



Practical Farm Processes to Conquer Orchard Pests

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18th Australian Almond Conference

Pullman Hotel Melbourne, Albert Park, Victoria

October 30th - November 1st, 2018



SUPPORTED BY:
Horticulture Innovation Australia Ltd



HOSTED BY:
The Almond Board of Australia



Our Background



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- Century Orchards is a 600ha Almond Orchard located in Loxton, SA
 - Vertically integrated company, with interest and control from paddock to plate
 - High Inputs chasing Big Crops
 - Use state of the art technology to effectively produce almonds, resulting in maximum returns for our investors



Pest Issues and Management



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- The Big 3; Hull Rot, Carob Moth and Carpophilus Beetle
 - What we have seen over the seasons
 - What we have and are trialling
 - What we have implemented



Observations



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- 2011 Summer Rains Initiated the issues
- Hull Rot is the primary infection
 - minimise mummies minimise pest pressure
- Sanitation is key and most cost effective
 - There is no 'Silver Bullet'
- Insect Damage is a 'Profit Killer'
 - Approximately every **1%** increase in Insect Damage to Nonpareil Costs us **\$100,000**

	NonPareil Data		
	Insect	Mould	Staining
09/10	1.07%	1.14%	2.69%
10/11	1.66%	3.93%	12.27%
11/12	2.96%	2.56%	3.19%
12/13	2.34%	2.31%	3.15%
13/14	1.58%	1.05%	2.74%
14/15	0.78%	0.29%	1.57%
15/16	1.13%	0.86%	0.87%
16/17	1.82%	0.55%	1.98%
4 yr average	1.33%	0.69%	1.79%
8 yr average	1.67%	1.59%	3.56%

Carob Moth Trials and Results



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Predatory Wasps



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- Trialled the Release of Trichogramma Predatory Wasps
 - x4 Releases with x3 different species released
 - Released using egg tabs stapled to trees
- Egg Laying Traps used for Monitoring
- Did see some Predatory activity but quite Labour Intensive



BUGS
FOR
BUGS

BIOLOGICAL
SERVICES

Mating Disruption- OCP



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- With the high cost of insecticide applications we have been looking at Mating Disruption
- Working with Organic Crop Protectants applying mating disruption pheromones by drone
- Drone applies pheromone material to tops of the canopy



OCP- Results



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- Initial Results on 40ha trial are looking promising with trap counts dropping to 0 after applications
- Insect damage looks to have improved compared to the control
- Similar results and costs to insecticide but allows for more markets as insecticide free

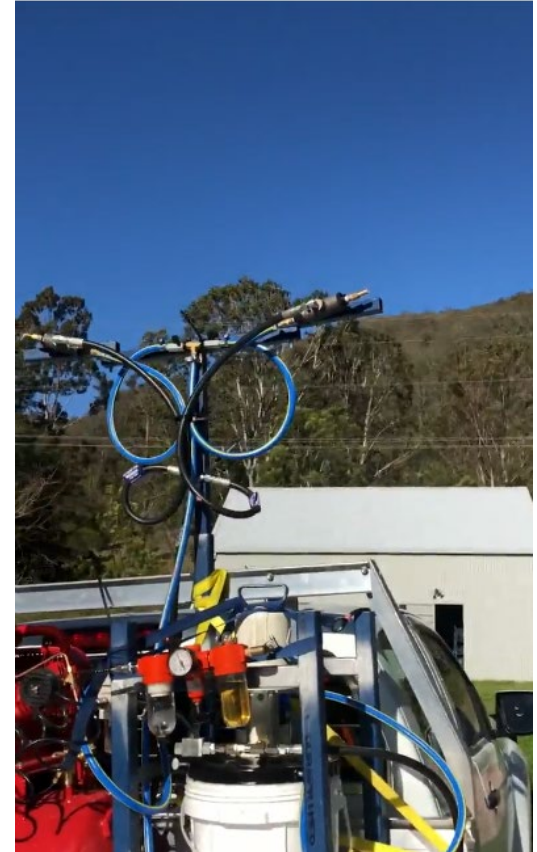
Date	D5, Row 2 5 trees sth M/R	F10, Row 24 9 Trees Nth M/R	J7, Row 3 M/R
13-Sep	Traps set		
20-Sep	10	10	3
27-Sep	13	11	4
4-Oct	27	32	13
11-Oct	51	24	64
18-Oct	80	55	54
25-Oct	97	105	83
1-Nov	56	120	52
8-Nov	0	91	53
15-Nov	0	73	79
22-Nov	0	113	101
29-Nov	0	84	87
6-Dec	0	57	44
13-Dec	0	66	69
20-Dec	0	40	29
27-Dec	1	29	22
3-Jan	2	20	10
10-Jan	0	48	28
17-Jan	0	30	32
24-Jan	0	19	30
31-Jan	2	80	23
7-Feb	1	54	23
14-Feb	1	32	16
21-Feb	0	23	28
28-Feb	0	17	25
7-Mar	1	80	53
Averages	13.7	52.5	41.0

