

# *San Juan Basin Research Center*

*Colorado State University  
Agricultural Experiment Station  
Hesperus, Colorado  
Beth LaShell*



# SJBRC Staff

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# Developing A Hands-on Organic Weed Management Learning Center For Commercial Market Gardens In Local Communities





# WSARE Grant

- Western Region
- Sustainable Agriculture Research and Education
- Professional Development Grant
- August 1, 2008 to July 31, 2010



# Purpose

- Develop a Learning Center for organic market garden weed management strategies
  - Address the needs of newcomers to the 4-Corners region and long time residents looking for more sustainable alternatives or methods to increase income



# Primary Investigators:

- Beth LaShell, San Juan Basin Research Center
- Darrin Parmenter, La Plata County Horticulture Agent
- Dr. Phil Shuler, Fort Lewis College
- Jim Dyer, SW Marketing Network
- Gary Hathorn, Model Farm Dissemination Program; Shiprock, NM
- Tom Hooten, Montezuma County Agent



# Training Participants

- **Agriculture professionals**
- **Master Gardeners**
- **Students**
- **Progressive producers**
- **Model Farmers**
  - Opinion leaders in culturally diverse communities, and training the next generation of professionals and producers



# Outcomes

- Establish Learning Center for training participants in organic weed management strategies
  - Determine knowledge level of Learning Center training participants
  - Provide hands-on organic weed management training to Learning Center participants
- Increase availability of training opportunities and resources on organic weed management
- Create printed document (2011) containing purchase information, appropriate methods, cost, efficacy, and sustainability data





# More Outcomes...

- Establish website to document strategies and provide links to current literature
  - [www.colostate.edu/dept/sjbrc/owm](http://www.colostate.edu/dept/sjbrc/owm)
- Create BLOG
  - [www.organicweedmanagement.blogspot.com](http://www.organicweedmanagement.blogspot.com)
- Provide agriculture professionals with different methods of obtaining the knowledge to help organic producers.
- Assist participants in establishing on-farm demonstration sites in Year 2 to increase local knowledge and implementation.



# Workshops for 2010

- **Initial Workshop in April**
- **Summer Workshops (1.5-2 hours)**
  - Methodology
  - Soil and sustainability analysis
  - Efficacy and production
  - Hands-on tool usage
  - Managing web-based information
- **Organic Weed Management Symposium**



# Demonstration Area at SJBRC

- Organic Market Garden Plots
  - 2008: Used 10 different techniques
  - 2009: Used 14 different techniques
- Crops Grown
  - Beans, Beets, Corn, Broccoli, Cabbage, Peas (only 08)





**FLC Students  
created and planted  
market garden plots**



**Plots established- May 11, 2009**



**Plots established- May 22, 2008**

# OWM Techniques in 2009

## Barrier Methods

- Black Plastic
- Sunbelt Weed Fabric
- NRCS Weed Barrier
- Garden Bio-Film
- Planters Mulching paper
- Garden Blanket
- Weed Guard Plus
- EcoCover
- Shredded Paper

## Cultural and Biological

- Horticultural vinegar
- Flaming
- Corn Gluten Meal
- Glaser Wheel Hoe

## And a Control



# What happens if you do nothing?



# Barrier Methods

- Black Plastic
- Sunbelt Weed Fabric
- NRCS Weed Barrier
- Garden Blanket





# Black Plastic

- 3' x 50' roll - \$7.44
  - \$.05 per square foot
- 4 mil plastic
- Not biodegradable
- Puncture resistant
- Looks the best!





# Sunbelt Weed Fabric



- 3 x 50 ft roll \$14.79; 3' x 300' roll \$69.99
  - \$.17 to \$.08 per square foot
- 3.2 oz/yard high-grade fabric blocks 99.7% of light
- Resistant tearing, puncturing and weed penetration
- Approved for most government weed control applications
- Typically lasts 8-12 years
  - Manufacturer guarantees product for 5 years against UV breakdown
- Observations
  - Surface gets very hot during peak of summer
  - Can be reused in market gardens
  - 3' may not be wide enough for market garden rows





