COASTAL FRUITGROWERS' NEWSLETTER

ISSN 1446-0513

INSIDE

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Coastal Fruitgrowers' Newsletter
Edited by Sandra Hardy
Design & Layout -
Cathryn McMaster

No. 67 Summer 2007/08

Dear Growers

Welcome to the final edition for 2007 — another year flies by!

I'd like to take this opportunity to thank all our sponsors and authors for their continued patronage of this Newsletter throughout the year.

In this issue the final technical report from the industry funded "Citrus Rind Quality" project summarises the findings from this important research on issues affecting navel rind quality. The report highlights the importance of applying gibberellic acid (GA) sprays in summer to reduce albedo breakdown and improve rind firmness.

There's also lots more interesting articles to enjoy over the Christmas period.

Wishing you all a very merry Christmas and a prosperous New Year.

Sandra Hardy

Communicating the effects of production conditions on outturn quality in navel oranges (Project CT01029)

Ken Bevington, Lingwen Zeng, Steven Falivene Katina Lindhout (NSW DPI) and Michael Treeby, Richard Storey (CSIRO Plant Industry)

This is the technical summary from the final report of Project CT01029. This project was funded by Horticulture Australia Limited and the citrus industry with additional funding from NSW Department of Primary Industries, CSIRO, and SARDI.

The report describes the results of research to investigate the effects of environmental factors and cultural practices on the incidence of post harvest rind breakdown in navel oranges and to develop an objective test for rind age.

Background

Factors affecting the susceptibility of navel oranges to postharvest rind breakdown were investigated from 2002 – 2005. The work was initiated in response to the high outturn losses experienced by the citrus industry with navel orange shipments to the USA during the 2000 export season.

Types of rind breakdown seen at outturn were described and quantified during visits to San Diego in 2003 and 2004. Rind breakdown was the major cause of rejection of fruit during repacking with symptoms of chilling injury the most common form of breakdown.

Influence of climatic conditions

Mixed model analysis of outturn data indicated significant effects of year, region and packing shed on the incidence of rind breakdown with the effects of region and packing shed varying between years. Overall, the effect of year was more important than the effects of region and packing shed. The analysis further indicated that variables associated with time of harvest and fruit age were an important source of between carton variation in rind breakdown in season 2000, but were of less importance in seasons of low rind breakdown.

Compared to 2000, rind breakdown occurred at relatively low levels from 2001 – 2005 (1.4 – 2.8% of fruit per carton *cf*. 5.9% of fruit in 2000). The high incidence of rind breakdown seen in 2000 was attributed to the unusual climatic conditions experienced during the 1999/2000 growing season. Rather than being the result of a single factor it was concluded that a combination of factors were most likely responsible, including above average spring temperatures which lead to very early flowering and rapid early fruit growth and above average heat unit accumulation and rainfall throughout most of the Stage II cell expansion phase of fruit growth from February to April. It was hypothesised that these conditions lead to the early onset of rind senescence.

In structured trials the proportion of fruit showing symptoms of rind breakdown following a period of low temperature storage was influenced by scion budline and rootstock genotype, some cultural practices, and by harvest date and storage temperature.

Scion and rootstock influences

The influence of genotype is complex with both rootstock and scion budline affecting the likelihood of postharvest rind breakdown. The effect of rootstock was investigated using Bellamy navel orange trees growing on seven different rootstocks. The overall rate of postharvest rind breakdown was approximately 7% but seasonal influences were strong and the nature of breakdown symptoms varied between seasons. Overall, fruit from trees growing on *P. trifoliata* were less likely to show symptoms of breakdown compared to fruit from trees on sweet orange or citrange rootstocks.

Amongst a range of scion budlines growing on the same rootstock on the same site and managed uniformly, the incidence of postharvest rind breakdown in unwaxed fruit stored at 1ºC

varied from 0 – 32%. Scion genotypes varied in seasonality (i.e. the time of the season when internal maturity is acceptable), but scion seasonality was unrelated to the incidence of rind breakdown. **Significant differences in rind breakdown were apparent between genotypes within the early season selections, the mid/late selections and the late season selections.**

Influence of cultural practices

With regard to cultural practices, in a trial in which water supply was varied between 50 and 150% of tree water needs, over watering was seen to be associated with greater incidences of some forms of breakdown, but the response was strongly dependent on rootstock and season. In trials conducted over three seasons, the mineral nutrient status of trees or the mineral nutrient supply (N and K) had no impact or only a very weak impact on the incidence of postharvest rind breakdown.

Variability in the incidence of postharvest rind breakdown amongst fruit harvested from trees on uniformly managed sites was linked to differential phenological development (i.e. variation in physiological fruit age) and to variation in tree health (as indicated by shoot vigour). The significance of these observations is that management units are generally harvested as single units, but the total population of fruit encompasses fruit of widely differing physiological condition. **A key finding from the project was that variation in orchard topography can have as great an effect on the morphological development and maturation of fruit as variation in year to year climatic conditions.** To minimize rind breakdown problems the uniform application of management practices to blocks of variable topography is clearly not appropriate. Both growers and packers need to be aware of sections of orchards that are at increased risk of postharvest rind breakdown and should not be harvested for export.

GA sprays

The use of gibberellic acid (GA) is the most effective management tool available to growers to improve rind quality and delay the onset of rind senescence. Effects of timing and concentration of GA sprays on rind colour development, rind firmness and the susceptibility of fruit to rind disorders were investigated in a series of trials conducted in the Riverland and Sunraysia over four seasons.

Summer GA sprays applied before the end of January were effective in reducing the incidence and severity of albedo breakdown, improving rind firmness and maintaining a more homogenous albedo tissue structure without adversely affecting colour development or early harvest. In addition, summer GA sprays also enhanced the effect of autumn GA sprays on rind firmness.

Autumn GA sprays significantly delayed rind colour development, and the earlier sprays were applied following colour break then the firmer fruit rinds were at harvest. Sprays applied after May slowed colour development but had no effect on rind firmness. Based on the delay in rind colour development, April GA sprays could be used to extend the harvest period by up to 25 days and May GA sprays by 15 days. There was no additive effect of combined summer and autumn sprays on colour development. In a trial shipment of January GA-treated fruit and untreated fruit sent to the USA in 2004, GA-treated fruit outturned in better condition than untreated fruit with fewer skin defects.

Based on the results of these trials it was recommended that a summer GA spray should be considered mandatory for all fruit destined for export, whereas the timing of autumn sprays would be dependent on harvest schedules and the impact of seasonal conditions on rind development.

