R&D INSIGHTS
THE LATEST UPDATES ON R&D WITHIN THE OLIVE INDUSTRY | SEPTEMBER 2022

R&D Insights contains the latest levy-funded R&D project updates, research findings and related industry resources, which all happen under the Hort Innovation Olive Fund.

Hort Innovation partners with leading service providers to complete a range of R&D projects to ensure the long-term sustainability and profitability of the olive industry.

Central NSW Olive Workshop address local grower issues

Late July saw an extra event added to the AOA's calendar for 2022, with a comprehensive two-day olive workshop addressing ssues being experienced by growers in central NSW and the Hunter Valley.

They've endured quite a bit over the past few years: first drought and fires, then torrential rain and flooding, and through it all an increasing level of olive lace bug infestation. A number of groves have also changed hands and it was recognised that the new growers needed industry information and support made readily available, to ensure both the viability of their olive businesses and the continuing high quality of EVOO and/or table olives produced across the region.

Information one-stop-shop

Held at Rylstone Olive Press, AOA CEO Michael Southan described the workshop as "a one-stop-shop for growers keen to get more information".

"It covered pretty much everything, from the Australian Standard, *OliveCare®* and keeping records to grove management, table olive production, and pests and diseases. We also looked at testing, what's important in olive and EVOO judging, and marketing issues like how to get into food service and what's happening with supermarkets," he said.

"Plus we had a number of industry sponsors there, so people were able to talk to experts about the best equipment for their own set up.

"We had an enthusiast gathering of around 50 all up, and attendees ranged from very experienced 'old timers' to people with very small groves and 'weekend farmers'.

"Not surprisingly, the stand-out areas of interest centred around grove management: pruning, soil health, nutrition - compost vs other fertilisers - and diagnosis and control of pests and diseases.

"There was a lot of interest in sustainability too, and people were keen to hear from the organic growers there about how their management systems work.

"Feedback overall was really positive and we've heard that many started pruning as soon as they got back from the workshop, some even sharing photos on WhatsApp. That's a great outcome!"

Help needed

Attendee Ben Wilmot has 700 olive trees, planted 20 years ago by his parents on their property at Putty. Unfortunately they weren't successful and the grove is now in need of some serious TLC, so Ben went to the workshop for help on what to do.

"I don't live there full-time, and they're mature trees which need a lot of attention, so they're in a state of disrepair," he said.

"But I've got a second wind of trying to make something of the grove, and

I found the information from the workshop extremely useful."

Ben said the main problem they've had is lace bug, with previous sporadic spraying not successful. Earlier machine pruning had also created a dense canopy of regrowth in which the lace bug flourished.

So it's not surprising that his main take-away topics were "spraying and how to treat lace bug, and the type of pruning", along with organic vs non-organic, the importance of soil, and discussion around ground cover vs mowing.

"There were some excellent presenters and it was interesting to hear what people had to say - including some varying advice from a range of different perspectives. Everyone's situation is different, so it gives you the chance to find out which may work on your own property.

"The most valuable element for me was Andrew Taylor on pruning. That was very interesting and helpful.

"It's my number one focus, because all my trees need severe pruning now due to the lace bug damage. I also didn't realise that ongoing pruning was such a crucial thing for good production."

Information into action

Having learned that now, Ben said he's already turned information into action in his grove.

"I've started in hard with the pruning," he said.

"I'd done a bit before but the knowledge from the weekend was very valuable and encouraging, and has given me confidence to get on with it.

"The next thing will be the chemical spray regime, and then potentially working on the soil and ground covers. I think for now that'll be enough to keep me busy."

Big step up the learning curve

Fellow attendees Carrie and Tony Nakad have 200 Frantoio trees in their Bathurst grove, now up to six years old. Having originally planted 100 trees 'for fun', they now have an end goal of 700-800 trees and an olive business.

