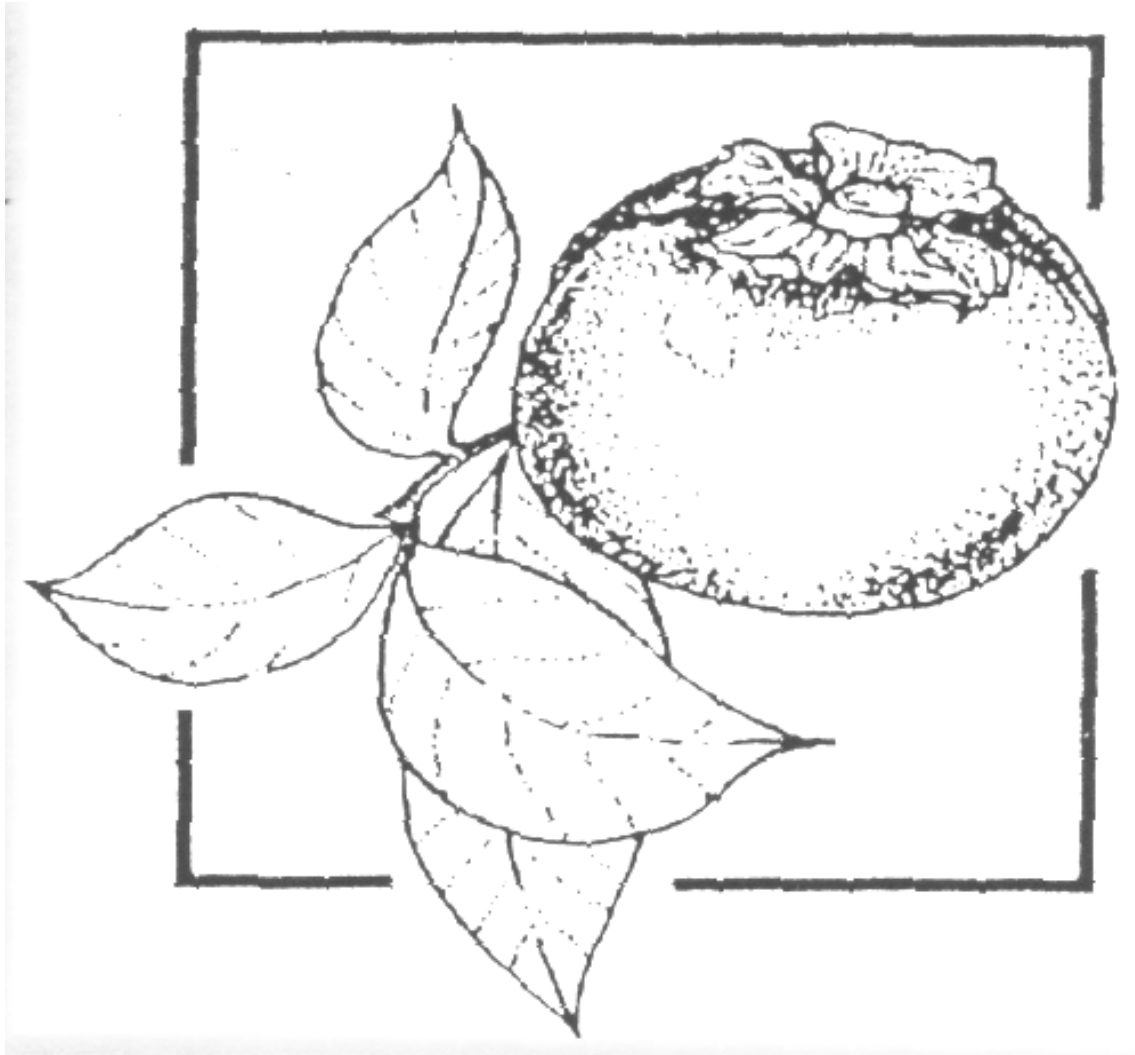


PERSIMMON



PRESS

Official newsletter of
Persimmons Australia Inc.

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Persimmons Australia

2010/11 Executive

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Contributions

Articles, letters to the editor and other contributions to *Persimmon Press* are most welcome - please send to:

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Disclaimer

The views, opinions, claims and statements made in this publication are those of the authors and are not, by publication, necessarily those of the Editor or the Persimmons Australia.



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The President's Perspective

By Kent Andrew

Your executive committee continues to meet (and also as Horticulture Australia's Persimmon Industry Advisory sub committee) formally twice per year – and hold regular phone conferences as required in between sessions.

As your PA executive we will deal with “agro political” issues – often common areas with many other Horticultural Industries. An example is the significant on-going issue with respect to the problem of the pending decision to withdraw the use of Fenthion and Dimethoate for interstate quarantine control of Fruit Fly. Our industry has already expended funds (we believe successfully to date) to trial irradiation as an option, so we are well advanced on this issue.

As your Persimmon Industry Advisory Committee, with professional support from HAL staff, we plan and decide how to best spend your levy funds on marketing and research programs. I remind all persimmon growers that as levy payers they have access through the “Persimmons Australia” website, and then the HAL website to see updated reports on “R&D” projects.

Earlier this year, as the season commenced, I was pleased to represent the industry at two events to support the marketing plan for this season. The first was to support a training session in Melbourne to assist the Public relations firm – “Retail Action Alive” in their training of staff for our Persimmon “In Store Demonstrations” These were conducted in supermarkets in Melbourne, Sydney and Brisbane. The casual staff were guided through an intensive program of how to eat, serve and enjoy our persimmons and all agreed the “growers” input was a valuable support resource - particularly as most present were not very familiar with the fruit. It was also valuable to be briefed on the questions the demonstrators were required to ask the consumers, the rationale for the questions, and how the results will be analysed.

The second was to assist our media/public relations event in a restaurant “Assiette” in Surrey Hills in Sydney. There, our “celebrity chef” Warren Turnbull very professionally conducted over four separate briefing sessions for the day, serving some delightful persimmon recipes to a full range of Sydney's top

food journalists. Warren's presentations were, I believe exceptional. The event was also attended (and organised on our and HAL's behalf) by staff from “Impact Communications”, and where appropriate I gave a “growers perspective” to the journalists. Certainly, personal feedback from the journalists on the day indicated a great success. On-going formal evaluation through HAL marketing staff in conjunction with our marketing consultants will be reported to, and assessed by, your committee as part of our planning for future marketing programs. I thank Stephen Jeffers for supplying some super quality fruit to Warren Turnbull for the event.

Our current research programs are predominantly being carried out at Queensland DPI's research station at Nambour. With changing QDPI staff structures and arrangements I wish to advise that Simon Redpath, who has carried out much of the project work over the last three years, is leaving the Department. He has been an energetic and valuable asset to our industry. Also longstanding persimmon researcher at Nambour Alan George has “retired”. We thank them both for their service to our Industry and wish them well for the future. (Alan may still be assisting us in the future). Bob Nissen, also known to most in the Industry, and Grant Bignell (effectively taking over from Simon) will be continuing to manage our current research program at Nambour. I hope you will be able to come to Nambour, to our AGM and Levy Payers meeting in September, and meet them as well.

I trust the season has been good to you all – I continue to look forward with your committee to growing the markets for our fruit, and to increasing returns to you the growers.