This Season- OCP Trial



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- We will be running the trial again this season to check positive data seen last season
- We are working very closely with both OCP and Agricultural Departments setting up the best methods of testing and monitoring
- We are using a ground applicator instead of the drone
 - This will reduce application cost
 - Increase % of pheromone in the canopy where it is most effective



What we have Implemented



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Simple Rules



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- Get as many Nuts off and out of the orchard as Possible
 - Correct harvest techniques
 - Re-shaking
- Proper levelling and ground preparation
- Keep Tree-Line/Wetting Zone Clean as possible
- Destroy mummies properly and at the right time
- Correct Timing of Sprays and Control Measures

Getting All the Nuts



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- Shaking at the right time
 - Early shaking before Hull Rot sets in and insects can damage
- Setting up machines properly and at the right speed
 - Stop Sweepers and Harvesters leaving crop behind
 - Good operators with machinery set up correctly
 - Never assume Common Sense- Need Supervision
- Best results from Re-shaking
 - Straight after a rain or heavy fog/dew
 - Going the opposite direction of initial shake
 - Re-shake all Nonpareil as a minimum



Proper Ground Preparation



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- X-blading straight behind last harvest pass
- Cover crop in straight behind X-blading
 - Improves IPM
 - During growing season slash every 2nd row
 - Allows mummies to be caught and concentrated for destruction
- Level ground improves harvest efficiencies
 - Less dirt swept
 - Run harvesters higher
 - Reduces nuts lost and buried



Keep Tree-Line/Wetting Zone Clean



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- Mummies in the wetting zone are Breeding Sites
 - Watering every day creates perfect disease environment
 - Wet mouldy nuts attract moulds and pests
 - Less issues with Sprinkler Orchards- Feast to Famine
- It's an ongoing battle keeping the wetting zone clean
 - Every wind/storm event brings mummies down
 - Birds, Spraying, Machine Traffic all bring nuts down
- Once a year clean up does not solve the issue



Options to Keep Tree Line Clean



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- V-Sweeper/Sweeper
 - Best option as it concentrates the mummies
 - Quick but higher cost to purchase and run
- Tractor Mounted Blowers
 - Cheapest to buy and run
 - Made from Old sprayers
 - Slowest



Options to Keep Tree Line Clean



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- Air-o-Fan
 - Lower deflector plates to blow each spray
 - Getting 5-8 passes a season
 - Must check coverage is still adequate
 - Water sensitive paper
 - Moving the spores into the canopy when the chemical is most effective