Rind age

The impact of differential phenological development highlighted the need to be able to objectively measure the physiological age of fruit rinds. Rind colour, as measured by the CIE tristimulus system, allowed clear identification of the onset and completion of colour break, and, therefore, the onset of the final phase of fruit development. But this system lacked sufficient sensitivity to differentiate the colour of fruit that had recently completed full colour change from the colour of fruit that had completed colour change weeks previously. The use of alternative technologies that provide more information about specific wavelengths should be investigated in relation to identifying rind colour changes after the fruit attain full colour.

ProGibb® treated citrus travels the world fresh.

ProGibb® is now registered for reduction in creasing on Navel and Valencia oranges.

Whether you are exporting to the USA, South East Asia, Europe or Japan, the people of the world who buy citrus fruit have one thing in common: they look for and pay for the freshest looking fruit and quality.

The question is, when your fruit is shipped to such far flung markets, how can it maintain clean glossy rind and quality?

The answer... **ProGibb**.

Simply stated, citrus treated with ProGibb maintains better rind quality. That helps citrus endure storage and shipping better so the fruit inside stays fresh longer. And that is precisely what the fruit buyers of the world want most.

Beyond that, ProGibb has established itself as a useful tool in coordinating the harvesting and marketing of citrus crops. That's better for your packing house, and better for you.

So if you want all the hard work that goes into your orchard to pay off at the market, use ProGibb. Because fresher looking citrus means better profits. Wherever it's sold.

For more information on ProGibb® contact Phil Glover, Regional Manager on 0418 668 586.

SUMITOMO CHEMICAL

Sumitomo Chemical Australia Pty Ltd (ABN 21 081 096 255) 501 Victoria Avenue Chatswood NSW 2067 Tel: (02) 9904 6499 Fax: (02) 9904 7499

® Registered Trademark of Valent BioSciences Corporation, Libertyville, IL, USA

Another approach to assessing the physiological age of navel orange fruit rinds involved the investigation of the expression of known and unknown genes in the rind as a function of fruit ontogeny. A number of candidate genes were identified that potentially could be the basis of an objective test for rind age. The abundance of mRNA from a gene coding for a protein bearing some similarity to a protein involved in the oxidation of phenolic compounds in other plants was observed to be much greater as the average age of the fruit population fruit became greater. This warrants further investigation because the activity of this protein can be assayed for relatively simply. Another gene of unknown function was expressed more in senescing fruit than non-senescing fruit, and further investigation indicated that the relative expression of this gene was consistent with the seasonality pattern of three different navel budlines: for fruit collected on the same calendar day, the abundance of mRNA for this gene was much greater for fruit from an early season selection versus fruit from a mid season selection, which, in turn was greater than for fruit from a late season selection.

Knowledge of the gene expression patterns in the developing navel orange rind has wider application beyond industry's immediate need for an objective method of measuring rind physiological age.

Phosphorous acid and phosphoric acid – are you confused?

Sandra Hardy, Industry Leader, Citrus, NSW DPI, Gosford and Nerida Donovan, Plant Pathologist, NSW DPI, Menangle

Phosphorous acid and phosphoric acid are two chemical products commonly used in horticulture, but they have very different uses.

Phosphorous acid has some fungicidal activity and is commonly used to treat Phytophthora root rot in a range of crops. Whereas Phosphoric acid is used as a phosphorous (P) fertiliser, especially in hydroponic and fertigation systems, because it is very soluble in water. Each product has its specific use and these are not interchangeable. The table below summarises the properties of each product.

References

Brunings, AM, Datnoff, LE and Simonne, EH 2007, *Phosphorous acid and Phosphoric acid: when all P sources are not equal*. University of Florida.

Chemical	Phosphorous Acid (H3PO3)	Phosphoric Acid (H3PO4)
Other names used	Phosphonic acid, phosphonate	Phosphate, orthophosphate
Breakdown products	phosphonate (phosphite)	Hydrogen phosphate and dihydrogen phosphate.
Examples of commercial products	Rid a Rot®; Stop Wilt®; Phos-inject®; Dominator®; Sprayphos 620®; Throwdown®; Phospot 400®; Aus-phoz.®	Mono and diammonium phosphate; single and triple superphosphate; ammonium polyphosphate
Uses	Fungicide – activity against some pathogens, e.g. *Phytophthora sp*., Phosphonate resistance has been reported in some *Phytophthora spp*. so phosponates should be rotated with other compounds. Is not a source of the nutrient phosphorous.	Fertiliser – nutritional source of P. Most water soluble form of P. Sometimes used to clean irrigation pipes.
Mobility in plant	Systemic fungicide, mobile in the plant. Easily absorbed by roots and leaves and translocated (in the xylem-water vessels) in the plant.	Mobile in the plant. In soil, dissolves in water and available for plant uptake. Can react with soil nutrients to prevent plant uptake (e.g. at low pH forms insoluble salts with aluminium and iron, at high pH reacts with calcium).
Chemical stability in plant	Stable in plants. Can intensify P deficiency symptoms in plants.	Very stable in plants.

National Plantings Database
Project CT02033

Extracted from the final report of Project CT020533

Judith Damiani, Australian Citrus Growers

Introduction

The Australian citrus industry recognised that in order to more effectively market their citrus products, the industry first needs to have a detailed understanding of what their supply capabilities are. The National Plantings Database project was undertaken to address this issue. The Australian citrus industry now has a comprehensive, detailed record of citrus tree plantings and irrigation systems, covering all known major citrus growing enterprises in Australia.

Digital aerial photography and comprehensive one-on-one surveys of citrus growers have been compiled into regional databases of citrus planting statistics. Regional statistics have been supplied into a national database to provide the industry with a well informed picture of the Australian citrus industry.

The database is based on ESRI ArcView GIS or Geographic Information System software allowing digital photography to be integrated with grower property and plantings data. From this database individual Crop Plans were produced for every grower surveyed. Grower confidentiality is maintained at all times. Data is maintained and updated at the regional level with consolidated data only supplied to ACG for the purpose of statistical reporting at only regional and national levels.

Results of the 2003 Survey

A national total of 29,780 hectares of citrus plantings have been mapped from orthophoto imagery, with 89% of this area surveyed to the variety level. A summary of some of the data collected and mapped is outlined in Tables 1 and 2.

