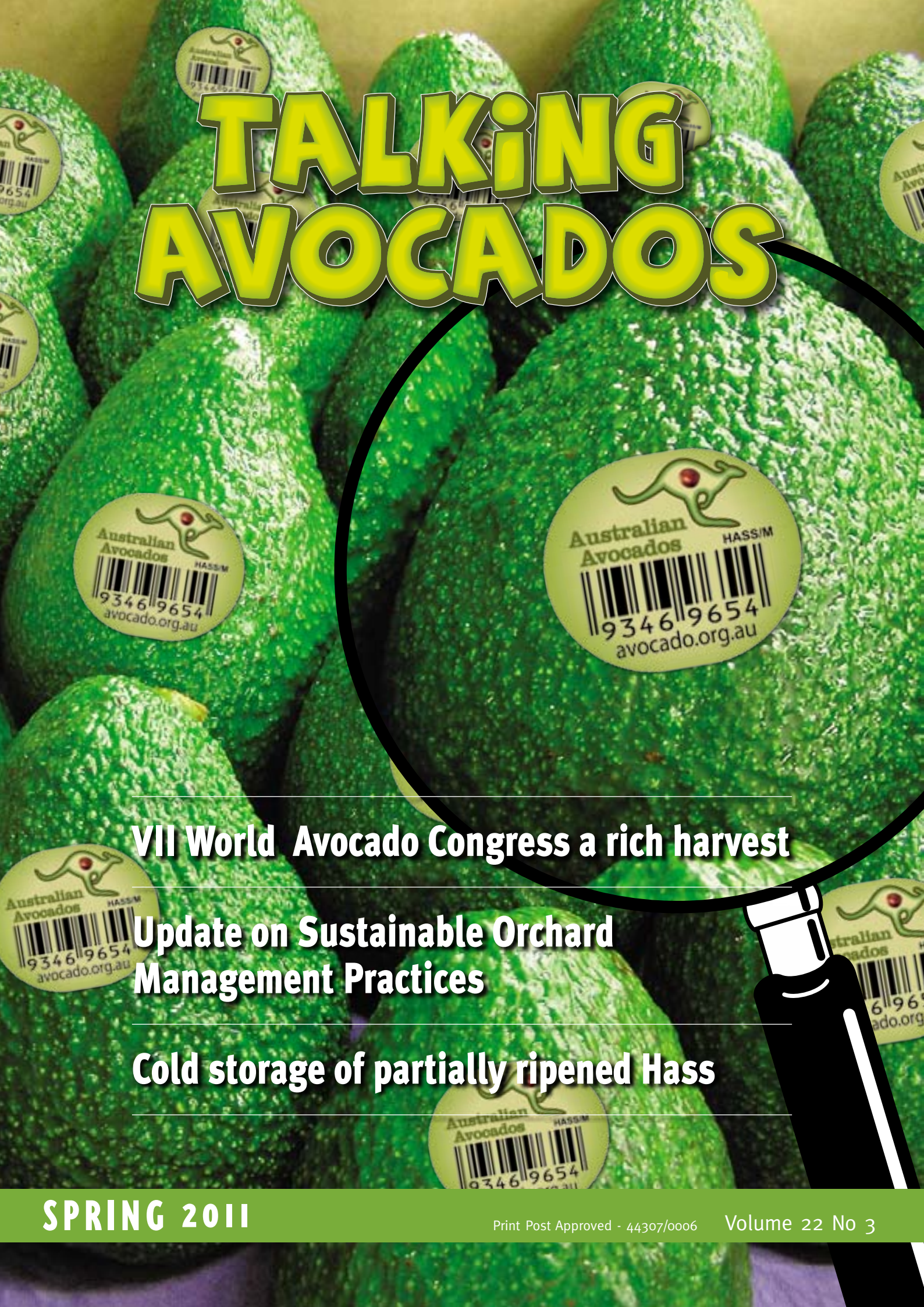
TALKING AVOCADOS



VII World Avocado Congress a rich harvest

Update on Sustainable Orchard Management Practices

Cold storage of partially ripened Hass

SPRING 2011

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We all make mistakes: If we make a mistake please let us know so a correction may be made in the next issue.

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Chairman's Perspective

In September, the long awaited and highly anticipated VII World Avocado Congress 2011 came to tropical Cairns, and for those who attended it was an event that will certainly not be forgotten!

Over 850 delegates from 24 countries came to our shores for this event and they brought with them a lot of knowledge about the avocado industry, an opportunity to make new global contacts and friends, a very welcomed $3 million boost to the North Queensland economy, not to mention a lot of tequila (this made a very interesting train ride back to Cairns from Kuranda!).

A big thank you must go to our CEO Antony Allen and the team at Avocados Australia; they have spent over a year carefully planning and organising this amazing event and it went off without a hitch, you should be very proud of yourselves. The board of Avocados Australia and all the Australian delegates congratulate our office staff for the professional work they did to make this Congress an outstanding success and we are so very proud of you all.

Thank you also to all the growers who took time out of their busy schedules to attend and represent our industry, like me I think you would agree that it was an invaluable experience.

And also the biggest thanks to the growers who kindly offered up their farms for the Congress pre-field trip and field trip, the feedback from the delegates was that these tours were one of the highlights of their trip to Australia.

On a less happy note, the market conditions in September-October leave a lot to be desired. Volumes into the Australian market have been stable for the last five months, but at the end of September the wholesale market prices dropped significantly; $8.00 in only two weeks. This represents a 33% drop in return to Australian avocado growers. This time of year is always difficult with Australian and New Zealand fruit vying for a place in the market.

I would like to stress that Avocados Australia is working with growers, packers and marketers to try to understand the conditions that have caused this problem and to develop strategies to try and prevent this happening again.

This has happened before and all avocado supply stakeholders are aware of the things that will upset the market; but there seems to be a disconnect between what a single operator does and the understanding that your little contribution to poor product, poor marketing, and poor forecasting magnifies when it joins the same problems of many other operators, thereby resulting in market confusion and eventual collapse.

We can take from this the lesson that only by working together and co-ordinating supply into the supermarkets can we hope to solve the issues we are currently dealing with.

As we head into the summer period I would wish all growers the very best luck with the weather conditions and hope we do not experience the devastating weather of last summer.

I would like to give a special "thank you" to Henry Kwaczynski for his tireless representation of avocado growers in the Sunshine Coast, on the Avocados Australia Board and on the international stage. Henry has retired from the board and the successful candidate representing Sunshine Coast is Peter Annand. Congratulations to Peter and we look forward to your contribution to this great industry. Congratulations also to the return of Daryl Boardman and Chris Nelson to their regions.

Jim Kochi

Jim Kochi, Chairman, Avocados Australia

WARNING

Avocados Australia has for a number of years paid a large amount of money for the industry's right to use the **Heart Foundation "Heart Tick"** on avocados.

If you are using a "Heart Tick" logo from anyone other than the label companies Label Press, Spicer Labels, Sinclair International and Warehouse Packaging and Design you are acting illegally.

No other label printers are able to legally print the "Heart Tick" for use on avocados. Avocados Australia is undertaking a clean up of the "Heart Tick" printing. We will lose access to the "Heart Tick" logo if it is used illegally.

Avocados Australia, AUF and the Heart Foundation will enforce their Registered Trademark rights to the fullest extent.

If you have non-genuine labels do not use them. If you know of label companies offering to print non-genuine **"Heart Tick"** labels for you please let us know on **1300 303 971**, so we can all help keep this valuable tool.

All growers could lose access to the "Heart Tick" logo if you don't act now.

NATIONAL HEART FOUNDATION · APPROVED ·
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Industry Matters

Written, edited and compiled by
Antony Allen, CEO of Avocados Australia

The slump in the value avocado market over the last two weeks

The slump in the value avocado market from late September is slowly becoming clearer. To assist in fixing this issue Avocados Australia have spent considerable time digging through the stories, opinions, and numbers to present a more accurate picture. Only this way are we be able solve and prevent the same situation from occurring again

Some facts about the situation:

- Prices for the period July through to the mid-September were at around $22-24 per tray.
- The end of September saw the price drop to $18 per tray, then to $16 and then to $14.
- The cross over period, when New Zealand enters the Australian market, is a problem period every year.
- Misinformation rumours and the undermining of the Infocado data during this period results in the market reacting to perceptions and blatant manipulation.
- Australian and New Zealand growers have both slowed down the picking of their fruit in order to try and alleviate the situation.
- Woolworths continues to source Australian fruit for Western Australia, South Australia, and Queensland. Queensland will only remain on Australian fruit if it is available for Woolworths to purchase. Tasmania, Victoria and NSW are all on New Zealand fruit, but Australian fruit is supplementing supply in NSW.
- Coles continues to source Australian fruit for Western Australia and South Australia. Tasmania, Victoria, NSW and Queensland are all on New Zealand fruit only.
- Coles has a single country of origin policy for each store. The policy includes a three day notice period to change to another country's fruit. This has prevented Coles from sourcing Australian fruit at all once they have changed over to New Zealand fruit.
- Total September 2011 volumes forecast by Australian growers/packhouses are substantially lower than what was actually dispatched.
  New Zealand market their export avocados through approximately 10 exporters, although 2 exporters manage the majority of the crop.
- New Zealand's competitive advantage to supply Coles and Woolworths is a continuous supply in a programmed approach. This is something that is possible for Northern NSW and Southern Queensland, but not as easy due to the numerous smaller packing sheds.
- The marketing program has been operating throughout August, September and October.
- The marketing program is funded on estimates that are provided; underestimating the volume of fruit short changes the marketing program substantially. Good estimates mean that the program can match the real volume of fruit being shipped to the market.

We will continue to work on solutions and argue the case with the supermarkets to gain greater access. We can only do this if you support the programs and work as a cohesive industry, providing a competitive advantage to Australian growers.

Consumers should win with avocado prices dropping

In the last two weeks the Australian avocado market has dropped. Volumes into the Australian market have been stable for the previous five months, however September saw a volume increase and wholesale market prices dropped significantly; $8.00 in only two weeks. This represents a 33% drop in return to Australian avocado growers.

"We have been shocked with the drop in value over the last two weeks" explained Mr Antony Allen, CEO of Avocados Australia, "this time of year is always difficult, we have the entry of New Zealand avocados into the Australian market, and that means changes in the market."

Currently Australian fruit is being supplied from Southern Queensland, Coastal NSW, the Tristate region, the Perth region and Bunbury. The Southern Queensland, Coastal NSW, and Tristate regions are made up of medium and smaller growers, who have not normally supplied Coles and Woolworths.

Coles and Woolworths have changed over to New Zealand avocados in the eastern states. The major Australian supermarkets both source avocados from New Zealand from September to February. Australia continues to exclusively supply avocados into South Australia and Western Australia.

This year, Woolworths have worked with a few suppliers to keep Queensland on Australian fruit for as long as possible. Disappointingly, Coles has stated that they "don't usually carry the avocados from NSW as they typically don't meet our customers' eating quality expectations on flavour, shape, size and shelf life."

"The NSW region is one of the regions that set up the avocado industry in Australia over 35 years ago," responded Mr Allen, "avocados from this region are of high quality and are very sort after by consumers, with high dry matters."

Coles have implemented a system of Single Country Supply in their stores for fruit and vegetables, and to change the country of origin a three day notice and change over process is used. This system was created in response to 'Country of Origin Labelling' breaches for which they have been fined. The end result is that once Coles start their New Zealand fruit program there will be little ability for them to purchase fruit from Australia. This system punishes Australian growers who supply the wholesale market.

Uniting growers in Southern Queensland, Coastal NSW and the Tristate region to work more closely and coordinate supply into the two supermarkets will significantly aide in solving the issues that they have been experiencing this year. Avocados Australia is working with the growers, packers and marketers to solve the supermarket access problem.

Industry Matters continued

VII World Avocado Congress a rich harvest

Last month, the VII World Avocado Congress was held in Cairns, Queensland. This five day premier event brought the global avocado industry together and a $5 million boost to the region's economy.

Avocados Australia had the honour of hosting the World Avocado Congress at the innovative Cairns Convention Centre. 850 avocado producers, wholesalers, food service providers, market traders, retailers and government representatives from 24 countries around the world attended this amazing event.

"Unlike any other event, the World Avocado Congress brings everyone together; researchers, growers and marketers, all attend in large numbers," commented Mr Antony Allen, President of the International Avocado Society and CEO of Avocados Australia. "One of the great opportunities the Congress allowed was the exchange of information between the Spanish and English speaking avocado world."

The VII World Avocado Congress was sponsored by the foremost avocado marketers in Australia, the US, New Zealand, and Mexico; they included Avocados from Mexico, Costa Exchange, Mission Produce and Primor Produce. "Without the invaluable support of our sponsors the Congress would not have been such a fantastic success" said Mr Allen.

The rich Scientific Program included more than 230 presentations from leading industry experts in the fields of genetic resources, pests and diseases, culture management, post harvest/processing, marketing and the commercial stream. The Congress was very lucky to secure plenary speakers Dr Michael D'Occhio, Professor of Food Security at the University of Queensland, and Dr Gabrielle Persley who has spent over 25 years working in international agricultural research and development.

Renowned chef, food presenter, recipe writer, and internationally awarded cookbook author Kate McGhie received glowing reviews from delegates for her demonstration on using unripe avocados to brilliant effect as well as exciting approaches to hot dishes with avocado.

The Industry Exhibition became a 'hub' of networking for both delegates and exhibitors to reaffirm old contacts and establish new relationships within the industry. Consistent traffic through the Industry Exhibition was a guarantee thanks to the Welcome Reception, Congress lunch breaks, as well as all morning and afternoon teas being held there. The 35 exhibitors that made up the Industry Exhibition were thrilled with the high level of exposure the Congress brought to their businesses/organisations.

The Industry Exhibiton was the perfect opportunity for the Australian avocado industry to debut their new mascot 'Alvin Avocado'; Alvin features heavily in the industry's education material, ranging from a colour and ripeness poster to avocado handling posters.

