

In A Nutshell

Autumn 2018

R&D Roundup

Future trial plans for the
ACE orchard



Almond 'Ashes'
hit mark with
Indian almond buyers

5 minutes with...
Gavin McMahon

CEO - Central Irrigation Trust (CIT)

New IPM program for
managing insect pests

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FOR FURTHER INFORMATION, CONTACT YOUR HAIFA TEAM

Trevor Dennis, Managing Director
E: trevor.dennis@haifa-group.com

M: 0400 119 852

Jon Corona, Agronomist
E: jon.corona@haifa-group.com

M: 0408 568 605

Peter Anderson, Qld Sales Agronomist
E: peter.anderson@haifa-group.com

M: 0459 488 850

Jason Teng, Customer Service/Logistics
E: jason.teng@haifa-group.com

M: 0488 036 528

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Years of Growth





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The line-up of the inaugural Almond 'Ashes' cricket match between the Australian Almond Sellers XI and the ABA Indian Buyers Invitation XI at Gulfoods in February (page 8).

In A Nutshell

Published by: **Almond Board of Australia Inc**, ABN 31 709 079 099

1801 Bookpurnong Road, PO Box 1507, LOXTON SA 5333

+61 8 8584 7053 admin@australianalmonds.com.au www.australianalmonds.com.au

The Almond Board of Australia is the peak industry body representing the interest of almond growers, processors and marketers in Australia. In a Nutshell is published by the ABA to bring news to all industry contacts and members.

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Funding

This project has been funded by Hort Innovation, using the almond research and development levy and contributions from the Australian Government. Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.

Some articles within this publication refer to projects managed by Horticulture Innovation Australia Ltd (HIA) with funding from the grower R&D levy and matched by the Commonwealth Government.





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ALMOND BOARD OF AUSTRALIA

ABA Membership

Why become a member?

The ABA is the peak representative body for the Australian almond industry and as such addresses many issues that impact on all participants in the industry including growers, processors and marketers and those that supply inputs. These impacts can be positives such as free trade agreements or promotion to stimulate demand and hence prices or they can involve minimising negative situations such as food safety issues, market access problems, chemical registrations etc.

The ABA develops and drives the implementation of the Australian industry's strategic plan which is done to benefit all producers and other industry participants. The strategies involve building domestic and export markets, the key to strong grower returns, addressing a wide range of risks from the availability of production inputs to government policies that impact on costs and yields. These matters effect on the bottom lines of almond enterprises. The ABA's whole of industry strategies have been successful and have worked to ensure the large increases in production have been cleared.

The ABA operates a number of activities that support industry and generate revenue to fund its operations and keep membership fees at a low and affordable cost. Being an ABA member provides crucial support for your industry body that we need and appreciate. A strong membership base provides added force in our representation of industry to government and in the wider community.

Join the ABA today, in the knowledge you are assisting the industry and yourself to move forward as Australia's most valuable horticultural industry.

Join the ABA by visiting our website,
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ExecU

Each year this post harvest article cites the challenges faced in growing and harvesting the crop, but this year we have had wonderful weather during the harvest period that has delivered uninterrupted and efficient shaking, sweeping and pick-up operations.

The 2018 crop will be our lowest since 2014 due to poor pollination weather, frost damage, and crop loss attributable to pests. Within this issue, Paul Cunningham of Agriculture Victoria has provided an insight into the research work being undertaken to provide improved control of pests that are causing production losses and making meeting customer specification more challenging and expensive.

The US research and practical grower experience in managing Orange Navel Worm has shown that orchard hygiene is critical to reducing damage. With the researchers still seeking new management methods, the industry must focus on orchard hygiene. This means:

1. Managing disease to reduce the difficulty of shaking the nuts from the tree.
2. Shaking the trees with the aim of removing all nuts which will likely mean reshakes.
3. Optimising the sweeping and pickup aspects of harvest to remove as many nuts as possible from the orchard to minimise the overwintering nuts on and in the soil that provide refuge for the pests, allowing them to commence breeding later in the year. It is important that the orchard floor has been prepared to provide

an even surface that facilitates optimal collection of the nuts and minimises those left behind.

4. Destroying the nuts left behind by flail mowing, slashing and preferably mulching. These activities must be undertaken at a frequency and pace that ensures destruction of the nuts to the point they will not sustain overwintering of the beetle in the orchard.

5. The orchard hygiene endeavours must also extend to stock pads to ensure mummy nuts are not left onsite.

6. Preferably an area wide approach by neighbouring orchards will reduce across fence movement of pests.

The European Parliament continues to remove the authorisation to use chemicals that are considered injurious to consumer health. Iprodione is the latest to have it's approval for use withdrawn. The ABA is seeking to have the MRL remain in place until the 2018 crop is sold as it was grown during the period that use was permitted.

Spray drift from nearby crops is an increasing concern to the almond industry and growers are urged to speak to their neighbouring farmers to ensure chemicals, where almonds do not have an MRL, are sprayed when conditions are safe to do so as residue testing is becoming increasingly sensitive and very low levels can be detected. The ABA is seeking low level MRL's for almonds for chemicals not used in almonds but are commonly used in other horticultural or cereal crops to avoid marketing issues that are not the fault of our growers.

Whilst harvest has been underway to deliver the 2018 crop, much has been made of the trade war between the USA and China and the opportunities this provides for Australian agriculture. China

tive pdate

is a significant market for almonds that are mainly supplied from California with some tonnage from Australia. The tariff advantage for Australian almonds has been 8% and the remaining 2% reduction of the tariff scheduled for January 1st, 2019 will eliminate the tariff completely.

The tariff increase on USA almonds from 10% to 25% does confer a significant advantage on Australian almonds but such disruption on the world market is harmful for all as a shrinking of the Chinese demand for almonds, due to higher prices, means more US product must find a home in other markets. With Australia's 2018 crop being smaller in size to the past three years any additional sales to China will mean reduced tonnages sold into other markets.

The global annual production of almonds has grown and is set to increase rapidly but annual increases in world demand have kept pace and in 2017/18 shipments should outstrip production leading to reduced carryover stocks, particularly of higher quality almonds.

The widespread frosts in California, that burnt flowers and appeared devastating does not seem as damaging as first thought. A well respected trading house in California has predicted a crop of 2.51 billion pounds, which is an increase of around 11.4% above last year's crop. This basically aligns California's production with their current shipments although there are many in the USA that believe the estimate is too high and the subjective estimates from growers has the figure at 2.3 billion pounds. Either way the market is in good shape today to digest the predicted volume of stock in the 2018/19 marketing year.



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Ross Skinner, CEO

Neale Bennett

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More details on page 27



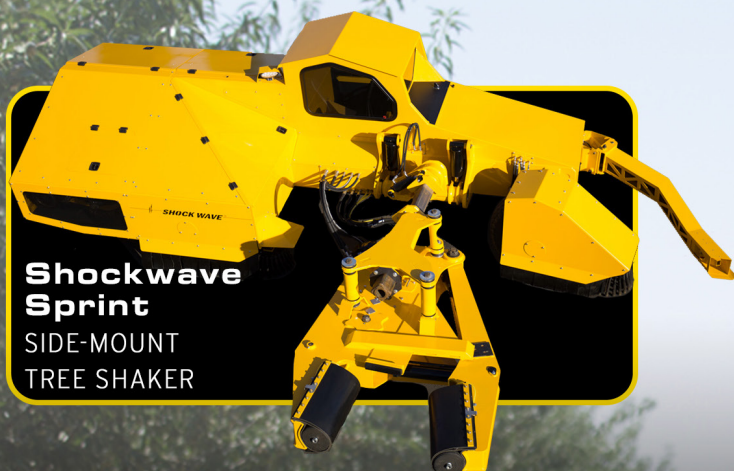
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AUSTRALIA

Cowanna Almond Harvesting
Mildura, Victoria
Tel: 03 5025 3700
Mobile: 0418 990 391
Email: neale@cowanna.com.au

HEADQUARTERS

2700 Colusa Highway
Yuba City, CA 95993 USA
Tel: +1 530 673 2822
Fax: +1 530 673 0296
Email: sales@shakermaker.com



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STUDYING THE IMPACT OF EATING ALMONDS AND COGNITIVE FUNCTION IN CHILDREN



University of
South Australia



The ABA has commissioned a pilot study to determine if children aged 8 to 14 years who eat almonds experience an improvement in their cognitive ability. This study will be conducted at the University of South Australia and will be lead by Associate Professor Alison Coates (pictured).