Don't forget to visit the
Persimmons Australia
website at
[www.persimmons
australia.com.au](http://www.persimmonsaustralia.com.au)

Snippets from the Secretary

By Jeanette Wilson

MEMBERSHIPS NEEDED

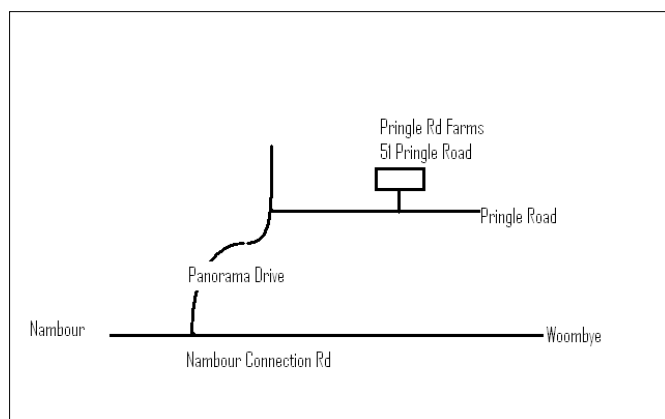
Our membership is diminishing - the Executive works on your behalf because they feel strongly about your industry. There are times when we will need to get in touch with our members, to seek their ideas and opinions. The membership covers our insurance and other unforeseen expenses.

In this Newsletter we enclose a Membership/Renewal Membership form for the Year 2011/12. If you are not a financial member please seriously consider joining us. The fee is \$82.50 per year. Thank You

FORTHCOMING MEETINGS

Persimmon Levy Payers Meeting, AGM and Field Day

The Persimmon Levy Payers Meeting, AGM and Field Day will be held on Saturday, 17th September at 9.30 am. A special thank you to Stephen and Robyn Jeffers for hosting these meetings and the field day on their property (Pringle Rd Farms, Pringle Rd, Nambour).



Persimmon Advisory Committee Meetings

As usual our meetings will be held in conjunction with the Industry Advisory Committee meeting which will be held on Friday 16th in Nambour. The Committee will also meet with Grant Bignall, our New Researcher at Maroochy Horticultural Station. We also have a new Marketing Manager, Elisa Tseng, who we met with in February. This will be your opportunity to meet with Elisa and to hear the results of our marketing campaign for 2011. Our Industry Services Manager, Astrid Hughes will be in

attendance at these meetings. The Executive will be staying at the Red Bridge Motor Inn, 380 Nambour Connection Road, Woombye, Queensland 4559 – Phone 5442 3933 on Friday night.

HAL Forum

Kent attended the HAL forum in Sydney the third week in May. The format has changed a little, but the major HAL forum will still be held during the third week of November.

If you have any considerations or ideas and you think your Executive can assist, please get in touch so your ideas can be relayed to the Executive for further discussion. Our Research and Development Project is ongoing and our Public Relations and Promotion/Marketing Project will be reported on at the Levy Payers Meeting.

PERSIMMON INDUSTRY WEBSITE

Take an opportunity to look at the Persimmons Australia website at www.persimmonsaustralia.com.au and there you will find the new industry logo.

PUBLICITY THIS SEASON

Thank you to those who contacted us with persimmon publicity during the season.

On Thursday I was walking up the main street in Gympie and glanced in the Kitchen Shop window. I saw a metal basket 25 x 10 cm “Avanti” (the maker and well known) and there were persimmons on the cardboard box, looking delightful, so check out your kitchen shop.

OUR ORCHARD

The orchard is asleep and giving us a chance to catch up on all of those other jobs that we didn't get done because we had so much rain. I think this last season was pretty ordinary, actually worse than that. So much rain, stained and marked fruit, hopefully the 2012 Season will be a vast improvement.

So folks, enjoy the break for it won't be long before those pale green leaves are back on our trees and the persimmon cycle commences yet again

From the Farms

Season update from South Australia

By Nick and Sally Hobbs

To say that the current season has been abnormal is a bit of an understatement. The rain kept coming. In Renmark we had more than our yearly average in the first six weeks of the year and over the border in the Sunraysia it was even higher with one event producing 300 mm in places.

For many crops it has been a disaster, wine grapes rotting on the vine before they could be harvested, pistachio severely affected by anthracnose to the point of some crops being a total loss, stone fruit and almonds having both crop and tree loss.

Persimmons were one of the exceptions. We have seen one of the heaviest fruit sets in recent years requiring significant thinning. The rain plus a mild summer with no heat waves has resulted in this fruit sizing like I have never seen. It is larger by at least two count sizes over a normal season.

Last newsletter I wished for plenty of persimmons and plenty of dollars. For most southern growers this will only be half true. As I write this the wholesale

markets are awash with fruit putting heavy pressure on prices. The oversupply caused by a combination of higher yields and the season being compressed into a shorter window by the late season.

Rarely in agriculture do we see big yields coinciding with high prices. To look on the positive side perhaps lower retail prices will encourage greater and more widespread consumption and growth for the long term.

Report from Inland Queensland

By Geoff Patteson

We are in the midst of pruning. Trees are carrying plenty of good strong budwood for next years crop. This is pleasing to see after such a wet year. We have had the most rain ever recorded in this district, but still produced an average crop. It does show persimmons can be quiet resilient. Also this area does not flood, fortunately.

To my knowledge most Queensland growers produced an acceptable crop. Certainly everyone can look forward to a season with a full profile of moisture and full water storages. This is a big change to the last 30 years.

Introducing Grant Bignell

I would like to introduce myself to the persimmon industry. I have worked for DEEDI for over 10 years in plant physiology and breeding. I commenced my new role as a research scientist in February 2011 working on the Australian Sweet Persimmon Industry Development project. I look forward to developing a close and productive relationship with the Australian persimmon industry and assisting with the direction of future R&D.



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Persimmon R&D Update 2011

By Grant Bignell

Pre-harvest Trials 2010/11

Grant Bignell, Bob Nissen, David Bruun, Dr Alan George and Simon Redpath

Sunny

Two trials were established in the Nambour region to evaluate the effectiveness of the growth retardant "Sunny" (uniconazole-p) in reducing tree vigour and

increasing fruit size in Fuyu. Three rates (1ml/L, 2.5ml/L and 5ml/L) were applied to the foliage 10 days before flowering.

Sunny applications reduced shoot extension by around 30% (Figure 1) from November to March. Only small differences were observed in fruit size (diameter), with fruit from the Sunny treatments 0.5-1.4mm larger than the control (Figure 2).

