Organic Weed Management Techniques

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Organic Weed Management Learning Center

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Introduction:

The Learning Center was established at the Old Fort Lewis campus at Hesperus, CO. It provided hands-on training to agriculture professionals, master gardeners, model farmers, agriculture students and progressive producers. Our target region included LaPlata, Montezuma, Archuleta, Dolores and San Miguel counties in Colorado as well as San Juan county in New Mexico. Participants were recruited with the assistance of San Juan Basin Extension agents by hosting organic weed management symposiums, initial workshops and hands-on workshops during the growing season. Additionally, five presentations were given in the region to increase awareness of the Learning Center and recruit participants. Once participants indicated an interest in the Learning Center, they were updated via email on upcoming activities.

Daylong winter (February) symposiums on organic weed management included university and extension personnel covering topics relevant to both agriculture professionals and producers. These presentations presented topic-related research results and practical recommendations. Initial workshops were held at the Learning Center in April to provide in-depth information on a selected topic, gather baseline data on practices and to introduce participants to the Learning Center facility. Attendees at these workshops were asked to complete a survey on current weed management practices. This data was analyzed by SouthWest Marketing Network. With the help of Fort Lewis College (FLC) students a demonstration market garden was established. FLC students propagated transplants in their greenhouse and the Agriculture Field Techniques course designed and installed the organic weed management research plots. Students also assisted with data collection for the 15 different treatments throughout the summer and fall.

Multiple hands-on workshops were held at the Learning Center from June until October covering topics in soil analyses, methodology, efficacy, production and web-based information. Two or three of these two-hour workshops were held together so participants could be exposed to multiple topics in a shorter format.

In addition to symposiums and workshops, a blog (www.organicweedmanagement.blogspot.com) and website (www.fortlewis.edu/owm) have been maintained to post workshop presentations, weed management resources and provide updates on the research plots.

Organic Weed Management Trials:

Production trials using 15 different treatments were conducted in 2009 and 2010. A preliminary trial was conducted in 2008 to develop the best methods. The 2008 trial planted each treatment in a 25’ x 20’ block with 4 reps (5’ each) of five different crops (beans, beets, broccoli/cabbage, corn and peas). The crops were chosen to demonstrate cool and warm season crops along with transplants and direct seeded crops. For the final trials in 2009 and 2010, peas were removed because they need to be planted in April. The final trials were placed in 80’ rows using 4 reps of the selected crops. This layout more accurately represents the vegetable bed configurations we see in market gardens.

Thermacrons were programmed to record temperatures every 2 hours. A thermacron was placed in a plastic bag and buried approximately 8 inches under each treatment for the duration of the season. Data was downloaded and analyzed for minimum, maximum and average temperatures by month for each treatment. Complete results can be found in Appendix Table 3.

During harvest, all product was weighed (beans, beets, broccoli) or counted (corn and cabbage) by treatment and rep. Values were converted to ratios (100 = average value) to fairly compare data across years. Complete results can be found in Appendix Tables 1 and 2.

Installing Barriers

All barriers will need to be placed on prepared beds. Preparation should include removing weeds, leveling beds, removing rocks or other sharp objects and moistening soil with water. If using drip irrigation tape, it can be laid under barrier or on top. If laying under barrier, it should be put down prior to laying barrier.

We found that barriers should be at least 3' wide with 4-5' being more ideal if you want wider beds. The barrier edges will need to be buried at least 6 inches on all sides to prevent wind from wreaking havoc. If you purchase a 2' wide barrier and bury it properly, you only have 12 inches of weed barrier remaining. Likewise, the 6' barriers were too wide for the mulch layer machines.

During the course of this project, we used three different methods to lay barriers: By hand, plastic roller on prepared beds and plastic roller/bed shaper combination.

If laying by hand, roll out barrier quickly on moistened bed (helps barrier adhere to soil until secured) when it is not windy. Garden staples, rocks or extra hands can be used to secure barrier while you quickly bury edges. Use a sharp shovel to dig directly under barrier edge. Immediately place the dirt directly on the edge of the barrier pushing the barrier into the newly dug trench. Repeat for the length of the barrier one shovel width apart. Be sure that barrier is covered in trench and then compact dirt by stepping on it or using a shovel.