They're still on a big learning curve, Carrie said, and they've had plenty to deal with already - frost, drought and damaging rains. The AOA workshop was a chance to learn more about how to deal with it all.

"We're still finding out way, so we went to meet more people in the industry, to reiterate the knowledge we do have and to learn new things," she said.

"Also to draw on the knowledge of not only the presenters but also the attendees. It was a wealth of information, with everyone happy to have a chat and share."

They came away from the workshop with "A lot of information, a lot of enthusiasm and a refresher course - it looked at a lot of information and elaborated on it," Carrie said.

"There was also the opportunity to ask questions. You can read all the books you want but that first-hands experience and knowledge from someone who's done the hard yards is invaluable. And it was in our general region, so a lot of it was very specific for us."

Stand-out sessions

Carrie said there were a number of stand-out sessions across the two days.

"Because we're starting, Westerly Isbaih's presentation on marketing was right on target. She got you to think about the different factors involved if you want to get into food service, and how you would go about it," she said.

"Robert Spooner-Hart and Len Tesoriero's IPDM information is always great, and I know Tony really enjoyed Andrew Taylor's pruning session. He took a lot of information from that presentation, especially about technique: we're getting to that stage so that was really valuable.

"And I loved John Barton's compost session. His knowledge is prolific and his passion is so obvious – you could listen to him all day. It was very inspiring - I went home and got my pitchfork out straightaway.

"Also Mike Thomsett on grove health and nutrition. Again, he knows so much and understands how to make it work in a practical way."

Attendance invaluable

To anyone contemplating attending an AOA workshop or field day in the future, Carrie said 'do it'.

"Regardless of where you sit in the industry – new, five years in or 30 years' experience – it's invaluable," she said.

"The amount of information on the AOA website is fantastic, and a lot that people presented on is on there, but it was a chance to get more in-depth explanations on that information and ask questions that relate to your situation.

"It's also about the people you meet. All the presenters are just so passionate about their particular field, and it's a nice opportunity to catch up with everyone again."

Ben seconded the sentiment:

"If there's an AOA workshop or field day you can attend, definitely do it. Having just done this one, I'd love to go to the Tassie (Conference) too!"

This project is part of the Olive levy project Australian olive industry communications and extension program (OL18000), funded by Hort Innovation, using the Hort Innovation olive research and development levy, co-investment from the Australian Olive Association and contributions from the Australian Government.

Hort genome project to produce more resilient tree crops

In a $13.3 million joint research project currently underway, Australian researchers are using plant genetics to help solve DNA mysteries and create the horticultural tree crops of the future.

Delivered through Hort Innovation under the Hort Frontiers strategic partnership initiative, the five-year project is developing a genomic toolkit for tree breeders and researchers so they can better understand how genes control traits that are valuable to Australian growers - such as tree size, yield, disease resistance and tree maturity.

Harnessing cutting-edge genetic technologies, the knowledge is then being used to develop new tools to enable plant breeders to deliver new varieties with key productivity and profitability traits. Additional tools are being developed for growers to enhance farm productivity.

DNA mapping

The project aims to build a complete DNA map that will visualise the genetic make-up and variability of five of the nation's leading tree crops - avocados, mango, macadamia, almond and citrus fruit. These five crops represent 80% of Australia's horticultural tree crop production and account for more than 50% of horticultural tree crop revenue.

Program components

The research is being conducted by the Queensland Alliance for Agriculture and Food Innovation (QAAFI), embedded within the University of Queensland (UQ) and the Queensland University of Technology (QUT).

The program involves separate components working together to deliver a deeper understanding of the relationship between tree crop traits (phenotypes) and their underlying genetics (genotypes) and genetic mechanisms. This will then feed into the development of tools and opportunities for rapidly and more efficiently addressing current and future plant breeding needs identified by industries.

There are four components within the program: the Genomics Toolbox, Genotype Prediction Toolbox, Phenotype Prediction Toolbox, and a new Molecular Physiology component which complements research in the Genotype Prediction Toolbox.