The Social Program took delegates to visit real 'Aussie' avocado farms on the Atherton Tablelands and to Kuranda and the Rainforestsation Nature Park set on 100 acres of world-heritage rainforest. It also included the Gala Dinner where delegates latin danced the night away in celebration of the end of such a great event.

Peru will be the host nation for the next World Avocado Congress in 2015, beating both California and Colombia in what was a very close bid. ProHass President Mr James Bosworth has now assumed the role of President Elect of the International Avocado Society.

President Elect of the International Avocado Society and ProHass President, Mr James Bosworth at the VII World Avocado Congress 2011 Gala Dinner.

According to ProHass general manager Arturo Medina, Prohass developed a marketing strategy some time ago in order to have the support of most of the World Avocado Congress attendees from other countries. He went on to add that the Peruvian delegation positioned the image of Peru amongst thousands of people participating in the Australia congress, including producers, exporters, importers, researchers, etc.

"The goal is big and we want to organise the best World Congress yet – we have the conditions to do it," commented Mr Medina.

Full papers, Powerpoint presentations and a gallery of pictures for the five day VII World Avocado Congress 2011 are now available at *www.worldavocadocongress2011.com*

Avocado biosecurity plan launches at the VII World Avocado Congress

The Australian avocado Industry Biosecurity Plan and the Orchard Biosecurity Manual were launched at the VII World Avocado Congress in October 2011 in beautiful Cairns, Queensland. The biosecurity planning documents are a well received boost to protection against exotic pests for Australian avocado production.

The biosecurity planning documents are based on a risk analysis which identified specific insects, diseases and fungal infections that could damage avocado crops should they get into Australian orchards. The analysis was coordinated by Avocados Australia, Plant Health Australia (PHA) and Biosecurity Queensland, and brought together key researchers working on avocados in Australia.

Identified threats include avocado thrips which are causing large economic losses in Californian avocado orchards, avocado seed weevils which are a major pest in Central America, and Laurel wilt which is emerging as a significant pest of avocados in the US.

To be forewarned is to be forearmed, according to Mr Antony Allen, CEO of Avocados Australia. "The new Industry Biosecurity Plan lists all the potential high risk pests as well as identifying the steps that can be taken to reduce the risk of them coming into the country and spreading throughout orchards. It means we have an agreed plan based on the latest scientific advice and we can spring into action should any of these nasty pests be found here," said Mr Allen.

The avocado industry is worth around $180 million at the farm gate each year with around 1,000 growers in Australia and 70% of production grown in Queensland. Apart from the potential losses to individual growers, the avocado industry sustains many rural communities, so there is much to protect. The Orchard Biosecurity Manual has been written for these growers, according to PHA Executive Director and CEO, Greg Fraser.

"The main findings from the Industry Biosecurity Plan have been translated into a manual for growers, showing them what exotic pests to look out for, and recommending actions that all growers should be taking as a matter of course to reduce the risk on their properties." he said.

Practices that the manual recommends include cleaning vehicles and equipment, ensuring the hygiene of people moving on and off a property, and collecting all plant waste and disposing of it away from nursery and orchard areas

Industry Matters continued

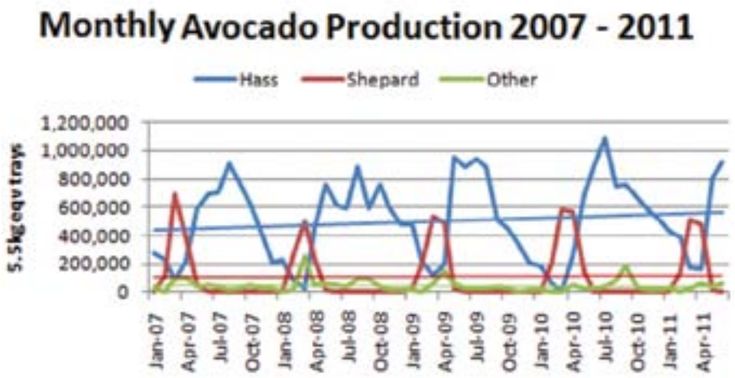
and water sources. "Biosecurity is everybody's business" says Greg Fraser, "and needs to be a priority for all orchards."

For more information on the avocado Industry Biosecurity Plan and Orchard Biosecurity Manual please visit the Plant Health Australia website *www.planthealthaustralia.com.au*

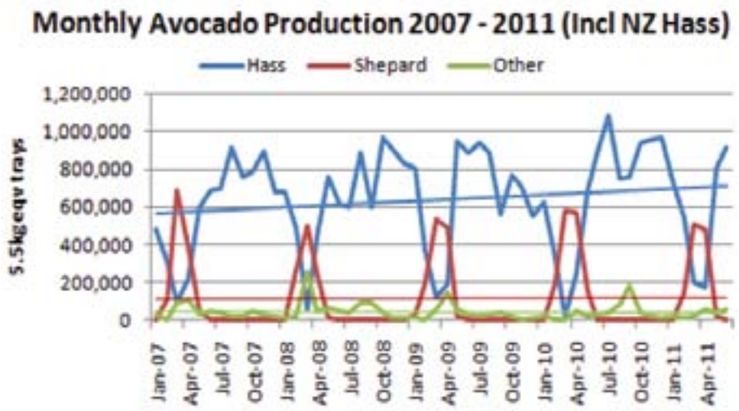
Infocado spring update

The Infocado program generated much discussion at the VII World Avocado Congress in September. At the last Congress in Brazil the program was in its early implementation stages so it was with great pride that Joanna Embry, Program Manager at Avocados Australia, updated the international audience on how the system has developed, and was able to demonstrate some of the information generated.

***Graph 1**: Monthly Avocado Production from 2007 – 2011*

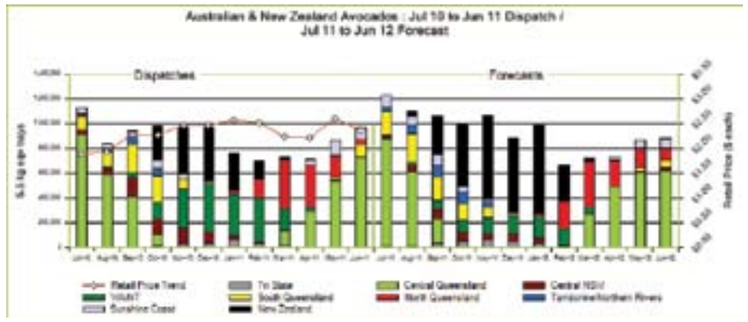


***Graph 2**: Monthly Avocado Production from 2007 – 2011 (including New Zealand Hass volumes)*



Below are extracts from the July 2011 Quarterly Infocado Report. The next Quarterly Infocado Report is due to be released to all contributors in the coming weeks.

***Graph 3**: Australian and New Zealand Avocados: Dispatch and Long Term Forecast*



As you can see from the above graph, Australian production will be slightly down while the New Zealand crop to Australia is expected to be higher. Western Australia will see a significant reduction in crop, while Tristate and Tamborine/Northern Rivers region are forecast to increase to more normal production levels.

With the higher volumes forecast in the market for the period July 2011 to January 2012, it will be very important to ensure the maximum volume is exported and that everyone is working very closely with their wholesalers and retailers to ensure flow through the system. A higher risk of quality issues with any blockages in the system causes a slowdown, with consumers reducing repurchase with each 'poor' quality experience.

All growers are strongly urged to update their 15 month forecast each month by the given deadlines, as this helps us to provide more accurate and timely reports for everyone's use. Not only does this information feed into the Quarterly Infocado Report but it also translates directly into the 'Percentage Dispatched by Region' graph on page three of the Weekly Infocado Report. The graph shows a true reflection of the crop still to be dispatched in the future.

OrchardInfo spring update

Within the coming months all Australian growers will be receiving via post and email copies of the 2010/2011 season OrchardInfo forms to update. These forms will be sent out to each growing region as their season finishes. The forms are used to collect orchard information including tree numbers, tree age, varieties, rootstocks and overall production. Once collated, this information will give individuals and the industry a clear understanding of how many trees of different ages are in the ground and therefore provide the information necessary to generate long term forecasts for the industry. It will also give individuals a good idea of what varieties are being grown and where.

We strongly encourage you to fill out the forms to the best of your ability and return them to us as the more people who participate, the more accurate the reporting will be.

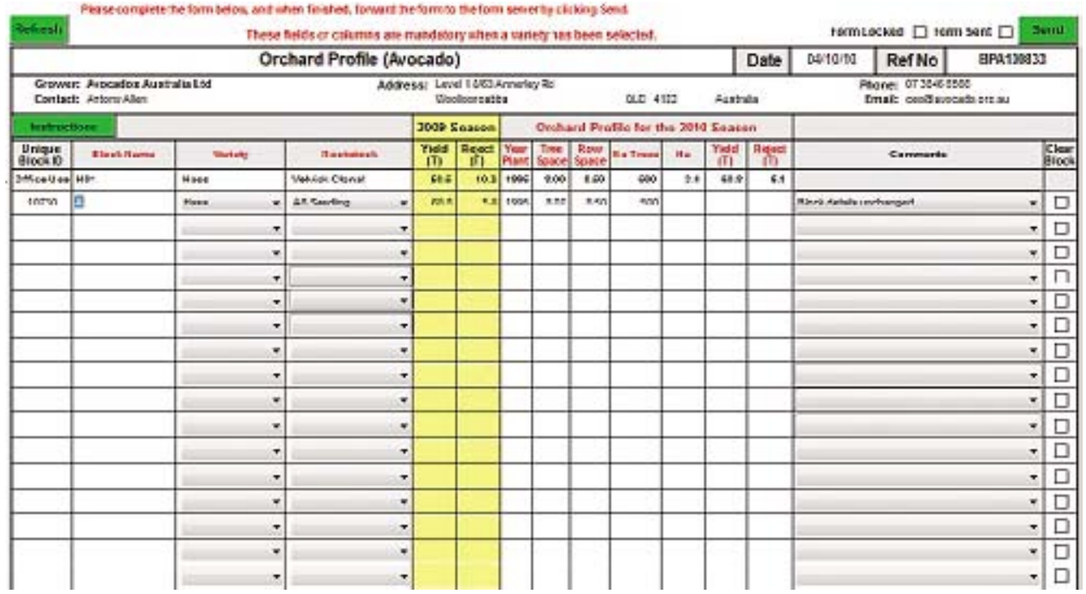
For more information please contact Julie Petty, Program Manager at Avocados Australia, on 07 3846 6566.

Sydney retailer training going gangbusters

Sydney avocado retailers are embracing an Avocados Australia Retailer Training program which has been rolled out since August 2011.

Over 60 retailers have been visited so far by Avocados Australia trainer Yianni Vrachnas, with an overwhelmingly positive response. A mix of major supermarkets, as well as independent green grocers, are being targeted in the campaign.

"The aim of this program is to engage retailers and get them reassessing how they should be handling their avocados to ensure that the fruit they sell is high quality and blemish free for the consumer" said Julie Petty, Program Manager for Avocados Australia. "By engaging retailers and their staff we want to push home the key messages from the Avocado Handling: Retail guide - *be gentle*, don't stack fruit more then 1-2 layers high and



Industry Matters continued

identify the ripe and ready fruit for the consumer so they don't need to squeeze the avocados."

"Our target is to visit a minimum of 150 stores in Sydney three times a year to ensure the information is implemented. This also allows us to train any new staff within the stores as staff turnover can be high" stated Julie Petty. "The feedback so far is that the retailers love the education materials we're supplying them and are very pleased to be involved in the program. They think it's a fantastic initiative".

Each retailer receives copies of the Avocado Colour and Ripeness Chart, Avocado Handling: Retail poster, and The Little Green Book: The Adventures of Alvin. Recipe booklets and an update on the latest industry news and season is also distributed; this helps the retailers to understand what's happening in the industry and who they can contact if they want more information.

This program is also operating in Melbourne and is due to be rolled out in Brisbane and Perth in the coming months.

For further information about this program please contact Program Manager, Julie Petty at *supplychain@avocado.org.au* or 07 3846 6566.

Avocado education materials

As growers would be aware, Avocados Australia in conjunction with Agri-Science Queensland have been developing a number of new education materials to fill information gaps within the supply chain. Terry Campbell of Agri-Science Queensland launched the new Avocado Ripening Manual at the VII World Avocado Congress in September. This manual is being distributed to all avocado wholesalers and ripeners and provides an in depth guide to ripening avocados.

An Avocado Transport Guide, Harvest Guide and Quality Standards poster have also been under development in the last few months. The Transport Guide provides guidance on ensuring the fruit is pre-cooled to the correct core temperature provides recommendations for in-transit temperatures and emphasises the importance of maintaining good air flow during transport. The Transport Guides are being distributed to all Australian packhouses and avocado transport companies in the coming months.

An Avocado Harvest Guide for pickers as well as growers and managers is due to be released by the end of 2011. The poster, aimed at pickers, highlights the most important points they need to be aware of in the field and predominately uses images to convey those messages; this is because for many pickers, English is not their first language. The grower and manager harvest guide provides clear, concise recommendations to follow during harvest times. Alvin Avocado lends a hand telling this story.

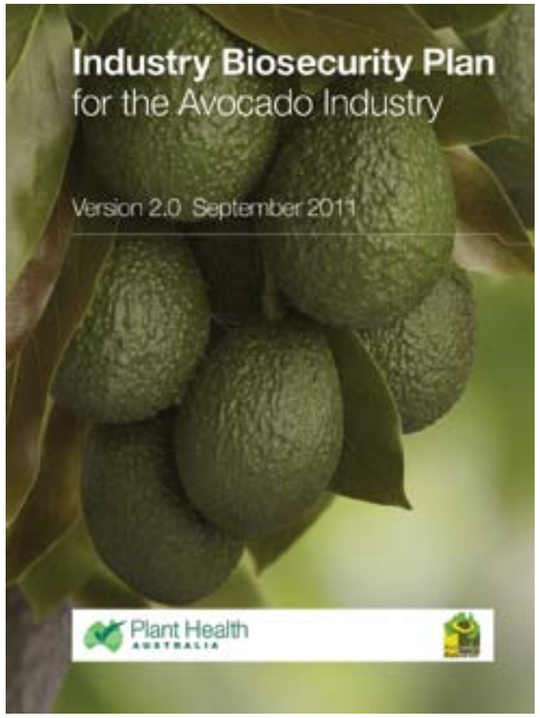
The existing Australian Avocado Quality Standards poster which was published several years ago is under review. The new poster which will be published by the end of 2011, is being reviewed to ensure the recommendations are up-to date with current practices. The new poster will be distributed to all Australian packhouses.