Table 1. National Citrus Regions – 2003 Summary

Region	Number of properties mapped	Citrus hectares mapped	% of hectares surveyed for variety	System managed by:
Queensland	94	4333	82%	Growcom, Brisbane
Bourke and Narromine	11	594	98%	ACG in collaboration with NSW DPI
East Coast NSW	82	597	92%	ACG in collaboration with NSW DPI
Riverina	560	8687	93%	Riverina Citrus
Riverland	645	7036	90%	SA Citrus & Industry Development Board
Western Australia	194	1191	52%	ACG in collaboration with Dept Agriculture WA
Kununurra	40	155	0%	Not surveyed - estimates from orthophoto imagery
Northern Territory	28	186	100%	Dept of Business, Industry & Resource Development
Murray Valley*	623	7,001	97%	Murray Valley Citrus Board
TOTAL	**2277**	**29780**	**92%**	

*Murray Valley citrus mapping was completed prior to this study, however results are included here for National totals.

Table 2. Citrus plantings by hectares.

CATEGORY		AREA HECTARES	
Not surveyed		2414	**2414**
Citrus	Citrus-Mix, Trials	708	**708**
Grapefruit	Grapefruit	385	
	Grapefruit-Red	168	
	Grapefruit-White	13	**566**
Lemon		1117	**1117**
Lime		95	**95**
Mandarin	Mandarin	582	
	Mandarin-Early	1687	
	Mandarin-Late	1176	
	Mandarin-Mid	758	**4203**
Navel	Navel	473	
	Navel-Early	2461	
	Navel-Late	4524	
	Navel-Mid	3857	**11315**
Orange	Orange	158	
	Blood Orange	55	**213**
Pummelo		2	**2**
Tangelo		316	**316**
Valencia	Valencia	8642	
	Valencia Late	68	
	Valencia-Seedless	121	**8831**
	TOTAL	**29780**	**29780**

Citrus growing in Bhutan

Sandra Hardy, NSW DPI, Gosford

Introduction

Bhutan is a small (38,394 km^2) landlocked country about the size of Switzerland. It is nestled in the eastern Himalayas between Nepal, Tibet (China), India and Bangladesh. The population of Bhutan is around 700,000 with around 70% of the people engaged or dependent on some form of agriculture for their livelihood.

Bhutan is a very unique country with government policies in place that aim to preserve both its traditional customs and lifestyle as well as protect the natural environment. Bhutan remained largely closed to the outside world until the 1960's with its economy largely self sufficient. Even today tourism is limited in order to maintain the natural and cultural environment.

The country of Bhutan has a measured program of development that is outlined in a series of 'Five Year Plans' (FYPs). The first FYP was initiated by the King in 1961. While the early plans focussed largely on infrastructure development, latter plans have focussed on socio-economic development. The Royal government has also placed continuous emphasis on the development of agriculture from the beginning of their planned development program for the country.

Topography and climate

The country of Bhutan comprises a series of steep mountain ranges that have been dissected

Source: MAPQUEST www.mapquest.com

by a network of rivers running north-south across the country. These rivers have cut through the mountains to form deep river valleys that drain out onto the northern Indian plains. The land rises 200 m in the southern foothills to peaks of over 7,000 m in the north. Around 70% of Bhutan is covered by coniferous forest and the government has a mandate to retain 60% of the land under forest cover into the future.

The topography and location of Bhutan ensures that there is the full myriad of climatic zones, from alpine in the north through cool and warm temperate zones to the wet, humid or dry subtropical regions in the east and south.

Only about 8% of the land area of Bhutan in considered arable, with the steep mountain slopes confining cultivation mostly to the lower valleys and floodplains.

Agriculture

Agriculture in Bhutan could be classed as subsistence farming based around cropping, animal husbandry and forestry. Farm size is generally small, with most people owning their own land and using traditional farming practices that are very labour intensive. Infrastructure is limited with most farms quite isolated and unable to irrigate or use heavy machinery. The land is still largely cultivated by animal driven ploughs.

The main crops grown in Bhutan have been based on the staple dietary needs of the local people and

include rice, corn, wheat, barley, potato, chilli and radish. The main tree crops grown are apples, mandarins and areca nuts.

Crops are mostly grown in the lower valleys and flood plains

The Ministry of Agriculture in Bhutan has a mission "To increase food production, raise rural income and improve the livelihood of the nation's large rural population while preserving the natural environment and conserving the natural resources of land, water, forests, flora and fauna for futrue generations".

Citrus production

The citrus industry is based on just one mandarin variety known locally as an orange. The variety is most likely a Ponkan or Emperor mandarin type. Mandarins are grown in 17 of the 20 districts of Bhutan, with production greatest in the southern subtropical regions of Tsirang, Chhukha, Samdrup-Jongkhar and Sarpang (see Map 1).

The local mandarin variety

Map 1. Districts of Bhutan
Source: www.tourbhutantravel.com

There are close to 1.8 million trees with an annual production of 31,000 tonnes. Average tree yields are 32 kg and fruit is harvested between November and February. Citrus is Bhutan's highest value export crop and the second largest in volume after potatoes. Around 18,000 tonnes are exported annually to the neighbouring countries of Bangladesh (85%) and India where the fruit is in high demand due to its large size and unique taste.

Trees are normallly multi-stemmed and tall

At least 60% of the population grow citrus, mostly for their own comsumption. Most orchards are small with less than 50 trees but commercial orchards, comprising 8% of growers, can have between 500 and 1,000 trees. Commercial growers comprise 50% of the total citrus orchard area of around 6,500 hectares.

The citrus industry currently uses only seedling trees which can take up to 9 years before they produce fruit. There are both government and private nurseries producing trees, but some growers also produce their own seedlings.

On farm management practices are very basic, limited to the application of animal manure (tethering cattle to trees) and clearing the undergrowth beneath trees a few times a year. The trees are not trained or pruned and are often multi-stemmed rising 4–5 m in height, with the crop being produced mainly in the tops of trees.

Pest and disease management is limited, a consequence of the cost and limited availability of products, and lack of appropriate control programs and strategies, equipment and knowledge.

The main diseases affecting citrus include the Huanglongbing (citrus greening disease), citrus canker, phytophthora root rot and powdery mildew. In 2003 when Huanglongbing was discovered, the government initiated a country-wide program to remove infected trees, restrict the movement of nursery trees and also supplied chemicals to growers to help control the pysllid insect vector.

The main pests affecting citrus include the Chinese Citrus fruit fly, trunk borer and spined citrus bug. The biggest cause of crop loss is fruit drop caused by the Chinese Citrus fruit fly.