BACKGROUND

Tree nuts and peanuts are rich in monounsaturated fat, protein, fibre, essential vitamins and minerals and several bioactive compounds. Due to this nutrient dense profile, they are recognised as a healthy food according to the Australian Guide to Health Eating with people encouraged to consume 30g per day. Data from the US has demonstrated improvements in diet quality when nuts are part of the diet of both children and adults. Approximately one third of children and adolescents in the US consume nuts on a given day. However, Australian children are much less likely to be consumers of nuts and seeds with less than 10% reporting eating nuts or seeds in the Australian Health Survey in 2012. The 2007 Australian National Children's Nutrition and Physical Activity Survey reported the average consumption for boys and girls aged 8-12 years was less than 3g per day. It is important to find strategies to increase nut consumption in Australian children.

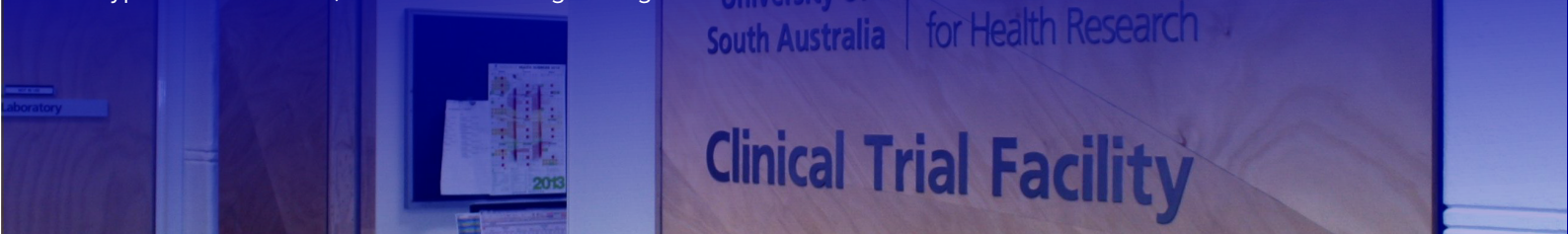
We have recently hypothesized that nuts can improve vascular health and cognitive function through a range of mechanisms due to their nutrient and phytochemical profiles. There is growing evidence to support this hypothesis in adults, with studies using a range of tree

nuts and peanuts reporting improvements in cognitive performance. Cross-sectional data from the 1988-1994 and 1999-2002 rounds of the National Health and Nutrition Examination Survey (NHANES) in adults aged 20-90 years, found that higher walnut consumption was associated with faster reaction times and greater ability to process information. Prospective studies have demonstrated a positive association between nut consumption and cognitive performance with a greater effect in those with the highest consumption of nuts. A recent paper reported that higher long-term total nut intake was associated with better average cognitive status. In addition, prospective cohort studies have reported improved cognitive performance and a reduced incidence of cognitive decline when the Mediterranean dietary pattern (with nuts as a key component) is consumed. Reduced cognitive decline has been associated with key nutrients, including monounsaturated fat and vitamin E, found in nuts and almonds in particular. However, there are very few trials looking at the health benefits of nuts with children.

AIM

The proposed study is a 16-week (2 x 8 week phases) randomized, controlled cross-over pilot study aiming to firstly investigate whether Australian children will consume 30g almonds on 5 days per week for 8 weeks and secondly to compare the effects of consuming almonds on cognitive function compared with a nut-free control phase.

This study has recruited an Honours student from the University of South Australia who will work on this project. Recruitment of the children to participate in the study will commence in late April 2018. This study will take two years to complete and report.





ALMOND 'ASHE WITH INDIA

By Tim Jackson, Captain, Australian Almond Sellers XI

India is one of the Australian almond industry's most significant markets.

It is the largest inshell market for the industry and counter-seasonal advantages have seen an increasing number of Indian buyers combine Australian product with their traditional California inshell programs each year. Cultivating commercial interests and ongoing business relationships in this market is one of the prime focuses of the Almond Board of Australia's marketing committee.

In recent years the ABA have always staged an Australian Almonds briefing at the end of the third day of the Gulfoods Trade Fair in Dubai in February. Attendance has steadily grown and the event is now considered a popular feature of the program among Indian almond buyers who attend Gulfoods.

Last year's ABA presentation coincided with an Australian cricket test victory over India. It was mentioned (cheekily) during the presentation that while India remained one of the best performers in the global trade of almonds, there were grave concerns for the country's cricketing ability.

The response from the audience resulted in a challenge being issued for Gulfoods 2018. This eventually led to the staging of the inaugural *Almond Ashes* cricket

match between the Australian Almond Sellers XI and the ABA Indian Buyers Invitation XI this year at Gulfoods in February. The match was a celebration of the cultural similarities and our nations' mutual love for cricket (and almonds).

More than twenty Indian buyers took up the challenge against the Australian Almond Sellers XI. After their team was finally decided after rigorous pre-match try-outs the Ashes clash took centre stage in downtown Dubai.

The Aussies batted first and thanks to a solid partnership from openers Michael Scalzo and Brenton Woolston and a middle order onslaught by Nigel Carey, ABA boss Ross Skinner and man of the match Craig Greenwood posted 107 runs from their allocated twenty overs.

The Indian run-chase started disastrously. ABA market development manager Joseph Ebbage cleaned bowled their opener with the first ball of the innings! It was Dennis Lillee reincarnated! However, the Indians recovered to slowly accumulate runs and were still in contention when the last batting





SHIT MARK IN ALMOND BUYERS

pair came to the crease. The Aussies lifted with some desperate fielding and tight bowling to ensure they emerged triumphant by 14 runs.

Bookmakers were left reeling at the result as the warm ups prior to the game suggested that India would be too accomplished. They had talked a very big game in the lead up. "Cricket is in our blood, if you can't play cricket, you can't be Indian," was one of many comments made in the banter leading up to the friendly encounter. The Aussies were as surprised as anyone at the result.

Allrounder Toby Smith rounded off a polished performance with both bat and ball with a bruise on his shin from bravely getting in the way of a fearsome on-drive at point blank range. Simon Murphy's and Laurence van Driel's committed efforts belied the fact that the Irish and Dutch do not have strong cricketing cultures. Australian-for-

day Stefan Kaercher invented a new fielding position – 'silly fine leg' – and quickly learnt why it was called silly! He nearly lost his head when Shrey Bhatia hooked viciously past his right ear.



The game, as always when these two countries meet, was played in a competitive spirit. The passion and desperation shown on both sides created an atmosphere that lived on throughout Gulfoods and proved a talking point across the industry. The uniforms provided by the ABA proved much sought-after reminders of a memorable afternoon. It is not every day you get to play for your country!

The Californians, undisputed marketing gurus, also attended and were so impressed that some members suggested they could field a USA team next year. The Aussies suggested they would need to substantiate their credentials via a qualifying tournament against other cricketing minnows in Afghanistan before being permitted to grace the field against the two cricketing super powers!

