

# Quantifying biological control of pear psylla in a cover crop system

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3-year project

## Objectives:

1. Test whether an alfalfa cover crop leads to improved biological control of pear psylla
2. Estimate movement rates of predators from alfalfa into tree canopy
3. Determine whether switch in habitat accompanied by switch in diet to attack target pest (psylla)
4. Determine whether cover crop leads to increased levels foliar nitrogen in pear trees
5. Expand project into 3 commercial orchards (SARE, CSANR)

# Funding history

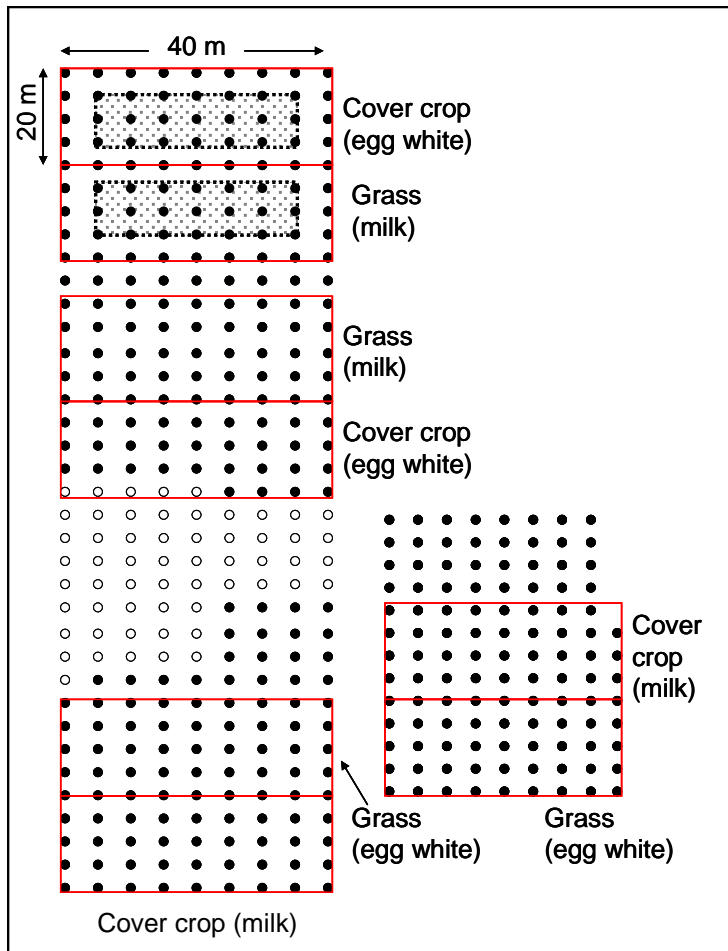
Additional funding:

1. Western SARE: \$121,092 (2008-2009)
2. WSU Center for Sustaining Agriculture and Natural Resources (CSANR): \$63,807 (2009-2010)

FPC/PPC funding: revised budget in red font

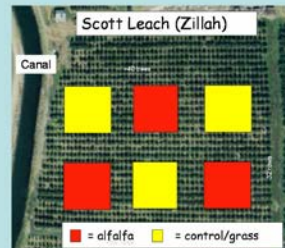
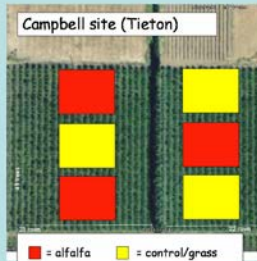
	2007	2008	2009	Total
ARS	\$20,000	\$20,000	\$20,000	\$60,000
	\$20,000	<b>\$15,000</b>	<b>\$0</b>	<b>\$35,000</b>
WSU	\$5,000	\$5,000	\$5,000	\$15,000
	\$5,000	\$5,000	<b>\$0</b>	<b>\$10,000</b>
TOTAL				\$75,000
				<b>\$45,000</b>