# NRCS Weed Barrier



- 6' x 300' or 4' x 300' available
  - \$115.50 and \$76.75, respectively
    - \$.06 per square foot
- Keeps the UV rays out
- Resistant tearing, puncturing and weed penetration
- Long lasting and reusable
  - 2010 will be fourth year for some pieces
- Observations:
  - Surface gets very hot during peak of summer
  - 6' may be too wide for market garden situations
  - Shifts easily if cut slits for plantings; does better with single holes for transplants





Picture from 2009 where we overlapped fabric to create square plots. Six feet may be too wide





# Garden Blanket



- 2' x 50' package \$12.99
    - \$ .13 per square foot
  - Convenient perforated tear offs
  - Pre-cut X's for plant locations
  - Micro perforations let in water
  - Absorbs sun rays that warm soil
  - Includes garden staples
- Observations:
    - Need more staples than provided
    - Slits for continuous rows caused barrier to tear in wind



# Biodegradable Barrier Methods

- Bio film
- Planters Paper
- EcoCover
- Shredded Paper
- Weed Guard Plus





# Garden Bio-Film



- 5 x 30 ft roll \$16.95
  - \$.04 per square foot
- 100% biodegradable and compostable mulching film
  - Made from cornstarch and other renewable resources
  - Begins to decompose in 50-60 days, biodegrading 95% after about 90 days depending on environmental conditions
  - Shelf –stable, its decomposition ability is only activated by UV exposure
  - It can be tilled into the soil at any time during the season
- Observations
  - Installation can be difficult
  - Edges must be secured
    - Only 30 inches wide





# Planters Mulching Paper



- 2' x 200' package \$29.99
  - \$ .15 per square foot
  - Getting more difficult to find
- Biodegradable, mulching paper
  - When the edges are secured, the crepe in the thin paper allows it to hug the soil and to efficiently pass on the heat it absorbs.
  - Porous to water, it effectively suppresses weeds and keeps vegetables from contact with the soil, reducing spoilage
  - Made from recycled paper containing a resin binder and an anti-microbial to stop decomposition at the paper/soil interface
- Observations:
  - Edges must be secured
  - Installation can be difficult
  - 2' is too narrow for market garden rows
  - Excessive moisture can accelerate decomposition





Sustainable Agriculture  
Research & Education





# EcoCover



- 1m x 100 m package \$65.00 plus \$60 shipping
  - \$ .12 per square foot
- Organically Certified Mulch Mats made from waste paper
- Manufactured in New Zealand; Limited availability in U.S.
- Observations:
  - Very easy to install
  - Edges must be completely covered to prevent tearing from wind





# Shredded Paper



- Shredded office paper and obtained bags from local bank
- Created method to lay paper mat
  - Used cardboard sides and created about 6' at a time alternating paper and water
  - Created 2 inch thick layer
- Observations:
  - Lowest weed percentage
  - Lowest crop production figures
  - Plants were deprived of Nitrogen





Picture taken July 7, 2009





**Planters Paper (left) vs Shredded Paper (right)**  
**July 30, 2009**





# Weed Guard Plus



- 23'' x 50' package \$12.99
  - \$ .13 per square foot
- 100% Natural Decomposition
- Fertilizer enhanced (5,5,5)
- Helps retain water and reduce soil erosion
- Observations:
  - Edges must be secured; Installation can be difficult; Tears in wind
  - 2' is too narrow for market garden rows
    - Notice excessive weed growth between rows
  - Excessive moisture can accelerate decomposition



# Cultural and Biological Control

- Horticultural Vinegar
- Flaming
- Corn Gluten Meal
- Glaser Wheel Hoe



# Horticultural Vinegar

- **1 gallon; \$26.00**
  - 1/2 gallon will treat 80 linear feet
- 20% Acetic Acid (household is typically 5%)
  - Diluted to 10% for research project
- Spray directly on dry leaves
- Most effective on warm, sunny days
- Contains Yucca extract to increase effectiveness
- High acidity (over 11%) can cause skin burns and eye damage



# Horticultural Vinegar- Apply when weeds are small



2008



2009







# Flaming



- Tractor mounted or handheld units available
  - Weed Dragon: \$69.99
  - Can produce heat up to 2,000 F
- Propane fueled
  - Purchase tank separately
- Pass heat quickly over small weeds
- Water in cells boils and bursts the cells
- Generally does not kill grasses
- Certain vegetables will not tolerate heat