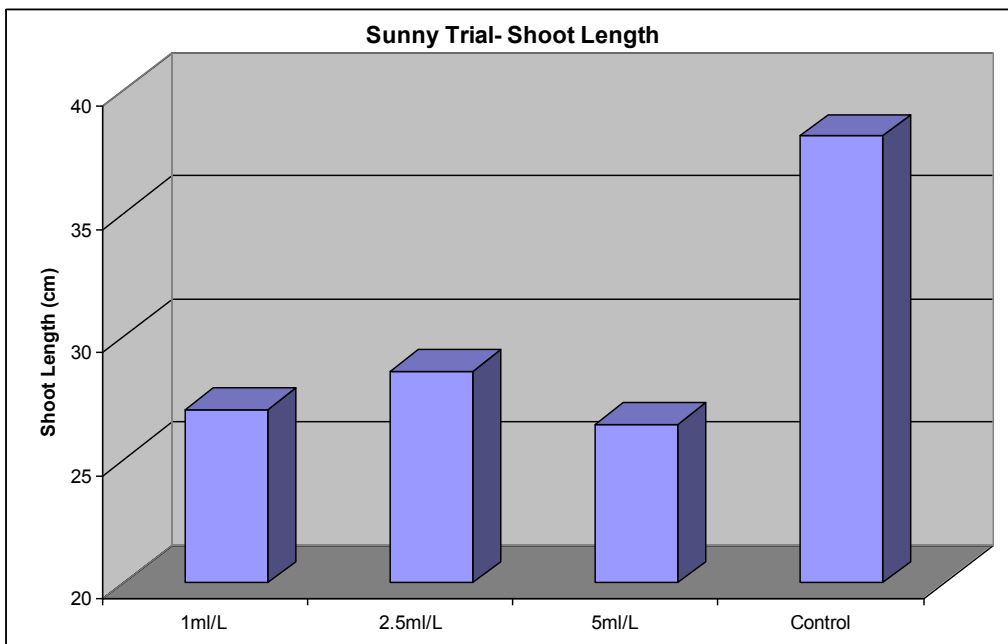


Figure 1- Differences in shoot length between Sunny treatments and control

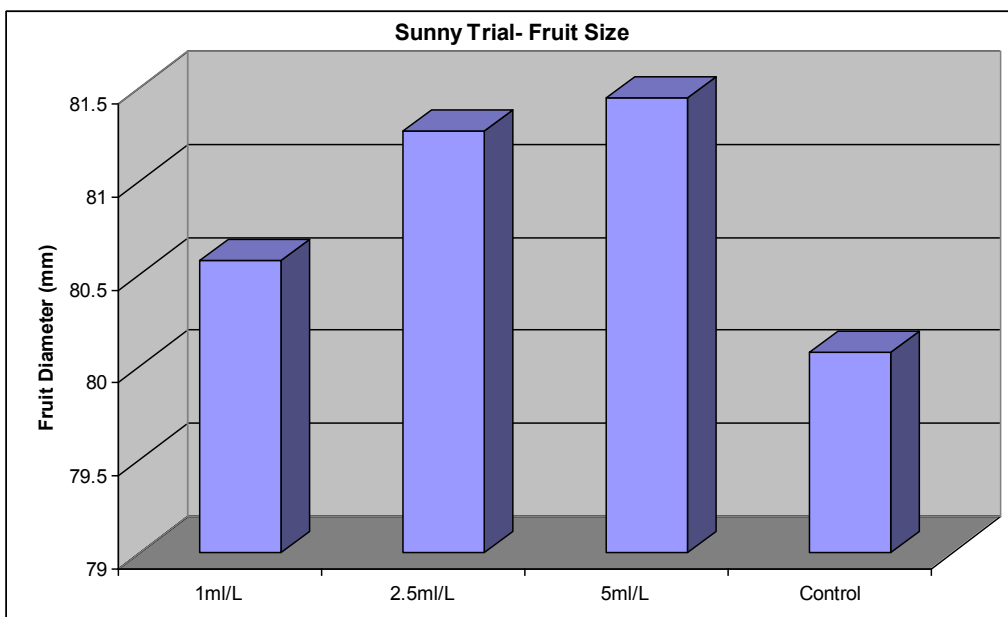


Figure 2- Differences in fruit diameter between Sunny treatments and control.

There were no differences observed in fruit maturity, colour, firmness or Brix. We experienced record rainfalls in Nambour for the months of December 2010 (615.6mm) and January 2011 (692.4mm). This abnormal season may have compromised the results. Trials will be repeated in the 2011/12 growing season and the residual effect of Sunny will be observed from the previous year.

Cincturing

The main aim of early season cincturing is to increase fruit set. It can also significantly reduce vegetative vigour in Fuyu. Cincturing trials were established on

the cultivar Fuyu at Kumbia, near Kingaroy in Queensland. The treatments were;

- Cincture 3-4 weeks before flowering
- Cincture during peak flowering
- Cincture 4 weeks before first harvest
- Cincture 3-4 weeks before flowering and then again 4 weeks before first harvest
- Cincture early November

All cincturing treatments reduced shoot extension compared to the control treatment, but cincturing 3-4 weeks before flowering and 4 weeks before harvest produced the best result (Figure 3).

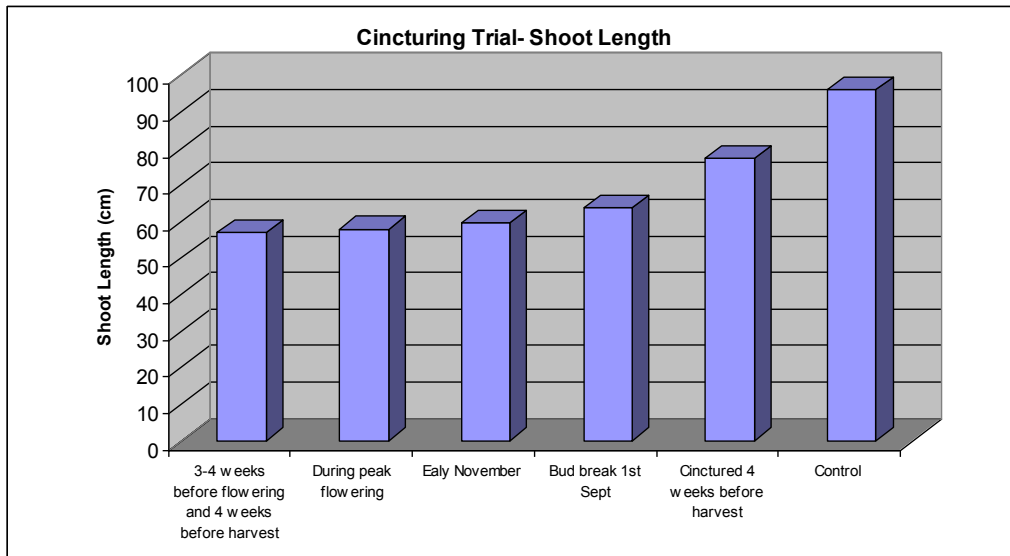


Figure 3 - Difference in shoot length and fruit diameter between cincturing treatments in April before first harvest.

Cincturing in early November produced the largest fruit that were 3.5mm larger in diameter than the

control (Figure 4).

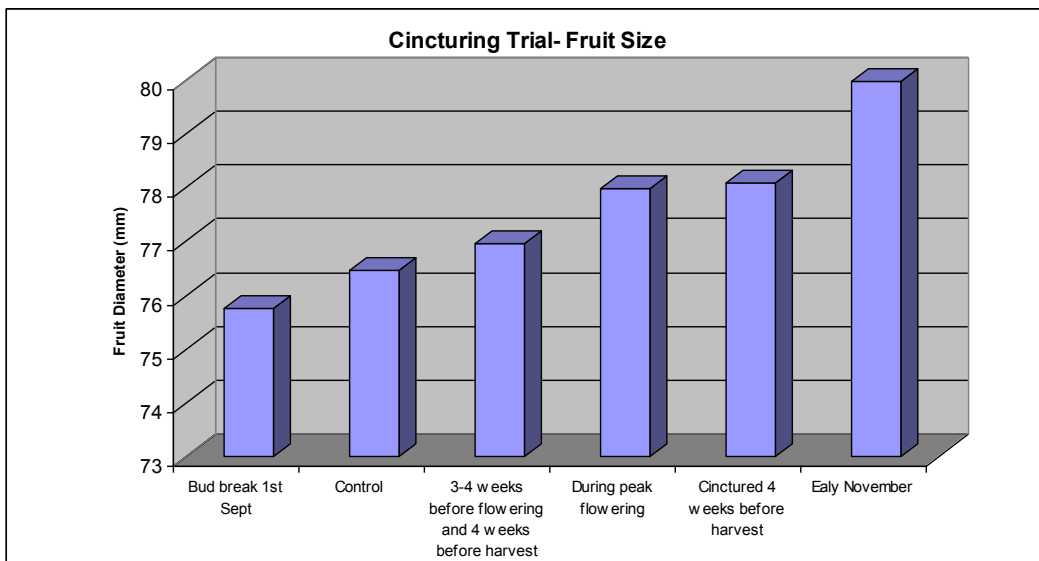


Figure 4 - Difference in fruit diameter between cincturing treatments in April before first harvest.