# Moxee site

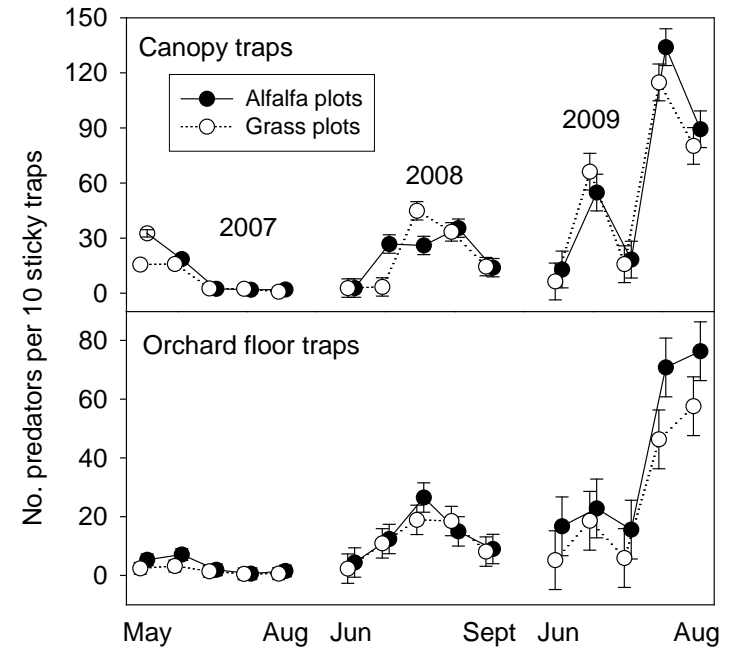
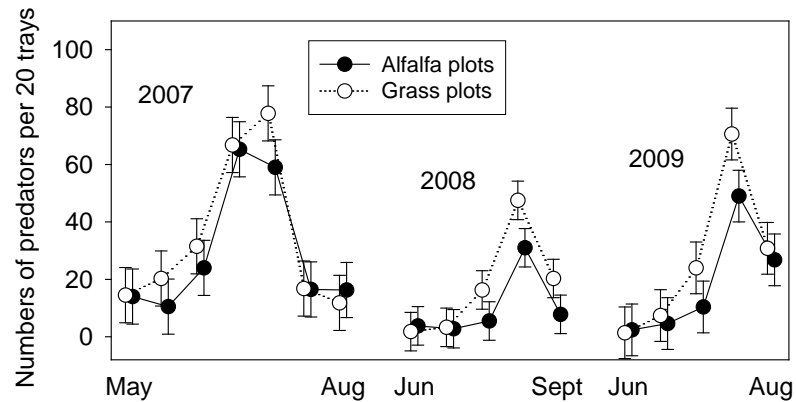
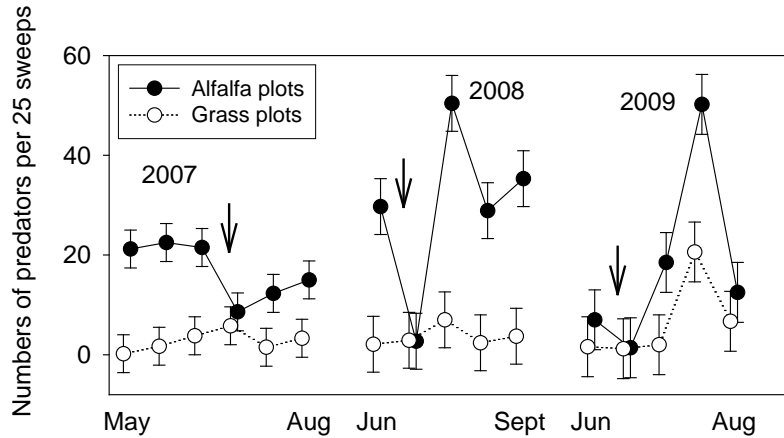


