# Technology Transfer of modern production techniques in the Victorian Goulburn Valley pome fruit industry

Michael Crisera Fruit Growers Victoria Ltd

Project Number: AP10019

#### AP10019

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the apple and pear industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of Fruit Growers Victoria Ltd.

All expressions of opinion are not to be regarded as expressing the opinion of Horticulture Australia Ltd or any authority of the Australian Government.

The Company and the Australian Government accept no responsibility for any of the opinions or the accuracy of the information contained in this report and readers should rely upon their own enquiries in making decisions concerning their own interests.

ISBN 0 7341 3379 0

Published and distributed by: Horticulture Australia Ltd Level 7 179 Elizabeth Street Sydney NSW 2000 Telephone: (02) 8295 2300 Fax: (02) 8295 2399

© Copyright 2014







### **INDUSTRY DEVELOPMENT PROJECT AP10019**

### FINAL REPORT MS190

### TECHNOLOGY TRANSFER OF MODERN PRODUCTION TECHNIQUES IN THE VICTORIAN GOULBURN VALLEY POME FRUIT INDUSTRY

### Milestone 190 achievement criteria:

All necessary reports complying with Horticulture Australia's requirements received and approved by Horticulture Australia Ltd.

**PROJECT LEADERS**:

Michael Crisera Industry Development Officer Fruit Growers Victoria Ltd <u>fido@fgv.com.au</u>

Virginie Gregoire Industry Development Officer Fruit Growers Victoria Ltd ido@fgv.com.au

This project has been funded by HAL using voluntary contributions from industry and matched funds from the Australian Government.

Any recommendations contained in this publication do not necessarily represent current HAL Limited policy. No person should act on the basis of the contents of this publication, whether as to matters of fact or opinion or other content, without first obtaining specific, independent professional advice in respect of the matters set out in this publication.

### CONTENT

1. SUMMARY	2	
2. PROGRESS SINCE LAST MILESTONE	3	
- One-on-one visits to local growers by the Industry Development Officer.	3	
- Publishing regular simple technical bulletins and increasing technology		
transfer of modern orchard management techniques.	3	
- Researching and working closely with local and overseas consultants and		
then passing on aspects of their expertise to local orchardists.	5	
- Conducting regular grower study tours to globally competitive orchards		
in different areas of Australia and the world.	6	
- Conducting regular on orchard meetings and BBQs with topics		
determined by the growers.	6	
- Managing the FGVL Goulburn Valley Young Grower Group from the		
previous MT06067 FIDO project.	6	
3. COMMUNICATION/EXTENSION ACTIVITIES/OUTPUTS AND		
OUTCOMES	7	
- One-on-one visits to local growers by the Industry Development Officer.	8	
- Publishing regular simple technical bulletins and increasing technology	Ũ	
transfer of modern orchard management techniques.	10	
- Researching and working closely with local and overseas consultants and	10	
then passing on aspects of their expertise to local orchardists	10	
- Conducting regular grower study tours to globally competitive orchards	10	
in different areas of Australia and the world	11	
- Conducting regular on orchard meetings and BBOs with topics	11	
determined by the growers	12	
- Managing the FGVL Goulburn Valley Young Grower Group from the	12	
previous MT06067 FIDO project	12	
- Discussion on all activities undertaken by IDO	12	
- Discussion on an activities undertaken by 100	12	
4. COMMERCIALISATION & INTELLECTUAL PROPERTY ISSUES	13	
5 NEXT STEPS	13	
U. UTHER ISSUES	10	
/. APPENDICES	13	

### 1. SUMMARY

The Goulburn Valley produces 188,000 tonnes of Australia's pome fruit at an estimated value of 143 million dollars which equates to 23% of national production of pome fruit. 85% of Australia's pear production comes from the Goulburn Valley.

The Goulburn Valley has historically been both a processing (cannery) and fresh fruit production area but a change in supply criteria by the cannery has meant that many fruit growers are facing the decision to increasingly focus on a highly competitive fresh market. In many cases this change requires a rethink and restructure of their orchards. Growers need assistance to make the right choices when replanting to modern planting systems and further subsequent support for seasonal decisions such as pest and disease control, soil and irrigation management, tree training, crop loading and post harvest storage technology.

In recent times technology uptake has been driven by the necessity to manage orchards through drought. Whilst drought has been a stimulus it has also brought inherent limitations of reduced income and a decline in industry investment capital. As the drought eases orchardists are faced with critical investment decisions and technological development must be at the forefront of those decisions as the industry moves to a higher competitive environment with the arrival of imported apples.

This technology transfer project managed by Fruit Growers Victoria Limited (FGVL), undertaken between September 2010 and June 2014, was first led by IDO Michael Crisera and was targeting Goulburn Murray pome fruit growers. Half way through the project and following the employment of a second IDO, Virginie Gregoire, the project was extended to the whole of Victorian pome fruit growers.

This project included 6 key extension strategies to transfer technology to the industry;

- One-on-one visits to local growers by the Industry Development Officer.
- Publishing regular simple technical bulletins and increasing technology transfer of modern orchard management techniques.
- Researching and working closely with local and overseas consultants and then passing on aspects of their expertise to local orchardists.
- Conducting regular grower study tours to globally competitive orchards in different areas of Australia and the world.
- Conducting regular on orchard meetings and BBQs with topics determined by the growers.
- Managing the FGVL Goulburn Valley Young Grower Group from the previous MT06067 FIDO project.

Topics raised during one-on-one visits included import and export, water and irrigation, biosecurity and IPDM, carbon trading, food safety and FGVL activities. Topics appropriate to this project were addressed by the IDOs on top of technical advice on production practices.

Publications were in the form of simple technical bulletins called 'Orchard Action' which consisted of concise technical advice on production techniques and IPM reminders called 'CropWatch Reminders'. After the first year these publications were compiled as an annual bulletin and distributed to the industry.