Cincturing during peak flowering greatly increased fruit set in November, but by April there was less fruit than the control (Figure 5). Cincturing 3-4 weeks

before flowering and 4 weeks before harvest resulted in the highest fruit count in April prior to harvest.

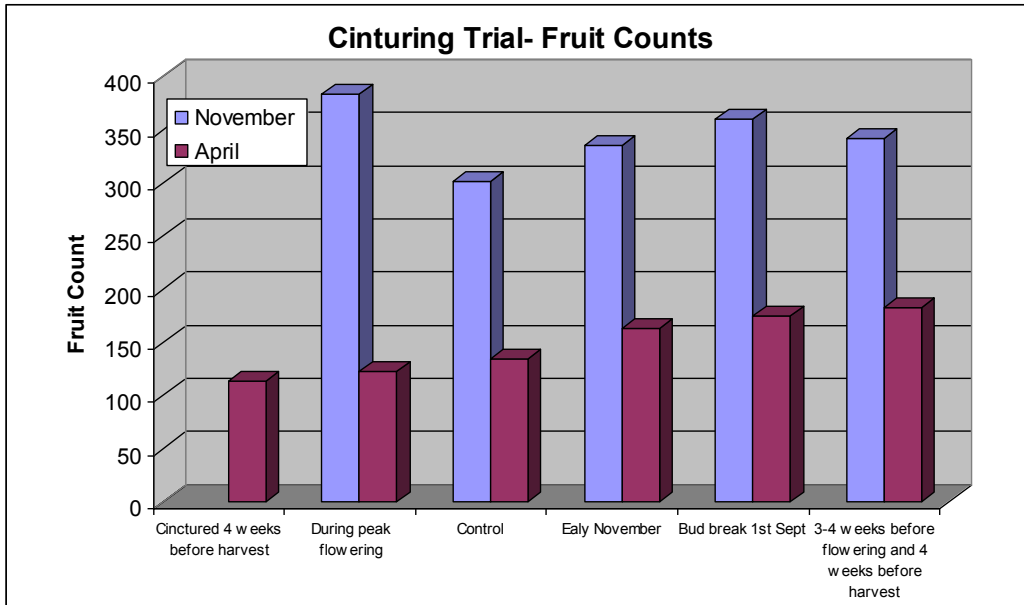


Figure 5- Average fruit counts per tree in November 2010 and April 2011.

Calcium Uptake

Observational trials on calcium uptake were conducted in Nambour, Amamoor and Goomboorian over the 2010/11 season. Increased calcium uptake can improve fruit quality and storage life. Six treatments were tested:

- Mycorrhizae (fungi) (once at bud break)
- Fulzyme (bacteria) (once at bud break)
- Cal Humate (every 2 months) + Mycorrhizae (once at bud break)
- Micro-fine Gypsum (Green Cal) (once at

bud break)

- Micro-fine Gypsum (Green Cal) + Mycorrhizae (once at bud break)
- Mycorrhizae + Fulzyme (once at bud break)

The unprecedented rainfall events that occurred during December-January 2010-2011 growing season significantly affected leaf calcium levels. The average leaf calcium levels for samples taken in November, January and March are shown in Figure 6 below.

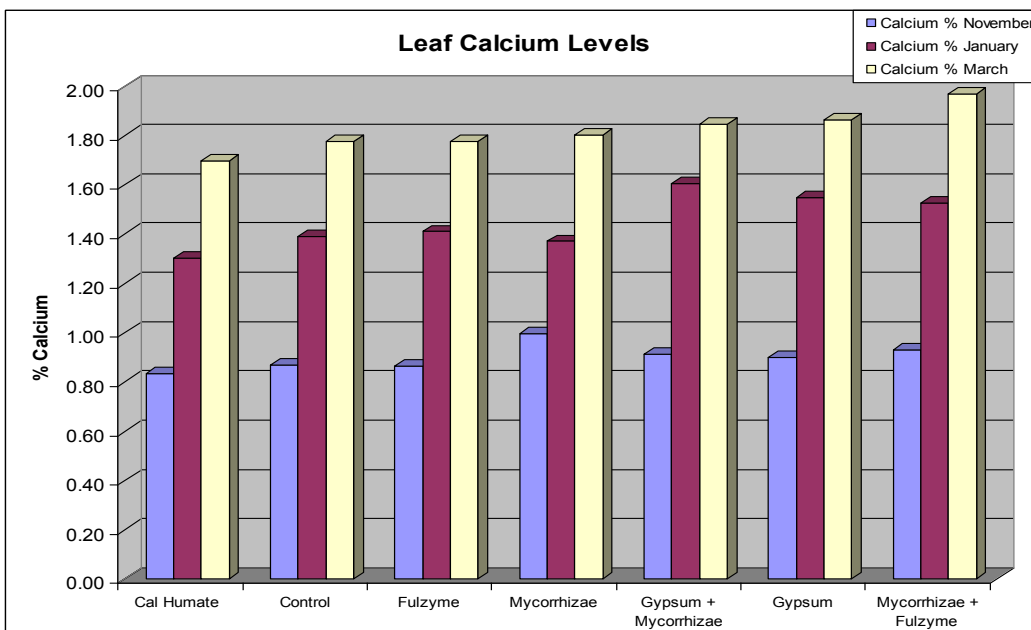


Figure 6- Average percent calcium of leaf samples taken in November, January and March.

Leaf calcium levels followed a normal pattern during the trial, increasing and peaking at their highest levels one month before harvest. In March the treatment with the highest leaf calcium level was Mycorrhizae + Fulzyme at 1.97%. This was approximately 21% below the recommended leaf calcium level of 2.5% one month before harvest. All treatments applied did not reach the recommended level.

In January the Gypsum + Mycorrhizae treatment was the highest at 1.6%, which was 20% lower than the recommended level of 2%. In November the Mycorrhizae treatment had the highest average leaf calcium level of 1% and all treatments were above the minimum recommended level of 0.8%.

This result has shown that biological fungi and bacteria products may facilitate calcium uptake. Trials will be repeated in 2011/12 so that these treatments can be evaluated under more typical growing conditions.

Clearwing Moth

A trial was established in Grantham to assess treatments for the control of clearwing moth. Four chemicals were trialed at different concentrations as a soil drench;

- Actara 1, 2 and 3 g/L
- Confidor 6, 12 and 18 ml/L
- Movento 4 ml/L
- Samurai 4,8 and 12 g/L

Trees were assessed for the percentage of new shoots affected by clearwing (Figure 7). The best level of control was achieved by Actara (2g/L) and Samurai (8g/L) with 25% and 30% of branches effected by clearwing respectively. All other treatments had more than 40% of new shoots damaged by clearwing.