Meeting plant industry challenges via genomic approaches

The project recognises that it is increasingly essential for Australia to be at the forefront of horticultural biotechnology, to ensure the industry remains profitable, productive and protected.

We've all seen recently - and many of you have been affected by - the significant challenges faced by the horticultural tree industry from plant diseases, production issues and climatic change. Breeding more resilient and suitable varieties is undoubtedly the way to tackle many of these challenges, however plant production is a slow and timely process.

QAAFI Professor Robert Henry said the long generation time of tree crop production made it difficult to proactively or "rapidly" develop new plant varieties in response to factors like pest and disease outbreaks, changing climate and evolving consumer preference.

"Advances in genomic sciences have benefitted many agricultural industries, but they haven't fully extended into horticulture in the same way they have impacted on field crops," he said.

"However, earlier genomic studies in apples demonstrated that elite seedlings could be bred and planted as commercial varieties after just 24 months using genomic prediction approaches - seven years earlier than through conventional breeding methods.

"Genomic approaches offer opportunities to progress the efficiency of genetic variation on individual plant performance.

Research Recap

PROJECT NAME: National tree genomics program (AS17000)

PROJECT AIM: To harness genetic technologies for the benefit of Australian tree crop industries through development and use in breeding (to deliver cultivars with key productivity and profitability traits) and improved management techniques.

PROJECT PARTNERS: University of Queensland, Queensland University of Technology & ors

FUNDING: Hort Frontiers Advanced Production Systems Fund

PROJECT TIMEFRAME: Ongoing

KEY INFORMATION:

- **Genetic technologies can be developed and used in breeding to deliver cultivars with key productivity and profitability traits, and to improve management techniques**
- **The program involves separate components working together to deliver a deeper understanding of the relationship between tree crop traits (phenotypes) and their underlying genetics (genotypes) and genetic mechanisms**
- **Each program component is developing a genetic 'toolbox' - a genomics toolbox**
- **These will used for the ultimate development of tools and opportunities for rapidly and more efficiently addressing current and future needs of industry**
- **Case study crops include almond, avocado, citrus, mango and macadamia**

How could the olive industry benefit?

Horticulturalist Michael Thomsett said the program's results could assist olive growers with adaptation to growing conditions or climate variation, by creating mechanisms to produce beneficial and/or more suitable physiological traits such as:

- flowering time and duration
- ripening time and speed
- fruit abscission
- tree size and shape
- growth habit
- drought resistance
- frost resistance
- pest and disease resistance

The program's results could create mechanisms to produce beneficial physiological traits in olives, such as frost resistance.

Outputs delivered through this project will have a major impact on Australian horticulture through improved management systems and more efficiently developed varieties."

Sector-wide impacts

While not one of the case study tree crops, Australian Olive Association President and horticultural consultant Michael Thomsett said the project is also promising for our industry.

"Successful research in the tree crops selected will inevitably have wider impacts across the horticulture sector as a whole," he said.

"Olive genomics would need to be studied specifically to fine tune any benefit to olive production in Australia, however this work will ensure that the science and pathways to adapt beneficial traits into tree crop production systems will be clearer, and future processes therefore more efficient."

Project update

In June the research team published an update focussed on the Molecular Physiology component of the project, which aims to improve understanding of the molecular mechanisms regulating productivity traits. Study crops are avocado, mango and macadamia.

The molecular physiology research team has been tasked to identify:

- the molecular signals associated with determinate and indeterminate growth and flowering in tree crops;
- the molecular signals associated with precocity in tree crops;
- the molecular signals which alter tree architecture; and
- the molecular changes in the plant which lead to early fruit loss.