More than twice a year IDOs worked closely with local and overseas consultants and scientists to transfer modern orchard management techniques. These included IPM course with American expert, Mark Whalon, Stone fruit thinning day, Apple scab workshop with German expert, Peter Triloff, sprayer demo comparing 5 different brands, Pear pruning workshops; and end of season reviews with consultants from different Australian growing regions.

A group of growers participated in a study tour to New Zealand in 2013, covering Hawkes Bay and Nelson growing regions. Highlights of the trip were then shared with the Victorian pome fruit industry through a report to industry produced by the IDO.

The IDOs organised several on orchard meetings and BBQs each year, some addressing specific topics (e.g. irrigation, sunburn) and others as part of regular regional grower group meetings. These are very important for networking amongst orchardists and industry stakeholders but also to discuss common issues and challenges.

The Goulburn Valley Young Grower Group met on average twice a year, sometimes with special guests, other times to plan upcoming study tours. In November 2011, 9 growers from that group participated in a study tour to Stanthorpe and the Brisbane fresh fruit market. A report was then published for the industry. The group also had the chance to visit the Nelson pome fruit production area in New Zealand at the very start of this technology transfer project.

### 2. PROGRESS SINCE LAST MILESTONE AND METHOD

The last Milestone was submitted on 30<sup>th</sup> November 2013. All achievements listed in this section cover a period of 6 and half months (1<sup>st</sup> December 2013 to 15<sup>th</sup> June 2014). The extension activities discussed here were utilised throughout the entire project with KPIs set for each 6 months.

#### One-on-one visits to local growers by the Industry Development Officer

With the project nearing completion and industry becoming increasingly engaged with the IDOs, there was high demand for one-on-one visits as the numbers show (137 grower visits in less than 7 months against a KPI of 120 visits per annum). This achievement is exceptional and was determined a priority over other extension activities for this period. This matter is discussed in further details at the end of this section.

Main topics covered during the visits included:

- Sunburn prevention management practices.
- General IPM Mites were a major issue in pears this year.
- Fruit fly trade with Tasmania, South Australia and Western Australia since Victoria has been declared endemic.
- Neglected/abandoned orchards, especially following SPCA's intake reduction.
- Irrigation upgrade.
- Birds and bats damage.
- New block establishment/replacement planting systems.
- Post harvest practices irrigation and fertilisation.

# Publishing regular simple technical bulletins and increasing technology transfer of modern orchard management techniques

Four Orchard Action articles were published and distributed to Victorian growers. Two of them (CropWatch reminders) included an update on all major pome and stone fruit pests in Victoria with a focus on codling moth population timings and miticides withholding periods. Neonicotinoids impact on bees and block establishment strategies were covered in the two latest Orchard Actions articles, published in April and May.

Below is a preview of each. Please see appendices for full version.





Figure 1 Orchard Action: CropWatch 7 January 2014

Figure 2 Orchard Action: CropWath 18 February 2014



#### Researching and working closely with local and overseas consultants and then passing on aspects of their expertise to local orchardists

Figure 4 Orchard Action 20 May 2014

Grafted late winter 2013 - shipped straight away

Planted in October 2014 due to wet weather

\*\*\*\*\*\*\*

New block established on cattle land No root promoter although each tree was drenched in a mixture of SeaSol, Confidor and

Planted as fresh grafts

Block condition

3.3m

Copper

FGVL IDO, Michael Crisera, contributed to an IPM course with the Goulburn Oven Institute of TAFE on the 13<sup>th</sup> and 14<sup>th</sup> March.

FGVL IDO, Virginie Gregoire, conducted an End of Season Review on the 12<sup>th</sup> May in Mooroopna. Speakers and workshops included:

- John Wilson, FGVL General Manager, on piecework agreement.
- Luke Ryan, Fairwork Ombudsman Office, on coming audit program.
- Dr Heidi Parkes, Jenny Treeby, Dr Rebecca Darbyshire and Dr Ian Goodwin, on the impact of climate change on pome fruit production.
- Peter Hunt, VFF, on important policy issues VFF is currently tackling.
- Virginie Grégoire, FGVL IDO, IPM and production review workshop.
- Stuart Holland, DEPI, on changes to the biosecurity act.

Buded during summer 2011-12

Planted as approx. 1.4 m high trees

All feathers removed at planting

Replant block, bear for 4 years No fumigant or root promoters

Block condition

2.5m

Planted in October 2014 due to wet weather

.....

- David Williams, DEPI, on new codling moth control options.
- Dario Stefanelli, DEPI, on new pear maturity measurement tool, the D.A. meter.

The Review was well attended with 40+ participants including 2 growers from Southern Victoria.



Figure 5 Some participants who attended FGV's End of Season Review 2014

# Conducting regular grower study tours to globally competitive orchards in different areas of Australia and the world

No study tours were undertaken during this period.

# Conducting regular on orchard meetings and BBQs with topics determined by the growers

An orchard walk with an indoors 'get together' was held at Priests Orchard in Pakenham on the  $6^{th}$  February 2014. The orchard walk consisted of walking through approximately 5 blocks and discussing, for each of them, management practices and results (tonnages and packouts).

#### Managing the FGVL Goulburn Valley (GV) Young Grower Group

The GV Young Grower Group visited the new and state of the art Nine Mile Fresh packing facility in Bunyip. Most of these growers are likely to send some of their production to this facility in the near future. Visits such as this one are very important to help growers understand the supply chain and how their fruit is sorted and packed after it has left the orchard.



Figure 6 Inside Nine Mile Fresh packing facility



Figure 7 Three members of the GV young grower group visiting Nine Mile Fresh

The below table summarises achievements against each KPI since the last Milestone and respects the order of the type of activities, as used above.