# 3 commercial orchards (CSANR, SARE funding)

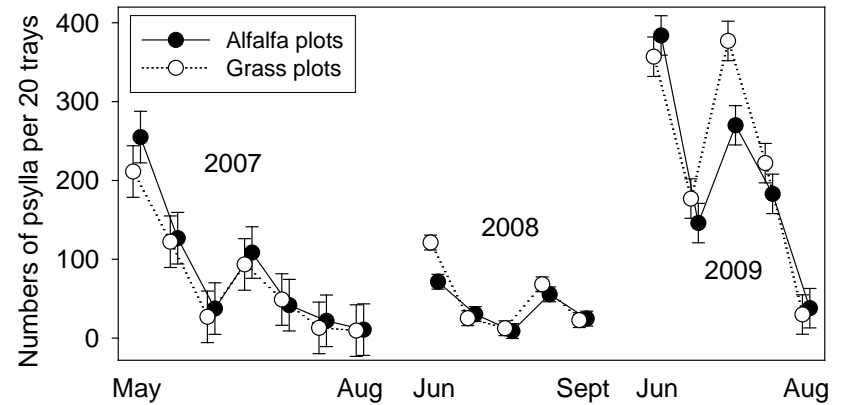
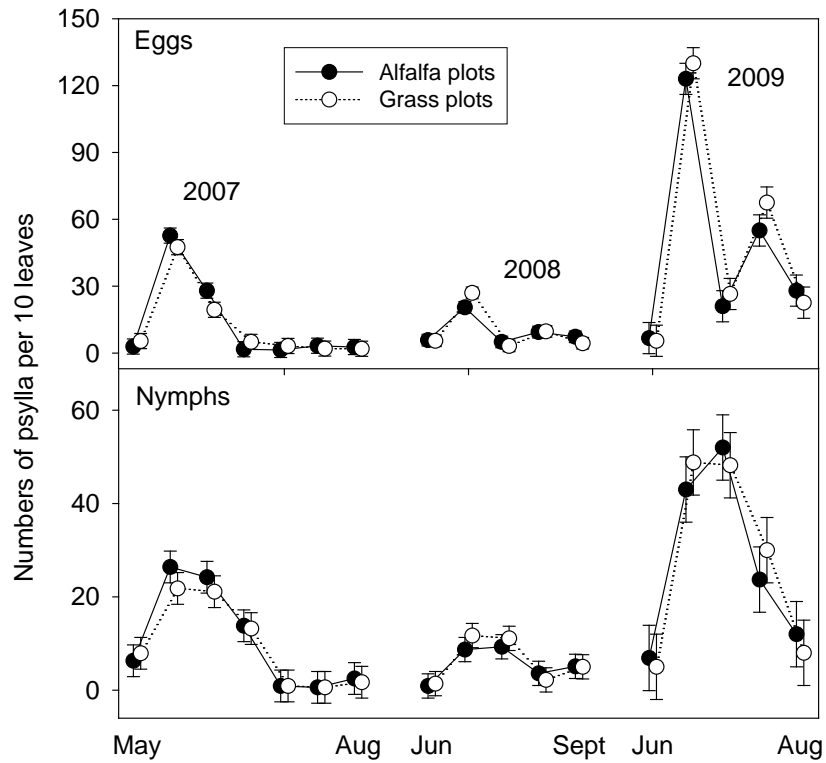
- 3 orchards
- Plots each 0.2 to 0.5 acres
- Strip of alfalfa down center of aisle



# Predator counts



# Psylla numbers

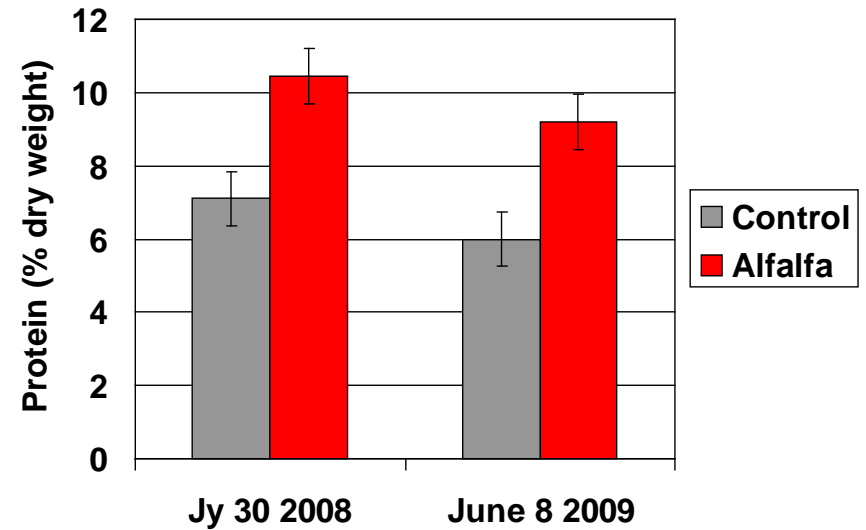
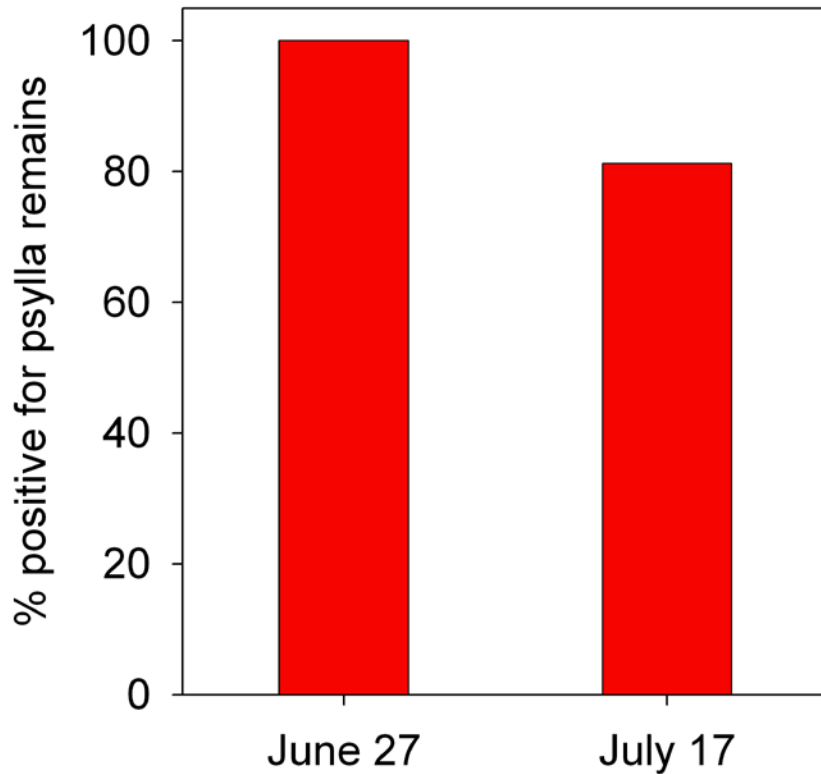


