RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

ORGANIC FARMING EDITION $1.50 NOVEMBER 20, 2003

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Growing the Great Organic Pumpkin Patch in a Leaf Mulch Bed

Joseph R. Heckman, Specialist in Soil Fertility

Creating an attractive environment for entertainment agriculture or the U-pick operations may bring more customers to your pumpkin patch. Imagine picking organic pumpkins in a weed free field without getting your shoes muddy. Bringing that image into reality is the objective of field trials currently underway at Rutgers.

In the 2003 growing season at the Rutgers Vegetable Research Farm-3 near New Brunswick we demonstrated that an attractive environment could be created by growing organic pumpkins on soil mulched at planting time with a six inch layer of leaves. The field, which is in its first year of organic transition, is adjacent to the Cook Student Organic Farm. The leaves were obtained from the Cook College campus and spread on the field using a manure spreader. Pumpkin seeds of the Howden variety were planted in the greenhouse and then transplanted into the field as the first true leaf appeared. The pumpkins were grown on both leaf mulched soil and on bare soil without mulch. When planting into the mulched area, the leaf mulch was scraped aside by hand in order to carry out the transplanting. The pumpkin plants were spaced equidistant 8 ft x 8 ft. Because soil test levels for P and K were already above optimum, only N was needed to grow the pumpkin crop. Each pumpkin transplant was fertilized with two tablespoons of dried blood, placed two inches deep near the base of the plant; one applied at transplanting and the second applied when the vines began to run. No pesticides were applied to control insects or disease.

Preliminary findings from this single field trial were as follows:

- Pumpkin yield and size were similar in the mulched plot and the un-mulched plot.
- Pumpkins in the mulched plot generally had better handles.
- Pumpkins in the un-mulched plot were muddy on the underside and would need to be washed and scrubbed to be clean prior to sale. Only leaves clung to the undersides of the mulched pumpkins and the leaf residue was easily brushed off by hand.
- As pumpkin vines grew over the surface of the mulch, they were able to send roots through the mulch layer and into the soil.

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PUMPKINS FROM PAGE 1

- The leaf mulch was very effective in controlling annual weeds but some perennial weeds grew through the mulch. In the un-mulched plot the weeds were controlled by cultivation until the vines covered the area.
- A few pumpkin plants were initially stunted when they were transplanted into the compacted zone made by the wheel traffic of the manure spreader. Thus, leaf mulch applications should be made only when the soil is dry enough to adequately support the field equipment.
- Leaves that were applied to the field were wet at the time of application, and they stayed in place. Thus, the typical concerns with leaf litter blowing off the field were not a problem in this case. This issue needs to be investigated on other sites with higher wind exposure.

Fig. 1. Pumpkin plants growing in a leaf mulched field. Plant on the right was stunted due to soil compaction resulting from wheel traffic.

Fig. 2. Pumpkin vines growing over leaf mulched soil with excellent weed control.

Fig. 3. Pumpkin plots before harvest (un-mulched in foreground, mulched in rear).

Fig. 4. On the left, pumpkins from un-mulched plots; on the right, pumpkins from leaf mulched plots. Note that the pumpkins from the leaf mulched plots exhibit a cleaner fruit surface after soil and leaf residue was brushed off by hand.

Transitioning to Organic: Weed Management for Soybean Production

Daniel Kluchinski, Department Chair, Agricultural and Resource Management Agents

Exponential increases in organic food sales, increased demand for soy foods due to substantiated health benefits, uniform national organic certification standards, and new and emerging markets are all positive reasons for transitioning some soybean acreage to organic production. However, the greatest management risk that growers fear in transitioning is weed control. New combinations of cultural and mechanical weed control practices need to be investigated to identify practical, effective and economical weed control methods in soybean under organic production methods.

A study was conducted in 2001-2002 at the Rutgers University Snyder Research and Extension Farm in Pittstown, NJ on a Quakertown silt loam soil. The study included 12 treatments to evaluate row width [narrow rows (8 inch) or wide rows (30 inch)], tillage timing and sequence (early, late or sequential), tillage equipment (rotary hoe or Buffalo™cultivator), and cover crop (rye residue) on weed control (Table 1). The plots are certified organic by NOFA-NJ or managed following USDA-National Organic Program standards. A randomized complete block experimental design with three replications was used. Ohio FG1 (food grade) soybean were planted at 215,000 plants/A. Due to poor rye stand in 2001, 40 lbs. of rye straw was hand applied per plot (equivalent to 2.9 tons/A) and this treatment used in 2002. Cultivations were done as per treatment listed below. Weed control data were taken August 2, 2001 and July 12, 2002 and plots harvested on November 12, 2001 and November 4, 2002.