	Table 1	Achievements	since l	ast mil	estone
--	---------	--------------	---------	---------	--------

KPI	ACHEIVEMENTS SINCE LAST MILESTONE
24 days of grower visits per annum with a target	Since last Milestone (30 Nov. 2013): 137 grower
of 5 growers to be visited per day. A total of 120	visits over a period of 7 months.
growers per annum.	
2 articles published quarterly in Core Facts and	4 articles published in FGVL's newsletter.
then also published on FGVL's website. Total 4	
for this Milestone.	
2 growers meetings per annum with external	One IPM course in the Goulburn Valley
consultants employed by the IDO. Attendance	completed.
form and evaluation form to be filled out.	One End of Season review completed.
1 study tour per annum. Study tour report	No overseas study tour conducted since last
provided to FGVL members via Core Facts.	Milestone.
Study Tour report provided to HAL.	
Key points taken from small grower networks to	One growers meeting and orchard walk
be raised at FGVL Board meetings, management	completed in Gippsland. IDO reports are
meetings and actions set by the IDO.	regularly provided at FGVL Board meeting.
Goulburn Valley Young Grower Group	One visit to a new packing facility (located in
	Bunyip, Victoria) with the GV Young Grower
	Group completed.

### 3. COMMUNICATION/EXTENSION ACTIVITIES – OUTPUTS AND OUTCOMES

This section summarises all activities conducted since the start of the project in 2010 until today. Information on activities listed below is based on previous Milestones (MS102 to MS111) of AP10019.

In this section, activities are organised in sub sections by type of activity, as discussed previously. Every sub section describes outputs and outcomes for each activity. Outcomes may be broken down on a yearly basis if they differ extensively during the project. This is the case for the first type of activity, one-on-one orchard visits.

#### One-on-one visits to local growers by the Industry Development Officer

OUTPUT: Face to face visits to Goulburn Murray orchardists conducted by the IDO. OUTCOME: Grower feedback provided to industry on grower local issues and grower contribution to the IDO plan. Growers provided a range of technical information and supported in the implementation of new technology and orchard production techniques.

#### 2010-11

During the first year of the project the IDO conducted on average 5 grower visits per month dedicated to technology transfer. This was an important time to build trust within the industry and learn about current practices and the needs of growers. Some of the topics covered during these visits include:

- Impact of import on production practices
- Impact of import on selection of alternative commodities
- New varietal choices
- Water availability in the future and irrigation efficiency and latest technologies
- Carbon trading opportunities for pome fruit growers
- Protection against frost and hail
- IPDM and solutions for neglected orchards
- IPDM challenges in non neglected orchards: scale, woolly aphid and rust mite
- Growing high quality fruit for better price

#### 2011-12

During the second year of the project the IDO conducted a total of 170 grower visits which is well above the 120 visit per annum target. This is partly attributed to the employment of a second IDO based in Southern Victoria. The new IDO focused, during that period, on meeting every (as much as possible) growers in Southern Victoria and obtain an understanding of where the industry is at. In the meantime, the Northern Victoria IDO continued visits covering topics as listed below in addition to issues raised in 2010-11.

- IPDM and specific pests emerging from more targeted pesticide programs
- In tree pear maturity evaluation
- Irrigation management
- Post-harvest management

#### 2012-14

During the final 18 months of the project the IDOs conducted a total of 325 grower visits which relates to approximately 217 per year. At this stage of the project, IDOs were well established in their roles and the industry clearly saw the value of one-on-one visits. It is to be noted that a large portion of these visits were conducted in the Goulburn Valley. This region has a higher number of pome fruit production businesses and generally faces higher pest pressure. Goulburn Valley growers were also actively seeking advice from IDOs during the SPC Ardmona 'crisis' on growing apples and pears for the fresh fruit market and managing pests and diseases at a time several blocks may not be picked. This matter did not directly affect the Southern Victoria industry.

# Publishing regular simple technical bulletins and increasing technology transfer of modern orchard management techniques

OUTPUT: Articles to include technical data and latest technology for IPM and latest orchard production techniques.

OUTCOME: Goulburn Murray Orchardists updated through publications with the latest technology available for pome and stone fruit production including high density planting and IPDM. Orchardists have information in a form they can keep and refer to as required.

From November 2010, FGVL started producing and publishing 'Orchard Action' in its weekly newsletter. These consisted of technical 'in orchard' management practices and IPM reminders titled 'CropWatch reminder'. Below is a non-exhaustive list of some Orchard Action article titles.

'To grow fruit is not hard but we must manage climate risk'

'CropWatch reminder' (codling moth, oriental fruit moth and light brown apple moth population levels in the region + other major pome and stone fruit pests) 'Fruit size'

'Locust damage identification'

'Predatory mites'

'Hail damage'

'Fruit sizing protocol'

'Thinking about harvest'

'Pear pollination'

'Production tips – viable seeds'

- 'Maturity update and protocol'
- 'Post harvest nutrition'
- 'Maturity update Granny Smith, Red Delicious and Josephine pears'
- 'Establishing modern apple orchard Notes on orchard walk'
- 'Why planar canopies?'
- 'Signs of resistance'
- 'End of Season CropWatch Review'
- 'Understanding the causes of bitter pit'
- 'Growing next year's crop'
- 'Flowering bud or not'
- 'Neonicotinoids under the radar'

The objective was to publish 2 articles quarterly hence 28 articles over the length of the project. With 24 articles published only during the first season (Nov. 2010 to April 2011), this KPI was easily achieved. CropWatch reminders were typically released every second week during the growing season and other technical articles were released throughout the year.

#### Researching and working closely with local and overseas consultants and then passing on aspects of their expertise to local orchardists

OUTPUT: Latest orchard techniques passed onto orchardists by consultants who growers could not normally afford to employ themselves.

OUTCOME: Increased knowledge of orcharding techniques, all aspects relevant to Goulburn Murray orchardists or the provided consultant. Growers were able to have discussions with experts and increase their networks. Orchard walks and workshops also built networks within the industry.

Presentations and orchard walks/workshops with local and overseas consultants were conducted as listed below.

#### 2010-11

A 2-day IPDM monitoring course in December and January in the Goulburn Valley in conjunction with Goulburn Ovens TAFE.

