

## Orchard Floor Management in North Coast Organic Pear Orchards.

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### **Abstract:**

Weed control is a major challenge for growers of organic tree crops and is closely linked to soil moisture and fertility. Eliminating or reducing weeds in the tree row can increase crop water and nutrient availability. Past research has demonstrated that a clean in-row herbicide strip is optimal for conventional tree crops, but is difficult to achieve in organic systems. Most organic weed control strategies/tactics include various types of tillage equipment, including mowers and cultivators, organic herbicides, flame or steam weeders, and mulches. Tillage is used to control weeds in much of the organic tree fruit in California and while effective for weed control and boosting short-term nutrient release, growers often experience loss of soil quality. In-row mowing is also practiced in many organic orchards because it is inexpensive, but fails to effectively eliminate competition for water and nutrients. Organic or synthetic mulches are expensive, but may increase soil moisture and are thought to improve fruit size and yields. Available organic herbicides are relatively ineffective, especially for perennial weeds, but can reduce weed growth to tolerable levels with multiple applications

### **Objective:**

Our objective in the second year of this project was to determine if the efficacy of several weed control methods, 3 organic herbicides (Acetic acid, BioLink and Matratec), EcoCover (a mulch derived from recycled shredded paper), tree mulch (made from shredded trees) and combinations of these improved after a second year of treatment. This experiment was conducted in a young non-bearing orchard in Kelseyville, CA. Note: BioLink treatment replaced GreenMatch treatment in second year of study because Marrone Bioinnovations Corp. discontinued the sale of GreenMatch due to formulation problems.

## Significant Findings:

- Organically registered herbicides are ineffective as a standalone form of weed control and a second year of treatments did not improve effectiveness.
- Mulch derived from wood chips or shredded paper is a more effective form of organic weed control.
- Organic herbicides provided little, or no, long-term improvement to mulch treatments.

## Procedure:

Weed control strategies were applied to a young pear orchard for a second year to assess relative efficacy. Treatments strategies were: 1) Three organic herbicides applied one or two times (different treatments); 2) growers' standard practice (tree mulch); 3) growers' standard practice (tree mulch) plus an organic herbicide to enhance control; 4) EcoCover (EcoCover USA Corp. Huntington Beach, CA) mulch made from shredded recycled paper, with and without added tree mulch and 5) untreated control.

A single row in a young (4<sup>th</sup> leaf) orchard in Kelseyville, Lake County was utilized. The treatments were applied to established plots from the 2011 trial. The continuing trial is a randomized complete block with 4 replicates, plots were not re-randomized. Treatments were applied as 4 foot strip with each plot being 20 feet long applied by CO2 backpack. The organic herbicides used were BioLink experimental herbicide (Westbridge Corp., Vista CA) Matratec (Brandt Consolidated Inc., Springfield, and IL.) a clove oil based herbicide, and acetic acid product Weed Pharm (Pharm Solutions Inc. Port Townsend, WA). Spray volume was 70 GPA using a single 8006E TeeJet nozzle. Natural Wet(Safer Gro Labs, Ventura CA) a yucca based organically registered adjuvant was added to each treatment at 1% v/v. Herbicide treatment rates were made on a volume/volume basis for the formulated product plus water, except Weed Pharm which is formulated at 20% acetic acid and is applied as a "Ready to Use" application. In the second year of this study the herbicide treatments were applied on April 19<sup>th</sup> 2012 The EcoCover paper mulch alone treatment was removed and reapplied on March 27, 2012. The tree mulch alone and tree mulch over EcoCover treatments were not reapplied in the second year. All mulches were applied by hand. The second application of BioLink, WeedPharm and Matratec (treatments 3, 5, and 6) were reapplied on June 20, 2012. A visual rating of the phytotoxicity to broadleaf and grass weeds was taken 8 days after the first treatment. A second overall weed control rating was taken near the end of the growing season on August 13, 2012.

## Results:

The table below summarizes the visual weed control ratings taken during the growing season.

Treatments	Phytotoxicity 4/27/12		8/13/12
	Broadleaf	Grass	Control
1. UNTREATED CONTROL	-	-	2
2. Acetic Acid 20% 1-Application	4.25	5.5	2.25
3. Acetic Acid 20% 2-Applications	4.5	5	2.75
4. BioLink 6% -1 Application	4.25	4.75	2.5
5 BioLink 6% -2 Applications	4.25	4.5	2.25
6. Matratec 10% -2 Applications	2.75	2.25	2.75
7 EcoCover paper mat-alone	-	-	6.5
8. EcoCover + tree mulch	-	-	3.5
9. Tree mulch alone	-	-	4.25
10. Tree mulch + Acidic Acid( 1 App)	3.5	3.5	3.75
Phytotoxicity ratings are based on a 1-10 scale; 1=no damage; 10= complete damage	Control ratings are based on a 1-10 scale; 1=no control; 10= complete control		

## Discussion:

Matratec (also known as Matran) is the only herbicide treatment in this experiment currently approved for use in orchard systems, conventional or organic. Treating this orchard with organic herbicides for a second year did not improve weed control. Because the first year treatments were more effective on broadleaf weeds than on grass weeds there was more grass in the plots. The weed control provided by this year's organic herbicide treatments would be deemed unacceptable by most growers. The tree mulch provided better control of weeds throughout the season. During this season the grower applied tree mulch to the remainder of the orchard and it appeared to be providing adequate weed control. The paper mulch applied in year one broke down and was replaced in year two and provided good weed control. Unfortunately, as in the first year a perennial weed, field bindweed (*Convolvulus arvensis*) growing in the orchard middles over-took the weed plots in much of the trial. In other experiments we have found that organic herbicides are more effective in areas with a relatively low density of small broadleaf weeds. Organic herbicides have not as yet proven to be a reliable, cost-effective standalone weed control solution in orchard crop production, and provided little, or no, long-term improvement to mulch treatments.