With their work now well underway, during the most recent milestone period they have:

- identified methods to reliably produce determinate flowers in the field and collected samples from determinate and indeterminate flowers for molecular analysis (in avocado);
- using model species identified signals which travel from the rootstock to the scion to potentially regulate flowering and branching, and started applying this knowledge (macadamia);
- identified differences in levels of phytohormones between fruit that drop early from the tree and are retained (avocado);
- undertaken a field trial looking at the effects of Naphthaleneacetic acid (NAA) application on fruit retention (mango).

With change and adaptation now clearly identified as a crucial element of a successful horticulture industry into the future, this is exciting work. We'll keep you posted in *R&D Insights* as future project updates are released.

Latest AOA webinar recordings now available

The AOA's ongoing program of productivity and profitability webinars continues to be both popular and successful, providing industry members with information, learning and discussion about a wide range of timely and relevant topics.

Four more webinars have been run over the past three months:

Reducing Nitrogen costs with Soil Carbon

Responding to the rapid increase in fertiliser prices, this webinar was presented by well-known soil guru John Barton and took an in-depth look at sustainable alternatives to commercial Nitrogen fertilisers.

The webinar covered:

- why fertiliser costs are currently so high
- alternative sources of Nitrogen
- the Nitrogen cycle
- increasing nutrient storage
- soil microbes and Nitrogen
- how much Nitrogen can be saved.

As always, this presentation left attendees inspired to get out in the grove and work with their soil.

EVOO shelf life prediction

Presented by Modern Olives Laboratory Manager Claudia Guillaume, this webinar was timed to coincide with the end of the olive harvesting and processing season and focussed on the considerations around EVOO bottling and storage to

ensure ongoing quality. Discussion included:

- factors affecting the shelf life of EVOO
- determining EVOO best before dates
- labelling requirements around best before dates.

Claudia's depth of knowledge around EVOO chemistry, and her ability to 'translate' into grower-speak, made this another must-attend webinar for all producers.

The Mediterranean Blessing, Olive Leaf as a Herbal Medicine

This webinar looked at one of the increasingly-popular 'value-adding' elements for our industry, olive leaf extract (OLE), used for hundreds of years as a medicine and more recently for improving immune function.

Naturopathic clinician Ian Breakspeak discussed the medicinal value of olive leaf extract, and presented research on the differing efficacy rates of OLE made from fresh versus dried leaves.

His discussion around this interesting topic may also open the door to a new product for some producers.

Polyphagous Shot-Hole Borer in WA

The final webinar for the quarter explored a new and emerging plant pest threat, Polyphagous Shot-Hole Borer (PSHB). The beetle attacks a wide range of plants and has a symbiotic relationship with a Fusarium fungus, which kills vascular tissue causing dieback and tree death.

PSHB has been detected in the Perth metropolitan area and, while no specific risk has yet been recognised for olives, the information and learnings presented are relevant to our industry given the very real risk of a local Xylella fastidiosa incursion.

Presenter Dr Kylie Ireland, Plant Pathologist on the DPIRD Plant Biosecurity Pest Risk and Analytics Team, looked at response activities and the role we can all play in detecting and managing PSHB to reduce the risk of a wider incursion.

Recording links

For those who couldn't make it on the day, and/or want a refresher of the information, recordings of all of the webinars are now available for viewing on the *OliveBiz* website: go to *www.olivebiz.com.au* – Events – Calendar – 2022 AOA webinars.

The AOA webinar series is part of the Olive levy project Australian olive industry communications and extension program (OL18000), funded by Hort Innovation, using the Hort Innovation olive research and development levy, co-investment from the Australian Olive Association and contributions from the Australian Government.

Xylella a focus at 2022 Plant Biosecurity Research Initiative Symposium

The second Plant Biosecurity Research Initiative (PBRI) Symposium was held in May in Adelaide, bringing together pest and disease experts from around the country and overseas for a jam-packed program of cross-sectoral plant biosecurity RD&E (Research Development & Extension).

Looking at biosecurity from a 'big picture' perspective, the two-day event included a Trans-Tasman session on collaborative research between Australia and New Zealand and a Partnership Panel session discussing enhanced international and national collaboration.