# Movement studies



	June 2009		August 2009	
	Alfalfa	Control	Alfalfa	Control
<b>TRUE BUGS</b>				
<i>Anthocoris</i>	1/28 (3.6)	0/8 (0)	4/71 (5.6)	8/101 (7.9)
<i>Deraeocoris</i>	5/127 (3.9)	0/93 (0)	12/85 (14.1)	4/81 (4.9)
<i>Orius</i>	0/4 (0)	0/5 (0)	0/2 (0)	0/3 (0)
<i>Nabis</i>	--	--	1/1 (100)	--
<b>TOTAL</b>	<b>6/159 (3.8)</b>	<b>0/106 (0)</b>	<b>17/159 (10.7)</b>	<b>12/185 (6.5)</b>
<b>LACEWINGS</b>				
<i>Hemerobius</i>	0/1 (0)	0/1 (0)	0/1 (0)	--
<i>Eremochrysa</i>	4/31 (12.9)	5/23 (21.7)	18/48 (37.5)	5/16 (31.3)
<i>C. plorabunda</i>	6/17 (35.3)	1/17 (5.9)	5/35 (14.3)	5/14 (35.7)
<i>C. nigricornis</i>	1/1 (100)	0/3 (0)	5/23 (21.7)	0/3 (0)
<i>C. coloradensis</i>	0/1 (0)	1/10 (10.0)	--	--
<b>TOTAL</b>	<b>11/51 (21.6)</b>	<b>7/54 (13.0)</b>	<b>28/107 (26.2)</b>	<b>10/33 (30.3)</b>
<b>LADYBIRD BEETLES</b>				
<i>Hippodamia</i>	0/1 (0)	0/1 (0)	6/27 (22.2)	8/42 (19.0)
<i>Stethorus</i>	0/2 (0)	0/1 (0)	1/5 (20.0)	0/12 (0)
<i>C. transversoguttata</i>	--	0/1 (0)	--	--
<i>Harmonia</i>	--	--	2/6 (33.3)	3/17 (17.6)
<i>Chilocorus</i>	--	--	0/1 (0)	1/6 (16.7)
<i>Hyperaspis</i>	--	--	14/65 (21.5)	0/5 (0)
<i>C. septempunctata</i>	--	--	2/8 (25.0)	1/6 (16.7)
unknown	--	--	0/1 (0)	0/4 (0)
<b>TOTAL</b>	<b>0/3 (0)</b>	<b>0/3 (0)</b>	<b>25/113 (22.1)</b>	<b>13/102 (12.7)</b>
<b>SPIDERS</b>	<b>11/99 (11.1)</b>	<b>1/76 (1.3)</b>	<b>5/84 (5.9)</b>	<b>5/68 (7.4)</b>

# ELISA results (*Deraeocoris*) and leaf nitrogen results





# Speculation: why no effects on psylla densities?

- *Deraeocoris* and *Anthocoris* (tree dwellers) blur effects of other species
- Species shown to move from alfalfa to tree may not be psylla predators (ELISA)

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- Unknown biology
- Preference for aphids?
- Specialist on scale insects

# 2010 plans (end of CSANR funds)

- Nitrogen samples at commercial orchards
- Mowing trial at Moxee farm
  - Hypothesis: mowing prompts movement by predators from alfalfa into trees
  - Methods:
    - Use egg marker in alfalfa, assess whether mowing leads to jump in #'s of marked predators in tree canopy
    - Low RPM rotary mower, deposit of clippings near tree