The Indians went home vowing revenge. Just like Virat Kohli, the players displayed their disgust with the loss and almost immediately started identifying areas for improvement before they arrived for *Almond Ashes II* at Gulfoods, 2019.

Instead of the famous urn, a silver genie bottle containing incinerated almond inshell (pictured) has become the prized *Almond Ashes*. The ultimate prize for Australian almond sellers and Indian almond buyers has safely made its way back to Australia where it will remain until the two nations meet again in Dubai.

5 minutes with...

Gavin McMahon

This edition of “5 minutes with ...” is with Gavin McMahon, CEO of Central Irrigation Trust (based in South Australia) and Chair of the National Irrigators’ Council. Gavin describes his involvement in agriculture for the past 37 years, and in particular, the water industry.

Tell us a little about yourself and your background.

I was born in Brisbane and spent my early life there. After school I completed a Science Degree majoring in Environmental Science and then commenced my career as an Extension Officer with the Bureau of Sugar Experiment Stations (BSES). During my time with BSES, I worked in the Wet Tropics (Innisfail), Central Queensland (Mackay) and the Dry Tropics (Ayr). As an Extension Officer I became aware of the importance of understanding business principles and completed a Business Degree externally. After 23 years in the sugar industry I decided it was time for a change and moved to Berri, South Australia to take up a position as the Land and Water Manager with Central Irrigation Trust (CIT). As opportunities arose within CIT, I progressed to Operations Manager and finally CEO. My family have travelled with me on this journey and have loved living in regional Australia.

During the early stages of the Murray Darling Basin water reform in 2010, I became the Chairman of the National Irrigators’ Council and have represented irrigators on the national stage.

What do your current roles as CEO of Central Irrigation Trust and Chair of the National Irrigators Council involve?

CIT is a great company and I am very privileged to lead it. As the CEO, I am responsible for the reliable delivery of water to the farms we supply now and into the future. The role involves all aspects relating to the financial, physical and human resources of the company. As the Chairman of National Irrigators’ Council, I am responsible to ensure that the irrigator’s voice is heard loudly on the national stage and the

irrigation industry is not unfairly treated in major decisions. With the passing of the Water Act in 2007, many of the decisions on irrigated agriculture are now made in Canberra by the Commonwealth Government and it is important that the industry can have a dialogue with the decision makers.

What have been the most difficult problems you’ve had to deal with in the irrigation sector?

Recently I spoke at a leadership foundation seminar in Loxton and in developing a presentation, I realised that our region and those of us working in it have lived through three significant challenges and survived. Those challenges were the 1) the Millennium Drought, the worst drought in European settlement in Australia, 2) the Global Financial Crisis, the most significant financial correction this century and 3) the Murray Darling Basin Water Reform, the most significant water reform in 100 years. It is rare for people to encounter one such event in their careers, but we encountered all three together. However, our regions and most businesses survived and have emerged stronger and more agile.

“ Irrigated agriculture has a very bright future and it is fantastic to see Australia now becoming a major supplier to the Asian region. This is something that has been toted for over 30 years but is now becoming a reality. ”

What do you enjoy most about what you do?

I absolutely love living in regional Australia where you do not have the traffic, crowds, congestion and pollution you see in the major centres. They are great places to raise a family. I also love agriculture and watching our growers produce high quality products for the world markets. As an irrigation supplier, it is fantastic to be part of this process. Aren’t we also lucky to be able to get fresh local produce? Most importantly I love rural people and a sense of community. It is fantastic to walk down the street and have conversations with many acquaintances; something that is lost in the larger centres.

As the Chairman of NIC, I have also enjoyed representing irrigators on the political stage and ensuring that our views are heard, and we are not forced into outcomes that could be detrimental to our industries.

Describe the challenges you see for irrigated agriculture in the next 3-5 years.

As always irrigated agriculture will have some significant challenges over the next 3-5 years. Water security will feature prominently and I believe the next drought will be more difficult than the last. As permanent plantings expand



at the cost of the production of annual crops and dairy, the next drought will see more competition for water amongst users. I also believe that channel capacity may be a sleeping issue, with the ability of the system to deliver water when and where it is required. The transition to renewable energy will be a challenge, but also an opportunity and I believe one that regional Australia can benefit from. It is also important that our governments continue to support free trade agreements and infrastructure development to ensure our international cost advantages are retained. Finally, I believe that attracting a skilled workforce to regional Australia will challenge us all and it is important that we all invest in the development of a productive rural workforce.

What do you find exciting about the future of agriculture?

Irrigated agriculture has a very bright future and it is fantastic to see Australia now becoming a major supplier to the Asian region. This is something that has been toted for over 30

years but is now becoming a reality. We have to thank our governments as the negotiations of the free trade agreements with China, Japan and South Korea have seen immediate benefits to Australian agriculture and particularly our regions. Our governments have also been proactive in providing infrastructure that gives us a competitive advantage. For young people interested in exciting, technological and financially rewarding careers, agriculture now offers that.

What interests do you have outside of work?

My family has always been and continues to be my main interest. Our children now live in Melbourne, Perth, Brisbane and Berri and we love to follow their development and growth. I have been heavily involved in hockey in the Riverland and think the sport has a lot to offer. I also like riding my road and mountain bikes with my mates and we see this as our "men's shed on wheels". a great relief from daily challenges.

New IPM program for mana

Australia's almond production regions are currently suffering from unacceptably high levels of kernel damage by **Carpophilus Beetle** and **Carob Moth**. Research towards a long term, sustainable solution to controlling these two major pests is now underway, in the form of a five-year project that will see the development and implementation of an effective insect pest management (IPM) strategy for almonds.

The project is led by Agriculture Victoria (Victorian government), though the Mildura Research Station and the AgriBio Centre for AgriBioscience in Melbourne. This \$5 million project is co-funded by the Almond Board Australia, Hort Innovation, and Agriculture Victoria, and collaborates with South Australian Research and Development Institute (SARDI), and NSW Department of Primary Industries.

The project focuses on **seven key goals** that have been identified as top priority by industry and growers.

- Improved orchard hygiene, through the management of mummy nuts
- New technologies for monitoring and mass trapping of *Carpophilus* Beetle and Carob Moth
- Improved application of mating disruption
- IPM compatible pesticide options
- A better understanding of pests and their natural enemies (biocontrol)
- Improved post-harvest disinfestation, trapping and monitoring
- Fully integrated engagement and extension activities

These seven goals are achieved through 50 interrelated research tasks, each having been carefully developed and prioritised to align with the immediate and long-term needs of almond growers.

In the upcoming issues of *In a Nutshell* we will expand upon each of the seven goals involved in this extensive program of work, including progress, new findings, and new tools; and ways for growers, advisors, industry, and almond enthusiasts to engage with the almond IPM program.

Hitting the ground running

The program started this year, and the Almond IPM research team have been out in the orchards and working in the labs since early January. *Carpophilus* damage has been particularly bad this season, and the team already have a lead on why current control

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growing insect pests in almonds



isn't effective, and what can be done. Two key areas are highlighted below.

'Attract & Kill' traps urgently need redesigning for almonds.

Agriculture Victoria research scientists have discovered that the main *Carpophilus* species attacking almond kernels is not the same species as damages stone fruits. This is crucially important, because it helps explain why the Attract & Kill bait stations have not been working effectively. The current attractant in the bait station combines two formulations—a *Carpophilus* Beetle pheromone blend and a co-attractant (currently based on stone fruit odours)—which work synergistically to lure insects. Both the components need to be redesigned to catch the species that damages almond. This is by no means a simple task, as it involves analysing hundreds of chemicals contained in almond odours (for the new co-attractant) and released by the insect (for the new pheromone), using high tech analytical equipment, electrophysiological testing of insect antennae, and wind tunnel screening trials—all before field testing the new prototypes.