Chinese Citrus fruit fly causes extensive fruit loss

Although Bhutan has abundant water available very few farms (apart form those alongside rivers) can access this water as there is no infrastructure in place to get it up the mountain slopes.

Most citrus farms are quite isolated often 5–6 hours walk from the nearest roads. Fruit is harvested into baskets and then has to be carried by animals over long distances to the nearest road. From here it is then able to be taken by truck to either the local regional market or south to the main export centres.

Damage by trunk borer commonly causes tree death

There are currently no storage facilities or cool rooms in the country so fruit has a relatively short shelf life of 2–3 weeks. Although most citrus is for the fresh fruit market a small quanity is processed.

New project

In June 2007 a new collaborative project funded by the Australian Government through the Australian Centre of International Research (ACIAR), NSW DPI and the Bhutan Ministry of Agriculture commenced. The project will focus on improving the productivity and profitability of the Bhutanese citrus industry.

The main aims of the project will be to:

- Improve nursery tree production practices in Bhutan.
- Demonstrate and implement ‘on farm’ best management practices such as pruning, nutrition, pest and disease control strategies and crop management.
- Improve the capacity and knowledge of Bhutanese research and extension staff in citrus production techniques.

In addition the project will enable NSW DPI’s citrus research centre at Dareton to expand and strengthen its current programs in both citrus and mandarin rootstock and scion evaluation. The project will also allow for the development of a comprehensive mandarin production manual for Australian growers.

On-farm composting

Carly Low, Technical Officer – Green Waste Extension Project, NSW DPI, Gosford

What is compost?

Compost is produced by decomposing organic materials under specific conditions of temperature, moisture and aeration. Compost can be made from anything which was once living for example leaves, grass clippings, vegetable waste, crop waste, manure, fruit, straw, bark, bread and seaweed.

Benefits of compost

Compost, when added to the soil can help in reducing soil erosion, retaining surface moisture, improving drainage and aeration as well as providing a habitat for soil organisms such as worms. Compost also provides nutrients, boosts soil carbon levels, builds up soil organic matter, enhances soil biological activity and suppresses some plant pathogens.

Sources of compost

Municipal Waste: Waste from household garbage collections such as food scraps, cardboard and paper.

Feedlot waste: Waste from feedlots such as manure, feed and hay.

Dairy Waste: Manure from feedlots, leftover feed and pasture.

Garden organics waste: Waste from kerbside green waste collections.

Council Waste: Grass clippings, wood chips, tree clippings and soil.

Bio-solid waste: Composted sewage solids mixed at licensed composting facilities with other materials such as composted wood chips to form a high nitrogen blend which can be applied to degraded soils.

Agricultural waste: Farm waste such as vegetable matter, hay, straw, manure and tree trimmings.

Tips when buying compost

When buying compost by the bag, look for the Australian Standards AS4454 logo for Composts, Soil Conditioners and Mulches. When buying compost in bulk request a product specification sheet. This will list all of the Quality Assurance tests that have been undertaken and the acceptable N, P, K ranges for the compost and the raw materials in the compost.

Making compost

Preparation area

You need a flat area away from trees and houses. Ideally there should be enough room to use machinery to turn the compost heap. Any runoff from the area should be able to be captured and directed away from waterways. Ideally the area should be under cover or able to be covered by a portable cover such as a tarpaulin or carpet. A

Compost heap formed into a windrow on farm

shredder is also useful to reduce the size of larger materials.

Materials

Compost materials can be anything found on the farm that is organic. However there are some materials that are not recommended to compost on farm including: meat, fish, dairy, weeds, plant seeds, dog, and cat droppings. Do not compost metals, plastics or non-organic materials such as fibreglass.

The main concerns about composting meat, fish and dairy materials on farm include:

- If the correct temperature is not achieved or the composting process hasn't occurred for a sufficient time, pathogens will not be destroyed and could spread to other areas of the farm.
- The possible recontamination and regrowth of pathogens due to insufficient turning of all the compost material into the centre of the pile. (i.e. all parts of the compost heap do not reach the required temperature of 55-65ºC)

Most organic material can be composted

Method

Temperature + Moisture + Aeration= Compost

The ideal compost temperature is 55ºC, moisture should be retained at 60% and proper aeration should occur by turning the compost twice weekly for a period of 12 weeks as a general rule.

1. Add a layer of coarse material to the bottom of the compost area (e.g. woodchips) to allow for good aeration underneath the pile especially if using a cement surface.

Turn the compost twice weekly

2. Add alternate layers of carbon (brown) materials and nitrogen (green) materials watering periodically. The compost heap should be no higher than 2 m to ensure adequate turning.
3. Cover with an old carpet or tarpaulin.
4. Turn twice a week for 12 weeks.
5. Start a new heap rather than adding more materials to this heap.

What happens without proper temperature, moisture or aeration control?

Without high temperatures the organic matter can take months or years to compost and weed seeds and pathogens may not be killed. Without adequate moisture the composting process will be slowed down. Good bacteria cannot survive, move or function without adequate moisture. Without good aeration, anaerobic (low or no oxygen) composting occurs producing foul odours and slow or no breakdown will occur.

On farm compost monitoring equipment

Dial and digital thermometers as well as soil moisture probes are all relatively inexpensive and should be used for measuring temperature and moisture levels in the compost heap.

A standard soil pH test kit and the Solvita test kit which tests for compost maturity by measuring carbon dioxide and ammonia levels in the compost is also a good option.

Simple on farm tests that can be undertaken to monitor compost heaps.

Sniff test for maturity and compost readiness

Take a sample of compost in your hand (using gloves) sniff the compost. If it has no apparent odour and smells like a handful of soil then it is ready.

Squeeze test for moisture content

Take a handful of compost (wearing gloves) and squeeze in your hand- if the compost doesn't form a ball, it is too dry, (less than 55% moisture).

If the handful drips water, its too wet (over 65% moisture).

If the handful remains in a ball when squeezed, and there is no excess water, the moisture level is right (between 55% to 65% moisture).

Germination test for maturity

Take a seed tray and half fill with your compost, add 10 fast germinating seeds (e.g. cress, corn, cucumber, lettuce) and cover with more compost.

At the same time spread 10 seeds onto a moistened paper towel on a plate.

Compare germination speed and number of seeds germinating between the paper towel and compost. If the seed growth is slow in the compost, then it isn't ready to be used.

Bag test for curing/stabilising

Take a handful of compost, put it in a plastic bag and wet until saturated, then seal the bag. Leave it for a week. When the bag is re-opened the compost is ready if it does not have a foul odour.