- A 2-day IPDM monitoring course in May and June in the Goulburn Valley and Southern Victoria in conjunction with Goulburn Ovens TAFE. Local researcher Oscar Villalta and David Williams both presented to the group.

#### 2011-12

- 2 stone fruit thinning days (31<sup>st</sup> August and 2<sup>nd</sup> September) with private consultant Marcel Veens in Ardmona and Cobram.
- Apple scab workshop with German researcher Peter Triloff.
- Pear pruning demo with private consultant Marcel Veens and pear rootstock trial site observation with Mark Hankin (APFIP).
- End of season review with Marcel Veens presenting on future apple and pear growing systems for the Goulburn Valley. IDOs also presented a season pest and disease review.

#### 2012-13

- Sprayer demo with private consultant Geoff Furness and 7 sprayers from 5 different suppliers.
- Pear rootstock trial and pruning demo with Marcel Veens.

#### 2013-14

- End of season review with Dr Heidi Parkes, Jenny Treeby, Dr Rebecca Darbyshire and Dr Ian Goodwin presenting on the impact of climate change on growing apples and pears. Dr David Williams and Dr Dario Stefanelli presented on new codling moth control methods and new pear maturity evaluation tool.

# Conducting regular grower study tours to globally competitive orchards in different areas of Australia and the world

OUTPUT: Goulburn Murray grower study tours to best practice orchards in Australia and overseas. OUTCOME: Goulburn Murray growers brought back to their own orchards the best techniques from around Australia and around the world.

A study tour to New Zealand was conducted in January 2013. Local consultants facilitated the tour in the Hawkes Bay and Nelson growing regions. A total of 7 growers, representing 5 different orchard businesses from Gippsland, Yarra Valley and Harcourt participated to this 5 day tour.

Since their return, the Southern Victoria IDO has already observed changes in these businesses directly related to the study tour, such as the adoption of new grafting techniques and new varieties to be planted in the 2014 spring.



Figure 9 Uncommon grafting technique seen in New Zealand and adopted by a grower in the Yarra Valley



Figure 8 Envy apple variety seen in New Zealand and planned to be planted in the Yarra Valley

# Conducting regular on orchard meetings and BBQs with topics determined by the growers

OUTPUT: Local topical issues determined by the IDO and local grower network for local discussion.

OUTCOME: Grower ownership of the meetings so that outcomes can be measured against key issues facing the local grower network. Local networks built.

Orchard meeting and BBQs held as listed below.

#### 2010-11

- FGVL held a BBQ with growers at Ardmona while followed by an orchard walk.
- Sunburn protection field days held in August. Including BBQ and field walk at Silverstein's orchard in Shepparton East.
- Irrigation field day held in September including orchard walk at Turnbull Orchards, Ardmona.

#### 2011-12

- Grower BBQ and discussion evening conducted in April by the Goulburn Valley IDO and the Council of Greater Shepparton to discuss matters related to the Murray Darling Basin Plan.
- End of Season Review conducted in Drouin for the Gippsland growers in May.

#### 2012-13

- Pre-season grower meeting conducted by Southern Victoria IDO for Gippsland fruit growers.
- Meeting organised in Drouin for Southern Victorian growers to hear from Jesse Reader's (APAL Technical Manager at the time) tour to Europe.
- Orchard walk at Bonview conducted, giving the opportunity to local growers to see a successful pome fruit production business and discuss with the orchard manager.

#### 2013-14

- One growers meeting and orchard walk conducted at Priest's orchard in Gippsland.

# Managing the FGVL Goulburn Valley Young Grower Group from the previous MT06067 FIDO project

OUTPUT: Meetings convened and study tours hosted by the Goulburn Murray IDO.

OUTCOME: Increase the knowledge and profitability of the local younger Goulburn Murray orchardists and assist with planning for future planting of new orchard systems.

Goulburn Valley your grower group activities included meetings and study tours listed below.

- Study Tour for Goulburn Valley young growers, Nelson region from 24<sup>th</sup> to 27<sup>th</sup> November 2010.
- Dinner in December 2010 reviewing the tour.
- Meeting with Garry Langford from Corregeo in June 2011 to speak about dwarfing pear rootstocks and their performance in the Goulburn Valley.
- Meeting held in October 2011 to determine participants for the annual study tour.
- Study tour for the Goulburn Valley young growers to Stanthorpe apple growing region and the Brisbane markets. A total of 9 young growers participated to this 3 day tour in November 2011.
- Field day at Silverstein's orchard in April 2012 organised by IDO close to harvest to look at different reflective matting used on the orchard to enhance fruit colour in red varieties.

- Visit to the new, state of the art, packing facility Nine Mile Fresh with the manager, James Ryan, guiding the group around. Some of these young growers may be sending part of their fruit production to this facility which had just started to be functional at the time of the visit.

### 4. Discussion and Evaluation

All types of activities (6) conducted during this project were well received by the industry and offered different approaches to enhance and accelerate the uptake of new technologies by Victorian orchardists. An end of project review was conducted by independent consultant Peter Gray and submitted in October 2013. As it is mentioned in its 'Review elements', 'at this time it is difficult to establish the impact the project has had as there is no quantitative assessment of changes that have been adopted on-farm'. However, increasing interest from orchardists for IDOs one-on-one visits and good turn ups at field days and growers meeting are a clear sign that the project has been well received by the industry.

The full review has been submitted with Milestone 111 in November 2013 and includes 18 recommendations. These cover various aspects of the project, from activity planning to the delivery and outcome measurements. It suggests that IDOs should plan activities well in advance and aim for quality rather than quantity ensuring it aligns with industry initiatives. Building a good network with scientists is also recommended to improve activity quality. The delivery should be done in a way growers 'have a clear recognition of the project'. Articles should be accessible at all times on FGVL's website and field days, meeting and study tours should promote networking amongst growers. In future projects KPI 'should include clear, identifiable measures of outcomes.

