R&D INSIGHTS
THE LATEST UPDATES ON R&D WITHIN THE OLIVE INDUSTRY | DECEMBER 2020

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.

The field day program focusses on the role of healthy soils in producing healthy trees and lifting grove productivity.

Soil expert John Barton will build on his popular 2019 AOA National Olive Conference presentation on the importance of soil carbon.

Healthy Soils Field Days back on the calendar

The re-opening of borders and travel across much of Australia has been a positive for us all and now there's even more to celebrate, with news that the AOA's Healthy Soils Field Days have been re-scheduled.

Postponed due to the ongoing COVID-19 restrictions, the national series of Healthy Soils Field Days was originally scheduled to run between April and August. The program will now run during February and March 2021, with events being held in major production regions across all states.

"The postponement was unfortunate but necessary, and we were pleased to have been able to keep the momentum going in the meantime with the highly successful productivity and profitability webinar series," AOA CEO Greg Seymour said.

"But Australia has done incredibly well in managing the pandemic situation, so we're now confident that we can move the knowledge-sharing safely back in the field once again - in a COVID-safe manner, of course."

Program

The program for each field day starts with a focus on the role of healthy soils in producing healthy trees and lifting grove productivity. The information presented will cover a wide range of topics and information around soil health, from identifying issues with your soil (e.g. water repellent/ hydrophobic soils) and how to deal with them, to methods for monitoring and improving both soil and tree health.

Among the key topics will be composting - what it is, what it does, how to make it and how to use it - and soil carbon, providing and understanding of the role of soil carbon and its effect on soil water and biology.

Hands-on engagement

Joint organiser Peter McFarlane said that the 2021 program will be largely in the grove, providing the maximum opportunity for demonstration, explanation and hands-on learning.

"Rather than indoor AV presentations, event-specific program booklets are being prepared, which will provide key discussion points and illustrations to supplement the grove walks. We'll also be emailing them to all registered participants, with links to relevant documentation for reference, post-event," he said.

"Along with the expert presenters, each field day program will involve a panel of specialist service providers who will engage, demonstrate and discuss the latest technology to monitor, test, and measure vital soil parameters, and tree health.

"Grove-specific initiatives including canopy management, soil moisture

conservation, dealing with soil drainage problems, and managing organic certified groves will also be covered, while common grove management issues and innovations will be discussed by both the day's experts and field day hosts.

"And throughout each event there'll be plenty of opportunity for asking questions, gaining answers and sharing of experiences - 'what's happening, what works and what doesn't' is sure to be one of the unofficial hot topics of each event."

Presenters

Presenters will generally vary from state to state, making the most of local expertise, although several will attend most or all events. Each event will be hosted by the grove owners and AOA/*OliveCare®* executives and state directors, along with experts in the fields of Composting, Grove Soil and Leaf Survey and Analysis, Grove Nutrition Programs, Grove Canopy Management and Grove Monitoring/ Remote Sensing.

Here's just a few, and what they'll be covering:

John Barton, Charton & Bang Research & Development, and Andy Gulliver, C-Wise

John and Andy will build on their 2020 AOA Virtual Conference webinar, taking their focus on soil biology and improving soil health out into the grove. They'll get to the nitty-gritty of composting, soil carbon and the soil biome, showing you how to harness them in your grove to better manage tree nutrition and available water, improving tree health to improve grove productivity.

They'll also demonstrate how to make compost, and how to incorporate compost into the soil for the maximum benefits.

Peter Wadewitz, Managing Director, Peats Soils and BiobiN® Technologies

Joining the compost crew in SA, Peter will share his love and knowledge of compost and its benefits gained over 45 years in the industry. A specialist in commercial compost production and supply, Peter knows what the right compost can do to improve crop quality and performance, and will discuss the use of custom compost mixes for specific grove issues.

Peter Briscoe, Bioptiv

Peter's gig is biological farming methods and soil improvement amendments and he firmly believes in the power and importance of in-grove measurement. He'll demonstrate a range of tools for on-site testing, including pH and moisture readings, compaction and total soil biology, and take attendees through the process of soil and leaf sampling, and using the results to plan a grove nutrition program.

One day's learning = years of grove benefits

The field days provide an incredible opportunity to devote a day to your soil - which in turn will repay your trees and your business with health and productivity benefits in years to come. Your grove deserves it, so register now and ensure your place so you don't miss out.

