between the leaf veins. Magnesium deficiency causes yellowing of the leaf margins while the central part of the base of the leaf remains green.

What are these lumps on the branches of my tree?

The lumps are caused by the citrus gall wasp. For home garden trees, there is no practical chemical control for the problem. The best thing to do is to prune out the twigs and branches containing the worst galls. Burn the prunings. In commercial orchards, a spray with an appropriate chemical from the *Problem Solver Handy Guide* in early December, to coincide with the hatching of the gall wasp eggs, is recommended for susceptible grapefruit and mandarins.

Should I put any manure or fertiliser in the hole when I plant my tree?

No. Start fertilising only when the tree has started to grow healthy new leaves.