One-on-one orchard visits requires the establishment of a good relationship between the IDOs and growers to be successful. Hence, the slow start of this activity during the first year and the rapid increase in the number of visits during the second, third and final year. Demand for one-on-one visits during the last 6 months of the project was extremely high and may have shaded other activities. Technical bulletins required more time to produce than originally estimated however, IDOs managed to release well over 2 publications per quarter. Incorporating these bulletins to FGVL's weekly newsletter definitely enhanced visibility and uptake by the industry. It is mentioned in the evaluation that technical articles need a clear house style that is common to each of them so that it is clear these are produced under the same Technology Transfer project.

It has been pointed out by the end of project independent evaluation that FGVL may have used the private consultant Marcel Veens too often and that we need to diversify guest speakers we invite to these events. This recommendation will be considered in a future project. That being said, Marcel Veens is a private consultant well respected by local orchardists who travels to different growing regions around the world every year and will still be occasionally invited to future field days along with other experts.

Some of the challenges for the IDOs in this project certainly included conducting annual study tours and managing the Goulburn Valley Young Grower Group. It has been identified that an overseas study tour every second year would largely suffice. To ensure a good participation level, these should only be based on industry need. There is a range of study tours conducted, privately within the industry or by other industry bodies like APAL, and FGVL's technology transfer project purpose is to complement these already existing activities, not to compete against them. This has been incorporated in the next technology transfer project application. There was an attempt to organise a study tour to Stellenbosch, South Africa with Chris Jurisch, a local expert familiar with the Victorian industry, as a facilitator. Unfortunately, many growers could not afford to leave the orchard at the time planned for the tour and IDOs were forced to abandon the idea at that time.

Regarding the Goulburn Valley Young Grower Group, it has been recommended, in the independent project evaluation that more time should be given to work with this group. This activity was unfortunately slightly neglected in the last year of the project at the benefit of one-on-one orchard visits and orchard action article publications.

FGVL will continue industry development services through a new project, AP13027.

### 5. RECOMMENDATIONS

Based on the outcome of this project and the end of project review conducted by a local independent consultant FGVL believes that there is a need for the industry development services to continue to be delivered to Victorian pome fruit growers. FGVL also believes the focus should be on quality rather than quantity and this is why less study tours and field days with experts are planned in the next extension project, AP13027. This project has been complementary to other apple and pear technology transfer projects such as 'Future Orchards' (AP11017). It has been able to provide Victorian growers with one-on-one visits to facilitate individual uptake of new technologies that have been presented at workshops and farm walks. One-on-one visits also enable an understanding of industry needs that can flow through to other projects.

Under AP13027, FGVL will aim to incorporate every recommendation made by independent consultant Peter Gray in the AP10019 end of project review, from activity planning to delivery and outcome measurable.

### 6. APPENDICES

- 1. CropWatch reminder 7<sup>TH</sup> January
- 2. CropWatch reminder 18<sup>th</sup> February
- 3. Orchard Action article 'Neonicotinoids under the radar'
- 4. Orchard Action article 'Block establishment: two strategies compared'

Documents referred to for the period prior to 1<sup>st</sup> November 2013 are available upon request.



# CROPWATCH

### **CROPWATCH REMINDERS**

### Volume 3, Issue 4

The advice provided in this publication is intended as a source of information only. Always read the label before using any of the products mentioned. FGVL and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

# CODLING MOTH - 2nd GENERATION

### GOULBURN VALLEY

Egg hatch for the second generation has started already, as early as 20th December in some orchards of the Goulburn Valley. Later orchards have an egg hatch forecasted for 10th January. An insecticide cover should be kept for approximately 6 weeks on high pressure orchards.

#### SOUTHERN VICTORIA

Egg hatch for the second generation in Southern Victoria is forecasted for 11th Januray in earliest orchards with high pressure. Depending on local weather and initial biofix dates, egg hatch may not happen before early February.

**\*\*** On orchard with low codling moth populations (low pressure), egg hatch will start later and the cover period will be shorter, approximately 3-4 weeks.

**\*\*** By now, biofix dates should be set to predict spray cover periods. Grow-Fruit subscribers can look at their spray prediction reports for all the cover periods recommended on their orchards.

### **ORIENTAL FRUIT MOTH**

#### EGG HATCH GOULBURN VALLEY:

3<sup>RD</sup> GEN.:30 DEC. 2013 — COVER REQUIRED UNTIL 11<sup>TH</sup> FEBRUARY 4<sup>TH</sup> GEN: 3RD FEB.— COVER REQUIRED UNTIL 16<sup>TH</sup> MARCH

### FRUIT SIZE - Diameter (mm)

	Southern Vic	Goulburn Valley	
Gala	52	57	
Pink Lady	45	45	
Fuji	47	N/A	
<b>Granny Smith</b>	46	51	
Packham pears	N/A	50	



### Inside this issue:

EGG HATCH PREDIC- TIONS	1
FRUIT SIZE	1
MITE CONTROL	2
FRUIT FLY	2
ORCHARD PHOTOS	2
APPLES, PEARS AND	3



### JANUARY

#### **REMINDERS:**

- WATCH TWO SPOTTED MITES
- WATCH 2ND COHORT CODLING MOTH NUMBERS.
- WATCH LBAM IN ALL FRUIT
- WATCH WOOLLY APHID IN APPLES, ASSESS MALI PARASITISM.
- MAINTAIN ORCHARD HYGIENE.
- CONTROL CARPOPHILUS IN STONEFRUIT.
- WATCH WESTERN FLOWER THRIP IN BETWEEN FRUIT.
- WATCH FOR RUST MITES
- WATCH BRYOBIA MITES
- ASSESS MEALYBUG LEVELS IN PEARS

# **Options for mite control**



8 products from 7 chemical group for minimized risk of resistance:

Name	Active ingredient	Chem. Group	Mode of action
Acramite	Bifenazate	2D	Contact and residual activity on motile stages
Apollo	Clofentezine	10A	Growth regulator of mite eggs & some nymphs
Calibre	Hexythiazox	10A	Contact and stomach action on mobile stages
Omite	Propargite	12C	Contact action on active stages
Paramite	Etoxazole	10B	Contact and residual activity on motile stages (TSM & ERM)
Pyranica	Tebufenpyrad	21A	Contact action (TSM & ERM)
Torque	Fenbutatin oxide	12A	Contact ans stomach action on motile stages
Vertimec	Abamectin	6A	Stomach action, some translaminar action (TSM & ERM)

# FRUIT FLY Hotline: <u>50 514 618</u> OR visit <u>ICA Database</u>



### Some images from this season







# APPLES

#### BLACK SPOT/APPLE SCAB

Blocks with infection will need to maintain a tight spray program, especially in thick canopies.