The full program, including speaker and venue details for each field day, is available on the OliveBiz website - www.olivebiz.com.au – where you can also register. Go to the Events drop-down then Calendar and click on the listing for 2021 Soil Field Days. Alternatively, contact Liz Bouzoudis via secretariat@australianolives.com.au or 0478 606 145.

Note: All events are subject to any COVID-19 restrictions/cancellation which may apply at the time.

2021 Healthy Soils Field Days dates and venues:

- **Sunday 14 February 2021 - Lentara Grove, Exeter, TAS. Registrations close 5/02/2021.**
- **Sunday 21 February 2021 - Lisadurne Hill Olives, Rushworth, VIC. Registrations close 12/02/2021.**
- **Sunday 28 February 2021 - Peninsula Providore Farm - Nangkita Olive Grove, Tooperang SA. Registrations close 19/02/2021.**
- **Sunday 7 March 2021 - Hunter Valley NSW - Hunters Dream Estate, Pokolbin NSW. Registrations close Friday 26/02/2021.**
- **Sunday 14 March 2021 - aFthonia Farms (Organic in conversion), Hampton (via Toowoomba), QLD. Registrations close Friday 5/03/2021.**
- **Sunday 28 March 2021 - Preston Valley Grove, Lowden (via Donnybrook) WA. Registrations close 19/3/2021.**

This project has been 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.

Comparison tool aids healthy cooking choices

The Olive Wellness Institute (OWI) keeps rolling out great informative resources, including new additions to its popular podcast series. One of the latest also unpacks another valuable resource, the OWI's interactive oil comparison tool.

The quick and easy guide compares the health attributes of the main cooking oils available in Australia, allowing users to make informed decisions about what they use.

OWI dietician Jacqui Plozza said the type of oil we use can have a positive or negative affect on our health, depending on a variety of factors.

"That means it's important to be able to compare one oil with another using the same variables," she said.

"So the tool compares the various grades of olive oil - EVOO, virgin olive oil and olive oil - and a range of other widely used cooking oils, and measures a variety of different factors that impact the healthfulness of each."

Those factor include:

- production method
- phenols/biophenol content
- Vitamin E content
- fatty acid profile
- trans-fat content
- stability when heated."

Smoke point and oil stability

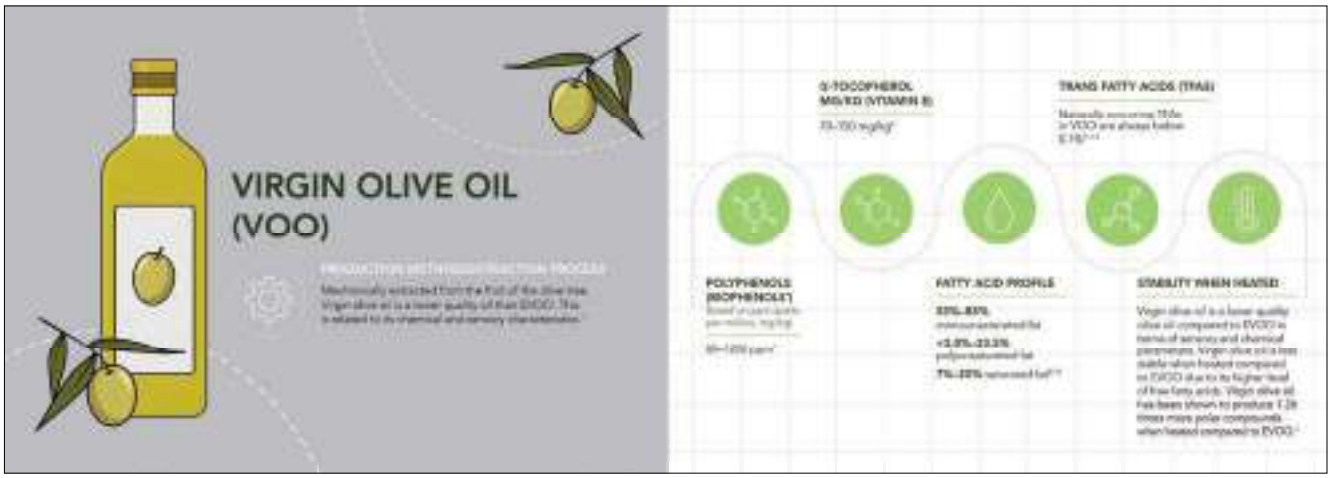
Plozza said smoke point isn't referenced in the table, for a good reason.