# Corn Gluten Meal



- By-product of corn milling process
  - Pre-emergent herbicide
    - Effective in stopping or inhibiting root formation
    - Must be applied after seeds have germinated or use transplants
  - 10% Nitrogen
  - Been primarily used on lawns
    - 20 lb/1000 square feet recommended

## Trade names:

- WOW, WeedBan, SafeLawn
- \$.02/square foot plus shipping
- Lawn products are not as effective
  - Pure corn gluten meal not readily available





# Glaser Wheel Hoe



- Lightweight with low center of gravity
  - \$349 for professional version
    - Wider; heavier duty; 57 inch handle; 12'' wheel
  - \$199 for standard version
    - 52 inch handle; 10'' wheel
- Several attachments available
  - \$59-\$99
  - Oscillating knives
  - Furrower
  - Cultivator



# Cost Comparison Review

	Cost	Square feet	Cost per sf
Black Plastic	\$ 7.44	150	\$ 0.05
Sunbelt Weed Fabric	\$ 24.99	150	\$ 0.17
	\$ 69.99	900	\$ 0.08
NRCS Weed Barrier	\$115.50	1800	\$ 0.06
	\$ 76.75	1200	\$ 0.06
Garden Biofilm	\$ 16.95	400	\$ 0.04
Planters Mulching Paper	\$ 29.99	200	\$ 0.15
Garden Blanket	\$ 12.99	100	\$ 0.13
WeedGuard Plus	\$ 12.99	100	\$ 0.13
EcoCover	\$125.00	1024	\$ 0.12
WOW: CGM	\$ 49.90	2000	\$ 0.02
Horticultural Vinegar	\$13.00	240	\$ 0.05



# Weed Suppression

Treatment	DataPoint	Percentage
Glaser Wheel Hoe	Weed	0.83%
Shredded Paper	Weed	3.33%
Biofilm	Weed	15.42%
NRCS	Weed	16.67%
Sunbelt	Weed	22.08%
BI Plastic	Weed	34.17%
EcoCover	Weed	41.25%
Weed Guard Plus	Weed	52.50%
Hort Vinegar	Weed	59.58%
CGM	Weed	62.08%
Control	Weed	71.25%
Garden Blanket	Weed	74.58%



# 2009 Production Data (Beans, Beets, Broccoli)

<u>Treatment</u>	<u>Total Production (pounds)</u>
EcoCover	21.3
Planters Paper	19.9
CGM	18.6
GWH	18.2
Sunbelt Weed Fabric	17.4
Biofilm	15.6
Flaming	13.3
Hort Vinegar	12
Black Plastic	11.4
Garden Blanket	7.5
Weed Guard Plus	6.3
NRCS Fabric	5.1
Control	2.2
Shredded Paper	0.8



# New Barrier Methods for 2010

- Red Mulching Film
- Newspaper/Straw combination
  
- Removing the following:
  - Shredded Paper
  - WeedGuard Plus



# Summer Workshops

- **Hands-on Topics**
  - **Methodology**
    - Tour demonstration plots
  - **Soil and sustainability analysis**
    - Soil sampling, pH meters, water filtration, soil compaction
  - **Efficacy and production**
    - See which methods are working
  - **Hands-on tool usage**
    - Glaser Wheel hoe, Flamers, Hand tools
- **Schedule**
  - **Beginning in June**
  - **1.5 to 2 hour workshops at SJBRC in Hesperus**
  - **Usually conduct 2-3 different workshops**





# Summer 2009 Workshops



# Becoming involved in OWM Learning Center

- Website
  - [www.colostate.edu/dept/sjbrc/owm](http://www.colostate.edu/dept/sjbrc/owm)
  - Long term storage of information
- Blog
  - [www.organicweedmanagement.blogspot.com](http://www.organicweedmanagement.blogspot.com)
  - Small articles/pictures that can be easily updated



# Demonstration Plots for 2010

- Shiprock, NM
- Norwood, CO
- Bayfield, CO

Will work with producer to set up best organic technique for their crop and climate



# How can you be involved?

- Sign up to be a participant!!!
  - Complete form today and you'll receive email updates on workshops and activities
- Attend workshops
- Contact me at [lashell\\_b@fortlewis.edu](mailto:lashell_b@fortlewis.edu)
- Stop by anytime to tour the demonstration plots



# Questions?



## WSARE Hoophouse at Hesperus

**Before**



**After**



**Demonstration Site 1-09**