More information

There are a series of fact sheets on composting available, including:

- What is compost?
- How to make compost.
- Composting methods.
- Questions about compost.

For more information or a fact sheet contact Carly Low at:

Gosford Horticultural Institute
NSW DPI
Locked Bag 26 Gosford NSW 2250
Ph: (02) 4348 1921 fax: (02) 4348 1910

New insect causing galling on citrus – have you seen it?

Prepared by Plant Biosecurity and Horticulture and Forestry Science

Background

In March 2007, samples of citrus rootstock twigs with unusual insect damage were collected by a crop consultant from a property in the Central Burnett region of Queensland and sent to DPI&F for diagnosis. Affected twigs had soft, raised, spherical swellings externally,with numerous small white larvae inside. A single wasp reared from the infested twigs resembled the native citrus gall wasp (CGW), *Bruchophagus fellis*, however, the damage symptoms and larvae were sufficiently different from CGW to raise concern that this may be an exotic pest or a native species not previously associated with citrus.Wasps reared from infested twigs were identified by CSIRO to be from the genus *Eurytoma*, but the species could not be determined. Other *Eurytoma* species have previously been noted on native citrus in New South Wales, however this is the first time a species of this genus has been reported on citrus in Queensland.

What is being done?

DPI&F is working with citrus consultants to establish the distribution of the wasp in Queensland and the varieties attacked. DPI&F is also working with CSIRO to identify the wasp and to determine if it is a new species or a native that has changed its normal host preference as a result of conditions such as drought. We need your help to report damage symptoms on citrus similar to the images in this DPI&F article.

What types of plants are affected?

To date, damage on twigs, thorns, soft terminal growth and the bases of midribs and petioles has been noted mostly on field grown troyer citrange rootstocks or regrowth beneath unthrifty scions. It has also been detected on a single Calamondin tree, a Meyer lemon and in sweet orange rootstocks. Surveys of citrus orchards in proximity to known detections have not revealed damage to scion material or fruit.

How does Eurytoma damage differ from citrus gall wasp?

Citrus gall wasp causes distinctive woody galls on citrus, even when only a single larva is present. Galls can be more than 25 cm long and contain hundreds of larvae in distinct circular cells. Gall size is directly correlated with the number of larvae present. CGW has a single generation each year; the short lived adults emerge in October and oviposit into soft spring growth twigs, thorns and petioles. Larvae over-winter in the first instar and rapidly complete development in early spring. CGW attacks all citrus varieties, but there are clear differences in susceptibility. Rough lemon and troyer citrange rootstocks are very susceptible and grapefruit is the most susceptible cultivated variety. Lemons and oranges can be affected; mandarins are the least susceptible.

By comparison, the recently reported *Eurytoma* sp. causes soft, irregularly shaped, non-woody galls. The larvae do not occur in circular cells and it can complete several generations per year. The galls of *Eurytoma* sp. occur on leaves, midrib bases, petioles and twigs. Affected thorns are shortened,

swollen and distorted. The larvae and their tunnels are more elongated than those of citrus gall wasp. Significant damage appears to be restricted to field grown rootstock seedlings.

Emergence holes associated with *Eurytoma* sp. galls or swellings can be apparent at ~20 cm intervals on stems in which several generations of the wasp have been completed. Heavy infestation of soft terminal tissue causes cessation of growth, poor graft performance and production of regrowth shoots below damaged areas. The worst affected twigs break off just below the growing point.

Need more information or want to report symptoms?

The DPI&F wishes to determine the distribution of the new wasp and to assess the extent of damage caused to both rootstock and scion material. To report suspicious damage, or for more information contact the DPI&F Business Information Centre on 13 25 13.

Wasp emergence hole and typical soft spherical swellings or galls on a Troyer seedling twig.

Photo: Dan Papacek, Bugs for Bugs, Mundubbera.

Eurytoma sp. larvae tunneling in a Troyer seedling twig.

Photo: Dan Papacek, Bugs for Bugs Mundubbera.

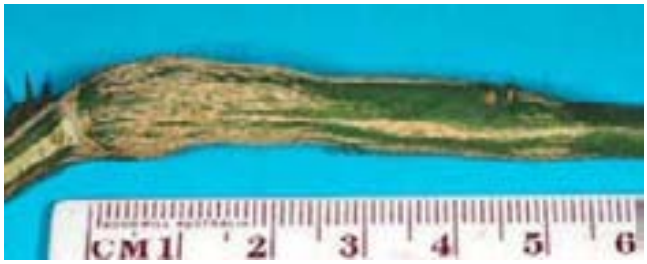
Troyer rootstock seedling showing soft galls and a swollen thorn base on soft autumn growth caused by Eurytoma sp.

Photo: Dan Papacek, Bugs for Bugs, Mundubbera.

Heavily infested Troyer regrowth twigs broken off by the wind.

Photo: Paul Slattery, Biosecurity Queensland.

Citrus Gall Wasp



Hardened, woody gall on pommelo caused by the native citrus gall wasp (CGW), Bruchophagus fellis.

Photo: Chris Freebairn, Horticulture & Forestry Science.

A large Citrus Gall Wasp gall on pommelo containing numerous larvae in their characteristic circular woody cells.

Photo: Chris Freebairn, Horticulture & Forestry Science.

News in Brief

♦ Pat Barkley Foundation: call for nominations

Source: ACG Members Newsletter, 3 October 2007

The Pat Barkley Foundation aims to assist the Australian citrus industry to maintain access to world class technical expertise via the provision of international travel grants. These grants allow attendance at scientific meetings, workshops or training programs, or to visit leading scientists overseas.

The Australian Citrus Growers are putting out a call for applications for 2008/09 bursaries, with the deadline being the 31st January 2008.

Further details: www.australiancitrusgrowers.com or email susie.thornton@australiancitrusgrowers.com

♦ National orange pre-season forum

Source: ACG Members Newsletter, 15 October 2007

On the 9th October, ACG facilitated another National Orange Pre-Season forum for key citrus participants; state boards, industry bodies, packers, exporters and processors.

This forum enabled the sharing of information and discussion on the coming 2007/08 Valencia season and a recap on the current navel season.

Forum participants were keen to contribute relevant information discussing current issues, namely; current water allocations across key growing regions, impact of drought on forecasted production levels, assessment of the navel and Valencia season and an overview of the juice market.

