

## **2008 PROGRESS REPORT: ORGANIC CROPPING RESEARCH FOR THE NORTHWEST**

**TITLE:** Assessing effects on an alfalfa cover crop on biological control and tree nutrition in organic pear orchards

**PERSONNEL:** Vince Jones, Washington State University Tree Fruit Research and Extension Center, Wenatchee, WA 98801  
David Horton, USDA-ARS, 5230 Konnowac Pass Rd., Wapato, WA 98951  
Tom Unruh, USDA-ARS, 5230 Konnowac Pass Rd., Wapato, WA 98951

**CONTACT PERSON:**  
Vince Jones, (509) 663-8181; [vpjones@wsu.edu](mailto:vpjones@wsu.edu)

**REPORTING PERIOD**  
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**KEYWORDS**  
pear psylla, cover crop, biological control, tree nutrition

**ABSTRACT**  
Organic pear growers must balance the conflicting pressures between optimal nitrogen levels and controlling densities of pear psylla, a nitrogen-loving insect pest of pears. We are assessing in 3 certified organic pear orchards and 1 experimental pear orchard whether planting of a legume cover crop (alfalfa) led to improved tree nutrition and increased biological control of psylla. Alfalfa was planted in 2 foot wide strips in each of 3 commercial organic pear orchards in spring 2008; at the experimental orchard, aisle-wide strips of alfalfa had been planted in spring 2006. Each alfalfa plot was paired with a control (grass understory) plot. Sampling at the 3 commercial orchards will begin in 2009 as the alfalfa becomes better established. Sampling of pest and predator densities, predator movement, and tree nitrogen was done in June-August at the experimental orchard. There was no effect of the cover crop on pest or predator densities in the tree canopy. Tree nitrogen appears to have been higher in the cover crop plots than control plots. The predator movement data are still being analyzed.

### **OBJECTIVES**

1. Determine if an alfalfa cover crop leads to an increase in densities of generalist predators in the pear tree canopy;
2. Confirm that increased densities of predators in trees having a cover crop understory are due to movement by predators from cover crop to tree;
3. Assess whether pear tree vigor and foliar nitrogen increase in cover crop plots;
4. Determine whether the increased predator densities in cover crop plots lead to enough of an increase in biological control to offset any increases in psylla fitness associated with the higher nitrogen levels in the cover crop plots;
5. Forward results to growers.

### **PROCEDURES**

The studies are being done in 3 certified organic orchards and one experimental orchard. Three blocks were established at each of the organic orchards (Figure 1). One plot in each

block has a grass understory and the other has a 2 foot wide strip of alfalfa down the center of 4-8 aisles (depending upon plot size) (Figure 1). The alfalfa was planted in early spring 2008 (Figure 2). The experimental orchard consists of 4 blocks, each with paired alfalfa and grass understory. The alfalfa was planted in 2006, and occurs over the entire width of the aisle (approximately 6 feet wide) rather than as a 2 foot wide strip.

Pest and predator numbers are being monitored with sweep nets, beating trays, sticky traps, and by taking leaf samples. Predator movement between cover crop and tree is being assessed by applying a protein-based marker (egg white) to the cover crop, and assaying (with ELISA) tree-collected arthropods for presence of the marker. Leaf samples are taken for determination of nitrogen levels (Bradford assay).

#### PROGRESS TOWARD OBJECTIVES

- Alfalfa planted at 3 commercial orchards (Figures 1 and 2).
- Experimental orchard sampled for predator densities (5 dates), pest densities (5 dates), predator movement (3 dates; specimens not yet completely assayed), predator feeding (3 dates; specimens not yet completely assayed), and pear leaf nitrogen (1 date).
- Results:
  - substantial increase in predator densities on orchard floor associated with alfalfa cover crop (Table 1);
  - despite the increased numbers, no correlative effect on predator numbers in tree estimated either with beat trays or sticky cards (Table 1);
  - counts of psylla adults on trees slightly higher in grass plots (Table 1), but nosimilar effect on psylla immatures (Table 1);
  - 1% increase (by dry weight) in pear leaf nitrogen in alfalfa plots (Table 1).

#### OUTPUTS

- Results are to be presented at 2009 Northwest Pear Research Review (Hood River, Oregon)
- Grower cooperators were kept updated by e-mail

#### IMPACT ON GROWER PRACTICES

None yet

#### INSTITUTION

Washington State University, Pullman, Washington

#### FUNDING SOURCES

Western SARE (2008-2009): \$121,092

Washington Tree Fruit Research Commission - - Pear (2007-2009): \$45,000

#### ORGANIC RESEARCH LAND

Station 1.3 acres non-organic

On-farm 6.6 acres certified

#### FARMER COOPERATORS (3)

Campbell Orchards, Tieton, WA

Valicoff Fruit, Wapato, WA

Leach Orchards, Zillah, WA