Thanks to Peter Hoffman, Leigh Barker, Scott Ledger, Victoria Jones, Terry Campbell and Simon Newett at DEEDI for their valuable input into these documents. For more information about any of these guides please contact Avocados Australia Program Manager Julie Petty at *supplychain@avocado.org.au* or 07 3846 6566.

Exotic avocado pests targeted by biosecurity planning resources

Two biosecurity planning documents targeting pests of avocado crops have been released by Plant Health Australia (PHA), boosting protection against exotic pests for Australian avocado production.

The Industry Biosecurity Plan for the Avocado Industry and the Orchard Biosecurity Manual for the Avocado Industry were launched at the VII World Avocado Congress in Cairns in September.



Industry Matters continued

The biosecurity planning documents are based on a risk analysis which identified specific insects, diseases and fungal infections that could damage avocado crops should they get into Australian orchards.

The analysis was coordinated by Avocados Australia, Plant Health Australia (PHA) and Biosecurity Queensland bringing together key researchers working on avocados in Australia.

The high priority pests identified include avocado thrips which are causing large economic losses in Californian avocado orchards, avocado seed weevils which are a major pest in Central America, and laurel wilt which is emerging as a significant pest of avocados in the US.

The new Industry Biosecurity Plan lists the most serious exotic pest threats of avocados and analyses overseas experience and entry pathways to assess the risk of them reaching Australia. Armed with this knowledge, the Plan sets out what systems of protection are in place and what additional measures are needed to minimise the likelihood of these pests establishing and spreading.

Apart from potential losses to individual growers, the avocado industry is worth around $180 million at the farm gate each year and sustains many rural communities, so there is much to protect.

Around 1,000 growers produce avocados in Australia and, according to PHA Executive Director and CEO, Greg Fraser, the Avocado Orchard Biosecurity Manual has been written for them. "The main findings from the Industry Biosecurity Plan have been translated into a handbook for growers. It shows them what exotic pests to look out for, and recommends actions that all growers should be taking to assist in the early detection and reporting of suspected high priority pests and to reduce the risk on their properties," he said.

Practices that the manual recommends include cleaning vehicles and equipment, ensuring the hygiene of people moving on and off a property, and collecting all plant waste and disposing of it away from nursery and orchard areas and water sources. It also includes fact sheets on the highest priority pests, a handy biosecurity checklist and template that can be used for logging visitor movements.

"Biosecurity is everybody's business" says Greg Fraser, "and needs to be a priority for all orchards."

For more information on the Industry Biosecurity Plan and the Orchard Biosecurity Manual for the Avocado Industry visit the Plant Health Australia website *www.planthealthaustralia.com.au*

Best practice biosecurity wins award for Birdwood

2011 Biosecurity (Plant) Farmer of the Year Award winners Sandra and Peter Young developed their best practice biosecurity procedures at their nursery to produce avocado trees that were free from *Phytophthora cinnamomi* root rot disease. Today, over thirty years later, they produce more than 150,000 trees annually, and Birdwood is Queensland's leading tropical and subtropical fruit production nursery, providing a wide range of plants for growers and home gardeners.

Judges of the Biosecurity Farmer of the Year Award for 2011 were impressed with the holistic way biosecurity is included in production processes in the business. The Young's clear passion for their business and the pride they take in being industry advocates for biosecurity was clearly evident.

The business was started in 1978 when Peter, then Extension Officer with the Queensland Department of Primary Industries, identified a need across Australia's horticultural industries, for high quality, disease-free fruit trees. Now, all tree stock at the nursery is grown under the Avocado Nursery Voluntary Accreditation Scheme (ANVAS) guidelines.

To prevent pests and diseases, all plants are grown in containers on benches in a steam-pasteurised growing mix and watered with disinfected (chlorinated) water. Samples of plant root and soil are regularly tested for diseases.

Sound record keeping at critical points in production allows plants to be traced from entry to the nursery all the way to despatch. Boots have to be cleaned before entering any plant-growing area in footbaths with a copper disinfectant.

Vehicles are controlled as well. The loading surfaces of nursery vehicles are disinfected. All roads are sealed for dust suppression and general ease of site hygiene. Where it is necessary for non-nursery vehicles to enter production areas, these are inspected and if necessary, washed down before entry.

Peter Young says biosecurity has been at the very forefront of production processes in the business so they can supply good quality, healthy fruit trees to clients. Under his guidance Birdwood helped pioneer a nursery industry accreditation scheme and in 2006 became one of the first nurseries to achieve EcoHort certification.

Earlier this year, Birdwood was proud to become the first fruit tree nursery in Australia to be accredited for BioSecure HACCP, the on-farm biosecurity program for production nurseries in Australia which aims to keep production sites and nursery stock free of unwanted pests by prevention, early detection and planned, managed responses.

Peter Young appreciates the benefits that good biosecurity practices bring to the business. "A sound on-farm biosecurity program becomes part of your brand and helps to maintain market access and open new opportunities in the future."

His tip for farmers is to use all available means to ensure good farm biosecurity, to enhance plant health, productivity and profitability. He also advises the use of genetic resistance or tolerance where it is available, and the use of biocontrol agents, access control, and the judicious use of chemicals.

The Biosecurity Farmer of the Year Award is sponsored by Plant Health Australia and Animal Health Australia – the not-for-profit organisations established to coordinate the government-industry partnership in plant and animal biosecurity. The Award forms part of the Australian Farmer of the Year Awards, hosted by Kondindin Group and ABC Rural.

For more information about Plant Health Australia and the awards visit *www.planthealthaustralia.com.au*

Nominations for the 2012 Biosecurity Farmer of the Year Award are expected to open in June next year. The Awards promise to be even bigger in 2012—the Australian Year of the Farmer. As well as being eligible for the category

Industry Matters continued

award, all finalists have the opportunity to be named Australia's Farmer of the Year.

The nomination process is quick and simple. Register your interest in being part of the program or someone you think is deserving by contacting Plant Health Australia on (02) 6215 7700 or email *info@phau.com.au*

New iphone app set to revolutionise access to local food in the Northern Rivers

MyFood Northern Rivers – a new App for iPhone and iPad that will better connect users with local food – will be officially launched by food writer Belinda Jeffery on Wednesday 19 October, during the launch of the 2011 Food Celebration at the North Coast National Exhibition at the Lismore Showgrounds.

The FREE App which is now available from the App Store is intended to put local people, and those visiting the region, more quickly in touch with the wide variety of food that is grown, produced, sourced, sold and served in the Northern Rivers.

Users will be able to search for local producers, restaurants, retailers, markets and food events by name or town and even by those that are closest to them using advanced geolocation services from Google. App users will be able to find restaurants on a map, contact producers via email or even visit their favourite market's website. The App also enables users to create a list of 'favourites', and to rate and share information and photos with other users via email, Facebook and Twitter. Importantly, users will be keeping the outlets on their toes, with the ability to report any listed outlet that doesn't serve or sell local food!

RDA-NR CEO Katrina Luckie said: "We're delighted to introduce the first version of this App that will make finding local food more convenient. It will grow and improve as it becomes more popular. We already have many producers and retailers – including our local markets – on board, and we want more restaurants and cafes in the region who serve locally-sourced food to add their details. It's easy to register. Just visit *www.sustainfood.com.au* and follow the prompts. We want as many local outlets as possible to sign up soon."

Pam Brook, Convenor of Northern Rivers Food, welcomed the App launch as a great addition to the 2011 Food Celebration at the North Coast National. "This is our second year celebrating local food at the National and we're delighted to welcome this 'must have' App as another great tool to promote the huge variety of delicious food that we grow and produce right here in our region."

The App is FREE and available to download and INSTALL from the App Store, via your Apple mobile device, or via iTunes. The App, which works on iPhone, iPad and iPod touch, requires iOS 4.0 or later.

Producers, manufacturers, retailers and restaurants who would like to be included in the App should head to *www.sustainfood.com.au* and follow the prompts to enter their details.

MyFood Northern Rivers has been created by RDA-Northern Rivers, supported by Northern Rivers Food Links; the NSW Department of Trade & Investment, Regional Infrastructure & Services; and the Northern Rivers NSW Business Chamber.

GROWER CALL TO ACTION

Help stop Australian avocado growers investing in marketing for imported product.

Avocados Australia has been lobbying the Australian government for over four years to implement an equal marketing levy on imported product, and now we need your help.

Only with your full support and active participation can we hope to achieve an equal marketing levy and stop Australian avocado growers investing in marketing for imported product.

Show your support for an equal marketing levy on imported product.

A co-ordinated and personal approach by Australian avocado growers will be the most effective in rousing the Australian Government, and therefore we ask you to take action immediately.

Arrange a face-to-face meeting with your local MP and Senator to personally express your opinion.

Write a letter in support of an equal marketing levy for imported product.

Points to focus on:

- Australian growers invest 4.5 cents per kg (25 cents/5.5kg tray) annually in the avocado industry's marketing program.
- We are only asking for a fair and equal investment.
- The USA has a system that does exactly what we are asking for.
- This does not contravene the WTO in any way, or the CER with New Zealand.

Please contact the Avocados Australia office on (07) 3846 6566 or email admin@avocado.org.au if you require assistance or further information.

Around Australia

Tamborine and Northern Rivers Report

By Tom Silver, Avocados Australia Director for the Tamborine and Northern Rivers Growing Area

Northern NSW and Tamborine growers would by now be done with their 2011 crops, with most I'm sure saying good riddance. The anticipated shortfall of fruit in the pre-NZ supply window has not manifested, meaning growers who had held out for higher prices or who unluckily supply later in our season are being rewarded by slack demand, agents saying do not send fruit, and prices barely above cost of production if that. This has come as a shock after a number of years of relatively buoyant sales through this period; meaning fair returns for farmers. The factors contributing to the situation are multiple and well understood though I will bore you with some of them anyway:

- Improved crop forecasting. Infocado is only as good as the data that goes into it. Picking programs need to be planned in advance.
- Retail price need to reflect market conditions, this is generally out of the hands of growers but worth a rant anyway.
- Greater cooperation by growers and marketers to reduce the amount of different brands in the marketplace.
- Growers holding out for higher prices due to rumour and hearsay of a supply shortfall.

Most of these factors are interconnected and all contribute to an unpredictable market, slow sales, reduced quality and destroying our bottom line. As new plantings come on line both here and from across the ditch the problem will only exacerbate. Let's work towards a solution!

On a lighter note congratulations to Avocados Australia on an excellent, professional and entertaining World Avocado Congress. Antony Allen and his team have set a very high bar for future events. Thanks to all involved especially to local growers for allowing such a crowd to traipse their farms, our Chairman Jim Kochi for his unending hospitality and good humour, Dr Elizabeth Dann for putting together such a comprehensive Scientific Program, and to all delegates for making the effort to get up there and be a part of it.

Whilst I'm thanking people, Henry Kwaczynski is standing down from the Avocados Australia Board after 14 years of committed service. Henry's contribution to our industry has been huge, he has seen our industry mature from a handful of 'Hill Tribes' to the professional, innovative envy of Australian horticulture it is today. Depending on the situation, he has been both our industry hardman and our peacemaker and has always put good governance and the interests of all Australian avocado growers first. Thankyou Henry, you are a friend and a role model, best wishes to you and Jocelyn for the future.

Sunshine Coast Report

By Peter Annand, Avocados Australia Director for the Sunshine Coast Growing Area

Harvest is well advanced or complete in most orchards. Flowering looks generally good and fruit-set will depend on weather over the next few weeks.

I appreciate the opportunity to represent Sunshine Coast growers on the board of Avocados Australia and look forward to keeping in touch with as many growers as possible on a regular basis.

Please give me a call if there is anything you would like to discuss about our industry or just to make contact. My contact details are on page 3 of Talking Avocados.

Central New South Wales Report

By Chris Nelson, Avocados Australia Director for the Central New South Wales Growing Area

As I write this regional update, Central NSW orchards are in full flower, or are shortly to be, and all growers I am sure will be hoping for a return to a heavy and consistent crop in light of mixed results over recent years. That said, given the current state of the domestic market, a potentially record crop for NSW makes for ominous forecasts in terms of farm gate returns. It is something that I think can be addressed in time to ensure positive results, but we will need to start working now.

Given that the NSW season typically overlaps with the harvest of both early season QLD production and late season NZ/WA/Tristate production, growers have usually found the best results are obtained by waiting for our fellow QLD growers to more or less finish their season before really getting stuck into their own harvest. We have preferred to compete in a market with New Zealand (NZ) during the spring months when demand and returns are typically on the rise.

The benefits of the above scenario are being tested this season where the introduction of NZ fruit to the Australian market prematurely has had disastrous results. At a time when we have always seen the market firming, prices are actually falling. The market problems have stemmed largely from the decision by the large supermarket chains to change over to NZ supply almost exclusively rather than taking a staged approach. As growers we must be prepared to take some of the blame for this and I am certain that late season Australian growers can do a better job of trying to convince our largest buyers of avocados that we can continue to provide a superior Australian product for much longer than we are currently being given credit for.

At the end of the day though, we can never force our supermarkets to buy Australian so we must be prepared to use alternative methods to achieve our goals. One thing we can do is actively promote our product such that it would be to their (the supermarkets) competitive advantage to use local supply. In recent years in particular, there has been room in domestic market for both Australian and New Zealand fruit with good returns available for all. However, as the NZ crop continues to increase (which it will do for many years to come) there comes a point where we must seek to differentiate our product to ensure our own viability.