A key outcome of the forum was the concern for the ongoing impact of the drought, particularly the reduced water allocations across key growing regions that will inevitably affect production of oranges.

The three regional State Boards (MVCB, Riverina Citrus and SACIDB) provided revised estimates of their Valencia's. Overall, smaller fruit size and a 33% reduction in Valencia production on previous season's output is expected – the lowest Valencia crop for 35 years.

The Valencia marketing outlook was not positive. Demand seemed 'flat', with competition from South Africa, the US and Chinese navels still to peak, and the Australian dollar continuing to rise.

Processing prices have been set for contract suppliers "in excess of $250/t" and were not expected to change. Increased retail prices are required to alter this, which are already at record highs, and starting to impact on sales. If at all possible, growers were urged to lengthen harvest as much as possible to assist with marketing. With the current price of water, there were concerns that these grower prices were non-economic.

♦ Citrus industry to embrace change

Source: ACG media release, 17 October 2007.

The steps to restructure Australia's citrus industry have begun.

The Industry's peak body, Australian Citrus Growers (ACG), has kicked off a series of regional road shows that will outline two possible structure options that could best service the Industry.

The move has the support of the Industry's grower-funded bodies who in 2005 endorsed the need to change the existing structure.

ACG President, Mark Chown said "it was clear to all parties along the citrus industry's supply chain that the structure of the current grower-funded bodies was based on a traditional, agripolitical, regional representative model that is seen to be less relevant in these modern times".

"Never has the industry met such a strong challenge

for change from markets, production costs, export competitors and natural resources, as in these current tough times."

Within the industry, growers currently support 13 citrus bodies through levies or voluntary contributions (this does not represent all citrus grower bodies). In short, this equates to one citrus body for every 160 growers.

Obviously the timing of the industry's restructure had been challenged by the increasing water crisis as well as the upcoming Federal Election. However, the peak body was committed to continue consultation with the Industry, during this uncertain period, about the restructure process with a more long-term view in mind. It is vital that we not only address the immediate issues but plan ahead for the benefit of not just the grower but the industry in general.

Since 2005, the industry had been independently reviewed and had developed a new direction - Citrus 2015 - which strongly recommended aligning all structures and resources. To address the recommendations, the formation of a new national peak body was suggested with direct grower membership and regional presence. The new peak body would also have a strong commercial influence from a board of seven directors with grower, supply chain and commercial experience.

The two possible structure options which focus on the type of regional presence required could be:

Multi Structure with improved coordination between the existing regional grower bodies by:

- Encouraging the amalgamation of regional grower bodies.
- Formal contracts between State Statutory Authorities and the new peak body.
- The multiple collection of various statutory levies and voluntary contributions will remain with varying levels of state, regional and national administration.

OR

Single Structure with full integration of all existing grower bodies by:

- Nationally coordinated programs through a regional presence as directed by the new peak body such as Industry Development Officers, contractors and sub-committees.
- One set of national levies and membership fees for a more equitable, efficient service delivery and leadership.

In 2008, levy payers will be asked to decide on the best possible, structural option to drive the Industry forward.

For more information, contact Communications Manager, Susie Thornton on (03) 5023 6333 or 0411 140 083.

♦ National orange promotions project

Source: ACG members newsletter, 5 November 2007

This year the National Domestic Orange Promotions Committee did not have a budget allocated for a new promotional campaign, however a small allocation was made for a national project to centralise all historic citrus marketing material.

In September, Sydney based company Gingerfrog Strategic were appointed to immediately undertake the project scope, which was to collate all historic marketing collateral from industry into one centralised location.

On 25th October, marketing consultants Gingerfrog Strategic met with ACG in Mildura to discuss the citrus promotions coordination project.

Gingerfrog Strategic presented a summary of all materials collected from regional bodies. This material has been entered, evaluated and catalogued into an extensive database.

The project to date has been successful, with a large amount of historical material to be made available in a succinct format for industry reference purposes.This will also be a good base to then develop further marketing activities to ensure the right direction for stakeholders going forward.

All material will be scanned for the purpose of electronic reference.

Marketing ideas stemming from the meeting will also be developed further and be presented to Horticulture Australia Limited and the National Orange Promotions Committee at a future date.

♦ Domestic organic standard coming soon

Source: Agriculture Today, September 2007

To overcome the concern that has existed for many years over misrepresentation of produce as organic or biodynamic on the domestic market, a new Australian Standard is being developed.

Standards Australia agreed to develop a code after a request from Australia's organic industry peak body, the Organic Federation of Australia.

The concept of an organic standard for Australia is not new. Since 1992, enforceable national standards for exported organic products have detailed minimum requirements for production, processing and labelling.

The Australian Quarantine Inspection Service (AQIS) administers the national standard and associated Export Control Orders.

Anecdotal evidence suggests the national standard for exports has become the standard for the domestic market where AQIS does not have legal jurisdiction over failure to comply; nor does it cover organic products imported into Australia.

This limits options for ensuring the integrity of organic products in the domestic market.

Moreover, the Trade Practices Act, 1974 and State and Territory food laws provide truth in labelling requirements but lack of enforcement by Federal or State agencies against apparent non-compliance have robbed the organic industry of evidence to convince governments to develop a legislative framework for organic products sold domestically.

The NSW Organic Ministerial Advisory Council (OMAC) will provide advice on mechanisms which can improve the integrity and security of organic food entering the marketplace and increasing consumer confidence in these products.

The current national organic export standard is being considered as a basis for the development of the Australian Standard.

While Standards Australia will develop the new Australian Standard, it will not be involved in the certification of growers or retailers claiming to meet it, nor can the Standard mandate certification. This is a key concern of industry and in parallel to Standards development, the Standards Australia technical committee is investigating potential regulatory frameworks which could achieve these objectives.

The Standard is expected to be finalised in 2008, following a comprehensive review and community consultation process.

For more information contact: Robyn Neeson, NSW DPI, Yanco (02) 6951 2735.

♦ Consumers on top

Source: Agriculture Today, September 2007

Why go organic? Answers to the question are, like most big picture questions, varied.

Whatever the reason, with demand outstripping supply over several years and gaining momentum, organic agriculture is no longer a fringe industry, according to NSW Department of Primary Industries organics and food industry development manager, Scott Seaman.

"Some see it philosophically as the right way to farm for nature's benefit, some as a lifestyle choice. Others see the health benefits of a non-chemical production system. Then there's the economic potential and a marketing point of product differentiation. The real difference for the organic industry is that consumers drive the market."