There are two types of mulch layers with and without bed shapers. We used the mulch layers on all types of barriers including the degradable ones with good success. Some layers place a metal bar in the core of the barrier while others place the barrier on top of rollers. We found that the layers with the core worked better for more fragile barriers.

We installed the drip line prior to using the mulch layer. The drip tape was secured with garden staples and was used as a guide for the tractor driver to keep rows straight.

We also recommend that you use a tractor that is approximately the same width as your mulch layer. Note in the above picture that the tractor wheels are 12-15 inches wider on each side. Because of this, we had to leave extra space between each row of barrier so that the tractor wouldn't drive on the installed barrier. Since we had several different types of treatments, we placed a non-barrier treatment between the installed barriers so there was not wasted space.

Mulch layers unroll the barrier on the ground and then use a wheel to hold the edge in place. To cover the edge, a round disc pushes dirt on the barrier. There are several adjustments that need to be made if you use barriers that are different widths. The angle and depth of the disc influenced how well the barrier edges were covered. The 3 point arm was adjusted to raise or lower the front of the much layer which affects the bed shaper or soil leveling feature.

Once the barrier is laid, you are ready for transplants or seeding. Use a very sharp utility knife to cut X's for transplants or long T's for seeding. We found that cutting the long rows for seeding often caused issues with the more fragile barriers. You need to secure the edges of the long rows or they will rip. We used garden staples to keep slits open for emerging plants.

While the plastic barriers are fairly maintenance free, we found that some of the degradable and alternative barriers required a lot of care for the first couple of weeks. We found a fine line between keeping the paper-based barriers too wet (begin to break down) and too dry (tear in the wind). While garden staples work well in plastic barriers, they often cause the degradable barriers to tear. We tried rocks and other objects to weigh down the corners of barriers but the spots under the objects degraded quickly causing larger holes.

Organic Weed Management Techniques

Plastic Barrier Methods

- **Black Plastic**
- **Sunbelt and NRCS Weed Fabric**
- **Garden Mat**
- **Red Plastic**
- **Embossed Black Plastic**
- **Embossed White on Black Plastic**

Degradable Methods

- **Planters Mulching Paper**
- **Shredded Paper**
- **Bark Mulch**
- **Bio-film**
- **Ecocover**
- **EcoOne**
- **Embossed Black Biodegradable**
- **Weed Guard Plus**

Cultural, Biological and Mechanical Methods

- **Flaming**
- **Horticultural Vinegar**
- **Corn Gluten Meal**
- **Glaser Wheel Hoe**
- **Hand Weeding**

Plastic Barrier Methods

Black Plastic

May, 2010

Specifications and Installation Notes:

Purchase at least 4 mil plastic. Black plastic was found to have highest minimum temperature early in the season.

Observed Advantages and Disadvantages:

Advantages

- Puncture resistant
- Available at most local stores
- Proven Production results
- Tends to hold more heat during early Spring
- Cheapest at $.05/square foot

Disadvantages

- Not biodegradable
- Must be removed at the end of the year
- Tends to hold more heat during summer
- Not porous to water

Purchasing and Cost Information:

3' x 50'roll - $7.44 ($.05 per square foot)

Resources:

How to setup black plastic: http://www.youtube.com/watch?v=H5-qlZ04TWk
Mulch Laying System: http://www.youtube.com/watch?v=6fOIGj1GZWM&feature=related
Hubbard Mulch Laying System (make your own): http://www.youtube.com/watch?v=yx965D1po3w&feature=related

Temperature and Production Data

Temperature Data (degrees F)			
Month	**Avg**	**Min**	**Max**
May	59.2	47.3	72.5
June	64.6	50.9	77
July	69.1	56.3	91.4
August	66.5	61.7	73.4

Production Data (expressed as ratios)					
				Average	
	2008	**2009**	**2010**	**2008-10**	**Ranking**
Weight	199	164	129	164	1
Counts	143	56	56	85	16

July, 2010