The solution I believe will largely lie in a move to use Australian promotional levies to fund the promotion of Australian avocados rather than just avocados in general. In turn this will continue to ensure that 'fringe dwellers' like Central NSW can continue to largely avoid significant harvest overlap with QLD and thus avoid further market pressure being experienced in winter. New Zealand industry members will surely not be pleased with a move to this type of promotion but after many years of refusing to contribute matching promotional levies for participation in our market, it can hardly be viewed as unreasonable.

I would like to thank Antony Allen and his dedicated team for making the VII World Avocado Congress in Cairns such a resounding success. I personally believe we are privileged as an industry to have such a brilliant management team working for us in Brisbane. I would also like to take the opportunity to remind Central NSW growers that it is never too early to start planning your attendance at the next World Congress event to be held in Peru in 2015.

Around Australia continued

North Queensland Report

By Jim Kochi, Avocados Australia Director for the North Queensland Growing Area

In September the VII World Avocado Congress 2011 came to our region and I would like to thank all the growers who attended and all the growers who so generously opened their farms for the visits. Special thanks to Matt Weinert DEEDI Mareeba for his organization of the farm visit venues and the schedules, and also for his devoted interest in our industry. I hope the Congress was of benefit to you and will stimulate your interest and planning for attendance in Peru in four years time.

The spring has sprung and now we search for the elusive Shepard set. This variety likes to hide in the foliage but this year it seems to be very shy. The flowering looked good but the many alternate cold/warm snaps have resulted in a smaller fruit set than expected. However, the true value of the set will become evident in November.

October has given us very hot dry conditions and this will be a challenge to maintain good irrigation programmes and to control sunburn. Also, this heat can bring violent storms so I wish all growers in NQ safe passage through this coming summer season. We hope for a better deal from the weather this year.

In my Chairmans Perspective I made mention of a market collapse in October. As we get a better understanding of this problem I would urge all NQ growers to take note of the learnings that will come from the October collapse so that we do not have a repeat event in February as our Shepard crop comes in on the tail end of a large New Zealand crop.

I can not stress enough the importance of accurate and timely forecasting and dealing with merchants who have marketing programmes in place. The central market can be a dangerous place for the spot market punter as October has shown us all.

Tri State Report

By Nick Hobbs, Avocados Australia Director for the Tri State Growing Area

Harvest looms so like a good little orchardist it has been time to look at possible crop levels and where the fruit this year will be marketed. It's time to visit the markets; catch up with agents; and talk about the how, when, and where. The Congress also added some extra level of conversation as many of the main avocado agents were present.

The conversation goes pretty much like this.

Agent: How is the Hass crop?

Me: Sensational! Biggest we have had in ten years with excellent size and quality

Agent: Fantastic. The buyers have always loved Tristate avocados. They are the best in Australia. We have missed them during the drought.

Me: Excellent, now what about Lamb Hass?

Agent: (His smile evaporates), they are harder to sell and the buyers have been turned off. We have to discount them to the Hass price. They are watery and the flesh shrinks away from the skin.

Me: When does your grower harvest?

Agent: We get them off before he starts his Hass.

Normally it is our early season areas that cop the criticism for harvesting fruit immature and we have all heard how a poor eating experience turns the consumer away from buying for a number of weeks. Don't worry; we can have the same issues down south. The Citrus industry this year had a concerted campaign to try and prevent early immature fruit from depressing sales.

If fruit shrivels, or in the case of Lamb Hass with a thicker skin, the flesh shrinks away from the skin or has a watery texture, the fruit is immature with low oil content.

Research work on Lamb Hass versus Hass in California shows that Lamb Hass is significantly lower in oil content at the same point early in the season and accumulates oil at the same rate so remains backward in oil content compared to Hass all season. The conclusion is that it reaches maturity about four months after Hass.

For the Tristate area, dependent on crop load and the season, this approximates to a first harvest around mid-December and best eating maturity after the New Year.

Sensory evaluation studies in New Zealand concluded that maturity was around four months later than Hass and recommended a minimum oil content of 27 percent to maximise consumer acceptance. This is significantly higher than our Australian standard of 23 percent for Hass. While I have no information on when Lamb Hass would reach 27 percent dry matter in the Tristate region I have no doubt that the consumer acceptance is greater the later the fruit is harvested.

In the past, before we had more knowledge of its time of maturity, I have seen Lamb Hass harvested as early as September in the Tri State. Perhaps it is not surprising that it has developed this reputation in the marketplace. Now I believe a majority of Lamb Hass growers in our district are committed to holding off harvest till fruit maturity and consumer acceptance is greater. Growers want to maximise the return on their investment in the orchard. The prospect of having to remove the plantings as I understand has happened in other districts is not great.

After supplying fruit at high oil contents to some agents it may surprise that comments like these occur:

"I have had no consumer resistance at all" (expectation was that he would).

"Fruit is easier to handle late in season than Hass as it

Around Australia continued

takes longer to ripen and gives me more control."

"Not sure now why we have to discount them."

If interested in the overseas work you can access it by putting 'Lamb Hass maturity' into the search engine at *www.avocadosource.com*

If we can get everyone on the same page and harvesting fruit at high oil contents the problem is how to overcome the established stigma that the variety has in the market. It will certainly help to have the better eating experience.

Remember to tell your agent why they are now different than the past and good luck with your late Lamb Hass harvest.

South Queensland Report

By Daryl Boardman, Avocados Australia Director for the South Queensland Growing Area

Spring is sort of here and it has been a hot and cold start. Let us hope that the hot remains and we have a reasonable flowering.

In early September our industry and country hosted the largest event on the world avocado calendar; this being the VII World Avocado Congress.

I attended along with many others from Australia and 23 other countries. It was a fantastic event and I would just like to congratulate our CEO Antony Allen and his fantastic team as well as our Chairman, Jim Kochi for running such a wonderful event.

On a more real and not so nice note, since the Congress we have had the start of the New Zealand and Australian supply rallying for positions in the market place. It's been a pretty shaky start with price reduction falling at a rate that seems unneeded and unnecessary, but the market is the market and I guess it will all come out in the wash as to why this has happened; so time will hopefully tell the story.

From what I see, once again in our industry we have to probably work harder together to make sure that the important markets remain taking Australian fruit and that growers are honest and forecast their crop the best they can to either their packers, or to the industry through the Infocado system if packing their own fruit. The days have gone where we all think we are the best marketer and think we know that next week or next month things will improve and the way this season is shaping up both Australian and New Zealand growers will really feel this impact.

What do we do you ask? I don't have a crystal ball but what I do know is that the way that the Avocado Export Company is working with growers, packers and marketers; working together, supplying product when needed, at sometimes below the market just to retain customers, is the future of our industry. This company has seen fantastic growth in markets and sales and this has only happened through the dedication of the people involved.

On a much sadder note we have had the tragic loss of a lovely lady from the Blackbutt/Mt Binga region, Bev Williams. Bev was taken in a tragic car accident on the 24 September 2011 at Mt Binga. She was laid to rest at the Kilcoy cemetery on the 3 October 2011. Ray and Bev had developed and grown their orchard with a huge amount of hard work from them both over the past 25 years. Bev will be sadly missed by all. Our best wishes go to Ray and all the family.

Around Australia continued

Central Queensland Report

By Lachlan Donovan and John Walsh, Avocados Australia Directors for the Central Queensland Growing Area

We hope everyone who managed to make the VII World Avocado Congress in Cairns enjoyed themselves, managed to catch up with friends and even learnt a thing or two. It certainly was a great success and congratulations to Antony Allen and the team at Avocados Australia for all their hard work to put together a fantastic show. Congratulations also to Dr Liz Dann who put the Scientific Program together, well done.

The Central Queensland season is well and truly past us now and looking back we all had some issues with the big wet; many of us lost a lot of trees. After it has all been picked and packed I believe the fruit quality and the overall yield surpassed expectation, the price for most of our season was very good, only towards the end was the market, especially for the smaller and lower quality fruit, over supplied.

This season coming is another where there will be some challenges set for us, at this stage there is the potential of most regions being on an 'on' crop, we will need to shift consistently large volumes through the markets and chains and have a quality product for the consumer. Please don't go shirking our responsibilities in the orchard especially with regard to anthrachnose and phytophthora control, any shortcuts will truly cost us.

The Central Queensland crop is set up to be a big crop, at the time of writing this the trees are all flowering very well, there's plenty of water but it is still too early to see what set there is, there are plenty of cracks in the wicket!

There is one bright spot that you would have seen it Infocado that the exports are gradually increasing, most of the volume is going into the Asian market and we need to keep developing this market. We have some great advantages in Asia especially with the freshness of the product and the overall quality. This is a market with great potential, a huge population with extremely low consumption right on our door step, but it will take a lot of work. Please be supportive of the exporters who are trying to develop these markets, this will be critical for our long term profitability (survival!).

Around Australia continued

Western Australia Report

By Russell Delroy, Avocados Australia
Director for the WA Growing Area

At the time of writing this harvest north of Perth is over half way through and well under way in the Bussleton/Capel region.

There is considerable turmoil in the marketplace, especially in the Eastern states where nearly all major retail shelf space is dominated with heavy NZ supply. Australian fruit in these markets has been relegated to a very depressed wholesale market with premium fruit selling down to $14/tray. These market conditions look set to remain weak for at least the next 4-6 weeks. Australian packer/marketers with our industry organization must work together much harder with the objective of placing Australian Avocados in prime retail space first and foremost – we fail our growers if we do not achieve this.

The WA harvest this year is set to be about half of last season – although still considerable at around 900,000 trays. In a more competitive marketplace, this year WA growers should aim to differentiate our product by ensuring best possible quality – focus on cool chain management and grading to a high standard. Larger fruit size profile this season in WA due to a light crop load will make 'retail price point' competitiveness difficult - as long as avocados are retailed per piece rather than by Kg there remains a constant disconnect between growers who produce Tonnes/Ha and retailers who sell by piece. If only we could grow 30T/Ha all size 23/25!

On a more cheerful note the winter rains have returned to WA this year and have relieved many of the growing concerns of irrigation water shortages – however continuing to do whatever is necessary to 'drought proof' irrigation resources will be a wise investment going forward. Spring weather patterns look more typical so far and coupled with a solid flowering across the state there is every prospect of setting 2-3 times this years harvest. Lets all pray for warm spring days followed by warm spring nights and lots of busy bees!

The recent World Avocado Congress in Cairns was a great success! Credit must go to the staff of Avocados Australia who have worked tirelessly for many months to make it such a great event. Among many good research papers presented at the Congress it was encouraging to see a significant amount of work on the complex issues around pollination/fruit set/irregular bearing – still much more needs to be done.

Children's fussy eating habits start at home

Survey suggests parents are not good role models when it comes to healthy eating

A staggering 88 per cent of parents admit to allowing their children to eat in front of the television and a further 34 per cent admit to bribing their children with rewards to make them eat fruit and vegetables, according to new research by Australian Avocados.

The Australian Avocados survey, conducted by Newspoll* examined the attitudes, opinions and behaviours of parents with children aged 2 – 12 years, to establish how influential parents can be when it comes to promoting healthy eating habits.

Surprisingly, only one in three parents admit to eating the minimum recommended serving of two fruit and five vegetables most days of the week and 39 per cent of parents say their child has picked up a bad or unhealthy eating habit from themselves.

"It's important for children to see their parents or carers making healthy eating choices to influence a healthy dietary pattern early in life. Children develop 70 per cent of their taste preferences by the age of three, so the earlier you start, the better," says childhood educator, Shelley Woodrow.

For the second year running, Australian avocado growers have launched a resource kit for early childhood educators, to encourage young children to eat a 'rainbow of colourful vegies and fruit', in a bid to increase the consumption of fruit and vegetables amongst young children. The initiative has increased its participation numbers since last year, with the program growing from 408 centres in 2010 to 600 centres in 2011 signing up to receive their free resource kit, equating to almost 58,237 children participating in the program to date.

"A positive eating environment is a really important learning opportunity for children's long term health. Family mealtimes can teach children about food, customs and social behaviours. The Australian Avocados 'Eating My Colourful Vegies and Fruit' early learning resource provides children with an interactive and fun method to nurture lifelong healthy eating practices," Woodrow continued.

The 'Eating My Colourful Vegies and Fruit' resource kit will equip educators and carers with the tools and knowledge to contribute to well-being and food-focused learning experiences for young children, while encouraging them to explore and enjoy the taste of fresh foods in fun and interactive ways. Hands-on sensory food experiences will guide and encourage food preferences and educate the children about how fresh produce is grown, how it looks, feels, smells and tastes.

It's not all doom and gloom! The survey also revealed that 87 per cent of parents are encouraging their child to taste a new fruit or vegetable, even if that child rejects the taste first time. Almost one quarter of parents say they offer that new fruit or vegetable again at least one more time if it was rejected the first round, and a further 63 per cent say they will offer it at least two more times to encourage their child to re-try. Research suggests that children often need exposure to a new food six to ten times before accepting it and many more for it to become a preference*.

"It's not unusual for young children to be cautious about new tastes and textures, but their taste buds develop over time, so repeated relaxed and fun exposure will positively influence their willingness to try something new," said Woodrow.

Green plant foods have a special focus in the 'Eating My Colourful Vegies and Fruit' program, as they are particularly important for young growing bodies.

"The nutrients and fibre in vegies and fruit help growing bodies fight disease and promote good health. Helping your child to enjoy fruit and vegetables from every colour of the rainbow could be one of the most important health lessons you can share with them," said Woodrow.

Avocados also feature strongly in the activities as they are perfectly suited to the overall aims of the education program.

"From a nutritional perspective, avocados deserve a place at the top of the list of desirable greens as they make such a valuable contribution to a child's diet and contain a wide selection of nutrients vital to every aspect of a child's growth and development. As well as being a great first baby food and a good source of dietary fibre, avocados are naturally low in sugar, rich in healthy monounsaturated

* Birch, L.L.,1999, 'Development of Food Preferences,' Annual Review of Nutrition,19, pp.41-62.

Children's eating habits continued

fats and folate, as well as a rich source of Vitamin C," says nutritionist, Zoe Bingley-Pullin.