Research is underway as a top priority. Field trials on the new prototypes will begin later this year (Nov 2018-March 2019), although these will be screening (selection) trials on new formulations. The aim is to have a new lure developed and evaluated by the 2019/20 season.

In addition to this, the team are working on a new dispenser (sachet) to deliver the attractant in a way that has increased longevity, effectiveness, and practicality, and is significantly cheaper for growers. Field trials on prototype dispensers will begin this season.

Improved Mummy Management for *Carpophilus* and Carob Moth control.

How many mummies? Commencing in winter 2018, Agriculture Victoria research scientists begin the development of scientifically validated guidelines for mummy thresholds, by identifying the relationship between the density of mummies within the crop, and the ensuing damage to new nuts in the following season. These thresholds will help inform growers and industry on the application of control measures as part of the IPM program.

Orchard hygiene. Fallen nuts are also a key source of insect populations, and this year's research has already found evidence that current practices of flail mowing (mulching) may be ineffective—insect larvae are still surviving in mulched nuts. Alternative methods will be investigated as part of the IPM program, including a microwave technology that may be able to disinfest nuts on the ground (e.g. in windrows).

Mating disruption, biocontrol and new pesticide options are also on the agenda

The project team have been collecting data alongside companies and growers trialling mating disruption (SPLAT®) for Carob Moth control, with the aim to improve the application of this technology.

Field surveys are underway to source potential beneficial insects as biocontrol agents to attack pest populations, and next season will see trials assessing commercially available *Trichogramma* for Carob Moth biocontrol.

In addition, laboratory studies are being undertaken to look at how superwettors might improve insecticide delivery.

Progress on these, together with the new project tasks as they are phased in, will appear in future issues of *In a Nutshell*.

Images: Carpophilus Beetle (above left) and Carpophilus larvae (above right).

MARKETIN

Domestic Update

During the 2017 calendar year, there has been a consistent increase in the number of Australian households purchasing almonds. The Nielsen Homescan research for MAT (Moving Annual Total) December 2017 indicated that 48.1% of Australian households purchased almonds compared to 45.9% for the same period last year.

Global pricing for almonds softened during 2017 which has led to a decrease in the average dollar spend per household from \$30.90 in 2016 to \$28.98 in 2017. Interestingly, Australian households continue to spend more dollars on almonds than on any other nut type.

Almonds remain the leader in new product launches within the Australian nut industry during the last marketing year. The Innova Research report highlights that during the 12 months to February 2018, 302 products were launched with almonds as an ingredient. By comparison, cashews were included as an ingredient in 123 products and peanuts in 212 products for the same period to February 2017.

To put this in perspective, five years earlier in 2013-14, almonds were included as an ingredient in 154 products, cashews in 63 products and peanuts in 96 products. The Innova Research indicates that there has been a significant increase in the number of products launched in Australia with nuts as ingredients.

Over the five years from 2013-14 to 2017-18, 1,292 products have been launched with almonds as an ingredient. The four major food categories for these new products have been: Cereal, Energy & Sports Bars, Breakfast Cereals, Chocolate Blocks & Pieces, and Dairy Alternative Drinks.

Almonds as a healthy workplace snack

One of the growing features of our Australian Almonds promotion program is the number of nutritionists and sports dietitians who feature almonds in their presentations to corporate clients, school groups and high performance athletes. For example, two nutrition agencies in Sydney, *The Biting Truth* and *The Gut Health Dietitians* have featured almonds in their Nutrition Courses presented to a number of audiences within Woolworths, Macquarie Bank and ANZ.

These presentations support our Australian Almonds' position of being a healthy workplace snack. Our Australian Almonds press release around healthy snacking at work, and featuring our program dietitian, Bree Murray (bottom right), was picked by several online news agencies including the Australian Daily Mail with a reach of over 40 million world-wide.



Jesse Rothwell, a Sports Dietitian, featured our almonds and new footy-themed snack tins to a Victorian Institute of Sport presentation in Bendigo.

Taste Buds - Growing Future Foodies



For the first time, Australian Almonds has sponsored a school holiday cooking promotion to children. Held in Adelaide's Rundle Mall during the April school holidays, Australian almonds featured in an event titled "Taste Buds – Growing Future Foodies".

Our almonds were included in several recipes the children prepared and cooked and were highlighted in a number of different forms: kernel, blanched meal and flaked.

All the children over the ten days received a footy tin with roasted almonds to take away. Also, some almond branches with hulls attached were presented on the stand and explained by the chefs.

G MATTERS

'Hard Nut' promotion

We have launched our Australian Almonds 'Hard Nut' promotion with the AFL Players Association for the second year. Again we will feature players from the AFLW and the AFL to promote both the health benefits of almonds and our consumer competition.

Each of our player ambassadors create three video pieces: a feature human-interest story, a specific almond nutrition piece and a Hard Nut competition clip.

Our AFLW ambassadors are Tiarna Ernst from the Western Bulldogs and Richelle Cranston from the Melbourne Football Club. Their video piece is very interesting as they share insights from their working lives: Tiarna is an Obstetrician who takes time from hospital to play and Richelle is a landscape gardener. Go to our Australian Almonds facebook page to see their video clips.

Another of our AFL PA ambassadors is a past player, Andrew Carrazzo from the Carlton Football Club. Andrew's story is also very interesting as he moved from playing AFL football to becoming a dad of triplet daughters. With Andrew's three girls now at school, he is an ideal spokesperson for our theme of healthy after-school snacking.



Australian Almonds

Published by Robbie Ranieri [?] · April 10 at 10:45am · 🌐

...

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MARKETING MATTERS

Export Update

Two key features of our 2018 Australian Almonds export market development program were our promotions at Gulfoods in Dubai during February and at Foodex in Tokyo during March.



Gulfoods

The Gulfoods trade show which ran from February 18 to 22 is now the world's largest annual food event, noting that Anuga in Cologne is a biennial exhibition. At the 2018 Gulfoods, more than 97,000 visitors attended across over one million square feet of exhibition space. There were 5,000 exhibitors and 185 countries represented.

Our Australian Almond stand was situated within the Australian pavilion and part of a combined Taste Australia promotion funded through Hort Innovation. All five Australian almond marketers participated in the Australian Almonds promotion. Our 9m by 3m booth featured a backwall of almond orchards at harvest.

An important feature of our Gulfoods promotion is a Customer Networking Seminar we run on the third evening of the exhibition. Each year, this event continues to grow with 92 attending our 2018 event. As per our previous practice, Ross Skinner, presented an Industry Update which was the feature of



the Seminar. Tim Jackson stepped up to recall the magnificent efforts of all involved in the inaugural Australian Almond Vs Indian Almond cricket match on the evening prior to Gulfoods. With the help of the venue's chef, Tim burnt some almonds in-shell and placed their ashes in a special urn which will be the coveted prize for future Gulfoods Ashes cricket matches with our Indian customers.

A couple of weeks after Gulfoods, we conducted our Australian Almonds promotion at Foodex in Tokyo. This event ran from March 6 to 9. This event attracted over 70,000 visitors with more than 3,300 exhibitors.

Foodex

Similar to Gulfoods, our Australian Almonds booth at Foodex was situated within the Australian pavilion. However, as our Japanese



market is still quite small, our booth was commensurately sized.

The Australian almond marketers to participate at Foodex were Almondco, Olam and Select Harvests. We welcomed a visit to our booth by our Australian ambassador to Japan, Mr Richard Court AC and the Austrade Trade Commissioner, Ms Cheryl Stanilewicz.