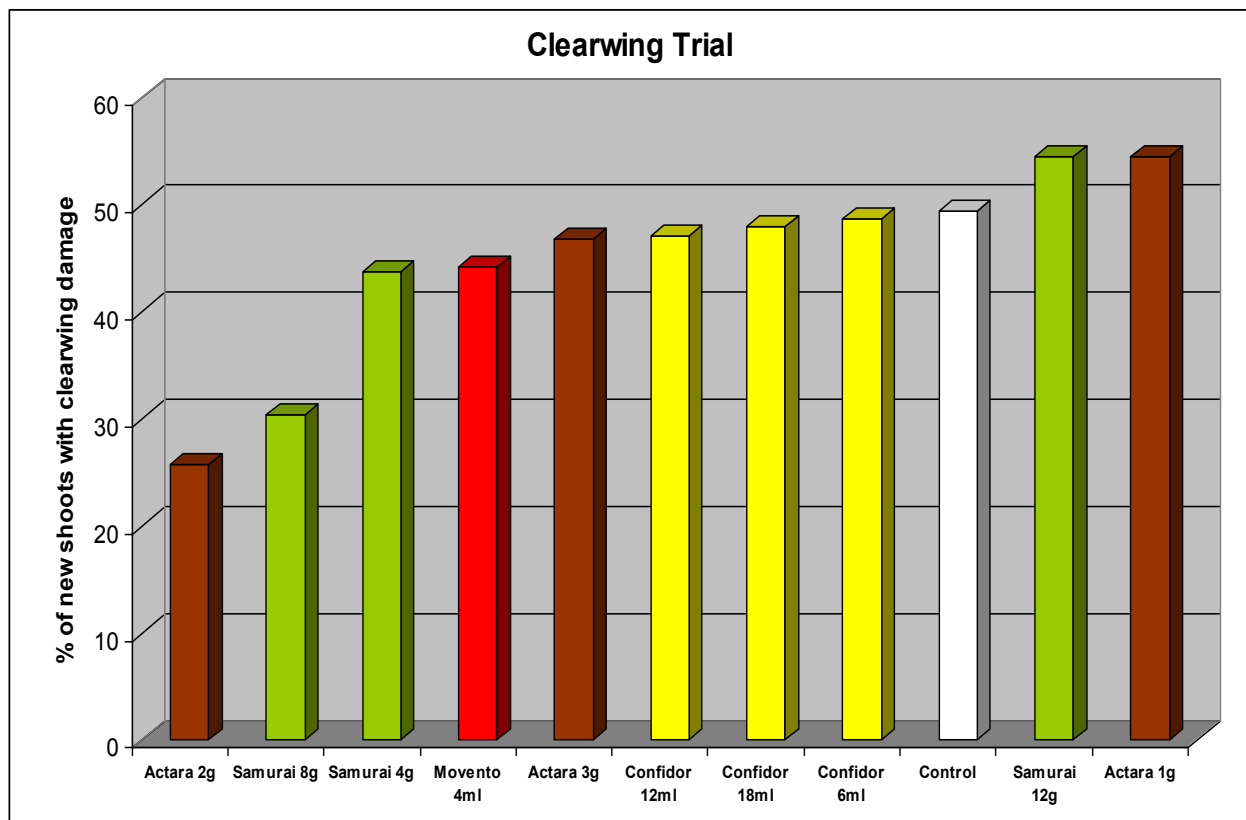


Figure 7- Difference in new shoots affected by clearwing between chemical treatments.

Due to the variation in clearwing populations within orchards, larger trials will need to be conducted to test the efficacy of these chemicals. However, preliminary results from this trial show some level of control has been achieved.

DEEDI entomologists are currently assisting with clearwing moth research in an effort to understand more about this moth's life cycle with the aim to implement an effective control measure for this pest.

Industry Evaluation and Snapshot

By Impact Communications Australia

2012 Strategic Recommendations and 2011 Outcomes

2011 PR Objectives were:

- Explain new names: sweet persimmons and original persimmons
- Encourage trial
- Communicate uses, selection, seasonality and storage
- Continue to outreach to food leaders, likely to recommend purchase, while expanding reach
- Balance long lead media coverage with that in short lead news

Key Results October 2010 – June 2011:

- Number of clips generated: 52
- Total audience reach: 8,057,280
- Advertising value equivalent for editorial: \$126,531.40
- Cost per opportunity to see: \$0.002
- Return on investment (professional fee): \$1:\$9.90

What issues and challenges must the persimmon industry consider for its 2012 campaign?

Issue	Implication / ideas for 2012
Confusion still exists between sweet and original persimmons	<ul style="list-style-type: none"> • Campaign needs to continue to focus on announcing new names and clearing up varietal confusion. • This is exacerbated by inconsistent or confusing point of sale (eg Fuyu Fruit v Persimmons) • IMPACT suggest that in 2012 messages should be refined to include more detailed information and suggestions about sweet and original persimmons.
Half way through the campaign, the 'ripeness' message changed to promote eating sweet persimmons soft as well as hard. This further confused media on when to eat each variety of persimmon.	<ul style="list-style-type: none"> • Communication needs to promote sweet persimmons as the versatile persimmon that can be eaten soft or hard in contrast to original persimmons which must be eaten soft.
'We eat with our eyes'. Beautiful recipes and images inspire media to file, even in long lead media who normally only use their own recipes / images.	<ul style="list-style-type: none"> • Media must be offered new images and recipes to engage with the fruit. • Recipe development for 2012 was undertaken by HAL. IMPACT hopes to use these images.
Persimmons short season continues to prove problematic for many long lead media.	<ul style="list-style-type: none"> • Issuing updates on the crop and its potential (when in-store, size, quality, etc) will continue to communicate with media and help them plan ahead when to feature the fruit. • Early communications critical for to secure long and short lead.
Ambassador allowed media to engage with the fruit.	<ul style="list-style-type: none"> • Maintain ambassador as the 'gourmet-voice' of the industry.

Evaluation of Activities carried out in 2011

'Announce the season'

HTMLs issued in November to long lead media, key trade partners and industry. Short lead media were targeted in February. The email reported on the persimmon season, varietal differences, usage suggestions, selection, storage and handling tips. It included commentary from Ambassador, Warren Turnbull of Assiette Restaurant. It secured an open rate of 35%, well above the 19.4% average open rate suggested by research by the American Direct Marketing Association.