Funded by Australian avocado grower levies which are matched by the Australian Government through Horticulture Australia Ltd, the 'Eating My Colourful Vegies and Fruit' resource kit includes:

- A resource book for educators, which includes background notes, 'try new foods' tasting protocol, step by step guide to five food learning experiences covering sensory exploring, tasting and making, and more.
- A large format 'Tasting the rainbow of colourful vegies and fruit' poster, featuring photographs of fruit and vegetables arranged in a fruit and vegetable 'rainbow'. The poster can be used on the wall, table or floor and includes food-related sensory words to encourage vocabulary and language development.
- Rainbow swatch consisting of five brightly coloured samplers in a range of hues and shades for each colour of the fruit and vegetable 'rainbow'. This tool enables educators to lead matching, sorting and comparing exercises for real foods and those featured on the fruit and vegetable 'rainbow' to find 'same', 'similar', and 'different'.
- My food finder; avocado shaped view finders to focus children's attention during explorations of fruit and vegetable colour, shape, texture and size.
- A website and DVD including examples of learning experiences in action, nutritional rationale for the program, tips and suggestions for preparing food and including avocados on the menu.
- Picto-recipe cards; a durable set of three picto-recipes which illustrate each step of a child-friendly recipe.

These learning experiences support language development, food literacy, science discovery and social skills. Parents can implement simple activities at home to support the education underway in early childhood centres.

For access to the resources available in the 'Eating My Colourful Vegies and Fruit', log onto *www.avocado.org.au.*

This resource has been created using avocado grower levies which are matched by the Australian Government through Horticulture Australia. The material has been developed by two highly qualified and experienced educators who understand the specialist area of child-centred food and nutrition education. Shelley Woodrow is an independent education consultant with 20 years of experience in the development, production and delivery of high quality, multi-media, cross-curriculum education resources to teachers and students throughout Australia.

Cold storage of partially ripened Hass (AVO 8018)

A critical part of the development of improved ripening of avocados has been the development of a ripening manual and part of this has involved R&D trials to fine tune handling recommendations. In this article we talk to DEEDI researcher Dr Roberto Marques about his work on storage of partially ripened Hass.

TA: Roberto, why did you undertake this work and what exactly did you do?

RM: Part of the development of the new ripening manual meant working with one large avocado handler to develop systems that met their need to consistently deliver partially ripened fruit. They told us that a big problem to them was that orders are often delayed or even cancelled, and so they needed to store partially ripened fruit. We needed to find out how best to store fruit depending on its stage of ripeness.

What we did was source commercially packed fruit from South East Queensland, which we ripened with ethylene to several different stages of ripeness. We then held batches of fruit at temperatures ranging from 2 to 8°C for periods of up to 14 days. We then ripened the fruit at 20°C and assessed the fruit to find out the effect of storage.

TA: You repeated this trial over two seasons. What were your findings?

RM: We found differences in ripening times and large differences in internal fruit quality. An example is fruit held at 5°C for 7 days. Where fruit was rubbery at the start of the storage, it ripened after storage in 7 days, but where the fruit was softening it ripened in less than 4 days.

The effect on fruit quality was large. At low storage temperatures or for long durations we got diffuse discolouration at commercially unacceptable levels. The effect is shown in Figure 1.

TA: So what are your critical recommendations resulting from this work?

RM: As shown in the Figure 1, for storage up to 10 days store partially ripened fruit at 5-8°C. If storage time is 10–15 days then store at 8°C. We are also saying not to store fruit at 2°C, especially where fruit are softer than the rubbery stage of ripeness.

TA: Where can avocado handlers get more information?

RM: All these findings have been incorporated into the avocado ripening manual which was released at the recent VII World Avocado Congress and is available from Avocados Australia.

The DEEDI project team would like to acknowledge the support from Horticulture Australia Ltd., CostaExchange Ltd. and Avocados Australia in undertaking this work.

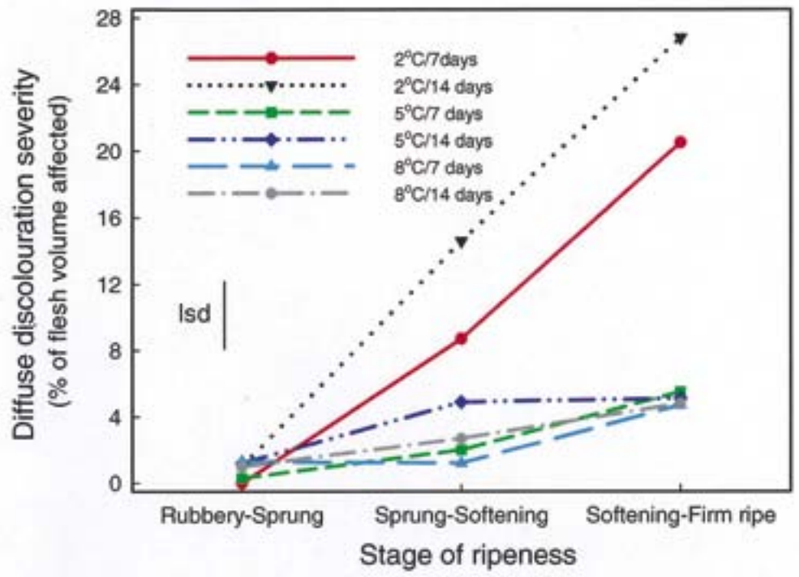
Figure 1 Effect of storage temperature and duration on Hass fruit at 3 stages of ripeness.

Rubbery-Sprung 2°C

Sprung-Softening 2°C

Softening-Firm ripe 2°C

Figure 2 *Effect of low storage temperature on flesh quality of ripe Hass fruit at 3 stages of ripeness.*



Alternate Bearing Research

An update on progress in New Zealand and Australia.

Grant Thorp, Peter Minchin, Helen Boldingh, Nick Gould and Andrew Barnett
The New Zealand Institute for Plant & Food Research Limited
PB 92169 Auckland, New Zealand.

This article provides an update on a series of on-going research projects established in Australia and New Zealand to provide the avocado industry with a better understanding of the causes of alternate bearing and a set of solutions to ensure growers can consistently produce reliable fruit yields.

All avocado-producing regions encounter alternate bearing to some extent with unreliable yields from one year to the next, especially with 'Hass'. In high cropping years prices to growers are low, while in light cropping years marketers find it difficult to maintain consistent supplies into key markets. Environmental triggers such as frost or drought can initiate these ON/OFF cropping cycles, while internal physiological mechanisms are responsible for their continuation. Much horticultural work has attempted to understand these.

Previous research with avocado and other crops examining reasons for low fruit set have implicated both low tree carbohydrate status and boron deficiency as drivers of alternate bearing (Whiley et al, 1996; Wolstenholme 2010). Research in Australia and New Zealand is addressing these factors in an international research programme led by scientists at Plant & Food Research.

Alternate bearing research

There are two scenarios that can lead to alternate bearing (Figure 1). The first is when there are "fruit but no flowers", which occurs when the presence of a heavy crop one year inhibits shoot growth and flowering in the next year. The second is when there are "flowers but no fruit"; in this scenario, there are sufficient flowers but very poor fruit set. Depending upon season and environment, these two scenarios may be additive or independent of each other. Our research has focused mainly on this second scenario which is more typical of the situation in New Zealand and parts of Australia. New research projects being developed in collaboration with scientists in California, Spain, Israel and Chile are being established to address the first scenario which appears to be prevalent in hot and dry Mediterranean-type climates.

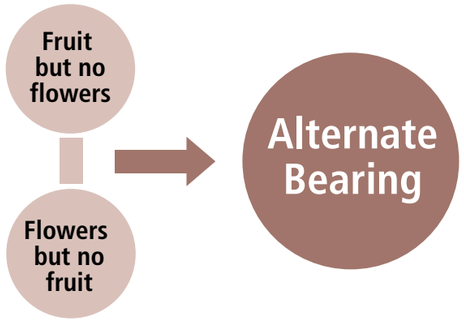


Figure 1. Alternate bearing can result from having too many fruit but not enough flowers for the following season and/or from having sufficient flowers but not the right conditions to set sufficient fruit.

Carbohydrate and boron physiology

Is boron transported in the phloem of avocado trees?

A continuous supply of boron is vital for the formation of new cells during plant growth and development and flowers are particularly sensitive to any deficiency in boron supply (Iwai et al. 2006). Insufficient transport of boron to flowers and developing fruitlets could be an important factor contributing to alternate bearing in avocado.

In many plant species boron is not transported in the phloem, which is the sugar transport pathway in plants from leaves to flowers and elsewhere. In these plants distribution of boron throughout the plant depends completely upon transport in the xylem, the water transport pathway that terminates in the leaves. Some plants have polyols (e.g. sorbitol, mannitol) as a component of their phloem sap which joins with boron to make boron mobile in the phloem. This has been well documented in many tree crops, such as apple and almond (Brown and Hu 1998).

The major carbohydrates in avocado are the 7-carbon carbohydrates D-mannoheptulose and the polyol perseitol (Liu et al. 2002). Our hypothesis was that the presence of perseitol in the phloem sap of avocado may facilitate the transport of boron via the phloem. While this had been previously suggested in the avocado literature, it had never been demonstrated, until now.

- Mass spectrometry was used to demonstrate that perseitol does in fact form a complex with boron. So there is the potential for boron to be transported in the phloem of avocado.
- We then demonstrated that young avocado leaves had considerably more boron than older leaves which means that boron had been exported from these older leaves. With nutrients that are not transported in the phloem, such as calcium, their concentrations increase over time in older leaves as there is no export.
- We also showed that boron was able to move from a mature avocado leaf into nearby young tissues including flowers, indicating phloem mobility, and we found boron in phloem sap collected from an avocado inflorescence (Figure 2).

Thus we were able to confirm that boron can be transported in the phloem of avocado by joining up with the carbohydrate perseitol. This suggests that boron transport may be related to the amount of perseitol in the phloem sap.

Further research examined this possibility.

Variation in phloem sap composition in avocado trees

The phloem is a key structure in the supply of carbohydrates and remobilised minerals to developing plant tissues, including the flower. Inadequate supply of nutrients (carbohydrates and minerals) via the phloem to flowers could result in poor flower quality and low fruit set.

To investigate the role of the phloem in the supply of sugars and nutrients to the avocado flower, and how this may affect the processes of pollination and fruit set in different regions and environments, we have been monitoring the concentrations of carbohydrates and boron in phloem sap collected from inflorescences during flowering. Samples were collected from 'Hass' avocado orchards in New Zealand and Australia, and in California with the help of Dr Mary Lu Arpaia.

***Figure 2**. Small Eppendorf tubes were attached to the cut end of 'Hass' avocado inflorescences at mid-bloom to collect samples of phloem sap. This allowed us to quantify the relative amounts of different carbohydrates and boron being transported to the flowers.*

- We found that three major carbohydrates, sucrose, perseitol and D-mannoheptulose, plus boron, were important nutrients supplied by the phloem for flowering and early fruit growth.
- We also made some preliminary observations of relationships between boron and perseitol concentrations in ON and OFF cropping trees (Figure 3) and between samples collected after periods of very hot or relatively cool humid conditions. These still need to be confirmed.

The implications of this research could be that crop load and/or boron nutrition need to be better managed to ensure sufficient supply of boron to developing flowers, especially in ON cropping years. This means applying boron to supply the needs of the growing fruit in order for there to be sufficient left in the leaves to supply the developing flowers. Research in New Zealand has indicated that applying boron directly to flowers has little effect (Dixon et al. 2007).

Also, it is possible that low boron and carbohydrate concentrations in phloem sap during the cool humid conditions that are predominant during avocado flowering in New Zealand could partly explain poor fruit set in this region.

Is boron transport to avocado flowers regulated by carbohydrate supply?

The fact that boron and perseitol are transported together in the phloem suggests that the transport of boron from leaves to flowers is regulated by the transport of perseitol. We tested this by using branch girdling (cincturing) techniques to manipulate the supply of carbohydrates to flowers (see review by Whiley 2002 and a previous report by Thorp et al. 2009). We were expecting that increasing the carbohydrate content of leaves would increase the export of boron to flowers. Branch girdling treatments were applied in two separate experiments in 2008 and 2010 to manipulate carbohydrate availability and thus boron supply from leaves to flowers in 'Hass' avocado trees with high (ON) and low (OFF) crop loads.

- Few differences were found between leaf carbohydrate concentrations in ON and OFF cropping trees. However, leaf boron concentrations were consistently lower in ON cropping trees, which suggests that the fruit were a major competing sink for boron.
- Leaf boron concentration declined during winter at a similar timing to that of D-mannoheptulose, the storage form of perseitol.
- Girdling treatments increased the amount of boron exported from leaves and increased the boron content of flowers.

Thus we were able to provide evidence that boron supply to avocado flowers is associated with carbohydrate availability in the adjacent leaves.

Role of carbohydrates and boron in determining flower quality in avocado

One of the arguments for why carbohydrate and boron resources are implicated as a possible cause of alternate bearing is that when trees are carrying high crop loads there are insufficient carbohydrates and boron available to support floral development and ensure successful fruit set (Scholefield et al. 1985). This implies that there can be poor quality flowers, characterised by being deficient in carbohydrates and/or boron. Projects in Spain and New Zealand have been examining this possibility.

Figure 3*. Examples of ON and OFF flowering 'Hass' avocado trees near Towoomba, Australia. Phloem sap was collected from these trees to determine the effect of crop load in the previous season on the relative amounts of the different carbohydrates and boron that were being delivered to flowers. Low carbohydrate and/or boron concentrations in flowers possibly indicate a high chance of poor fruit set.*

Earlier work in Spain by Iñaki Hormaza and Librada Alcaraz showed that flowers with high starch content were more likely to set fruit than flowers with low starch content (Alcaraz et al. 2010). In collaboration with the Spanish scientists we undertook to expand on this result and quantify the concentrations of individual carbohydrates and boron in avocado flowers and relate these to the probability of flowers setting a fruit.