"It's not a good predictor of how stable an oil is when heated, its healthfulness when heated, or how suitable it is for high heat cooking. In fact, it correlates really poorly," she said.

"A better predictor of an oil's stability when heated is a measure called polar compound production. Polar compounds are linked to health conditions including neuro-degenerative disease and are formed when oil is heated, so it's important to identify how much of that harmful breakdown product is forming. It's used commonly in commercial kitchens to determine when frying oil needs to be thrown out and replaced because it's no longer safe for human consumption."

The comparison tool shows there are a number of factors that are important to how stable an oil is when heated:

- fat profile - the more poly-unsaturated fat, the more likely an oil is to break down;
- production method - the more refined or processed, the less stable under heat;
- antioxidant content - the higher



the level, the less likely it is to break down.

EVOO vs olive oil

"The antioxidant content is why EVOO is even more suitable for high heat cooking than olive oil," Plozza said.

"And the tool shows that the difference between the two is actually quite significant. They have the same fat profile - high in monounsaturated fats and low in polyunsaturated and saturated fats - but that's where it ends.

"Olive oil is refined, which means it goes through processes like bleaching or neutralising. The refining process of any oil can result in the production of trans-fats, so olive oil, along with other refined oils like grapeseed and canola, contains artificial trans-fats. Refining also strips out important healthy compounds like biophenols.

"EVOO, on the other hand, is produced by mechanical means only, without refining. That means the antioxidants from the olive fruit can infuse into the oil, which is why there are much higher phenols in EVOO than in other grades of olive oil, and other oils.

"It's also the key reason why EVOO is much more stable than olive oil when heated, as the antioxidants protect the oil from breakdown. They also transfer into the cooked food and are critical to the oil's health benefits.

"Other oils don't contain that level of antioxidants (a) because they're refined and (b) they weren't present in the first place. The tool shows that many of the refined oils contain less than 10ppm of antioxidants, compared with EVOO which contains 80-1200ppm (1ppm = 1mm/L)."

Fatty acid profile

Plozza said the fatty acid profile is also important when determining the healthfulness of an oil.

"Health professionals recommend replacing saturated fat with unsaturated fat. There's mono-unsaturated fat, which EVOO and virgin olive oil is high in, and there's also polyunsaturated fat, which other oils are higher in.

"We know that poly-unsaturated fats are more prone to breaking down and oxidising because oxidative damage occurs at double bonds, which means your oil is becoming unstable and breaking down. That's not great when you use an oil for cooking because heating also makes it more prone to breaking down.

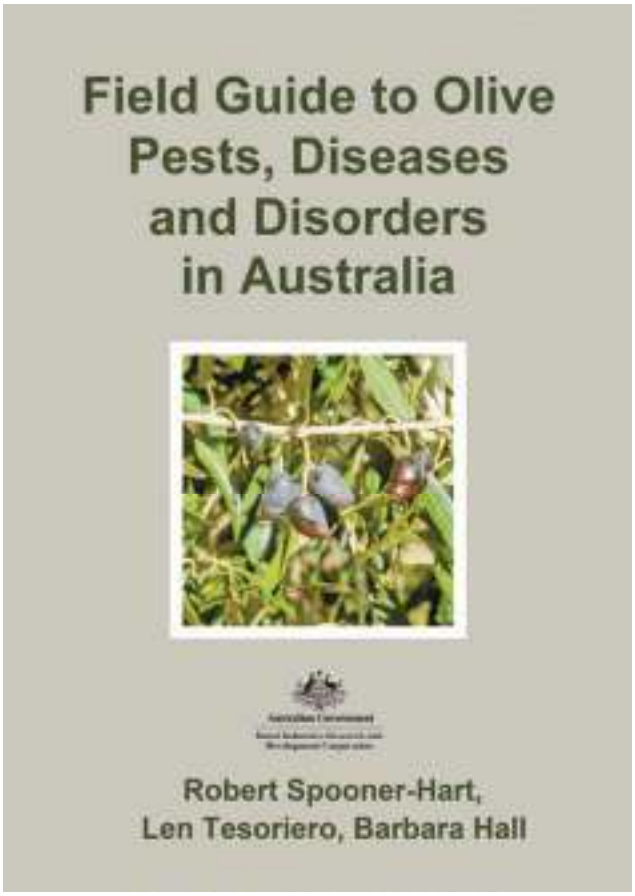
"But the tool means that people can now access all this information quickly and easily, giving them the knowledge they need to make healthful decisions when they shop and cook."