#### POWDERY MILDEW

Monitor for secondary infection in more susceptible varieties (Granny Smith, Pink Lady, Sundowner)

#### WOOLLY APPLE APHID

Monitor colonies of woolly aphid. Monitor for A.Mali parasitic wasp and parasitism. Parasites work best in open canopies during warmer temperatures.

## PEARS

#### Fruitlets 55mm—70mm.

#### BLACK SPOT/PEAR SCAB

Watch for summer infection on WBC pears especially close to harvest.

#### LBAM

Monitor for LBAM in between fruitlets.

#### <u>MEALYBUG</u>

Mealybug in calyx ends of fruits are difficult to control. Look for parasitized mealybug.



# **STONEFRUIT**

#### OFM

Prepare to apply cover for 3rd GEN egg hatch in January.

#### CARPOPHILUS BEETLE

Monitor for carpophilus beetle to get an understanding of your orchard population. Maintain good orchard hygiene to help control population. Put out your attractant and kill traps at least 6 weeks prior to harvest. Use high water volumes if a spray is needed.

### CODLING MOTH

Watch for 2nd gen-



eration numbers in trapping and 2nd cohort in the Goulburn Valley.

#### LBAM

Monitor for LBAM in shoot tips and in between fruitlets.

#### BRYOBIA MITE

Bryobia found on leaves close to tree centers. Monitor population and predators. Can be a good food source for predatory mites.



#### OFM

See egg hatch date for 3rd generation in January if trap numbers increase.

#### CODLING MOTH

Watch 2nd generation numbers over the coming weeks. Check calyx ends of fruit for grub entry if numbers have been high over the first generation.

#### BRYOBIA MITE

Not seeing high numbers of bryobia in pears this season, can be higher in Josephines.

#### RUST MITE

Monitor closely if block has a history of rust mite. Scan tops of leaves and

#### LBAM

Monitor for LBAM caterpillars in shoot tips and in between fruit.

#### BROWN ROT

Maintain good orchard hygiene to reduce inoculums and potential infection sites. Thin fruitlets off bark and avoid clumps of fruit.

#### SHOTHOLE

Watch for leaf shothole like symptoms in cool wet spring conditions.

#### TWO SPOTTED MITES

Starting to see med-high levels of two spotted mites in apples. Monitor closely in blocks that have had



Carbaryl chemical thinning or Synthetic Pyrethroids during blossom. Apple trees do not recover well after damage from two spotted mites.

#### RUST MITE

Seeing the odd blocks with rust mite. Can cause leaf bronzing and will re-

quire control if numbers are high. Can be good prey for predators also.



around calyx ends of fruit for rust mite.

#### TWO SPOTTED MITES

WBC have a lower tolerance to mites than other varieties. Leaf burn are not always from two spotted mites.



'leaf burn in pears are not always from two spotted mites'

#### BRYOBIA MITE

Monitor for nymphs on the undersides of limbs and leaves.

#### TWO SPOTTED MITES

Odd blocks with two spotted mites now.

#### WESTERN FLOWER THRIP

Watch for juveniles feeding in between mature smooth skin stone fruit.





The advice provided in this publication is intended as a source of information only. Always read the label before using any of the products mentioned. FGVL and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

# WITHOLDING PERIODS

As the picking season has started already growers must be careful with witholding periods (WHP). Here is a list of WHP for a few common insecticides and miticides.

Insecticide	WHP Pome fruit	(days) Stone fruit	Miticide	WHP Pome fruit	(days) Stone fruit
Altacor	14	14	Acramite	7	3
Insegar	14	n/a	Apollo	21	21
Avatar	14	7	Calibre	3	3
Prodigy	14	n/a	Omite	7	7
Delegate	7	3	Paramite	7	7
Calypso	21	14	Pyranica	14	14
Samurai	21	21	Torque	2	14
** Calypso: Peaches have a WHP of 21 days unlike other stone fruits.					

### POST HARVEST TREE HEALTH

Post-harvest tree management plays a very important role in next year's crop load. Things to keep in mind to maintain tree health after picking and avoid a too early shift into dormancy include keeping the trees well irrigated and provide them with adequate fertilizer. Looking at leaf and soil tests for a well balanced fertilizer formulation.

Controlling pest outbreak that could limit the photosynthesis process is also important after picking. The period from harvest until dormancy is a crucial time of the year for trees to build up carbohydrate reserves in the root system for the following season. The carbohydrate reserve level can have a major impact on blossom and fruit set.

# FRUIT SIZE - Diameter (mm)

	Southern Vic	National average
	Diameter (mm)	Diameter (mm)
Gala	67	66
Pink Lady	58	57
Fuji	60	60
<b>Granny Smith</b>	57	58



### Inside this issue:

WITHOLDING PERIODS	
POST HARVEST TREE	1

HEALIH	
FRUIT SIZE	1
FRI II T FI Y	2

LURE MIXTURE PREP.