In what was a huge effort by Librada Alcaraz, she hand pollinated 2959 'Hass' flowers for us in New Zealand during flowering in 2010, and 24 hours later collected styles from these same flowers for subsequent carbohydrate and boron analysis. Of the hand pollinated flowers, 69 continued development to produce a fruit, to give 2.3% successful fruit set. The styles from these flowers/fruit, plus comparable samples from early, mid and late-blooming flowers that did not result in successful fruit are now being analysed in our laboratories in New Zealand for carbohydrate and boron composition. Librada undertook a similar project in Spain during their flowering period, and tissue samples from these were extracted and shipped to New Zealand for analysis.

The project is incomplete. However, the potential impact of this work is that it will provide new knowledge on flower quality that will contribute to the development of more sophisticated flower thinning strategies to regulate crop load and mitigate the effects of alternate bearing in avocado.

Future work

The next step in this research will be to test the findings presented here in a series of long-term crop regulation experiments using girdling with/without flower and/or fruit thinning to regulate the concentrations of carbohydrates and boron in current season shoots in order to manipulate flower boron concentration and thus potentially fruit yields at the whole-tree scale. Projects up until now have all been at a scale that tells us we can change flower quality and so potentially increase yields and reduce the severity of alternate bearing, but unless we can scale these projects up and run them over several years, we will not be able to demonstrate these results in a real situation.

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High density planting systems for 'Hass' avocados

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Alternate bearing is a significant problem for avocado industries worldwide. Development of small tree, high density planting systems may make it easier to use management options to control alternate bearing (Thorp et al. 2001). This article describes methods by which avocado nurseries and/or growers can produce single leader trees with a slender pyramid shape suitable for high density orchards.

Background

Orchard productivity is proportional to the total intercepted radiation (Monteith 1977). This means growers need to manage the shape and size of their trees to maximise the total amount of incoming radiation intercepted by the orchard. Schaffer and Whiley (2003) emphasised this point when they said growers need to shape avocado trees so that a greater proportion of leaves receive sufficient light to attain their maximum photosynthetic potential. With apples and other crops that use high density planting systems, the ideal tree shape is a "slender pyramid" shape by which the tree is slightly wider at the base than at the top (Tustin 2000).

There is a common belief that alternate bearing cycles are more prominent in older avocado orchards with large trees that are difficult to manage. New "high density" orchards established with fast track development systems to promote early yields from "small trees" may provide growers with more options to apply the sophisticated and precise management interventions needed to achieve consistently high yields in avocado groves, and thus avoid extreme alternate bearing (Hofshi 1999). Previous work in New Zealand, California and Chile has demonstrated the proof of concept for high density orchards. However, there remain two key requirements to the success of these systems:

- Nurseries will need to provide growers with single-leader trees suitable for high density orchards; this requires a radical re-think of the type of tree produced by avocado nurseries.
- Renewal pruning systems need to be developed, tested and confirmed so that growers can contain tree size and maintain consistent yields over the life of the orchard.

An additional requirement, not normally encountered in California or Chile but that has been a barrier to the success of high density plantings systems in New Zealand, is to obtain high yields from young trees.

Slender pyramid trees

The key to promoting the growth of a single-leader tree with a slender pyramid shape suitable for high density plantings is to encourage vigorous growth from a single growing point from the grafted scion. If there is sufficient vigour in the primary growth axis, then a new "sylleptic" lateral shoot will be produced at every leaf node as the primary axis extends (Figure 1). These shoots form by syllepsis, as they emerge and extend at the same time as the primary growth axis, without an intervening period of rest (Thorp et al. 1994). A high proportion of sylleptic shoots on 'Hass' avocado trees is a good indicator of vigorous shoot development.

Unfortunately, the economics of growing plants in nurseries requires that plants are closely spaced on the propagation benches and this inhibits the number and growth of these sylleptic lateral shoots (Figure 2).

One option is for nurseries to sell the plants soon after grafting, before shading reduces the production of lateral shoots developing from the primary growth axis. This would mean it was then left for the grower to promote the required vigorous growth in the field from a single growing point that will produce a single leader tree with a lateral branch at every leaf node. Growers can do this by removing at an early stage any competing "proleptic" shoots arising below the primary growing point that is being promoted to form the trunk (Figure 3). These shoots form by prolepsis, as they develop from resting buds below the terminal bud being promoted as the primary growth axis (Thorp et al. 1994). These proleptic shoots reduce the vigour of the primary growing point and so it is important that they are removed as soon as possible once the primary growing point has been identified.

Another option tested for the first time in New Zealand in 2010/11 was to take a larger plant from the nursery, plant it into the field and then pin it down to create a bend just above the graft union, to force the development of a new primary growing point (Figure 4). A new growing point was formed within a few weeks and quickly became a vigorous extension shoot, producing the desired growth habit with a new lateral shoot at every new leaf node to give the desired slender pyramid tree shape. The new shoot did not need to be staked as it immediately developed a very strong, tapered trunk. The original section of the tree was kept for a few months before it was removed; in the meantime, the leaves on this section supported the growth of the root system and of the new trunk. Any vigorous upright shoots that developed from this older section were removed so that they did not compete with the newly formed trunk.

This option of pinning down the tree at planting and promoting the growth of a new trunk works better than just using a "heading cut" used to promote a new growing point. The heading method removes all

Figure 1. *The desired growth habit for single-leader 'Hass' avocado trees. Note the new "sylleptic" lateral shoots (arrowed) produced at each leaf node along the primary growth axis.*

Figure 2. *It is difficult to promote vigorous growth from a single growing point with a new lateral shoot at every leaf node when avocado trees are closely spaced on nursery benches.*

Figure 3. *Avocado growers have the option of planting out smaller trees and promoting the growth of a single, vigorous growing point in the orchard. This is done by removing at an early stage any competing "proleptic" shoots arising from below the primary growing point that is being promoted to form the new trunk. Arrows mark the proleptic shoots that need to be removed.*

Figure 4. *Strong single-leader 'Hass' avocado tree with the desired slender pyramid shape produced by pinning down the main stem of the tree and forcing a new stronger growing point from above the graft union. The original section of plant (arrowed) can be seen pinned down to the left.*

High density planting systems for 'Hass' avocados continued

leaf growth that otherwise could support root growth and growth of the new trunk, so that the new growing point is slow to develop and lacks the required vigour to produce the desired slender pyramid growth habit.

Future work will involve working with groers and nurseries in New Zealand and Australia to plant test plots of high density 'Hass' avocado trees using young plants produced using the metods described here. Interested growers should contact Grant Thorp at Plant & Food Research (*grant.thorp@plantandfood.co.nz*) if they require more information on these trials.

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Update on Sustainable Orchard Management Practices

(AV08020)

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Trials investigating the effect of a range of orchard management practices on tree growth, fruit quality and yield are continuing. The outcomes for the 2011 season and activities planned for 2011/2012 are presented below.

Mulching trials

The effect of mulching treatments on tree growth, fruit quality and yield was established on 2½year old Hass trees in Central Queensland in September 2009. Filter-press, avocado woodchip and cane-tops were reapplied in September 2010. A grower treatment (inter-row slashings with a thin layer of filter-press of less than 2 cm) was included for comparison.

The effect of mulching on yield was assessed in seven trees for each treatment. Fruit was harvested at maturity on the 20 June 2011 and the number and weight from each tree recorded. As reported in the last edition of Talking Avocados (Vol 22 No 1 Winter 2011) mulching with avocado woodchip significantly increased yield with 380 fruit at 97.7 kg per tree, compared with 259 fruit at 70.5 kg/tree in the grower treatment.

At harvest, 20 fruit of uniform size were sampled from five trees from each treatment and ripened at 20°C. Ripe fruit were cut into quarters, the seed removed, and the skin peeled from the flesh. The quarters were visually rated for the severity of rots and internal disorders as the percentage of flesh volume affected. Body rots were characterised as those developing from the skin into the body of the fruit (Photo 1), stem end rots as those starting from the stem end of the fruit (Photo 2), and vascular browning as the percentage of the flesh rendered non-useable by the disorder (Photo 3).

There was no significant effect of mulching on the severity (% of flesh volume affected) and the incidence (% of fruit affected) of fruit rots and disorders (data not shown). However, there tended to be less fruit affected with body rots in trees mulched with avocado woodchip (13%) compared with 23% in the grower treatment trees.

Microbes (TwinN®)

The effect of foliar and soil applications of TwinN®, a freeze dried source of nitrogen fixing microbes, on tree growth, fruit quality and yield was investigated in 3½year old Hass trees in Central Queensland. A grower nitrogen program and a reduced nitrogen treatment were included for comparison. The grower treated trees received an additional potassium nitrate at a rate of 90g per tree in March 2011.

Foliar treatments were applied at a rate of 5 litres per tree. Soil treatments were applied as a drench at a rate of 10 litres per tree to an area under the canopy. Treatments were applied in August 2010 (floral buds were at cauliflower stage at this time), in November 2010 (maturity of the spring growth flush) and in April 2011 (maturity of the summer growth flush and prior to floral bud development).

The effect of TwinN® application on yield was assessed in 10 trees for each treatment. Fruit was harvested at maturity on the 27 June 2011 and the number and weight from each tree was recorded. In the first year of the experiment there was no significant effect of TwinN® application on fruit size and yield (data presented in Talking Avocados Vol 22 No 1 Winter 2011).

At harvest 20 fruit of uniform size were sampled from

Photo 1. Body rots

Photo 2. Stem end rot

Photo 3. Vascular browning

Update on Sustainable Orchard Management Practices continued

seven trees for each treatment and ripened at 20°C. Ripe fruit were rated for the severity of rots and internal disorders as the percentage of flesh volume affected as described earlier. The effect of TwinN® on the severity (% of flesh volume affected) and incidence (% of fruit affected) of fruit rots and disorders is presented in Table 1.

Table 1 Effect of TwinN® on the severity (% of flesh volume affected) and incidence (% of fruit affected) of body rots, stem end rots and vascular browning in fruit ripened at 20°C. Values are the means of 140 fruit from seven trees per treatment. Means in each column followed by the same letters are not significantly different ($P \geq 0.05$).

	Severity			Incidence		
Treatment	Body rots	Stem end rots	Vascular brown-ing	Body rots	Stem end rots	Vascular brown-ing
Grower nitrogen treatment	3.7 a	3.5 a	2.7 a	55 a	58 a	59 a
Foliar TwinN® + grower nitrogen treatment	3.4 a	3.1 a	2.5 a	58 a	55 a	57 a
Soil TwinN® + grower nitrogen treatment	2.8 a	2.9 a	2.3 a	45 a	54 a	56 a
Foliar TwinN® + reduced nitrogen	3.1 a	3.4 a	2.6 a	49 a	62 a	65 a
Soil TwinN® + reduced nitrogen	2.2 a	2.5 a	2.0 a	46 a	49 a	49 a

There was no significant effect of TwinN® application on the severity and incidence of fruit rots and disorders. However, there tended to be less rots and disorders in fruit sampled from trees in the Soil TwinN® + reduced nitrogen treatment.

Foliar tr eatments

Pyroligneous acid (PandA®) is an organic liquid derived from bamboo that has been reported to improve root, shoot and fruit growth, increase resistance to pests and diseases, reduce leaf fall and fruit drop, and improve yield and fruit quality.

A trial to investigate the effect of foliar application of PandA® on fruit quality and yield was established on $3^1/_2$ year old Hass trees in Central Queensland. Foliar treatments of PandA® at 2 and 4 ml/l alone and in combination with a copper fungicide (Norshield WG) were applied at 3-5 week intervals using a motorised spray unit. Five trees for each treatment were sprayed to the point of run-off using six litres per tree. A total of six applications were made during the cropping season with the first application on 18 January 2011 and the final treatment one week prior to harvest on 15 June 2011. An unsprayed control and grower treatment (Norshield WG) were included for comparison. All trees received three copper fungicide treatments between October and December 2010 prior to the commencement of this trial.

Trees were harvested on 22 June 2011 and the number and weight of fruit was recorded in each tree. In the first year of the trial there was no significant effect on PandA® on the number of fruit, yield or average fruit weight (Table 2).

Table 2 Effect of pyroligneous acid (PandA®) on the number of fruit, yield and average fruit weight in 4 year old Hass avocado trees. Yield data are means of five trees per treatment. Means in each column followed by the same letters are not significantly different ($P \geq 0.05$).

Treatment	No. of fruit	Yield (kg/tree)	Av. fruit wt (g)
Untreated	184 a	51.2 a	284.6 a
Grower treatment	228 a	63.2 a	279.1 a
PandA® 2ml/l	193 a	53.5 a	281.8 a
PandA® 2m/l + grower treatment	195 a	54.0 a	281.5 a
PandA® 4ml/l	219 a	61.3 a	280.0 a
PandA® 4ml/l + grower treatment	204 a	57.6 a	281.5 a

At harvest 20 fruit of uniform size were sampled from five trees for each treatment and ripened at 20°C. Ripe fruit were rated for the severity of rots and internal disorders as the percentage of flesh volume affected as described earlier. The incidence or percentage of fruit affected with these rots and disorders were determined.

The effect of PandA® on the severity (% of flesh volume affected) and incidence (% of fruit affected) of fruit rots and disorders is presented in Table 3.

Table 3 Effect of pyroligneous acid (PandA®) on the severity (% of flesh volume affected) and incidence (% of fruit affected) of body rots, stem end rots and vascular browning in fruit ripened at 20°C. Values are the means of 100 fruit from five trees per treatment. Means in each column followed by the same letters are not significantly different ($P \geq 0.05$).

	Severity			Incidence		
Treatment	Body rots	Stem end rots	Vascular brown-ing	Body rots	Stem end rots	Vascular brown-ing
Untreated	2.2 a	3.3 a	2.3 a	36 a	45 a	46 a
Grower treatment	1.6 a	2.1 bcd	1.6 abc	35 a	41 a	42 a
PandA® 2ml/l	1.9 a	3.0 abc	2.0 ab	35 a	44 a	43 a
PandA® 2m/l + grower treatment	1.4 a	1.7 d	1.2 c	27 a	32 a	31 a
PandA® 4ml/l	1.6 a	3.1 ab	2.2 a	34 a	44 a	47 a
PandA® 4ml/l + grower treatment	1.3 a	2.1 bcd	1.4 bc	26 a	35 a	33 a

Application of PandA® alone at 2 and 4 ml/l had no significant effect on fruit quality. However PandA® in combination with the grower treatment (Norshield WG) tended to reduce the incidence of fruit rots and disorders when compared with the grower treatment alone.