The key feature of our Foodex program is a Seminar we run of the first afternoon of the exhibition. Each year, this Seminar becomes more popular with the room packed with more than 40 members of the Japanese nut industry. Joseph Ebbage delivered an Industry Update with the three Australian marketers, Damien Houlahan, Tim Jackson and Laurence Van Driel answering a long session of questions from the audience.

Austrade's team in Tokyo helped to organise this annual Australian Almonds seminar and the Austrade Trade Commissioner provided the Opening address.



R&D RO

In this edition of the R&D Roundup we'll look at the future trials planned for the Almond Centre of Excellence (ACE) experimental orchard located at Loxton. Quite a lot of work has occurred in the background over the last nine months to bring together a range of scion and rootstock combinations and formulate these into meaningful trials. The South Australian Research and Development Institute (SARDI) and Plant & Food Research Australia (PFR) researchers have provided much input into the design of these trials. The University of Adelaide (UofA) has also had input through the ongoing Australian Almond Breeding project.

Almond Breeding Trial -(UofA)

In addition to the 34 selections that are still undergoing evaluation at Lindsay Point, the first 8 selections have been planted in 2017 at the ACE experimental orchard in stage 5 of the secondary evaluations. The planting of stage 6 will occur in 2018 with another 23 selections to undergo secondary evaluation. In addition to selections from the Australian Almond Breeding program, 15 international varieties from California, Spain and Israel will also be planted. A further nine selections will be planted as full-length rows as part of the commercial evaluation of the most promising selections from stage 3 of secondary evaluations i.e. these selections may crop heavier in early years or their cumulative yields are higher than Nonpareil.

Soil Amelioration Trial - (SARDI)

Trial Aim: *To assess pre- and post-planting soil management strategies that show potential in improving the health of the soil system. Quantifying impacts on soil physical, chemical and biological condition as well as tree response and the economics of production.*

As Australian soils are generally recognised as shallow and poor compared to those of major production regions like California, this trial seeks to find suitable soil-based methods of increasing production. Physical and chemical limitations to root growth are recognised factors in almond production. Increasing the effective root volume of almond trees will allow access to more water and nutrients. Improving the moisture release characteristics

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of soil will allow more effective supply of water to tree roots under severe conditions, such as heat-waves. This will be investigated by soil treatments including pre and post- planting organic amendments, subsoil ripping and combinations of both. The trial will consist of Nonpareil, Carina, Vela and Carmel planted on Garnem at a tree density of 7m x 4.5m.

H1 to H2 Optimised Density

Trial Aim: *To determine the optimum planting density transition from H1 to H2 for popular new varieties on a full vigour rootstock.*

Many almond plantings to date in Australia are at a traditional spacing (H1), there have been minor plantings of higher density (H2) plantings. These H2 plantings may be an easier step for many towards higher density plantings as familiar genetic material, basic operating practices and the machinery of H1 plantings can still be used. However, the optimum planting density, and how this influences yield and sustainability, remains unknown. This fully replicated trial addresses these questions for a progressive new full vigour rootstock choice (Garnem) in an ordered six step increase in orchard density from 5m to 2.5m tree spacing with the row spacing at 6.5m.

Critically, the layout allows three new varieties to be evaluated in addition to Nonpareil. These are Vela, Carina and Shasta.

H2 to H3 Optimised Density and Management - SARDI

Trial Aim: *To build knowledge in the establishment and maintenance of high density almond growing systems using self-fertile almond cultivars and comparing newly available medium vigour rootstocks. Effects on production will be measured and quantified.*

This trial will take the next steps from moderate density (Horizon 2/H2) plantings up to super high density (Horizon 3/H3) plantings using new self-fertile scions and size controlling rootstocks to give the best chances of a successful outcome in a completely new system. This fully replicated trial uses two new self-fertile scions (Shasta and Vela) grafted onto two moderately size controlling rootstocks as best bet combinations to balance and manage overall vigour whilst attempting to keep cropping as high and even as possible. Four tree densities will be assessed that move from H2 and H3:

- 6.5m row width (H2): 3.0m (513 trees/ha) & 1.5m (1026 trees/ha)

- 4.5m row width (H3): 2.5m (888 trees/ha) & 1.5m (1481 trees/ha)

Two simple training modifications will be investigated to facilitate tree management, Central leader and Palmette (Central leader with major row protruding limbs removed). The trial develops knowledge in the establishment and maintenance of very high density (H3) almond production systems under Australian conditions and attempts to manage some of the risk of extreme system change.

Scion/Rootstock Compatibility - (SARDI)

Trial Aim: *To screen a likely range of new self-fertile scions with desirable tree growth structures on a range of newly available rootstocks of differing vigour.*

This non-replicated trial is a scoping study to screen the compatibility of new self-fertile scion and rootstock combinations and gauge their suitability to higher density Almond production systems under Australian conditions. Two planting densities, H2 (6.5m x 3m) and H3 (4.5m x 2m). Demonstrating several promising rootstocks of differing source and vigour in association with a limited number of new self-fertile scions with the potential to become mainstream industry replacements. The rootstocks trialled include: Nemaguard, the Controller series from UC Davis, the Rootpac series from Agromillora, Krymsk 86, Cornerstone, Atlas, Garnem, Felinem and Monegro. The scions trialled include: Nonpareil, Vela, Almond 21, Shasta and Almond 12.

New Scion/Rootstock Compatibility - (SARDI)

Trial Aim: *To screen a wide range of new scion genotypes from the Australian Almond breeding program for high production, novel architecture, graft compatibility, growth habit and production traits for inclusion in future high-density production systems.*

Scoping study to screen the compatibility of new scion and rootstock combinations and gauge their suitability to higher density almond production systems under Australian conditions. This scoping study focuses on promising scion genotypes from secondary evaluations in the Australian Almond breeding program. These genotypes may not all be self-fertile but show potential as high yielding or having novel architecture that may make them suitable for high density growing systems. The scions used include: Nonpareil, Carina, Maxima, Vela and 16 breeding selections. To keep the trial a manageable size with many scions, tree numbers are reduced by

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grafting to a smaller number of “more likely” rootstocks and having one density (6.5m x 3m). These rootstocks are Nemaguard, Controller 6, Rootpac 40 and Garnem.

Tree architecture and advanced production systems PFR

The overall objective here is to better understand almond tree architecture and how different cultivars respond when planted at high density. The approach is to work with the natural growth habit (architecture) of specific cultivars and to use minimal “low input” pruning methods to produce trees suitable for high density plantings. Apart from increasing orchard yields (t/ha) and grower profits, additional benefits will include:

- Reduced time for new orchards to produce their first commercial crop
- Tree shape suitable for “shake and catch” harvesting with more uniform crop maturity and improved nut quality
- Smaller trees for more efficient water use and easier pest and disease management.

It is important to note that whilst the terms ‘central leader’ and ‘pruning’ are used in the description of some of the trials, it is not inferring that future almond orchards will be like modern apple orchards with a classic central leader tree that is trellised and requires high annual inputs costs in the form of pruning. Rather the aim is to observe the natural growth habits of new and existing scions, develop management strategies to establish a desirable canopy structure that will suit higher densities and maintain optimum light interception to drive increased productivity. The management strategies need to be cost effective, simple to implement and preferably a ‘one-off’ at the time of orchard establishment instead of an annual requirement.