The interactive comparison tool can be found on the home page of the Olive Wellness Institute website - *www.olivewellnessinstitute.com.au* - and you can listen to the podcast *Which oils are best? OWI's oil comparison tool* from the podcast page under the Olive Science dropdown.

IPDM project boosts industry participation and adoption

Dr Robert Spooner-Hart, Western Sydney University

The three-year olive levy-funded project *An integrated pest and disease management extension program for the olive industry* (OL17001) is now complete, and has undoubtedly affected practical change across the industry. This overview of the outcomes is taken from the OL17001 Final Report.



Industry engagement with project outputs

The on-line outputs were launched during the AOA webinar *IPDM Project Resources and How to Access Them* on 1 September 2020, and user access was logged by the AOA until 19 October 2020 (seven weeks). The number of page views ("hits") are presented in Table 1. For the relatively short timeframe, they are very pleasing.

Interestingly, the number of views of the IPDM outputs home page exceeded the number of attendees at all project Field Days. Of the specific outputs, the Field Guide and Best Practice Manual were the most frequently accessed; the tutorials and flyers were also popular, with more than 100 views each.

Page views	Output
314	IPDM output home page
148	Field Guide
116	Best Practice Manual
110	Tutorials home page
104	Flyers home page
126	Webinar on outputs
48	Grove Innovation article (15/9/20) on IPDM outputs

Table 1. Engagement with on-line project outputs 01/09/20 - 19/10/20.

End-of-project survey feedback

There were 47 survey responses, compared with 130 responses in the original baseline survey. This is likely to be, at least in part, due to "survey fatigue" associated with the substantial increase in on-line communications as a result of COVID-19. Nevertheless, there was a good distribution of respondents, especially across the key olive-growing states.

The results of the end-of-project survey are compared here with those of the baseline survey, to estimate the project's impact and how effectively it met its key objectives of more informed and engaged growers with respect to IPDM.

Status of pests and diseases between the two surveys

With regard to arthropod pests, the three major species identified in the end-of-project (2020) survey were the same as those in the baseline (2018) survey: (in order) black scale (with associated ant activity), olive lace bug and apple weevil. The most widely distributed pest (reported in all states) was black scale, with olive lace bug a major pest in NSW, Qld, WA and some parts of Victoria. Apple weevil was a problem in WA, and less but increasing in SA and Vic.

There was a change in status of the three most important diseases/disorders reported: anthracnose was still the major disease, followed by cercospora leaf mould, replacing peacock spot. The project team

in fact discovered widespread distribution of cercospora leaf mould during the field day activities, although its economic damage was difficult to determine. As a result, we developed a tutorial and a flyer on this disease.

Dieback was the next most common disease/disorder. However, this condition is associated with a number of pests and diseases including black scale, olive lace bug, anthracnose, peacock spot and cercospora leaf mould, soil-borne pathogens, as well as adverse environmental conditions, so it is difficult to diagnose the most likely cause(s). As a result, we developed an additional flyer on Wood Rots and Dieback.

Peacock spot was the fourth most important disease in the end-of project survey. It is suspected that most leaf spot/leaf drop prior to our project activities (and thus recorded in the baseline survey) was attributed to peacock spot; clearly a major achievement of the project has been rectifying this issue. However, it may have also led to an over-inflated concern about cercospora leaf mould, and hence its apparent rise in status.

Hopefully, the tutorials and flyers developed describing the different symptoms of these pathogens, together with recommendations to obtain definitive laboratory disease diagnosis in the event of uncertainty, will alleviate this issue.

Pesticide use

While nearly 70% (66% in baseline survey) of respondents indicated that pesticides were important or very important for pest and disease management, these included organic chemical options. As a result, the selection and appropriate use of chemical options remains an important extension issue for the industry, and should be continually be reviewed by the industry in collaboration with Hort Innovation.

