Pheromone mating disruption of *Cydia latiferreana,* filbertworm, in commercial hazelnut orchards





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Oregon State

Outline

- Introduction Hazelnuts in Oregon
- Background and Justification
- Objective
- Methods
- Results / Discussion
- Further Research







Hazelnuts in Oregon

- 99% of the U.S.
 production
- 30,000 acres
 (2008)

• \$75.5 Million

Olsen, 2011

Cydia latiferreana, Filbertworm (FBW)(Lepidoptera: Tortricidae)



Cydia latiferreana, Filbertworm (FBW) (Lepidoptera: Tortricidae)



- ~1 cm in length
- Univoltine single generation per year
- Native to the West Coast,
 Willamette Valley
- Pest in Pomegranates
- Alternate host is Oaks

AliNiazee 1998

Management of Filbertworm

- monitoring with pheromone lure traps
- spray Esfenvalerate upon reaching economic thresholds
- Pesticides are broad spectrum can harm beneficial insects
- Growers asked for alternative treatments



Photo: Robert Couse-Baker

Olsen, 2010; Walton, et al. Pers Comm.









Pheromones in Pest Management



Males find females by tracking a sex pheromone released by females

Pheromones in Pest Management

Monitoring for the pest using synthetic sex pheromones



Rubber septa release pheromone

Traps contain septa and sticky cards

Pheromones in Management



Mating Disruption: Multiple point-sources make it impossible to pinpoint female source

Benefits of Mating Disruption

- Species specific not broad spectrum like pesticides
- Eradication is not the goal just management
- No special training, certification or equipment required for use



Photo:usda.gov

Codling Moth -*Cydia pomonella*

Photo: UC Riverside

Oriental Fruit Moth – *Grapholita molesta*



<u>Objective</u>

 Test the feasibility of pheromone mating disruption for FBW in commercial hazelnut orchards.



Photo: LA Times

<u>Two Styles of</u> <u>Dispenser</u>

1x Twin-tube 5x Ring (Meso)

(E,Z)-8,10-Dodecadienyl Acetate







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1x twin tubes around perimeter



1x twin tubes around perimeter

5x Meso-Rings within plots



1x twin tubes around perimeter

5x Meso-Rings within plots



1x twin tubes around perimeter

5x Meso-Rings within plots

1x-lure Delta Traps

10x-lure Delta Traps

Orchard 1: Monmouth, OR





Uneven topographyUneven tree spacing

Orchard 2: Amity, OR



S Amity orchard - Hwy 99



- Flat topography
- Young to old trees
- Very regular tree spacing

Dispenser Longevity

- Lures hung in tree during inital experimental setup
- 5 of each type collected every 4 weeks
- Stored frozen until sent back to manufacturer for analysis in October 2010







Damage Assessment

- 400 nuts are collected from each test plot
- From perimeter and center of plots
- All nuts were examined for FBW larvae or evidence.
- Industry rejection rate: 1-2% (1-2 larvae per 100 nuts)

Results

Dispenser Longevity



ShinEtsu Chemical Company, 2011

Trap Catches: Orchard 1 2009



Trap Catches: Orchard 2 2009



Trap Catches: Orchard 1 2010



Trap Catches: Orchard 2 2010



Percent Trap Shutdown

1 -	Weekly Treatment Trap Catches	*100
-	Weekly Control Trap Catches	100

Plot	2009	2010	
Orchard 1	71.0%	63.5%	
Orchard 2	51.9%	71.43%	

FBW Trap Counts

Plot	Control	LD	HD	Total
Orch. 1 '09	24	3	5	32
Orch. 1 '10	23	10	17	50
Orch. 2 '09	5	1	3	9
Orch. 2 '10	4	1	1	6

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Trap Count above economic threshold: Pesticide sprays were applied mid-August, 2010

Nut Examinations: Orchard 1

Site	Plot Type	Number Larvae	Nuts Cracked	% Infested
Orchard 1 2009	Control	0	455	0.00%
	Treatment	1*	865	0.22%
Orchard 1 2010	Control	0	821	0.00%
	Treatment	4	1655	0.24%

*No larvae found, damage in the form of frass or an exit hole

Nut Examinations: Orchard 1

Site	Plot Type	Number Larvae	Nuts Cracked	% Infested
Orchard 1 2009	Control	0	455	0.00%
	Treatment	2*	907	0.22%
Orchard 1 2010	Control	0	821	0.00%
	Treatment	4	1655	0.24%

Pesticides were applied to Orchard 1 in August 2010

Nut Examinations: Orchard 2

Site	Plot Type	Number Larvae	Nuts Cracked	% Infested
Orchard 2 2009	Control	0	438	0.00%
	Treatment	2*	907	0.22%
Orchard 2 2010	Control	0	807	0.00%
	Treatment	0	1630	0.00%

*No larvae found, damage in the form of frass or an exit hole

Summary of Conclusions

• Current formulation of the dispensers is sufficient for season-long protection.

 Significantly greater mean FBW per trap were found in control plots in 1 of 4 replications.

Summary of Conclusions

 Greater total FBW trap catches were found in the control plots of each replication.

 Nut damage did not reach rejection thresholds for damage in any plot examined.

Discussion

 Despite lack of statistical significance, trends are still apparent, warranting further research

 Pilot study – design and density of dispensers could use tweaking

Current Analysis & Future Work

- Summer 2011: Larger individual plots to reduce edge effects
- Release rates and dispenser type
- Cost effectiveness versus current methods
- Redesign of damage assessment



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- Release rates and dispenser type
- Redesign of how we assess damage
- Cost effectiveness versus current methods

References and Acknowledgments

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Thanks to:

- Oregon Hazelnut Commission, Agricultural Research Foundation, Pacific Biocontrol
- Jeff Newton, Glenn Thayer, Jeff Olsen, Shawn Mehlenbacher
- Walton Lab Technicians: Drew Mahedy, Mike Reitmejer, Tyler Kilkenny, Sam Tochen, Danny Dalton, Betsey Miller
- Bioresource Research Program at Oregon State University: Wanda Crannell
- Oregon State Entomology Grad and Undergrad Students, and Faculty