1. Commercial high density

Trial aim: *To validate management systems for new almond orchards planted at high density.*

This long-term study will evaluate two self-fertile almond varieties (‘Shasta’ and ‘Vela’) budded on Nemaguard rootstock. Four planting densities will be compared:

- 6.5m row width: 3.0m (513 trees/ha) & 2.0m (769 trees/ha)
- 4.5m row width: 3.0m (741 trees/ha) & 2.0m (1,111 trees/ha)

All trees planted as “unpruned” central leader trees

taken direct from the nursery and grown with minimal pruning to produce full height trees up to 5 or 6 m tall depending on row widths. Trees planted 3.0 m apart along the rows will be trained as narrow “palmette” style trees by removing any large structural branches growing out into the centre of the rows. Trees planted 2.0 m apart will be pruned in both directions to produce a slender pyramid tree shape.

Trial design will ensure that micro-climates expected in a fully commercial high density block are replicated in this trial. This is important to ensure that the trial provides a true indication of the effect of planting density on kernel quality and maturation.

2. Pruning responses – new cultivars

Trial aim: *To optimize pruning systems for current and future almond cultivars planted at high density.*

This medium term study will evaluate a range of pruning and nursery management techniques to produce central leader ‘Nonpareil’, ‘Maxima’, ‘Carina’, ‘Vela’ and ‘Shasta’ trees suitable for high density plantings. All trees budded on Garnem rootstocks with two sets of trees budded in early-December and mid-January and a third set “dormant budded” in late-March. This produced a range of tree sizes (large, medium and small, respectively) for field-planting in winter. All trees planted with 4.5 m row width and 3.0 m spacing (741 trees/ha) and grown as central leader trees with no or minimal pruning according to tree size at planting.

3. Architectural studies

Trial aim: *To accelerate identification, breeding and commercialization of almond cultivars suitable for high density orchards.*

This short-term study will characterize desirable architectural traits in current and future almond cultivars starting with “unpruned” trees in their 1st leaf budded onto clonal rootstocks. All trees planted as “unpruned” central leader trees are taken direct from the nursery and grown with minimal pruning. Branching, spur development and flowering to be quantified on trees in their 2nd and 3rd-leaf. Cultivars include ‘Nonpareil’, ‘Carina’, ‘Capella’, ‘Maxima’, ‘Mira’, ‘Rhea’, ‘Vela’ and 8 advanced selections from the University of Adelaide almond breeding blocks. All trees budded on Garnem rootstock in mid-December and planted in winter with 4.5 m row width and 3.0 m spacing (741 trees/ha). By not heading the trees at planting and not pruning or selecting limbs, the true natural growth habit of the cultivars can be observed. These data will help develop future management guidelines for high density orchards.

Are you going spray?

Spray drift is of great concern for sensitive crops and environments, along with the fact that if the spray doesn't hit the intended target, you do your dough and your weeds live.

Bill Gordon, spray application consultant with Nufarm Australia says the focus of spraying herbicide needs to be on doing the job right so the weeds receive the correct dose and die, and this includes reducing the air borne fraction to a bare minimum.

"In many cases this means not spraying at night if the wind speed is too low," he says. "Many product labels prohibit night spraying due mostly to the risk of spray drift. Our studies have shown that with a coarse spray quality drift may travel up to 300 to 400 metres during the day after any inversion has broken, but spraying at night can leave up to

five times as much chemical in the air using the same products, nozzles and ground speed. This can result in spray drifting 10 to 20 kilometres or more at night, and this is unacceptable for other farmers, the community and the environment."

Mr Gordon says most growers are implementing best spray practice when it comes to boom height and nozzle selection but the temptation to spray at higher speeds and into the night can over-ride common sense at times.

"The flip side of this is that it is becoming more evident that using Delta-T as the main determinant of safe day-time spraying conditions may not be the best approach," he says. "What really matters most is the wind speed and whether the weeds are stressed or not."

"If the weeds are not stressed on a hot day, due to ample soil moisture, then spraying at a higher Delta-T may still be effective and safe, with coarse droplets surviving quite well and not becoming air-borne."

This can essentially increase the number of daytime hours available to growers to get the job done without spraying at night or early in the morning when the risk of spray drift is the highest.

"Getting onto paddocks as soon as possible after rain and using up the daytime hours to target priority paddocks will maximise weed control and minimise spray drift risk,"

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ing or killing weeds?

Source: WeedSmart

says Mr Gordon. "Spraying can continue into the evening in summer if the soil remains warm and the wind speed stays above 12 km/hr. If the wind drops off, then spraying should cease, usually by about 10 pm through to a few hours after sunrise."

The bottom line is that it is very difficult to determine a safe night-time spraying conditions.

When environmental conditions are borderline in terms of wind turbulence, the safe spray window can be extended slightly through the use of coarser sprayer quality where the proportion of droplets less than 150 microns is 10 per cent or less, keeping drift to a minimum. The trade-off, however, is reduced efficacy when using very coarse droplet size, particularly when the target is small, vertical or hard to wet.

"When buying new nozzles, check them against the new standard, which shows spray quality with adjuvants rather than water only," says Mr Gordon. "The GRDC has recently updated and published the 2017 Nozzle Selection Chart for growers to use as a reference. Using the correct nozzle and adjuvant combination can have a positive impact in reducing spray drift and maintaining efficacy."

"Reducing ground speed by just 5 km/hr can also make a big difference to spray coverage and efficacy of weed control, particularly if there is a high stubble load present," he says. "Water sensitive paper, in combination with apps such as 'SnapCard', is a good way to test the coverage, penetration and spray pattern achieved under different conditions, such as different ground speeds."

Mr Gordon's rule of thumb for effective weed control when applying fully translocated products (e.g. glyphosate and Group I) is a minimum of 6–8 per cent coverage, while coverage of 10–12 per cent or more is required for contact herbicides. "Pre-emergent herbicides are the most difficult to judge due to the number of variables involved in their effective application, but as a rule of thumb I generally look for coverage of at least 15–20 per cent," he says.

If you are going out killing weeds, you need to get everything right.

For more information about managing spray drift, visit the WeedSmart website: www.weedsmart.org.au

Bill Gordon's 10 Tips for Reducing Spray Drift

1. Choose all products in the tank mix carefully.
2. Understand the product mode of action and coverage requirements.
3. Select (and check) the coarsest spray quality that will provide effective control.
4. Expect that surface temperature inversions will form as sunset approaches and will likely persist overnight and even beyond sunrise on many occasions. **DO NOT SPRAY.**
5. Use weather forecasts to inform your spray decisions.
6. Only start spraying when the sun is about 20 degrees above the horizon and when the wind speed has been above 4–5 km/hr for more than 20–30 minutes, and clearly blowing away from any adjacent sensitive crops or areas.
7. Set the boom height to achieve a double overlap of the spray patterns.
8. Avoid higher spraying speeds.
9. Leave buffers unsprayed if necessary and come back.
10. Continue to monitor conditions, particularly wind speed, at the site during the spray operation.



SwarmFarm: Targeting

Just five years ago Central Queensland grain farmer Andrew Bate was in a tractor, spraying a wheat crop, and thinking about ways to farm better and more efficiently. His idea to create a 'swarm' of small, lightweight machines that could work autonomously and cooperatively, is now a commercial reality.

Along with his wife Jocie, Andrew is founding director of SwarmFarm Robotics. The headquarters of their agricultural technology company is their farm 'Bendee' at Gindie, south of Emerald, where their team of seven software and mechatronics engineers and technicians is building and testing world-first robotic technology specifically for agricultural applications.

"There are currently seven SwarmFarm robots working on grain farms, turf farms and in an environmentally-sensitive area on a mine site," says Andrew. "Our commercial release of 50 robots setup for spraying weeds using the WeedIT optical sprayer technology is now underway."

Weed control provides an excellent opportunity for robotics to shine. A time-consuming but 'simple' task that robots can do very effectively at a slower pace, ensuring every weed in the paddock is accurately and effectively controlled while still at a small size.