Participation in project activities

Almost 80% of respondents participated in at least one other IPDM project activity, most commonly the first survey, field days/workshops, the webinar and accessing project outputs on the AOA's *OliveBiz* website (particularly the Field Guide and IPDM Manual) (Table 2).

For 89% of those, their knowledge has been improved as a result, reporting improved pest, disease and beneficial identification, better understanding of biology and life cycles, information on alternatives to chemicals, planning of spray timing, and access to project output materials.

In addition, 60% responded that they had or would change their IPDM practices as a result of their participation in the project (23% were unsure) via increased emphasis on monitoring and record keeping, better tree health and canopy management, and investigating options (including organic ones) to chemicals before undertaking pest and disease control options.

Growers' IPDM knowledge and practices

Regarding growers' end-of-project knowledge of IPDM, 52% indicated they knew it well or quite a lot (30% in baseline survey), while 93% (80%) stated they were confident in identifying important pests, 88% (62%) in identifying diseases and disorders, and 54% (40%) in

AOA: applicable and well-executed project

AOA CEO Greg Seymour said the IPDM project "ticked all the boxes for improved management in the industry".

"It began with recognition of the need to improve, followed by access to quality information, all in an environment that builds confidence of the manager and fosters the implementation of improved management techniques," he said.

"The attendance numbers and level of producer engagement is testimony to the strategic applicability of the project, while the final survey responses reporting high levels of adoption of IPDM management recommendations provide the evidence for a well-executed project.

"It's notable that at industry events over the past couple of years the IPDM message is resonating strongly with producers. Comments and questions incorporating aspects of IPDM management - e.g. 'if I do X, how will that impact my IPDM program?' - show that the 'lessons' learned by producers at the IPDM/AOA field days are now front of mind.

"All growers also benefit from the high-quality outputs from the project posted on the industry's *OliveBiz* website, which have capacity to be updated on an ongoing basis."

Activity	% Participation
Previous (2018) project survey	64.86%
Attended field day	64.86%
Attended masterclass	8.11%
Attended webinar	35.14%
Accessed video(s) of field day presentations via *OliveBiz*	18.92%
Accessed new on-line tutorials	13.51%
Accessed new on-line flyers	21.62%
Accessed the revised Field Guide	32.43%
Accessed the IPDM Manual	32.43%
Direct contact with project researchers	18.92%

Table 2. Project activity participation (%) of growers from end-of-project surve

identifying beneficial species. Furthermore, 80% (70%) are confident they can now effectively monitor their grove: 93% (80%) indicated they monitor for pests and diseases in their grove, with visual observations the most common practice. A third of growers also utilise meteorological data to predict outbreaks, especially of fungal diseases.

These are substantial improvements from the baseline data, which is an excellent outcome in just over two years.

With regard to implementing IPDM practices, the most common problems were (in order) black scale and associated ant activity, foliar diseases, olive lace bug, fruit diseases and rots, and root and stem diseases. This is similar to the baseline survey, but with an increase in foliar disease monitoring.

Biosecurity practices

Over 71% of respondents in the end-of-project survey (50% baseline) had vehicle wash down facilities on their grove, 34% (18%) had a farm biosecurity preparedness plan and 45% (12%) had read the current Biosecurity Plan for Olive Industry, while 62% assessed visitors before, or on, arrival for pest or disease risk (not asked in baseline survey).

The substantial increase in implementing biosecurity activities can, in part, be attributed to the project outputs, including a flyer, tutorial and section in the IPDM manual on the topic, a tutorial on exotic pests and diseases, and its major emphasis in the Field Guide. It was undoubtedly also influenced by communications from *OliveCare®* Administrator Peter MacFarlane, and increasing industry concern over *Xylella fastidiosa*.

Additional grower feedback from the end-of-project survey

In addition to positive comments on the project, there were a number of useful additional suggestions, including continual updating of the project outputs, a masterclass for growers, and even more emphasis on tree health.

Working partnership with AOA

The project team's close working relationship with the AOA undoubtedly contributed to the project's success in engaging with olive growers.

This was particularly important with regard to ongoing communications about the project, collaboration in workshops/field days, and the hosting and monitoring of the industry surveys and the project's electronic outputs.

Future legacy of project outputs and olive IPDM succession plan

The project team deliberately organised a succession plan for the olive industry with regard to IPDM. First, it engaged the replacements for retiring long-standing olive researchers/extension personnel Barbara Hall (SARDI) and Stewart Learmonth (DPIRDWA) in various project activities, including field days and editing extension outputs.