Where to from here?

Mulching trials

The trial investigating the effect of mulching on tree growth, fruit yield and quality established in Central Queensland during September 2009 will continue for another year. Filter-press, avocado woodchip and cane-tops were reapplied in September 2011.

Additional trials investigating the effect of mulching with composted vegetation waste and Rhodes grass hay on tree growth, fruit yield and quality have been established on Shepard and Hass trees in North Queensland in September 2011.

Microbe treatments

The effect of soil applied TwinN® and reduced nitrogen treatments on tree growth, fruit quality and yield will be investigated in the 2011/12 cropping season. Treatments will be applied in October 2011 and April 2012. Additional trials will also be established in Southern Queensland and Northern New Wales in October/November 2011.

Foliar treatments

The trial established in January 2011 in Central Queensland to investigate the effect of foliar application of PandA® on tree growth, fruit yield and quality will continue in the 2011/12 cropping season. Monthly treatments of PandA® at 2 and 4 ml/L with and without copper fungicide will commence at the maturity of the spring growth flush in November 2011.

Branch scoring trials

Trials investigating the effect of branch scoring on fruit size and yield in Hass trees in Central New South Wales and South West Western Australia are continuing. These trials will be harvested in October and November 2011.

Acknowledgements

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VII World Avocado Congress a success

VII WORLD AVOCADO CONGRESS 2011

In September, the long awaited and highly anticipated VII World Avocado Congress finally came to our shores. Avocados Australia had the great honour of hosting this amazing event. The Congress was held in Cairns, Queensland from 5-9 September 2011 at the innovative Cairns Convention Centre.

This amazing five day event brought the global avocado industry together; 850 avocado producers, wholesalers, food service providers, market traders, retailers and government representatives from 23 countries around the world.

"Unlike any other event, the World Avocado Congress brings everyone together; researchers, growers and marketers, all attend in large numbers," commented Mr Antony Allen, President of the International Avocado Society and CEO of Avocados Australia. "One of the great opportunities that the World Congress allowed was the exchange of information between the Spanish and English speaking avocado world. Avocados Australia was truly honoured to host such an amazing event."

The VII World Avocado Congress was sponsored by the foremost avocado marketers in Australia, the US, New Zealand, and Mexico. Sponsors include Avocados from Mexico, Costa Exchange, Mission Produce and Primor Produce. Without their invaluable support the Congress would not have been such a success.

The rich Scientific Program included more than 230 presentations from leading industry experts in the fields of genetic resources, pests and diseases, culture management, post harvest/processing, marketing and the commercial stream.

The Congress was very lucky to secure plenary speakers Dr Michael D'Occhio, Professor of Food Security at the University of Queensland, and Dr Gabrielle Persley who has spent over 25 years working in international agricultural research and development.

Renowned chef, food presenter, recipe writer, and internationally awarded cookbook author Kate McGhie received glowing reviews from delegates for her demonstration on using unripe avocados to brilliant effect as well as exciting approaches to hot dishes with avocado.

The Industry Exhibition became a 'hub' of networking for both delegates and exhibitors to reaffirm old contacts and establish new relationships within the industry. Consistent traffic through the Industry Exhibition was a guarantee thanks to the Welcome Reception, Congress lunch breaks, as well as all morning and afternoon teas being held there. The 35 exhibitors that made up the Industry Exhibition were thrilled with the high level of exposure the Congress brought to their businesses/organisations.
The Congress was also the perfect opportunity for the Australian avocado industry to debut their new mascot 'Alvin Avocado'; Alvin who features in the industry's education material, ranging from a colour and ripeness poster to avocado handling posters.
The Social Program took Congress delegates to visit real 'Aussie' avocado farms on the Atherton Tablelands, to Kuranda and the Rainforestsation Nature Park set on 100 acres of world-heritage rainforest, and to the dance floor at the Gala Dinner where delegates Latin danced the night away in celebration of the Congress.

Peru will be the host nation for the next World Avocado Congress in 2015, beating both the US California and Colombia in what was a very close bid. ProHass President Mr James Bothsworth has now assumed the role of President Elect of the International Avocado Society.

According to ProHass general manager Arturo Medina, Prohass developed a marketing strategy some time ago in order to have the support of most of the World Avocado Congress attendees from other countries. He went on to add that the Peruvian delegation positioned the image of Peru amongst thousands of people participating in the Australia Congress, including producers, exporters, importers, researchers, etc. "The goal is big and we want to organise the best world congress yet – we have the conditions to do it," commented Mr Medina.

Full papers, Powerpoint presentations and a gallery of pictures for the five day VII World Avocado Congress 2011 are now available at *www.worldavocadocongress2011.com*

VII World Avocado Congress

News from Around the World

New Zealand: seeking avocado markets

At 49 cents each or three for a $1, avocados have rarely been cheaper in the shop, but what is a bargain for consumers is a bugbear for growers, who are making almost nothing selling them at that price.

It's the result of a huge crop, New Zealand's biggest ever.

An 'on' year harvest and new plantings maturing means about 5.8 million trays of avocados are expected to be produced this year, almost double last season's 3.1 million trays and a fifth more than the previous record.

About 3.4 million trays will be exported, double last year's total, with more than 80 per cent going to Australia, but it still leaves the domestic market awash with fruit which has driven prices here down to rock-bottom levels. Growers are receiving only $2 to $6.40 for a 20kg crate domestically for reasonable-quality fruit, while export returns in Australia have slumped and are likely to average between $11 and $13 a tray this year, compared with $20 for the last two seasons.

Nelson Fresh Choice owner Mark A'Court said he hasn't seen avocados this cheap in his 15 years in the supermarket business, "which isn't really a good thing for anybody, apart for the punters". "There are just so many around. We are virtually buying them for nothing."

Colin Benge, who jointly runs fruit and vegetable stores in Nelson and Stoke, said he expected prices to remain low for much of the season, including for bigger sized fruit not normally sold this far south.

It's a problem that is unlikely to go away, with the avocado harvest forecast to rise to eight to 10 million trays in a couple of years and as high as 12 million trays by 2015 as 200,000 trees reach maturity. Avocados last year were New Zealand's third-largest fresh fruit export, with sales worth $67m, but the industry is under increasing pressure from grumpy growers to come up with strategies to find new markets.

Like the pipfruit industry, debate is raging about who is to blame, the best way forward and who should run the industry. It's an outlook that dismays Dave Heraud, one of the biggest of a handful of commercial growers in the Nelson region.

Mr Heraud has more than 200 trees on his seven-hectare hillside winery at Clifton in Golden Bay, which regularly produce between 70,000 and 100,000 avocados a year which he sells locally to supermarkets and wholesaler MG Marketing, but said it would be tough this year to make much money after paying his costs, transport and industry levies.

Unlike the big growers in the Bay of Plenty and north of Auckland who finish harvesting in February, he picks right through to May-June, when his tree-ripened fruit often commands a premium. But at current prices, it was hardly worth picking them, the 76-year-old said. "I call New Zealand the goldrush country – first we had goats, deer and then kiwifruit, and now avocados."

In the early days, growers got very good money – one year he received $2.50 per fruit at the end of May – but too many people had jumped on the bandwagon since and "gone crazy" planting big orchards, particularly north of Auckland. "I'm not sure they know what they are doing. The whole thing will crash, I guarantee."

The key Australian market was set to become more difficult with major new plantings in Western Australian likely to compete directly with New Zealand exports there, while cheaper producers such as Chile were also expanding, he said. "I wouldn't be going into it if I was a young person."

Brett Hutchinson, who has grown avocados and run a nursery for over 20 years near Takaka, is not so pessimistic, saying he still expected to have a good season selling fruit from his 50 trees through the local Rural Service Centre, which offered a far better deal than the Nelson produce market.

Last year, his late-season fruit sold for $5 a kilogram, with his loyal customers expressing disappointment when he ran out. Avocados were a fickle crop, he said. "One year you can have a huge fruit set and the next year on the same tree you will get virtually nothing." But with such a large crop, there needed to be a vibrant export sector if prices weren't to take a hit, he said.

John Schnackenberg, Chairman of both the Avocado Industry Council and Avocado Growers Association, admitted the bumper crop was causing headaches domestically and in the Australian market, saying returns to growers would be well down on the last two "exceptional" years, which was to be expected. "The problem is once the price comes down it is hard to drag it back up again."

He agreed more could have been done to plan for it, but said getting agreement from those in the industry was like "herding cats".

While exports were semi-regulated through the Horticultural Export Authority, there was no such control over domestic sales, he said.

Steps had been taken to try to reduce the amount of fruit – which could double to 2m trays – coming on to the local market, but "you can't force anybody to do anything".

Packers had been urged not to pack smaller, lower-value fruit and many had agreed to that because there was not a market for it, he said.

If they tried to sell such fruit, growers would end up with a bill rather than a cheque after costs were subtracted, which would be "absolutely crazy".

Some "visionary" industry players had invested in a plant to process lower-value fruit, but the business was still in its infancy and establishing markets.

He agreed that New Zealand growers had to reduce their reliance on the Australian market, which was currently oversupplied with fruit and had driven wholesale prices down by as much as 50 per cent in recent weeks.

However, he expected that to ease and prices to recover over the next month as excess Australian fruit was sold.

Although exports there were set to double to 2.4 million trays this year, there was still some room for further growth in consumption during the summer months, but the New Zealand avocado industry realised it couldn't rely on Australia long term, Mr Schnackenberg said.

That was why it had boosted exports to Japan from 100,000 to 500,000 trays this year at returns that were better than Australia.

"It is why we are next on the list in terms of getting clearance to send avocados to China, which we expect will happen within two years."

Asian markets, with their burgeoning middle classes who ate little avocado, offered huge potential, he said.

"Avocado is one fruit that is growing around the world in consumption and is holding its value."

There was also plenty of export potential in the United States market – the biggest in the world and still growing – once the exchange rate eased. "It wasn't that long ago the bulk of our fruit went there by choice."

But to take advantage of new markets, growers had to lift their game, Mr Schnackenberg said.

"The avocado industry has to be an export industry to be viable."

"You need to be growing a crop that is 80 per cent exportable. If you are not taking care of your crop and are

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only able to export 40 per cent of it or less, then you will quickly run yourself out of business."

"There is a risk of complacency, but there remains significant opportunity with well-managed export programmes supported by good promotions."

In other words, export or die. Source: Nelson Mail

US: Jan DeLyser named "Produce Marketer of the Year"

On Sunday, October 16 at the PMA Fresh Summit Convention's keynote breakfast in Atlanta, Georgia, Jan DeLyser, California Avocado Commission vice president of marketing was presented the "Produce Marketer of the Year" award. Greg Johnson, editor of Vance Publishing's The Packer newspaper, presented the award, crediting Jan DeLyser with being "the consummate marketer; an incredible thinker; subtle, but very effective; the ultimate consensus builder and the face of the avocado industry."

DeLyser has been responsible for the overall leadership, management and organization of CAC's marketing functions since 2003. In 2007, under her leadership, CAC unveiled a new, integrated California avocado marketing campaign that leveraged the authenticity of real California avocado growers, helping consumers to associate "a face and a place" with the fruit. The campaign was heralded as being in the forefront of industry marketing communications. In subsequent years she has spearheaded continual marketing innovations that have kept CAC on the leading edge, including award-winning advertising, retail and foodservice programs, public relations activities with artisan chefs, outreach to food bloggers and strong engagement with social media.

Prior to joining the Commission, DeLyser spent 22 years in various facets of the produce industry including trade publications, trade association management, marketing for an international agricultural company and sales for a produce distributor. This broad-reaching experience helped her to understand industry perspectives from many different angles.

DeLyser also is active in industry leadership and serves as Chair-elect of the Produce Marketing Association. She also serves on PMA's Foundation for Industry Talent Board of Directors. She is a past chairperson of both the Produce for Better Health Foundation Board of Trustees and the Fresh Produce and Floral Council and has served on the United Fresh Produce Association's Board of Directors, Produce Marketing Association's Retail Board as well as the Buy California Marketing Agreement Board of Directors.

Source: Fresh Plaza

Chile: Chilean avocado big promise for agricultural sector

Chilean avocado production is proving to be very attractive to the foreign market. Chile takes, presently, the third place of world avocado production and second place in exporting this fruit. Therefore, it's understandable that a big volume of this fruit is sent abroad, 260,000 tonnes produced was per year, from which 193,000 are exported.

This number generates great opportunities for avocado producers. A promising alliance was made last week in Chile, between Mission and Cabilfruit. The national fruit company sold for US$10 million 50 percent of its property to one of the most important avocado exporting companies in the world.

Juan Pablo Cerda, executive director and partner of the national fruit company, assures that this operation will raise the number of plantations at 10 percent per year, "it will allow us to take advantage of several synergies on a world level. They - Mission - can raise their exports to South America and Europe, where Cabilfruit has quite developed commerce. On our side, we can keep on widening our operations and raise our presence in the US market."

This business will raise its exporting potential and start an investment plan in the company to have more plantations and double sales, as projections plan an increase up to US$100 million in 2015, against the present US$40 million per year.

Cerda keeps the intention to increase the number of producers who sell fruits to the company today, since Cabilfruit, more than producing and exporting its products, also manages its production and the production of more than 200 producers. Source: Diariodelagro

South Africa: Reduced avocado crop fails to dampen 'take a dip' spirit

The 2011 South African avocado season has drawn to a close, with a total of 6.8 million 4kg cartons exported from the end of April to the middle of October.

The crop was significantly down on the 2010 figure of 11.9m cartons, due to a combination of widespread hail in most production regions and an 'off' year in the cyclical production of avocados.