"Consumers are becoming more aware of agricultural production systems and the impact on natural resources and more aware of food and product safety, primarily desiring reduced levels of chemicals. Other factors include the perception of

improved food taste and flavour, animal welfare and social responsibility."

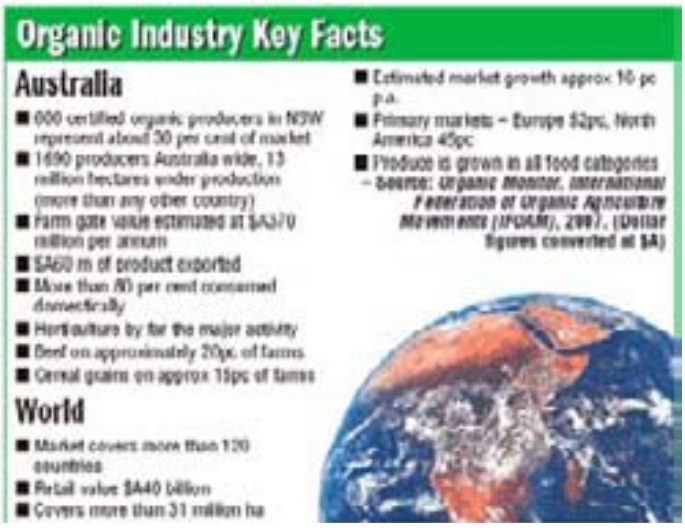
"Another social trend - eating seasonal and local produce - supports the values of rural communities, fair trade, carbon footprints, globalisation, and restoring the lost connection between farmers and consumers."

The major distribution channels for organic produce are now the major retail food chains, although there is a strong specialised retail sector for organics and a growing presence through farmers markets and direct-to-consumer retail.

Organic production in Australia is still relatively small, even though we dedicate more land to it than any other country.

The recent publication of the RIRDC strategic plan for the development of the industry identified strong opportunities in the cereal grains industry, as the highest priority. Other opportunities included animal production industries, for example beef, lamb and sheep meat, particularly in the rangelands areas of NSW. Both the horticultural and dairy industries were highlighted, with rapid growth in demand for both domestic and export products.

"The major strength of the organic industry is its base of Quality Assured production systems, a process of being certified by a third party, giving the consumer confidence in production integrity," Mr Seaman said.



Although there are several accreditation bodies, the process of having an auditing process backing the production system gives organics its strength.

For more information contact Scott Seaman, NSW DPI, Bathurst, (02) 6330 1200, scott.seaman@dpi.nsw.gov.au

♦ $5 million to help farmers tackle climate change

Source: Media release, DAFF07/159PM, 10 October 2007

Nineteen projects aimed at helping farmers to better manage the effects of climate change will receive $5 million under the Australian Government's National Agriculture & Climate Change Action Plan.

The projects cover a wide range of challenges and are designed to provide results that will put farmers, industry bodies and government in a stronger position to know how to respond to a changing environment.

The projects will focus on the four key areas of the Action Plan –adaptation, mitigation, research and development and communication and awareness.

They include:

- The Queensland Farmers' Federation ($857,000) – to improve the capacity of agriculture to manage the impacts of climate change
- Birchip Cropping Group and Land and Water Australia ($785,000), and WestVic Dairy ($120,000) – to communicate the risks and opportunities presented by climate change to Australian agriculture.
- Australian Farm Institute ($593,000) – to develop understanding of the economic implications for farm businesses of climate change and climate change policies.
- National Farmers' Federation ($200,000) – to investigate the potential role that soil carbon may play for emissions trading opportunities.

News in Brief

- Dairy Australia ($155,000), and Meat and Livestock Australia ($30,000) – to help farmers improve productivity and profitability while at the same time improving greenhouse gas abatement.
- Rice Growers' Association of Australia ($145,000) – for research and development projects to help farmers adapt to the risks and opportunities associated with climate change.

Funding of $500,000 has also been allocated to the fisheries and forestry sectors to help them address climate change issues.

The $5 million package includes $700,000 earlier provided to the Rural Industries Research & Development Corporation for research into methane capture and use technology.

The projects emerged from a climate change round table attended by more than 50 industry representatives in Canberra earlier this year.

Project details are available on http://www.daff.gov.au/natural-resources/climate

♦ Avocado industry dips into new industry biosecurity plan

Source: Avocados Australia, 2 October 2007.

The National Industry Biosecurity Plan (IBP) for the avocado industry presents the first nationally coordinated and consistent approach to managing and reducing the risk of plant pest incursions.

The IBP is a vital tool for Australia's avocado industry in the fight against pests and diseases which pose a constant threat to sustainability, profitability and viability. They provide a blueprint for taking the next steps to reduce the risk of incursions, improve pest and disease diagnosis and to develop contingency plans to deal with any outbreaks.

An outbreak could be devastating for the industry, local communities and Australia's economy. Pests have the potential to affect production, causing financial losses to industry and negative impacts on regional economies. They also threaten export market access, an industry grossing approximately $95 million per annum, as well as the environment.

Plant Health Australia (PHA) led the development of the IBP in partnership with Avocados Australia, HAL, the Australian Government and the state and territory governments. The significant linkages now established through the IBP will ensure that avocado growers are well placed to manage our most serious exotic pests and disease risks. As well as this it will help with our response readiness. The development of the IBP involved identifying the pests that affect the avocado industry worldwide, and prioritising them according to their risk to Australian producers.

More information on the avocado IBP and the 16 others currently in place is available on the PHA website at www.planthealthaustralia.com.au

What's new

♦ Managing bird damage

A new book called 'Managing Bird Damage to Fruit and other Horticultural Crops', by NSW Department of Primary Industries scientist, Mr John Tracey, provides a comprehensive assessment of the problem, current best practice approaches, options for management and what must be done to reduce damage in the future.

The book also contains fact sheets which provide growers with information about different pest birds and how to manage them. It is available from the Bureau of Rural Sciences and can be downloaded from their online bookshop at http://www.affashop.gov.au/product.asp?prodid=13796

Biofuels from woody plants

Source: Agriculture Today, October 2007

Renewed interest in commercial scale production of alternative fuels for transport chiefly emanates from issues relating to the use, impacts and rising demand for traditional fossil fuels.

In selecting alternatives, due consideration must be given to those fuels which serve to combat climate change and produce cleaner air.

Amongst the options is ethanol made from renewable feedstock. Large-scale ethanol production is currently based on sugarcane cultivation in Brazil and corn in the USA.