Focussed program

The program ran over two full days and was divided into eight sessions, each covering a specific focus area. Presentations incorporated work around a wide range of plant species, pests and diseases, and many had specific or generic relevance for olive growers. We've highlighted a few of the most relevant below.

Session 1 - Preparedness included several presentations on the topic of Australia's #1 biosecurity risk, *Xylella fastidiosa (Xf)*. The cause of devastating mass die-back of olive groves across Puglia, Italy, and with no cure for infection identified to date, *Xylella* is undoubtedly the olive industry's greatest disease risk. Presentations of note in this session included:

- Native insect vectors of *Xylella*
- *Xylella fastidiosa* and its vectors - potential control and management options for a prepared Australia
- Post-entry quarantine (PEQ) screening at the border

Session 2 - Diagnostics was also highly relevant to our industry, with the focus on *Xylella* continuing via presentations including:

- Development of rapid infield diagnostics for *Xylella*
- New diagnostics for exotic and endemic threats
- DNA-based gut contents analysis for investigating insect herbivory and movement

Session 3 - Surveillance also had a number of presentations of particular interest to olive growers:

- Use of hyperspectral analysis to detect plant pathogens
- Citrus biosecurity surveillance
- ImapPESTS case studies of sentinels
- Grapevine trunk disease management

Session 4 - Sustainable pest, disease and weed management has increasing relevance to all agricultural industries, with most notable topics for olive growers being:

- New biocontrol solution for sustainable solution for sustainable management of weed impacts to agricultural profitability
- Weed vision and management
- Biocontrol of fruit flies and Spotted Wing Drosophila

Session 5 - Biosecurity Partnerships commenced with one of the keynote addresses, Advances in technology for biosecurity risk detection by Joel Willis, Principal Director of Detection Capability and Emerging Technology, Biosecurity Operations Division, DAWE, before the Partnerships Panel session explored Future collaboration and co-investment opportunities.

Session 6 - Trans-Tasman Research followed with a look at some of the ground-breaking research happening further afield around surveillance, monitoring and incursion response, including:

- Remote sensing methods for biosecurity surveillance, response and eradication: NZ maize crop as a case study
- Novel volatile sensors for biosecurity
- Sentinel plants from concept to application: the value in the context of biosecurity for Aotearoa-New Zealand

Session 7 - Biosecurity and industry resilience moved the focus to the greater industry and supply chain, with presentations including:

- Biosecurity response and social licence
- Incentivising biosecurity for growers
- Valuing biosecurity along the supply chain

Session 8 - Capability Building then wrapped up the event with varied range of topics, finishing with a look at several of the more technical projects around diagnostics and treatment:

- Financial threat posed by BMSB to the Australian wine industry
- Biosecurity Warrior schools' program
- Linked machine learning classifiers for species and strain identification using fungal ribosomal DNA datasets
- Exogenous RNAi inhibits infection physiology of rust fungi to reduce symptoms in planta

Key messages

The symposium provided a wealth of information, and identified biosecurity strengths, challenges and directions for the future.

Among the stand-out messages shared by the presenters, particularly when reflecting on our own industry focus on prevention and/or control of *Xylella* fastidiosa, was that the best way forward for biosecurity is to leverage the latest R&D, innovation and technology for proactive change, while also applying the key learnings from the past.

About the PBRI

The Plant Biosecurity Research Initiative contributes to a nationally co-ordinated science-based system to protect the biosecurity all of Australia's plant industries and the environment.

The initiative is a partnership between the nation's plant Research and Development Corporations (RDCs), working collaboratively with Plant Health Australia (PHA), industry, state and federal biosecurity stakeholders. Horticulture Innovation Australia Limited is one of the core RDC partners.

It's also clear that biosecurity is not just about scientists and industry, and that it's vital to have a broad set of community members who understand the research and can be part of the solution.