Around 20% of exports were sent to the UK, with a split of 37% greenskin varieties and 63% Hass, against a total crop split of 42% greenskin and 58% Hass.

Promotional activity in the UK continued apace despite the reduced crop, with the over-arching Take a Dip with Summer Avocados theme including both an intensive media relations campaign and in-store marketing activity.

The media relations campaign achieved total opportunities to see of 123.7 million, with a media coverage value of £4.2m. The return on investment for the South African industry stands at 1:76.

This year's promotion developed the idea of dipping and sharing into a general summer lifestyle campaign, with various recipes and tips for guacamole, barbecues, picnics and al fresco dining, all included in a recipe booklet that was produced as part of the activity. The campaign website, *www.summeravocados.com*, was also updated to reflect the 2011 theme and the recipe booklet made available as a download, following an unprecedented 17,000 requests for the hard copy. So far, 6,800 copies of the booklet have been downloaded from the website, and three 'how to' videos that were produced as part of the campaign were seeded on YouTube and the first-ever Summer Avocados Facebook page.

Retailer activity included in-store sampling in 200 Asda stores at the end of August; 200,000 on-pack labels on Sainsbury's avocado packs in August; and coupon labels on M&S baby avocado packs from mid-July onwards.

Rob Metcalfe, managing director of PR and marketing agency Richmond Towers Communications, which organises the campaign, said: "This is our 16th consecutive year working with SAAGA, and one of the best yet, with exceptionally strong demand for our recipe booklet and a real boost online via both our website and our Facebook page. We are now very excited about prospects for a 2012 campaign, following some detailed UK shopper research carried out during the summer."

Derek Donkin, chief executive of the South African Avocado Growers' Association (SAAGA), said: "Despite the difficult weather conditions that the industry endured, it has been a strong season in terms of quality. Growers, packers and exporters were diligent in applying best practice in order to deliver quality fruit.

"Our campaign in the UK has achieved solid cut-through and we are delighted with the results to date. We look forward to putting together the 2012 plans soon." Source: SAAGA

Peru: Avocado exports to EU, Spain and the Netherlands see strong increase

Exports of avocado grew 90% in 2011 by the campaign's end. US$160 million exported against the US$84 million in 2010. Prices went from US$1.42 per kilo in 2010 to US$2.02 per kilo in 2011, a 42% increase.

These numbers are a result of the North-American market growth, as they imported US$775,000 in 2010 to US$26 million in 2011.

The Netherlands acquired 45% of the total, going from US$39 million to US$72 million in 2011. Sales to Spain went from US$28 million to US$39 million, a 23% growth.

Operations with countries like Chile, Morocco and Costa Rica intensify.

There were 95 companies exporting in 2011. Sales from "Camposol" (17% of the total exported), followed by "Consorcio de Productores de Fruta" (12%), "Soc. Agrícola Drokasa" (12%), Avo SAC (10%) and Hass Perú (8%).

Source: agrodataperu

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UK: Avocado weighing same as three rugby balls lands on supermarket shelves

A giant avocado weighing as much as three rugby balls lands on supermarket shelves this week. At 1.5kg, the variety known as Linda – Spanish for beautiful – is up to 10 times bigger than standard avocados and at least five times more expensive, costing nearly £5. Grown in Peru, the fruit reaches its exceptional size by staying on the tree for up to a year. Richard Bickerton, salads buying manager for Waitrose, said Linda avocados will start selling at selected stores.

He added: "It has generous proportions, a superb creamy texture with a very intense and slightly nutty flavour." Avocados first appeared here in the 1960s and quickly became popular in prawn starters. Their high levels of vitamins, good fats and other nutrients means they are classed as a superfood.

Source: mirror.co.uk

Peru: Peruvian avocado exports may outnumber Mexican and Chilean by 2013

Peru will become in 2013 a major exporter of avocados to Europe and the United States, markets where it will compete with Chile and Mexico, according to the president of the Exporters Association (Adex), Juan Varilias. "Peru continues to grow in food exports, so we project that agricultural exports (traditional and non-traditional) will close this year on the USD 4,100 billion and may reach USD 4.300 million even" he said.

He said that growth will be fuelled by fruits and vegetables such as grapes, mangoes and especially, avocado, which is a product that will enter the international market strongly, to the point that in the coming years Peru could improve its position in the global ranking of leading exporters Mexico and Chile.

He explained that by 2013 avocado plantations will be at maturity because agribusinesses have decided to bet on this product with increased investments in agricultural fields, so that in the future they may compete more intensely with both countries.

Avocado exports totalled USD $99 million between January and July this year, exceeding by 41 percent of sales in 2010.

The main destinations are the Netherlands, Spain and United Kingdom, which increased their purchases in 59, 22 and 56 percent, respectively, he said at the opening of the seminar Emprende Peru, organized in the framework of the Expoalimentaria 2011.

"The consumption of avocado in Europe is increasing, and the best part is that admission is given to competitive prices which makes this product grow a lot in that part of the world. It has also attracted interest from some Asian entrepreneurs" he said.

Source: Andina

Chile: Avocado volume estimated to grow 25%

The Association of Chilean Avocado Importers in Washington said that between 5-10 percent of the crop was affected by cold weather in June and July

The cold weather in some areas of Chile, in late June and July, did not freeze avocado shipments. Only 5-10 percent of the crop was affected by the weather, and the projected volume of 170 million pounds for this season will remain a 25 percent increase over last year`s season, estimated the Avocado Importers Association of Chile in Washington DC.

Labor Day marked the start of the Chilean avocado season, said Maggie Bezart, marketing director of the association, adding that about 70 percent of the country's exports to the U.S. will be distributed in the West and the rest will go to the East.

"Chile is known for its excellent quality and consistency in size", said Bezart. The size of the fruit earlier this year was small to medium, said Jim Donovan, business development Vice President for the Mission Produce Inc., of Oxnard, California, but recent rain and snow showers in dry areas could help increase the size later in the season.

He also pointed out, that demand will strongly increase for avocados, due to the restricted crops in California and Mexico this season. The increased volume of Chile should bring some relief to the prices for consumers, while allowing carriers to have a decent profit.

The double 48 avocado boxes reached FOB prices of U.S. $ 52.25 and U.S. $ 53.25 in late August and U.S. $ 44.25 to U.S. $ 45.25 in early September, according to USDA.

"We can't complain about prices", said Donovan. But he also said that prices will probably drop in the fall.

The eating quality of early fruit is good, says Dana Thomas, president of Index Fresh Inc. from Bloomington, California.

The executive said that a normal size for the fruit of this harvest is expected, which will be bigger than last year; with good promotional volume for retailers in early September.

Calavo Growers Inc., Santa Paula, California, began receiving small shipments of Chilean avocados in late July, said Rob Wedin, sales and marketing vice president. However, volume increased during August, and significant supplies must be available in September, he said, as long as in the second week of August, the quality is good. "Chilean fruit always looks great", said Wedin.

It is worth saying that about 10 percent of the total Calavo volume comes from Chile, and that number is increasing, he said.

Last season was the first time in 10 years that the three main producing areas - California, Mexico and Chile - decreased crops. With a 15 percent increase in annual demand, this resulted in some shortages and high prices. Therefore it is more likely to be a race by some Chilean producers and exporters, to ship their product to the U.S. at the beginning of the season, so as to take advantage of high prices. Producers should be patient if they want bigger boats. "With a six-month season, they have plenty of time to sell their harvest", he said.

Source: Simfruit

Mexico: Certificates of origin for avocado producers

Certificates of origin are being given to avocado producers, on the condition that it will be given to the growers complying with the level of 24 percent of dry matter. To keep the price up, and to limit commercialization.

"Such papers being issued by these organizations were created to improve the vegetable health plan concerns. Selling and buying of fruit is being manipulated as there are avocado producers on the national market that wish to harvest, but didn't comply with this demand, so they don't get the certification", said José Antonio Cruz García, president of the Association of Avocado Commerce Men of Michoacán (Acam).

He pointed out that such a document, so called Certificate of Origin of the fruit, is handed to producers that comply to the correct size for sale.

Grower Member Application Form

Avocados Australia Limited

ACN 105 853 807

For Associate and Affiliate membership application forms please go to *www.avocado.org.au* or call 07 3846 6566

Member Details

Business name and/or trading name: _____

ABN: _____

Key contacts: _____

Preferred address (postal): _____

Address of property (if different): _____

Contact Details

Business phone: _____

Home phone: _____

Fax: _____

Mobile: _____

Email: _____

Corporate Structure

How would you describe the nature of your operations (please circle)?

☐ Individual ☐ Partnership ☐ Company ☐ Trust

☐ Lessee ☐ Cooperative ☐ Other (please specify) _____

Please indicate the area of property that you crop for avocados (please circle)

☐ 0.5 - 5 ha ☐ 6-19 ha ☐ 20-49 ha ☐ 50-99 ha

☐ 100-149 ha ☐ 150-199 ha ☐ 200-499 ha ☐ 500 ha+

Special Interests

Please tick your main areas of interest from any of the following:

☐ Consumer information
☐ Environmental management/ sustainability
☐ Organic farming systems
☐ Water management
☐ Field days
☐ Pest management
☐ Food safety
☐ Production management
☐ Quality Assurance
☐ Technology/innovations
☐ Marketing
☐ Supply chain management
☐ Key political issues
☐ Other (please specify) _____

Grower Member Application Form continued

Payment Options

Grower Membership of Avocados Australia is $143 pa (including GST). You can pay your membership by cheque or credit card. To pay your membership fee, please choose one of the following options:

☐ **Cheque**

Please find enclosed a cheque for $143.00 made payable to Avocados Australia Ltd.

Please charge $143.00 to my credit card. Details are listed below.

☐ **Credit card** (please circle):

MasterCard Visa

Credit card number:

Name on credit card:

Expiry date:

Signature:

Privacy Options

Avocados Australia Ltd adheres to privacy rules with respect to the way we collect, use, secure and disclose personal information. Please indicate below (tick) if you do not wish to receive additional information.

☐ I do **not** give Avocados Australia Ltd permission to allow my postal contact details to be accessed by other organisations other than Avocados Australia Ltd which offer beneficial products and services.

•NB - No personal details other than name and postal address will be given out under any circumstances.

Once you have completed this form please place it in an envelope addressed to:

Avocados Australia
Reply Paid 8005
Woolloongabba Qld 4102

(no stamp required within Australia):
For more information or assistance please go to
www.avocado.org.au or call on ***07 3846 6566***

News from Around the World continued

He assured that this situation is manipulating the national and exporting markets so there's a fruit shortage, that in the case of the United States would generate a higher demand with higher price, even if it affects the local consumer. But now Mexican families can't buy avocado to the proper cost.

At last, he sustained that there were producers that have an interest in the selling of their fruit, but some municipalities don't hand out the document to them, so they can start harvesting. All this started a drastic drop in prices and the entrance in the market of a new harvest from the production areas, right after flowering, which brings a product of acceptable quality, quoted between 20 and 24 Pesos, mainly for export.

Source: Laopiniondemichoacan

FTA between Peru and Thailand take effect in January 2012

The Ministry of Foreign Affairs (MRE) ratified by a supreme decree published yesterday the protocol that was signed on 19 November 2005 in Busan (Republic of Korea) and its additional protocols. Posada said that the ratification, of the MRE Early Harvest Protocol and its additional protocols, means that they will be incorporating them into national legislation in Peru.

In the case of Thailand, the Early Harvest Protocol has been approved by the lower house of Congress and in the coming weeks it will be voted in the Senate, after several years where it could not be voted on by various political problems in that country.

"Once approved by the Thai Senate, the Ministry of Foreign Trade and Tourism (Mincetur) will issue a supreme decree that will fix the date in which the protocol will come to take effect. It is expected for all of this to happen on the first of January of next year," he told Andina news agency.

Among the products that will benefit from the protocol are: mango, avocado, tropical fruits, citrus, asparagus, onions, paprika, fruit juices, vegetable juices and extracts, fruit pieces, according to the Peruvian site.

NZ: Guacamole firm gets boost from Australian giant

A deal with Australian supermarket giant Coles has helped boost the avocado grower's company Fressure Foods, which produces fresh chilled guacamole. The Paerata-based firm near Auckland, which only began commercial production late last year, fell into high-margin retailing by a happy accident, after a glut of cheap frozen product from South America scuppered its plan to compete at a wholesale level.

The fresh guacamole is made using ultra-high pressure processing technology, also known as cold pasteurisation, which is used to increase the shelf-life of avocados without chemicals or preservatives. Fressure's products are available in supermarkets in Australasia, Japan and Singapore, and its general manager, Graeme Laurence, says Coles' initial order of about 15,000 cases sets it up to turn a profit by June next year.

Source: radionz.co.nz

Mexico seeks to export its products directly to China

The Aztec country expects to export directly to China, products like avocado and table grape and introduce mango.

About thirty businessmen and representatives of associations of agricultural producers, livestock, fisheries and food of Mexico began yesterday a tour in Beijing to boost exports without intermediaries with the signing of an agreement in the Council for the Promotion of Chinese International Trade (CCPIT).

The general director of cooperation and development of the CCPIT, Yang Xiaodong, said that "Mexico has a great economy, very open, and the signing of the agreement is of great importance to strengthen pragmatic cooperation to increase mutual understanding among entrepreneurs, opportunities and the entry of their products."

According to what the general coordinator of Trade Promotion and Development of the Export, Gabriel Padilla, said to Efe, "the purpose is to export the finished and processed, fresh, frozen or canned product. Mexico is a major importer of Chinese products and we seek to balance trade with the direct penetration of Mexican products."

"We would like to sell directly to China because Mexico has widely used Hong Kong`s platform, through brokers or dealers in the U.S.," he said. "We are authorized to bring beer, tequila, avocado and grape while through Hong Kong we bring lobster, sea urchin, sea cucumber and Mexican abalone. We would like to send tropical fruit, avocado and consolidate the grapes, and mango," he added.

In agriculture, Mexican trade deficit with China is 300 percent, he said, Mexico hopes to increase over the next two years direct exports up to 1,000 million dollars, to place China at the EU level, Central or South America as a destination for their exports.

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