APPLES, PEARS AND STONEFRUIT - BRIEFLY

3



### FEBRUARY REMINDERS:

- KEEP MONITORING FOR MITES AND PREDA-TORS
- WATCH 3RD GENERATION CODLING MOTH NUMBERS.
- WATCH LBAM IN ALL FRUIT
- WATCH WOOLLY APHID IN APPLES, ASSESS MALI PARASITISM.
- MAINTAIN ORCHARD HYGIENE.
- CONTROL CARPOPHILUS IN STONEFRUIT.
- WATCH FOR WITHOLDING PERIODS
  - WATCH FOR RUST MITES
- KEEP GOOD TREE HEALTH AFTER HARVEST
- ASSESS MEALYBUG LEVELS IN PEARS



### PREPARING FRUIT FLY LURE MIXTURE

IF USING KELTROL, PRE-MIX THE NIGHT BEFORE APPLICATION. MIX
THE KELTROL AT RATE OF 2.5-5.0gm KELTROL/100L WATER. MIX THE KELTROL
IN TO THE WATER. OVERNIGHT THE KELTROL THICKENS THE WATER, WHICH
MAY HELP IMPROVE THE RESULT.

• THE MORNING OF APPLICATION, MIX THE FOLLOWING IN TO THE (KEL-TROL THICKENED) WATER, RATES ARE AMOUNTS ADDED PER 100L WATER

- 2ltrs BUGS FOR BUGS FRUIT FLY LURE/100L
- 435mls HY-MAL (or equiv. registered product)/100L

 APPLY AT 15L/ha AS A COARSE SPOT SPRAY OR BAND TO LEAVES OF TREE. APPLY FRESHLY MADE MIXTURE (DO NOT STORE AFTER MIXING).
 BEST APPLIED IN COOLER TIMES OF DAY.

• APPLY EVERY 4-10 DAYS (USUALLY WEEKLY), DEPENDING ON FACTORS SUCH AS PEST PRESSURE & RAINFALL/OVERHEAD IRRIGATION. USUALLY OK, BUT IF UNSURE TEST CROP SAFETY ON SMALL AREA FIRST.

• PLAN TO COMMENCE PROGRAM AT LEAST TWO WEEKS BEFORE FRUIT FIRST BECOMES SUSCEPTIBLE. CONTINUE FOR 3 WEEKS AFTER HARVEST.

CONTINUE TO MONITOR TRAPS & FRUIT AFTER TREATMENT HAS
 COMMENCED. INTERVENTION WITH A REGISTERED COVER SPRAY MAY BE
 NEEDED OCCASIONALLY TO ACHIEVE COMPLETE CONTROL

January 2014

E&OE

FRUIT FLY Hotline: <u>50 514 618</u> OR visit <u>ICA Database</u>

# **APPLES**

#### BLACK SPOT/APPLE SCAB

#### Black spot may be almost inexistent in

some orchards due to very hot temperature. A fungicide program should still be in place to prevent postharvest rots.



#### POWDERY MILDEW

Monitor for secondary infection in more susceptible varieties (Granny Smith, Pink Lady, Sundowner)

#### WOOLLY APPLE APHID



Hot temperatures experienced lately provides a good

### PEARS

#### BLACK SPOT/PEAR SCAB

Watch for summer infection on pears especially after a rain event close to harvest in infected blocks.

#### LBAM

Monitor for LBAM larvae in between fruit

#### MEALYBUG

Mealybug in calyx ends of fruits are



difficult to control. Look for parasitized mealybug.

# **STONEFRUIT**

#### OFM

Prepare to apply cover for 5th GEN egg hatch in March for late stonefruit blocks.

#### CARPOPHILUS BEETLE

High numbers of carpophilus beetle this year. Monitor for carpophilus beetle to get an understanding of your orchard population. Maintain good orchard hygiene to help control population. Use high water volumes if a spray is needed.

environment for Aphelinus Mali parasite. Monitor closely the level of parasitism on woolly aphid before spraying.

#### CODLING MOTH

Watch for 3nd generation trapping

numbers. Keep a cover according to Biofix date.



Monitor for LBAM in shoot tips and in between fruitlets.

#### EUROPEAN RED MITE



LBAM

European red mite thrives in hot and dry weather. Monitor predatory mites and evaluate

#### OFM

See egg hatch date for 5th generation in March if trap numbers increase. Numbers always higher in Bosc.

#### CODLING MOTH

Watch 3rd generation numbers over the coming weeks. Check calyx ends of fruit for grub entry if numbers have been high over the first generation.

#### MITES

Keep monitoring mite and predator populations levels. Choose the right spray



#### LBAM

Monitor for LBAM caterpillars in shoot tips and in between fruit.

#### BROWN ROT



Maintain good orchard hygiene to reduce inoculum and potential infection sites. Thin fruitlets off bark

and avoid leaving clumps of fruit. Remove infected limbs post harvest.

pest to beneficiary balance before applying a miticide. Spray for mite after picking if necessary for general tree health.

#### **TSM & BRYOBIA MITES**

Seeing med-high levels of Bryobia two spotted mites in apples. Monitor closely in blocks that have had Car-



baryl chemical thinning or Synthetic Pyrethroids during blossom.

#### RUST MITE

Seeing the odd blocks with rust mite. Can cause leaf bronzing and will require control if numbers are high. Low numbers an be good prey for predators.

according to the predators level and ratio of eggs, nymphs and adult mites to maximize costly sprays.

#### Predatory mite



'leaf burn in pears are not always from two spotted mites'

#### BRYOBIA MITE

Monitor for nymphs on the undersides of limbs and leaves.

#### WESTERN FLOWER THRIP

Watch for juveniles feeding in between mature smooth skin stone fruit.

#### SAN JOSE SCALE

Watch for late season San Jose Scale on backs of leaves and fruit.



TSM adult and egg

### Neonicotinoids under the radar

Last week, Plant Health Australia was holding a symposium on neonicotinoids in Canberra to present the latest research results and discuss industries' concern in regards to the pesticide's impact on bee health. Stakeholders presenting included the Australian Honey Bee Industry Council, CSIRO, Canola grower, orchardist, Beekeepers, USEPA (USA), Syngenta, Bayer, CropLife Australia and the APVMA.