Outreach to media and food leaders

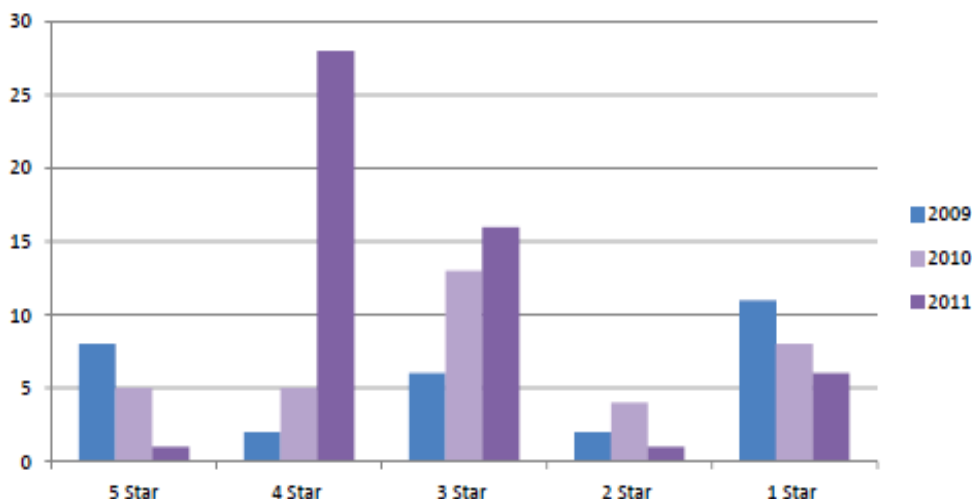
Media release 'Add a little piece of perfect to autumn with the Australian persimmon' was issued to long lead media in December and short lead in February. It focussed on the sweet and original messaging and included commentary from Warren Turnbull. It aimed

to create prestige and inspire home cooks to drive intentional purchase.

Assiette briefings: Sweet and Original

To celebrate the start of the season, key food media were invited to experience sweet and original persimmons at Assiette. These briefings allowed industry to recruit new advocates, rather than reinvest in the same media. Media attended half hour briefings where Warren Turnbull presented an assiette (assortment) of dishes using sweet and original persimmons. Media also received a kit and key ingredients from persimmon dishes. Head of the persimmon industry Kent Andrew attended. Key food media who attended : *Daily Telegraph (Taste.com)*, *Australian Good Taste*, *Super Food Ideas*, *Woolworths Fresh*, *Taste.com*, *Better Homes and Gardens TV*, *Prevention*, *Weight Watchers*, *Women's Health*, *Men's Health*, *New Idea*, *Australian Women's Weekly* and *Woman's Day*.

Star ratings for coverage, change year on year:



Star rating criteria:

5 Star article is full page/television/radio or includes audience interaction. In the case of newspapers, a five star article is the lead food article.

4 Star article mentions persimmons and includes a recipe or image

3 Star article mentions persimmons plus recipe OR an image (rather than both)

2 Star article mentions persimmons and includes editorial without recipe or image.

1 Star article includes persimmons recipes as a key ingredient but not the hero.

Strategic outtakes from star rating system:

- The bulk of coverage features persimmons along with recipes and images, which is appropriate given the need to explain persimmon varieties and their uses.
- Good ground has been made in making

persimmons the hero of the coverage, evidenced by the reduction of one star articles where persimmons is included as an ingredient or partner to the story.

- While 5 star coverage is less frequent IMPACT suggests the 2012 persimmon campaign include plans to secure high profile coverage.

Market Information Services

By Jon Brewer

This article is to inform growers about changes Market Information Services have undertaken to make their services more user friendly.

Market Information Services has recently launched a new Market Price Information Service designed specifically for growers. Market Reports for produce grown in different areas available in the Brisbane Markets will be faxed or emailed to subscribing growers on chosen days of the week or as a weekly summary. Subscriptions are limited to bona fide growers and will have a maximum content of five individual crops. These Reports are intended for one user and are subject to copyright legislation.

Changes in ownership or policy have resulted in Daily Market Reports no longer being published or broadcasted by a number of key media outlets. As a result, growers in some major production areas no longer have access to Market Price Reports through the channels that they have traditionally relied on. Other growers have been unable to access the media reports that are available because of time constraints or relative remoteness. Market Information Services believes this is unacceptable.

Growers have been concerned for a long period of time about the lack of transparency in their

transactions with wholesalers. It was certainly an issue at the heart of recent grower complaints. Equal access to current Market Information is one way to help level out the playing field. Industry bodies, wholesalers and grower organizations now have the opportunity to demonstrate their support for greater transparency by bringing this new service to the attention of their growers.

Another service that is available and presently in use by a number of grower groups, industry bodies and associations is a sponsored report site for specific crops or groups of crops (eg Banana, Mango and Citrus Reports). These specific Reports are available online, in their own web page, on both the Ausmarket and the relative association's websites. These reports are funded by way of sponsorship and advertising. Examples can be found on the Ausmarket and MIS website under the heading of Reports.

**Growers interested in this service should contact Market Information Services at
PO Box 229 Brisbane Market QLD 4106
Phone: (07) 3379 4576
Fax: (07) 3379 4103
<http://www.marketinfo.com.au>
adminmis@marketinfo.com.au**

History, Origin and Classification of Persimmon Cultivars in Australia and Vietnam

By R J Nissan, DEEDI, Nambour

This is only a brief extract from the original paper. To view the whole paper contact Bob Nissan at the Maroochy Horticultural Research Station in Nambour.

Introduction

The aim of this paper is to provide the Australian and Vietnamese researchers, extension officers and growers with a clear understanding of the origin, botanical, taxonomy, classification of persimmon and

varieties available world wide.

Persimmons have been produced in China for thousands of years with over 2000 selections made (Zhuang *et al.*, 1990). The majority of persimmons produced around the world are astringent, but recent breeding programs in China, Japan and Europe have produced non-astringent types. These new types are the basis of new plantings in many countries.

World production of persimmon has dramatically increased recently. From 2000 to year 2008, production increased from 2.4 million tonnes to 3.6 million tonnes. Brazil increased production by 166%, China by 56%, Israel by 114%, Korea by 49%, and Australia by 10%. Surprisingly, Japan's decreasing by 12% over the same period (FAOSTAT, 2010).

China is the largest producer with about 2.5 million tonnes or 70% of the world production (FAOSTAT, 2008; Zhang, et al., 2009). Italy produces 50 000 - 60 000 tonnes, Spain 33 000 tonnes and Israel 10 000 - 13 000 tonnes. These industries are predominantly based on astringent types (Giordani, 2002). Turkey produces 22 000 tonnes predominately based on old astringent cultivars (Ercisli and Akbulut, 2009). Lacer and Badenes (2009) reported Spain produces 70 000 tonnes of astringent persimmon. New Zealand produces, 3 000 tonnes of non astringent fruit (FAOSTAT, 2010).

Worldwide, persimmons are available year round, either as a fresh or stored product. Australia has the longest production period, from February to July, (Nissen et al., 2003; Mowat, 1990; Giordani, 2002; Ercisli and Akbulut, 2009; Lacer and Badenes, 2009; FAOSTAT, 2008). In Australia, production is scattered over five states, with Queensland producing about 70% of the total production. Only non-astringent types are grown. Annual production is about 1 800 tonnes from 250 000 trees (PAI, 2008). The growing regions extend from tropical Queensland, as far north as Townsville, to the temperate regions of Victoria (Cobram) and South Australia (Renmark). The fruit from the tropic regions mature at least four months earlier than fruit from temperate regions.

Vietnam produces about 50 000 tonnes from 6,100 hectares. All production is consumed domestically, mainly in cities. Vietnam has no export market because they produce astringent types or poor quality. Current domestic consumption is 0.7 kg per capita per annum. Persimmons are grown across ten provinces extending from the northwest province of Son La through to the Lam Dong province in the south central highland district of Da Lat. Production occurs from September to November with one cultivar left to hang over winter to be used in Tet (Chinese New Year) celebrations.