More information

A wide range of resource from the event are available to download from the PBRI website, including slides of the presentations referenced above and the 2022 Symposium Report.

Go to *www.pbri.com.au* – Events – Plant Biosecurity Research Symposium 2022 and take a look at the ones most relevant to you and your role in ensuring Australia's plant crop biosecurity.

Virtual kit makes exploring EVOO sensory characteristics easy

The Olive Wellness Institute team has added a new key resource to its online offering, rolling out a user-friendly extra virgin olive oil virtual sensory kit.

The team recognised that there was a sensory gap in the conversation around extra virgin olive oil (EVOO), so they decided to fill it.

"While the health benefits of our amazing products are increasingly well known, there's a lot less discussion happening around the sensory characteristics of EVOO," OWI Healthcare Professional Education Manager Sian Armstrong said.

"And as EVOO has a wide variety of aromas, tastes, and flavours, one of the best ways to experience the differences is through a contemplative tasting.

"So we created the new online sensory kit, which steps through how to conduct an EVOO tasting and provides information on the various sensory characteristics."

Topics covered include:

- Influences: factors influencing the sensory characteristics of EVOO - variety, maturity at harvest, climate and weather;
- Flavour: the combination of sensory factors including aroma, taste and 'feeling', fruitiness, bitterness, pungency, complexity and persistence;
- Detecting poor quality: common causes of defects in EVOO, negative flavour attributes;
- Conducting a tasting: step-by step guide, from choosing the right glass to palate cleansing between oils;
- Types of EVOO: mild, medium, robust styles.

Common varietal flavours in EVOO

Frantoio	Leccino	Barnea	Picual	Coratina	Koroneiki	Arbequina
Buttery	Caramel	Banana fruit	Tomato fruit	Green grass	Green grass	Red apples
Floral	Toffee	Banana skin	Tomato leaf	Woody	Cut grass	Confectionary
Dried herbs	Vanilla custard	Buttery	Tomato leaf	Cut grass	Green tomato	Tropical fruits
Green almonds	Condensed milk	Shallots	Fig tree	Leafy	Green banana	Creamy
	Vanilla biscuit	Grassy	Ripe guava	Nutty	Timber	Berries
	Cream	Woody	Over-ripe apple	Green almonds	Pine	Ripe fruits
		Seaweed				

Use and share

This is another great 'plain-speak' resource for those who to date may not have been confident to run their own tastings.

It's also ideal to share with customers, friends and your social media networks, to increase the conversation around the incredible variety of sensory characteristics found in EVOO – and why fresh, high-quality Australian EVOO is the best.

You can access the EVOO virtual sensory kit from the OWI website - *www.olivewellnessinstitute.org* – under Resources.

The Olive Wellness Institute is partially funded by Hort Innovation, using the Olive Fund research and development levy and contributions from the Australian Government, through the strategic levy investment project Educating Health Professionals about Australian Olive Products OL19001.

Join Conference workshop and help set olive levy R&D priorities

Increasing knowledge - both technical and practical - is one of the main aims of the olive levy R&D program, managed by Hort Innovation on behalf of the industry.

As growers and producers, you have hands-on, grove-level knowledge of the challenges facing the industry and the knowledge gaps which make them hard to meet.

And that's exactly what Hort Innovation needs to know about, so they can ensure your levy funds are providing the best targeted R&D outcomes and solutions for our industry.

To facilitate that knowledge-sharing, the AOA is getting everyone together at this year's National Olive Conference for a workshop session, where you can provide feedback in person on olive levy R&D priorities for future projects.

NATIONAL OLIVE 2022 INDUSTRY conference & exhibition

Workshop details:

Day 1 - Saturday, 15 October @ 2.00pm

Olive Levy R&D Priority Setting Workshop with AOA CEO Michael Southan and Hort Innovation General Manager Stakeholder Experience Anthony Kachenko.

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Hort Innovation Strategic levy investment | OLIVE FUND