However, ethanol produced from corn does not significantly diminish greenhouse gas emissions nor create much energy from the production after accounting for the growing and processing inputs. The International Energy Agency estimates that production of ethanol from corn reduces greenhouse gas emissions by 15 - 25%, relative to fossil fuels.

And as ethanol use increases, demand for cane and corn feedstocks will intensify and clash with the need to produce food and fibre.

In light of these shortcomings, ethanol production from more sustainable feedstocks such as agricultural and forestry waste and residues, and dedicated energy crops is rapidly becoming the preferred option.

Moreover, projected greenhouse gas savings from using these types of novel feedstocks is estimated to produce ethanol which is 90% more effective than petrol in reducing greenhouse gases.

The feedstocks of interest are woody plants which contain lignocellulose - lignin and cellulose.

Although there are many approaches for producing ethanol from lignocellulose, most are fundamental variations of either biomass hydrolysis or gasification. The latter process converts lignocellulosic feedstock into a synthetic gas which is in turn converted into ethanol, via microbial fermentation or chemical catalytic reactions.

Depending on the raw material feedstock, there are four to five operations in ethanol bioconversion using the biomass hydrolysis process.

The first and most expensive step involves pre-treating the lignocellulosic material. Constituent sugars are then released and subsequently separated from the residual lignin. The lignin portion is either used to fuel the process or is chemically altered to generate value-added products. The sugar solution is subsequently fermented by yeast or bacteria, and the resulting ethanol stream is concentrated via distillation and/or molecular filtering. This ethanol can then be used for a variety of purposes including as a mixture with petrol in vehicles.

Although various governments and corporations throughout the US and Europe have heavily invested in emerging lignocellulosic technologies, there has been scant activity on the Australian front.

To date, Ethanol Technologies Limited (Ethtec) is the only known Australian entity to undertake pilot scale feasibility studies into ethanol production from lignocellulosic materials such as sugar cane bagasse, timber, and agricultural waste.

The first phase of the project involves construction of a pilot scale concentrated acid pre-treatment facility at the Harwood sugar mill in northern NSW.

For information on Ethtec's project, go to www.ethtec.com.au.

For more information contact Tony Vancov, NSW DPI, Wollongbar, (02) 6626 1359, tony.vancov@dpi.nsw.gov.au

AQIS imported horticultural products survey

Source: Food Surveillance News - Spring 2007

The Australian Quarantine and Inspection Service (AQIS) is intent on improving the safety of imported horticultural products. AQIS first had to find out how efficient its inspections of such products are. So it took two 'snapshots' in the form of surveys, of the status of the products to see whether any pesticide residues or microbiological contaminants were slipping through its imported foods inspection net.

AQIS did the surveys in addition to its normal testing regime of 5% of all food imports. It does this on the advice of Food Standards Australia New Zealand, (FSANZ) which has responsibility for the Australia New Zealand Food Standards Code. All food sold in Australia must comply with the Code, including imports. So it was gratifying for both FSANZ and AQIS that the first survey found the imported food controls are working as they should.

AQIS compared its survey results with data from state government surveys of domestic foods and found their microbiological and chemical levels to be at similarly low levels. When our FSANZ experts analysed the results, we were able to advise that the imported horticultural products constitute a negligible food safety risk.

In the initial survey carried out between August and October 2005, AQIS collected 97 samples from four entry points into Australia, Sydney, Perth, Melbourne and Brisbane. The samples were mainly fresh foods, ranging from snow peas through baby corn to shallots, though AQIS also selected at random a small number of dried or frozen packaged foods.

The National Measurement Institute (NMI) did all the testing and looked specifically for E. coli (with results reported in colony forming units per gram per sample – cfu/g – and counts of less than 10 cfu/g were considered negative, Salmonella (with results reported as detected or not detected in 25g of sample), and pesticide residues, using a mix of High Performance Liquid Chromatography/Mass Spectrometry and Gas Chromatography/Mass Spectrometry.

The NMI found no Salmonella in any of the samples and 14 positive results for E. coli. Of these 14, 10 were isolated from a single horticultural producer in Fiji, three from different producers in Thailand and one from China.

For chemicals the NMI tested 50 samples for 139 different chemical residues – a total of 6950 tests. Of these only two returned positive results. A sample of semi-dried tomatoes tested positive to procymidone at 0.06mg/kg, which is well below the maximum residue level of 2.0 mg/kg permitted by the Code. A sample of garlic tested positive to fenvalerate, which the Code does not allow on garlic but which is permitted on other foods. We advised that the detected level of 0.14 mg/kg was unlikely to pose an appreciable risk to public health, even though it technically did breach the Code.

Based on scientific advice, and to be consistent with the National Horticulture Survey being coordinated by FSANZ, AQIS extended the initial survey. In the second survey, conducted between January and December 2006, AQIS was looking specifically for the pathogenic bacterium *E. coli* 0157:H7. AQIS field staff sampled 41 fresh vegetables because these were the foods that had *E. coli* present in the first survey. The samples included five samples of baby corn from Thailand. No *E. coli* 0157:H7 were detected.

EML Consulting Services Pty Ltd Queensland conducted the analysis of all samples for this extension survey using their NATA accredited Bax System PCR Assay for Screening *E. coli* 0157:H7 Kit.

FSANZ has advised AQIS that the overall survey results showed that good hygienic practices are generally in place and the risk associated with microbiological contamination of imported fresh fruit and vegetables remains low. However, since the AQIS survey there has been an outbreak of Shigella sonnei in 11 people in Queensland last August. This is believed to have been caused by one consignment of baby corn from Thailand. The outbreak is possibly linked to an earlier Danish outbreak through a common source in Thailand.

For the AQIS report go to www.daff.gov.au/ aqis /import/food/surveys/horticultural

Print Post Approved
PP255003/00759

COASTAL FRUITGROWERS' NEWSLETTER

PRINT POST
PP 255003/00759

POSTAGE PAID AUSTRALIA

The Coastal Fruitgrowers' Newsletter is a quarterly publication distributed in Spring, Summer, Autumn & Winter. It is available free to all commercial fruit growers in the Sydney Basin, Central Coast, Hunter Valley, South Coast & North Coast areas.

NSW Department of Primary Industries Staff - Who to contact for commercial fruit enquiries

Editor - Sandra Hardy
NSW Department of Primary Industries
GHI Locked Bag 26
Gosford NSW 2250
Ph: 02 4348 1900
Fax: 02 4348 1910
email: sandra.hardy@dpi.nsw.gov.au