Origin and botanical classification

Persimmon belongs to the *Ebenaceae* family, which also includes ebony. This family has about 500 species of trees and shrubs, subdivided into *Diospyros* and *Euclea*. *Diospyros* has about 400 species of evergreen and deciduous trees. The majority grow in

subtropical and tropical regions of Asia, Africa, and America, with a few species extending into temperate areas (Wagenitz, 1964; Cronquist, 1981; Ng, 1986, Mowat and George 1994). Persimmon cultivation documents from the 5th and 6th centuries establish China as the origin of persimmon (Grubov, 1967; Kikuchi, 1948; and Sugiura and Subhadrabandhu, 1996). *Diospyros kaki* was introduced to Japan about 1300 years ago (Ikegami, 1967) and is a deciduous species adapted to warm temperate areas (Mowat and George, 1994).

There are several species of *Diospyros* that are important: *lotus*, *kaki*, *oleifera*, *virginiana* and *rhubifolia*. *D. lotus* and *D. oleifera* are cultivated as fruit crops in China with *D. Lotus* eaten dried fresh. *D. oleifera* is mainly used for oil (tannins). *D. rhombifolia* is used as an ornamental as it has small attractive fruit on a dwarf tree in China (Janick and Paull, 2006). *D. kaki* is also consumed as a fresh and dried fruit in Japan, Korea, China, Vietnam, Italy, Spain, Portugal, New Zealand, Australia, Brazil and Turkey. *D. virginiana* the American or Eastern persimmon is native to eastern USA and is eaten fresh and used as a rootstock for the commercial cultivars currently grown. *D. digyna* (syn. *D. ebenaster*), black sapote, is thought to be a native of Central America. *D. discolor* (syn. *D. blancoi*), velvet apple or mabolo produces edible fruit of good quality in the Philippines (Janick and Paull, 2006).

Taxonomy

The botanical name of persimmon is *Diospyros kaki*, but the paternity of the name is assigned to Linneo (L.), to his son (L.f.), and to Carl Peter Thunberg (Thunb.); hence to refer to persimmon, the two names commonly used are *D. kaki* L.f. and *D. kaki* Thunb (Giordani, 2002). *D. kaki* L.f (= *D. kaki* Thunb.) is considered of Chinese origin (Giordani, 2002). However, Janick and Paull 2006, indicated that the authority for persimmon should be Thunberg due his reference to *D. kaki* in the *Nova Acta Regiae Societatis Scientiarum Upsaiensis*, (Vol. 3, p. 284), issued in 1780.

The genus *Diospyros* has, diploids ($2n=2x=30$), tetraploids ($2n=4x=60$), hexaploids ($2n=4x=90$) and nonaploids ($2n=9x=135$) (Somego, 1978; Yonemori et al., 2000;). Most of the wild species are diploids (a few polyploids), and the cultivated species *D. kaki* and *D. virginiana* hexaploids. Ng (1978) indicated that *D. glandulosa* could be an ancestor of *D. kaki*. Studies based on cDNA analysis show the relationships of *D. kaki* to *D. glandulosa*, *D. lotus* and *D. virginianan*, (Figure 2, Yonemori et al., 1998). Ng (1978), hypothesis that *D. glandulosa* has played a role in the

origin of *D. kaki* which is supported by recent research. Chromosomal markers using fluorescent *in situ* hybridization (FISH) and genomic *in situ* hybridization (GISH) showed that the wild species of *D. glandulosa* and *D. lotus* and the horticultural important *D. kaki* are closely related. Choi *et al.* (2003), using GISH on somatic metaphase chromosomes of *D. kaki*, showed *D. glandulosa* hybridised to *D. kaki*. This suggests that the genome of *D. kaki* and *D. glandulosa* share many common DNA sequences (Janick and Paull, 2006).

Kaki, 'oriental' or 'Japanese' persimmon, originated in China, and has been an important food in China, Korea and Japan for centuries (Janick and Paull, 2006). It is used as a traditional fruit for special gifts, and ancestral offerings in Vietnam, as recorded in numerous ancient documents, folk songs and proverbs (Chomchlow, 2004). The Japanese have also grown persimmon since ancient times and superior selections have been propagated for hundreds of years (Yakushiji and Nakatsuka, 2007). These cultivars have been introduced into the USA (California), Italy, Israel, Brazil, Australia and New Zealand (Yonemori *et al.*, 2000). Taxonomy studies have shown how the diversity of persimmon germplasm has narrowed due to inbreeding, but new studies are now providing genetic information to improve fruit quality. Very little research has been carried out on rootstocks to determine effects on fruit quality, precocity and tree size control.

Classification persimmon Cultivars

Developing persimmon fruit are astringent and the loss of astringency and changes in flesh colour with the presence of seeds during maturation provides us with a useful tool to classify cultivars.

Astringency and flesh colour

Persimmon fruit are usually highly astringent, due to the high level of tannins. These tannins cause a rough sandpapery sensation in the mouth and are unpleasant. More than 950 cultivars exist in China alone, with only one non-astringent cultivar ('Luo Tian Tian Shi') (Wang *et al.*, 1997). In Japan, 45% of all cultivars are astringent (Yonemori *et al.*, 1997). In Korea, the majority of the 186 cultivars collected are astringent (Kin *et al.*, 1988).

Astringency is due to soluble tannins in the vacuole of the tannin cell. Most persimmons do not lose their astringency until they are harvested and ripen. However there are a few cultivars that lose their astringency naturally when on the tree. Flesh colour also varies in persimmon cultivars, depending upon pollination. The flesh can become dark brown or

remain unchanged. Therefore, persimmon cultivars are classified according to their change in flesh colour with pollination, and the persistence of astringency as the fruit develops.

Sugiura (1983), Kitagawa and Glucina (1984), Yonemori *et al.*, (2000), classified persimmons into four types, depending upon these changes in flesh colour due to pollination and the presence of astringency:

- i. Pollination variant astringent (PVA)
- ii. Pollination constant astringent (PCA)
- iii. Pollination constant non-astringent (PCNA)
- iv. Pollination variant non-astringent (PVNA)

Classification persimmon cultivars based on astringency, flesh colour and pollination

Pollination constant (PC) types

Persimmon cultivars where the flesh colour does not change when pollinated.

Pollination variant (PV) types

Persimmon cultivars, when the flesh darkens to a deep red-brown or black colour around the seed when pollinated.

Astringent (A) types

The fruit of these cultivars only lose their astringency when over ripe and soft. They remain inedible until they become soft and do not transport well. There are two subgroups, constant-types (C) and variant-types (V), depending on changes in fruit colour with pollination.

In the pollination constant astringent (PCA) type, the flesh colour does not change and the seeds in the fruit do not produce any volatile compounds. The fruit remains astringent even if they have seeds. The pollination variant astringent (PVA) type change their flesh colour in the presence of seeds and produce low amounts of volatile compounds and the coagulation of tannins is restricted around the seed, so the astringency remains in the flesh. The flesh around the seed is not astringent where the brown spots are present.

Non-astringent (NA) types

These cultivars lose their astringency on the tree as they mature. They are also classified into constant (C) and variant (V), depending on the presence of seeds and flesh colour.

When seeds are present in the flesh of the pollinator variant non-astringent (PVNA) type, the flesh becomes flecked or dark brown colour as a result of pollination. If the variant-type does not have seeds the flesh does not turn a dark colour and it will keep its astringency until maturation. The flesh of the

pollinator constant non-astringent (PCNA) type will not change colour and the loss of astringency is not changed with the presence or absence of seeds, but it will keep its astringency until maturation.