I have also developed a succession plan at Western Sydney University for an entomologist/extension officer with experience in sustainable horticulture to continue this work when I retire.

Combined with the designed ability to update the project outputs as new information becomes available, we look forward to the continuing legacy of our work into the future.

Access IPDM project resources

The extension materials created throughout the project provide growers with practical, current information on implementing IPDM strategies in their groves. Now available for download and reference on the *OliveBiz* website, they include:

- **on-line tutorials on IPDM theory and practice, and key olive pests and diseases;**
- **information flyers on key olive pests and diseases**
- **revised Field Guide to Olive Pests, Disorders and Diseases in Australia**
- **Olive IPDM Manual**

Go to *www.olivebiz.com.au - Projects - IPDM Project,* where you'll find the full range of materials along with videos from the 2018 IPDM Field Days. There's also more information in the webinar recording *IPDM Project Resources and How to Access Them*, available from the Webinars link of the *Projects* portal.

Olive industry R&D resources updated

The AOA is currently conducting a review of the library of Australian olive industry 'seminal' research publications, and updating these valuable technical resources with current information and technologies.

AOA CEO Greg Seymour is heading the review project, which he said also aims to re-focus attention on the wealth of useful research information available for reference by growers.

Background

"The AOA used to be under the auspices of the Rural Industries Research and Development Corporation (RIRDC) - now Agrifutures Australia. A large number of industry research projects were funded through them, supported by in-kind industry contributions, to answer industry development and management needs as they were identified," Seymour said.

"That suite of publications can all still be accessed and reflects 20 years of investment in industry R&D. There's some really good research sitting there, so we decided to resurrect and review them as part of the current Olive Communications project.

"Of the 32 publications, we identified seven as current and relevant as published, nine as obsolete or superseded and 16 reports which could be usefully updated. This may be to reflect current industry circumstances, changes in growing conditions and practices, and particularly to include more recent research undertaken and new technologies developed in the field since they were written.

"We're having each of them reviewed by experts in the relevant field, who are then amending the original publication or writing an addendum, and updating the bibliographies.

"They're then being lodged on the *OliveBiz* website, where we've also put links to the original RIRDC publications.

"The reviews have greatly improved the original publications, bringing the information up to date and increasing the relevance for today's industry. We're keen for people to go onto the website, have a look, and make use of as many of the resources as possible to assist in improving their practices – and ultimately their olive businesses."

Find out more

The most recently completed review covers two of these R&D reports dealing with the water requirements of olives. You'll find the review report - *Water use and yield of young and mature olive trees: A review* – on page ... of this edition of *Olivegrower & Processor.*

The review project is part of the *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.

Note: *The Field Guide to Olive Pests, Diseases and Disorders in Australia* (RIRDC 07-153) has been updated as part of the olive levy-funded project *An integrated pest and disease management extension program for the olive industry* (OL17001).

You can access all the reviews, updated reports and links to the original RIRDC publications in the Projects section of the *OliveBiz* website – *www.olivebiz.com.au* – under Comms Project.

RIRDC/Agrifutures olive publications reviewed and updated to date:

- **Table Olive Production Manual (RIRDC 12-100)**
- **The Voluntary Industry Standard for Table Olives in Australia (RIRDC 12-111)**
- **Harvest-timing, Sensory Analysis and Shelf Life for Optimal Olive Oil Quality (RIRDC 10-177)**
- **Quality Enhancement of Australian Extra Virgin Olive Oil (RIRDC 06-135)**
- **Management of Black Scale and Apple Weevil in Olives (RIRDC 12-019)**
- **Field Guide to Olive Pests, Diseases and Disorders in Australia (RIRDC 07-153)**
- **From Planting to Harvest - A Study of Water Requirements of Olives from planting to first commercial harvest (RIRDC 05-039)**
- **Olive water use and yield – monitoring the relationship (RIRDC 03-048)**
- **Olive Harvest (RIRDC 05-013)**
- **Evaluation of Second Extraction of Olive Oil in Australia (RIRDC 12-109)**
- **Evaluation of Processing Aids for Olive Oil Extraction and Quality Improvement (RIRDC 01-091)**
- **Recycling Solid Waste from the Olive Oil Extraction Process (RIRDC 08-165)**

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