The cost benefit of robots applying herbicide lies in the frequency of treatment, accuracy and ability to safely operate any time of the day or night. While a grower may hesitate to go spraying, concerned that there might be another rain event and subsequent germination, the robots can 'go now and go later', always targeting small weeds at their most susceptible growth stage.

Weighing just 2 tonne fully loaded, each robot is only 10 per cent of the weight of a conventional sprayer and they fit in perfectly with zero till and controlled traffic farming systems.

The SwarmFarm robots optimise the use of existing optical sprayer technology to identify and target small weeds in a green-on-brown situation (i.e. in fallow) by enabling more frequent applications that are slower and more accurate. The ability to go over the same paddock every few weeks is the standout difference that robotics can bring to the management of herbicide resistance.

SwarmFarm operations manager and leader of field development, Will McCarthy, says the prescription spraying used on 'Bendee' involves the robots passing over the fallow paddocks once every two weeks. "This way, no weed will get bigger than the 50 cent piece size that is optimal for effective control," he says. "We can apply a wider range of herbicide modes of action, more robust rates for chemicals registered for this use pattern and potentially reintroduce products and brews that may have had reduced efficacy as broadacre sprays in the past."

"The robots are the ultimate weed scouts, tracking down escapes and eliminating them before they have a chance to set seed. Constantly targeting small weeds and preventing seed set is the only way to keep weed numbers low and avoid herbicide resistance."

The SwarmFarm robots enable the optical sprayer technology to really come into its own because the robots can operate slower, the cameras and sprayers can be closer together and the robots can go over the paddock repeatedly so there is no concern about getting the timing right. Every weed can be treated at an early growth stage for the herbicide to have maximum effect, tackling herbicide resistance at the source by applying constant downward pressure on the weed seed bank.

The SwarmFarm concept is ideal for new technology developments, as it allows easy integration of third party products as they are being developed, such as green-on-green technology. Will says the robots would then be able to distinguish between a weed and a crop plant and even between weed species. This will allow the removal of volunteer crop plants and even target broadleaf weeds like sowthistle in a broadleaf crop such as chickpea.

Although the current focus is on herbicide application, there is great potential to use the same platform to implement non-herbicide tactics such as targeted tillage or robotic chipping, steam or any other non-herbicide tactic found to be effective.

"Using the robot concept, microwave technology becomes a realistic option because the robots can stop at every weed and apply the necessary microwave blast to kill each weed, something that is simply not feasible for a tractor operator," says Will.

"Aside from weed management, the robots will enable direct management of a crop's plant population to maximise yield potential for the available soil moisture," he says. "There is no reason why the SwarmFarm platform can't be utilised for planting and applying fertiliser precisely and economically, controlling insect pests and even harvesting the crop. The system is in place to support any application really and all that is needed is the planter, cultivator or harvester to be engineered and bolted on."



Andrew reckons that a 10 000 ha property like 'Bendee' would only need two SwarmFarm robots to take care of all their weed control operations.

SwarmFarm robot features

Working through the features of the SwarmFarm robots highlights their simple and robust construction and numerous safety features. Will says the team has worked hard to make diagnosis as simple as possible and the modular components have minimal opportunity for failure. "If there is a problem, the replacement parts can be easily fitted on-farm without specialist technicians and the maintenance is straightforward and well within the capability of any farmer," he says.

Multiple safety features built into the robots, which make them safer than a person operating a spray rig or tractor, include:

- Obstacle detection sensors (can determine if the terrain ahead is suitable to traverse and also stopping if there is something in its path e.g. a vehicle or person),
- Paddock definition (it maps the paddock to show boundaries, fencelines, trees, troughs, dams etc. then uses software to generate A-B lines. The robot then drives itself around these fixed obstacles),
- Remote control using an iPad (allows the operator to stop and restart the robot when within the local farm network),
- A bumper sensor to turn off the machine as a back-up to the obstacle detection sensors (slow operating speed means any damage would be minimal if this was activated),
- A geo-fence that turns off the machine if it crosses the line.

Each robot has an 8 m boom fitted with eight WeedIT optical cameras, 40 nozzles and a 600 L spray tank. Depending on weed density across the paddock this could last all day or an hour. The robot monitors the volume of spray in the tank and makes a decision whether it can reach the end of a run or not before running out of spray. It then returns to a docking station for refilling. At the moment, a person is required to refill the spray tank but plans are in place to fully automate the refilling operation within the next 8–12 months. The 60 L diesel fuel tank on board gives the machine an operating time of 18 hours between refueling.

WeedIT cameras capture data from a 1 m wide band on the ground using NIR and IR light to detect green weeds in a 'brown' paddock. There are five individual sprayer solenoids per camera span, giving one spray nozzle every 20 cm. The cameras are set to turn on three nozzles over a weed to ensure good coverage, which is particularly important if there is a breeze blowing.

The genius of the SwarmFarm system lies in the 'smarts' of the SwarmHive base station computer. Located in the grower's office the SwarmHive takes care of the robots' activity and decision making and coordinates the workflow of all the robots operating in the paddock.

"If one machine is going slower due to higher weed numbers then the SwarmHive will reallocate the other robots to cover the extra area so that the whole paddock operation is completed at about the same time and all the robots come back to the docking station together," says Will. "It is updating in real time and making decisions about the weather conditions, mapping weed density, ensuring the robots are operating efficiently and sending alerts if any problems arise, such as a pump malfunction or an obstacle detected."

An on-site automatic weather station located at the docking station monitors key parameters such as Delta-T, wind speed and direction and ensures the robots only operate within the label directions. The SwarmHive automatically turns off the robots and then restarts them when the conditions are within the acceptable range. Integration with an on-site, automatic weather station also provides a reliable record of spray activities and the real-time environmental conditions during the spray operation, such as wind speed and direction. The grower also has 'on-the-go' access via an iPad app to monitor and control the robots if necessary, when within the local farm network.

For more information about managing herbicide resistance, visit the WeedSmart website: www.weedsmart.org.au



WeedSmart is an industry-led initiative aimed at enhancing on-farm practices and promoting the long term sustainability of herbicide use in Australian agriculture. Australian research partners, commercial entities, Government, advisers and growers have joined forces to ensure weed management remains at the forefront of global farming practice. Viable herbicide use will help secure the weed control productivity gains made by the current generation of Australian farmers.



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18th Australian Almond Conference

The Australian Almond Conference (AAC) will be held **October 30th to November 1st** at the Pullman Hotel, Melbourne.

Our previous conference was attended by 440 delegates and organisers are expecting a similar number to participate this year. With overseas and Australian presenters and exhibitors covering all areas of the supply chain it is set to be a great event for both networking and knowledge sharing.

It is hoped that given the large recent expansion of orchards that the new growers will attend the event and be welcomed into the industry.

Online registrations to open at the start of June 2018



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Get an update on all new, current and recently completed levy-funded activity with the new edition of Hort Innovation's Hortlink. Just released, you can check out the almond section at

www.horticulture.com.au/hortlink-2018-edition-1/almond.

As well as easy-to-read project updates, results and resources you can use in your business, Hortlink includes case studies, industry contacts and more. Don't miss the Faces of Horticulture section, which includes a closer look at Hort Frontiers activity, scholarship opportunities and other handy info!

Stay in the loop with your levy by becoming a member of Hort Innovation, the grower-owned, not-for-profit research and development corporation for Australian horticulture. Paying a levy doesn't automatically make you a member, but signing up is free at www.horticulture.com.au/membership.