Destroying the Mummies



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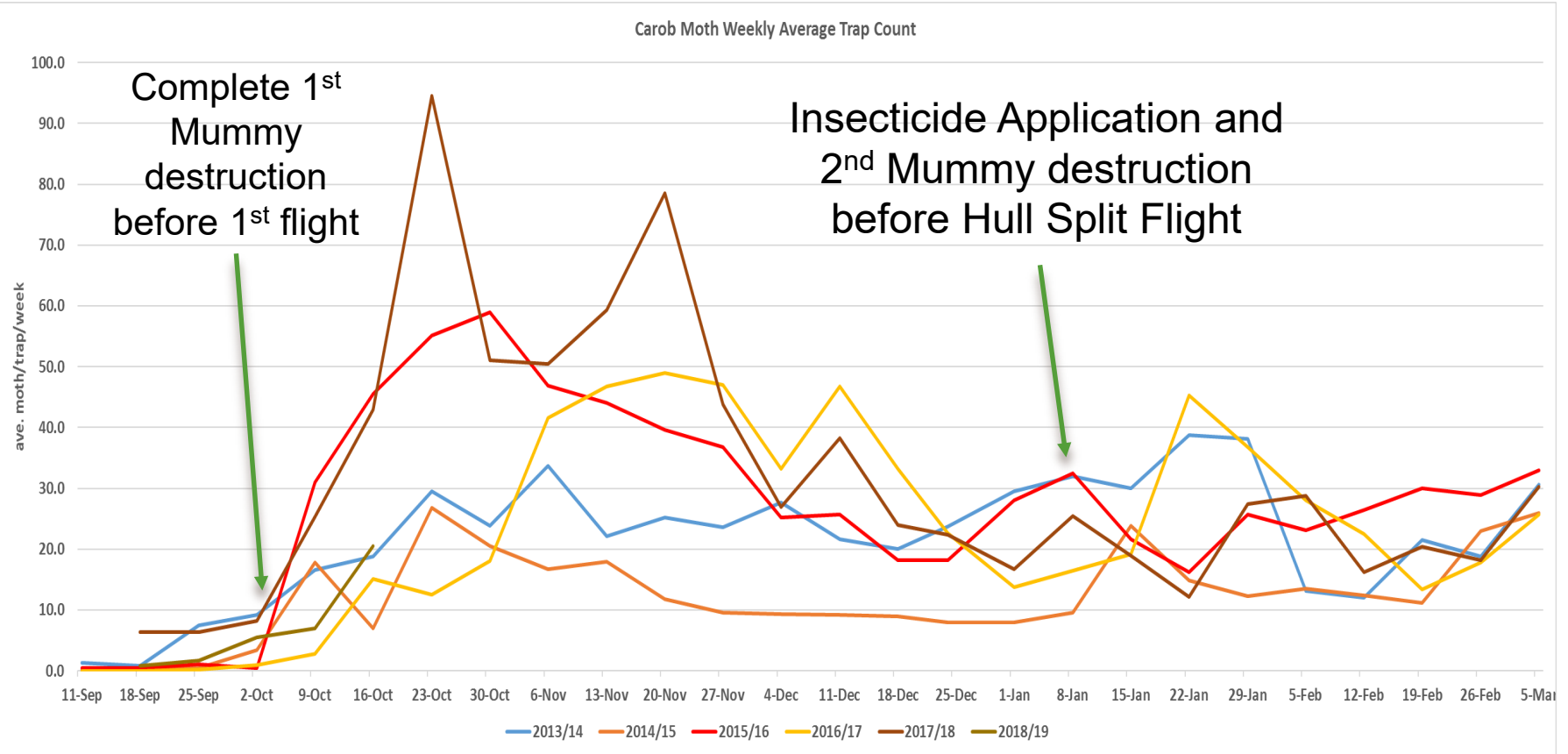
- Flory Flail Mowing
 - ‘Speed Kills’ need a patient operator
 - Rotate/Replace blades regularly
 - Make sure cover crop is not too wide
 - May not destroy nuts completely
- FAE Mulcher
 - Works best when swept prior
 - Destroys mummies really well when set up correctly
 - Can also be used to mulch sticks/pruning's



Timing is Key



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Insecticide Treatments



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- We have seen improvements with Insecticide applications at Hull Split
 - We look at degree days to determine best timing
 - 1,000 degree days from 1st August which works well with Hull Rot applications
 - Only night/early morning spraying to improve droplet life
- Target high Pressure Areas
 - Areas that are harvested early and processed first are always best
 - Areas harvested last should be targeted for Insecticide Applications
- Fumigate any Nonpareil which will be stored for more than 21 days

Tying it all Together



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- Clean Harvest
- Level Ground
- Keep Tree Line/Wetting Zone as clean as possible
- Destroy Mummies by early October
- Destroy Mummies again before Hull Split
- Spray at correct Times
- Sanitation Is Key and is an ongoing Process
- It's a Team Effort, need everyone on the same page



Thank You



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