#### The context

August 2012: Concern raised in America and Europe about neonicotinoids and their potential impact to the health of honey bees.

August 2012: In response to Australian beekeepers concern, the APVMA announces a review to look at the use of neonicotinoids in Australia and their impact on honey bees.

January 2013: The European Food and Safety Authority releases a report stating neonicotinoids represent some risks to bees' health.

April 2013: The European Commission suspends for 2 years the use of neonicotonoids on flowering crops.

February 2014: The <u>APVMA's overview report</u> is release.

April 2014: Crop Health Australia holds a symposium to present APVMA's report and give an update on latest research and concerns in regards to that matter to Australian stakeholders.

Some of the sections in the APVMA's overview report relevant to the pome fruit industry include ways of exposure of pollinators to neonicotinoids in the Australian horticulture industry; an extensive literature review on laboratory and in-field studies on the impact of this relatively new pesticide on bees' health around the world; need for insecticide labelling consistency; and most importantly recommendations and next steps.

From what's been presented in Canberra last week, research so far achieved internationally fails to show adverse effect on bees' health when neonicotinoids are applied strictly according to label. Doing so can be particularly challenging for orchardists during the flowering period for controlling certain pests.



#### Neonicotinoids of concern for the pome fruit industry

Clothianidin: Includes Samurai.

<u>Imidacloprid:</u> Contains the largest number of products registered for pome fruits and includes Confidor, Nuprid and Apparent. (See APVMA PubCRIS database for extensive list. Link at the end of this document.)

All products above are registered as systemic insecticides for soil drench applications as a preventive measure for woolly aphid. Most of them can also be applied to foliage later in the season when trees aren't in blossom e.g. to treat codling moth.

<u>Thiacloprid:</u> Includes Calypso, registered for controlling Apple Dimpling Bug.

Labels are currently inconsistent in terms of the toxicity levels of different neonicotinoids. Warnings range from "low impact on bees" to "highly toxic to bees" and "residues potentially remaining toxic to bees several days after application". Consistency on label warnings has been included in the recommendations.

#### guaranteeu.

### **PROTECTION OF LIVESTOCK**

Dangerous to bees and will kill bees foraging in the crop to be treated or in hives which are over-sprayed or reached by spray drift, and residues may remain toxic to bees several days after application.

Risks to non-target insects – Clothianidin may have adverse effects on some non-target Label warning example taken from Sumitomo's Samurai<sup>®</sup> systemic insecticide.

One question remains, should there be a similar review on fungicides? The flowering period being so crucial for apple scab and other fungus diseases control, avoiding fungicide sprays while bees are actively foraging is probably the true challenge for orchardists in regards to bees' health.

Further readings and tools:

APVMA to review science on pesticides and bee health

Neonicotinoids and honey bee health in Australia

Overview report on bee health and the use of neonicotinoids in Australia

APVMA: Public Chemical Registration Information System Search

Plant Health Australia

# **Block establishment: 2 strategies compared**

Planting 1 yr old trees (most common) VS planting fresh grafts (less common)

### Lady in red on M9 rootstock

1 yr old tres @ planting

#### Set up

3,200 trees/ha2D system with 6 wires3.6 m tree height at full canopy

#### Tree quality

Buded during summer 2011-12 Planted in October 2014 due to wet weather Planted as approx. 1.4 m high trees All feathers removed at planting

#### **Block condition**

Replant block, bear for 4 years No fumigant or root promoters



### Jazz on M9 and Bud 9

Fresh grafts @ planting

#### Set up

3,750 tree/haSlender spindle system (start with bamboo stick)3.5 m tree height at full canopy

#### **Tree quality**

Grafted late winter 2013 - shipped straight away Planted in October 2014 due to wet weather Planted as fresh grafts

#### **Block condition**

New block established on cattle land

No root promoter although each tree was drenched in a mixture of SeaSol, Confidor and Copper



#### First year inputs and performances

- \* Calcium nitrate @ 300 kg/ha
- \* Urea @ 200 kg/ha
- \* MAP @200 kg/ha

\* GA-3 - 1 application in early 2014 Pruning: once through out the season Extension : 40 cm average growth Average tree height as of May 2014: 180 cm

- \* Rustica @ 150 kg/ha
- \* Urea @ 2 x 15 kg/ha
- \* MAP @ 4 x 50 kg/ha

Pruning: 3 times through out the season Extension : 85 cm average growth Average tree height as of May 2014: 100 cm Average take estimated to be around 70%



Lady in red on M9 rootstock



Jazz on M9 and Bud 9

# **Block establishement**

# (continued)

### Lady in red on M9 rootstock

### Jazz on M9 and Bud 9

#### **Estimate yields**

2015: 0 t/ha - Focus on developing canopy 2016: 30 - 40 t/ha 2017: 55 - 60 t/ha 2018: Cumulative of 150 t/ha @ 5<sup>th</sup> leaf 2015: 0 t/ha - Focus on developing canopy 2016: 10 t/ha 2017: 25 t/ha 2018: Cumulative of 75t/ha @ 5<sup>th</sup> leaf



Even tree height

#### Pros

Planting 1 yr old trees is a known path. Canopy development and 5 year cumulative yield are easier to predict.

Tree height achived quicker Low risk of tree dying off

#### Cons

Trees must be ordered well in advance Tree cost averages \$15



Unven tree height

#### Pros

Trees were ordered only a few weeks before shipping - Ease of planning Tree cost averaged \$5

Cons

Block uneveness and unpredictable success - although these may be overcome with experience with that method

#### Comments

Roots of Jazz grafts showed signs of fungus infection at time of planting after being stored in sawdust for 6 weeks. Copper in the drench solution was to overcome that issue however root quality may be one of the cause of high proportion of tree die off.

#### Where to fom here?

Grafting on farm could be the way to go with cost of good quality rootstock averaging \$2 and shipping costs reduced. Is the ease of planning and lower cost per tree worth the lower 5 yr cumulative yield? Can success rate be improved?