Veberic et al., (2010) analysed primary (sugars, organic acids) and secondary metabolites (phenolics and caroteneoids) in 11 kaki cultivars: ‘Amankaki’, ‘Cal Fuyu’, ‘Fuji’, ‘Hana Fuyu’, ‘Jiro’, ‘O’Gosho’, ‘Tenjin O’Gosho’, ‘Thiene’, ‘Tijo’, ‘Tone Wase’ and ‘Triumph’. Multivariate statistical analysis and dendrogram based on the biochemical divided these 11 cultivars into 4 groups. These groups are the same as the classification groups described above by *Sugiura (1983)*, *Kitagawa and Glucina (1984)*, *Yonemori et al., (2000)*. *Veberic et al., (2010)* found pre-dominant sugars (fructose and glucose) and total carotenoids in the skin influenced the grouping of the cultivars, while organic and phenolic acids did not.

Persimmon cultivars classified as PVNA have a large amount of volatile compounds (acetaldehyde) produced by the seeds during the middle stages of fruit development which causes coagulation of tannins in the large tannin cells of the flesh in association with the loss of astringency, but PVA persimmon cultivars produce low amounts of volatile compounds and the coagulation of tannins is usually restricted to around the seeds so the astringency remains in the flesh (*Sugiura et al 1979*).

Classification based on fruit volatiles

PCNA persimmon cultivars from Japan lose astringency due to the dilution of tannins as the fruit grows and the development of tannin cells cease (*Yonemori and Matsushima, 1985; Yonemori et al., 2003a*). However, the mechanism for the cessation in development of tannin cells has never been fully explained. In 2003, *Yonemori et al.*, tested 15 Japanese PCNA cultivars and found that the tannin cells were much smaller those of non-PCNA cultivars. Tannins of PCNA fruit on trees do not coagulate with ethanol when immature, as opposed to the other non-PCNA cultivars which do coagulate. Therefore, *Sugiura (1984)* proposed that a separate persimmon classification should be considered. Dividing the cultivars between the volatile-dependent group (VDG) including non-PCNA types and volatile-independent group (VIG) including PCNA types (*Yakushiji and Nakatsuka, 2007*).

Based on *Sugiura*’s definitions using the quality of tannin in the flesh and the ability of pollination (seeds) to release volatile compounds during fruit development the cultivars are either from the Volatile Independent group (VIG) or Volatile Dependent group

(VDG) VIG cultivars are those where the loss of astringency is not dependent on the formation and accumulation of volatiles in the flesh. This group is comprised of all the PCNA cultivars.

VDG cultivars are those where loss of astringency is dependent on the formation and accumulation of volatiles in the flesh. This group is comprised of all the non-PCNA persimmon cultivars.

Persimmon Cultivars

Of the four types of persimmon, the PCNA group are the most commercially desirable. This is because they lose astringency on the tree and do not require any further postharvest treatment. However, there are only a small number of PCNA cultivars available that are productive, and produce high quality fruit with few defects. Furthermore, the diversity of persimmon germplasm has narrowed over time, due to a relatively small number of significant cultivars (*Sugiura, 2005*). In Australia, production is primarily based on non-astringent cultivars ‘Fuyu’ and ‘Jiro’. In New Zealand, ‘Fuyu’ is the most important cultivar. In Vietnam, production is based primarily on local astringent cultivars. In the north the major cultivars are ‘Thach That’, ‘Nhan Hau’ and ‘Luc Yen’. In the centre and south, production is based on ‘Trung Loc’, ‘Vuong (Tam Hai)’ and ‘Vuong (Ong Dong)’.

Postharvest Handling

Non-astringent cultivars offer significant advantages over astringent cultivars. The astringent types need the astringency to be removed before eating. The fruit must soften before they can be eaten and this creates problems for marketing. To overcome this problem, persimmon from Asia, are often cured or dried. Drying increases the concentration of sugar in the fruit. Fruit also lose their round full shape and excellent skin colour but the fruit can then be sold without any loss of quality.

Methods to remove astringency can cause the fruit to soften making the fruit difficult to market. The most popular method to remove astringency is by using carbon dioxide. Ethylene may also be used to hasten the process. Persimmons produce little ethylene but are highly sensitive to the gas. Ethanol can also be applied to the fruit. 1-MCP (1-methyecyclopropene) is a very effective inhibitor of the ethylene reaction in the fruit, blocking the ripening and softening process. The use of 1-MCP (1-methyecyclopropene) will be critical if astringent cultivars are grown in Australia. 1-MCP will have to be used in combination with the astringency removal methods to allow astringent fruit to be successfully marketed.

Your OrchardWhat to Do During the Coming Months

By Department of Employment, Economic Development and Innovation Horticulturalists

July

- No fertilising is necessary during this period.
- Minimal watering required at this time.
- Regularly check for signs of stem girdler damage. If detected, scrape clean infested areas and seal the wounds with plastic paint.

August

- No fertilising is necessary during this period.
- Minimal watering required at this time.
- If a mating disruption strategy is used to control clearwing moth put out a first round of clearwing moth pheromone wicks in mid August.
- Winter prune four to six weeks prior to bud break.

September

- Apply 20% of annual N, P and K at bud break (early to mid September).
- Steadily increase water application.
- If a mating disruption strategy is used to control clearwing moth put out a first round of clearwing moth pheromone wicks, if not already done in August.
- Winter prune four to six weeks prior to bud break.

October

- Steadily increase water application.
- Thin fruit just after fruit set.
- Start monitoring for spotting bug and yellow peach moth damage and for mealybugs and thrips. Treat as required.
- Spray trunks and soil around trunks with a registered insecticide to control ants.
- Commence protective sprays for cercospora leaf spot when half of the flowers are open. Continue at 14 day intervals until four sprays have been applied.
- If a clearwing moth mating disruption strategy is not used, check for adult clearwing moth activity using pheromone traps and if present apply a registered insecticide spray.

November

- Approaching peak water need.
- Continue monitoring for spotting bug, yellow peach moth damage, mealybugs and thrips. Treat as required.
- Spray trunks and soil around trunks with a registered insecticide to control ants.
- Continue protective sprays, using a registered chemical, for leaf spot at 14 day intervals.
- Summer pruning (Queensland) of water shoots to improve light penetration and stop excessive vegetative growth.

December

- Peak water need.
- Apply 60% of annual N, P and K fertiliser through the period from late December to early January.
- Continue monitoring for spotting bug and yellow peach moth damage and for mealybugs and thrips. Treat as required.
- For early bearing varieties, start monitoring for fruit fly with traps. Apply bait sprays as required.
- Continue protective sprays, using a registered chemical, for leaf spot at 14 day intervals until about mid December.
- Summer pruning (SA and Victoria) to improve light penetration and stop excessive vegetative growth.
- Leaf pluck around developing fruit from early December to help prevent rub damage (except in areas where sunburn problems occur).

Note: Fertiliser recommendations are taken from the 'Sweet persimmon grower's handbook'. These differ from and supersede the recommendations given in previous editions of the 'Persimmon Press' which were based on earlier recommendations.

For detailed information on persimmon management refer to the '**Sweet persimmon grower's handbook**' (published 2005 by the Queensland DEEDI) which is available from the 'The Queensland Government Bookshop at: www.bookshop.qld.gov.au