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May – Re-shaking practices

Re-shaking is a key aspect to orchard hygiene as the removal of the food source provides a time barrier between the harvest of one season and hull split of the next. Re-shakes should be conducted in accordance to weather conditions. The best re-shaking results occur when the fruit is heavier therefore early season rains and dewy mornings are key opportunities to act. It has been perceived that when shaking in the opposite direction to harvest, a more effective shake will occur. Re-shakes can be utilised up until early June so long as next season's buds are still dormant and are held tight on the laterals. When shaking in late May and early June, carefully monitor the shaker and tree to make sure the following season's flower buds are not being dislodged!



June to July – Further nut removal

In the worst areas consider poling for removal of nuts remaining in the tree. If unsure about the need for polling, collect a sample of mummy nuts throughout the winter months, crack them out and look for any *Carpophilus* or Carob Moth. In this case ignorance is not always bliss.

Upon completion, the resulting nuts should be swept into the midrow, then destroyed using a flail mower. Multiple passes may be needed to create the desired mummy destruction. Flail mowers can differ in specifications, where some units can create a vacuum to destroy nuts that may be under the soil surface; this can be promoted through blade selection. Speed of flail mowing, and the uniformity of the orchard floor is also critical in the effective breakdown of mummy nuts. Any resulting misses could encourage the growth of the *Carpophilus* Beetle population in the area. The earlier this practice is completed, the more time the pests must survive to make it to the next hull split.



IN THE Orchard

Brett Rosenzweig,
Industry Development Officer

As discussed in previous editions of *'In The Orchard...'*, the importance of orchard hygiene in relation to pest management is significant. As our industry grows, the potential for Carpophilus Beetle and Carob Moth to survive the winter months is increasing. The reputation of Australian Almonds being of high quality has been at risk in recent years. Whilst California faces an ongoing battle with Navel Orange Worm damaged kernels, we now face the similar situation on the market with Carpophilus Beetle and Carob Moth damage. As California has shown in their current management practices, the solution is not as easy as pouring a chemical into the spray vat and spraying the trees. A holistic management approach is required using available insecticide chemistry, best practice harvesting techniques and orchard sanitation. It is critical that this issue is adhered to by all growers in all regions to make it as hard as possible for winter survival. Best orchard management practices for orchard sanitation and hygiene are highlighted on a seasonal basis. The timeline is supported by the Almond Board of Australia's Production Committee.

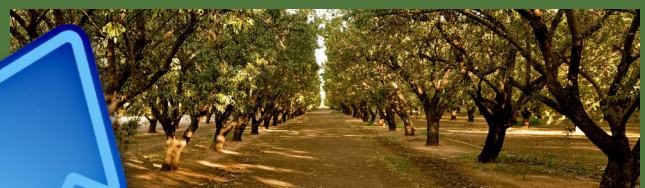
August to December– Monitoring pest activity

During this time monitor the pest and disease activity using appropriate trapping and fungicidal methods. Diseases such as Hull Rot can cause a rise in stick tights when it comes to harvest due to the toxin release process. If Hull rot is low, then this means the need for re-shaking is reduced and the blocks that do can be done more effectively to reduce risk of buds being shaken off. To achieve less hull rot, consider cultural methods to reduce the incidence of Hull Rot i.e. slight Regulated Deficit Irrigation at hull split.



January to April – Orchard preparation and harvest practices

Just as ground preparation is important for harvest it is equally as important for pest management. Ensure the orchard floor is clean and the irrigation system is functioning to minimise pooling of water. Pooling of water on nuts creates a climate where Carpophilus Beetle will thrive. It is important to ensure harvest crews are properly trained to shake the trees correctly to remove nuts efficiently whilst minimising tree damage. It is sometimes tempting to reduce shake time to quicken the harvest process up however this can leave nuts on the tree. Usually a 5-7 second shake is what is required on a mature tree and varying revs can create different shaking frequencies. A 10 second shake could be used if required. Up to the fifth leaf ensure adequate shaking times are used. Anecdotally, shaking slightly greener may also help remove more nuts during the shaking process (slightly heavier fruit weight) and may reduce the incidence of hull rot (reducing stick tights). Naturally, the crop will need to dry on the orchard floor for a slightly longer duration as it is still important to make sure the crop is only stockpiled at 6% moisture or less to ensure food safety standards are met.





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2018 Events

APRIL						
SUN	MON	TUES	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

April

2 Easter Monday

25 Anzac Day

MAY						
SUN	MON	TUES	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

May

10 ABA Board, Market Development Committee, Production Committee & Conference Committee Meetings, Loxton Research Centre

11 Plant Improvement Committee & Almond Centre Committee Meetings, Loxton Research Centre.

16 Sial China Trade Exhibition begins, Shanghai, China

18 Sial China Trade Exhibition ends, Shanghai, China

21 International Nut Congress begins, Seville, Spain

23 International Nut Congress ends, Seville, Spain

JUNE						
SUN	MON	TUES	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

June

1 Melbourne Good Food Trade Show begins

3 Melbourne Good Food Trade Show ends

11 Queen's Birthday Public Holiday, most regions.

22 Pollination Committee Meeting, Mildura

22 Sydney Good Food Trade Show begins

24 Sydney Good Food Trade Show ends

Satays with Spicy Almond Sauce

Satays with a spicy almond sauce and condiments make for a terrific snack or meal.

Ingredients

Satays

- 700 grams beef fillet cut into bite sized pieces
- 1 tablespoons light soy sauce
- 1 tablespoons dark soy sauce
- 1 tablespoons sesame oil
- Satay Almond Sauce
- 2 tablespoons vegetable oil
- 2 onions
- 5 garlic cloves
- 3 Birds Eye chillies
- ½ tablespoon belechan (dried shrimp paste)
- 200 grams roasted almonds
- ½ tablespoon petis udang (dark shrimp paste)
- 1.5 teaspoons salt
- 2 tablespoons palm sugar, grated (you can substitute honey)
- 1⅔ cups hot water
- 1 tablespoon kecap manis
- 2 tablespoon lime juice

Basting Mixture

- 2 tablespoons cooked almond sauce
- 1 tablespoon kecap manis (sweet Indonesian soy sauce)
- 2 tablespoons lime juice
- 1 tablespoon cooking oil

Condiments

- 1 large cucumber, peeled and cut into small wedges
- 2 limes, cut into quarters
- 1 tablespoon sambal or chilli sauce (optional)

Other

- Skewers, soaked in water for at least 30 minutes

Instructions

Sauce

1. Heat up a fry pan and add oil.
2. Fry onion, garlic, chillies and terasi/belechan and cook, stirring constantly, until fragrant.
3. In a processor, blend fried mixture with almonds, petis udang, salt and palm sugar.
4. Put mixture into a pot and add water. Cover and cook over low heat until smooth and thickened (about 15 minutes). Remove two tablespoons for basting mixture and then add kecap manis and lime juice to the remaining sauce. Cover and keep warm.

Basting Mixture

1. Mix almond sauce with kecap manis, lime juice and cooking oil on small plate.

Satays

1. Cut kangaroo, beef or chicken into bite sized pieces and place into a bowl.
2. Add soy sauce and sesame oil and mix to combine. Cover and leave for at least 1 hour or overnight.
3. Drain liquid and thread beef onto pre-soaked skewers.
4. Heat up a barbecue or griller. Grill the skewers for about 4-5 minutes, then baste with basting mixture and turn over. Baste other side and cook for another 4-5 minutes or until crispy and brown.

To serve, place satays on a plate and serve with warm almond sauce, cucumber pieces and lime slices.

Notes:

- Dairy-free
- Makes 9-10 large skewers
- Serves 4 as entrée or part of a main meal.
- Belechan is available at most supermarkets nowadays. Petis udang is available at Asian grocers.