Results

- Annual broadleaf and annual grass weed control was generally higher both years in wide row soybean compared to narrow rows. Weeds included galinsoga, lambsquarter, redroot pigweed, Pennsylvania smartweed, ragweed, barnyardgrass, crabgrass and giant foxtail.
- Most of the wide row plot tillage treatments provided fair (60-80%) or good to excellent (80-100%) control, while narrow row tillage treatments provided poor (20-60%) to fair control.
- Rye residue cover provided 4% control of broadleaf and 0% control of grass weeds in 2001, while in 2002, 88% control of broadleaf and 82% of grass weeds was achieved. The poor weed control in 2001 was most likely due to extended wet weather, decomposition of the residue and extended favorable conditions for weed establishment.
- Yields ranged from 36 to 49 bu/A in 2001, and 22 to 54 bu/A in 2002. In 2001 and 2002, yields were higher in wide versus narrow rows; wide row yields averaged 44 bu/A, and in narrow row plantings, 42 and 32 bu/A, respectively.
- In both years, yields were significantly lowest in narrow row soybean when two passes of a rotary hoe were used, as shown here, due to reduction in soybean plant populations or detrimental root pruning.
- Although plant populations were significantly reduced both years by the rye straw residue, yields (45.9 and 38.9 bu/A, respectively) were comparable with tillage-based treatments.
- Wet weather conditions reduced the effectiveness of the rotary hoe and therefore weed control obtained.
- In 2001, the highest yield (49.4 bu/A) occurred in wide row soybean with a single pass of a cultivator. The highest yield in 2002 (53.9 bu/A) occurred in wide row soybean with one pass of a rotary hoe and two passes

See Results on page 4

Table 1. Treatments - Tillage, Planting and Cultivation Dates

		2001	2002
Tillage (chisel plow + disk/harrow)		May 31+June 27	April 19+May 8
Planting Date		June 27	June 4
Treatments and Cultivation Dates (DAP=days after planting)			
1.	narrow row – hand-weeded control	as needed	as needed
2.	narrow row – no weed control	none	none
3.	narrow row, 1 rotary hoeing (RH)	12 DAP	13
4.	narrow row, 2 RH	12 DAP + 20 DAP	13 DAP + 22 DAP
5.	narrow row, 2 RH	12 DAP + 20 DAP	13 DAP + 22 DAP
6.	narrow row – into rye straw	none	none
7.	wide row – hand-weeded control	as needed	as needed
8.	wide row, 2 RH	12 DAP + 20 DAP	13 DAP + 22 DAP
9.	wide row, 1 RH + 1 cultivation (C)	12 DAP + 30 DAP	13 DAP + 39 DAP
10.	wide row, 1 late C	30 DAP	22 DAP
11.	wide row,1 RH + 1 C	12 DAP + 23 DAP	13 DAP + 22 DAP
12.	wide row, 1 RH + 2 C	12 DAP + 23 DAP + 30 DAP	13 DAP + 22 DAP + 33 DAP

Results from page 3

of a cultivator. Excellent weed control was achieved both years without reducing soybean plant populations.

Based on the study findings, the following recommendations can assist farmers interested in transitioning soybean production using organic practices:

- Prepare the seedbed a few weeks after primary tillage to allow weeds that emerge during that time to be killed.
- Plant into warm soil for quick soybean germination and establishment.
- Be prepared for unpredictable spring weather conditions, as wet, dry or cold weather can reduce weed control options and timing in narrow row production.
- A narrow row system can be successful depending on the cultivation equipment available. A rotary hoe with independent, floating ground driven wheels (hoes) that follow the contours of the field is best.
- Cover crop or crop residues may provide an increment of weed control.
- For maximum flexibility, plant in wide rows as they allow for weed control practices early and later in the growing season.
- Cultivators can be used to control weeds shortly after emergence and up to four weeks after planting. One pass often provided better weed control than one or two passes of the rotary hoe.
- Organic production systems require an integration of the above practices, experimentation to determine what best works on one's farm, and an appreciation for diligent planning, observation and management. ❑

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the National Organic Program onto land on which crops are grown using organic farming practices will not be an insured peril on any certified, transitional or buffer zone acreage. Crop losses due to poor quality will be adjusted according to the same procedure that applies to conventional crops.

Additional Information/Questions

Producers should consult their crop insurance agent to obtain specific information and applicable deadlines. A list of crop insurance agents is available at all USDA Service Centers throughout the U.S. or at the website address: www3.rma.usda.gov/apps/agents/.

Editor's Note: For more information on Crop Insurance in New Jersey including educational workshops or insurance agent lists, visit the Rutgers Cooperative Extension web site at: http://salem.rutgers.edu/cropinsurance or by calling the Rutgers Cooperative Extension Office in Salem County at 856-769-0090. ❑

Organic Outperforms Conventional in Drought Years

Olga Wickerhauser, NJAES Sustainable Agriculture Coordinator

Researchers at The Rodale Institute report that organically grown corn and soybeans significantly outyield their conventionally grown counterparts under drought. The researchers base this claim on data from The Rodale Institute's Farming Systems Trial, which was started in 1981 and is one of the longest-running experiments comparing organic and conventional production in the world.

The trial compared two organic treatments – one based on manure and the other on legume green manures for fertility – to a conventional treatment where the main inputs were synthetic fertilizers and herbicides.

Organically grown soybeans and corn grown under the manure based organic system outperformed conventionally grown crops in each of the six drought years during the 21 years of the trial.

Yields of corn grown in a legume green manure system were higher than that of conventional corn in five of the six drought years. The only exception was in 1999, a year of extreme weather, when severe crop season drought was followed by hurricane Floyd's torrential rains. In that year, corn grown after a legume cover crop yielded only one-third that of conventional corn. Researchers speculate the reason was that the hairy vetch cover crop used up what turned out to be most of the water the crops would get that year.

The study also found that the organic systems were more environmentally stable during the flood of 1999. The organic plots allowed less runoff and greater recharge of ground water.

In the trial, the researchers used a lysimeter placed below the plow layer to collect water in all plots. They found that, over a five-year period, water collected from organic plots was about 20% more than from conventional plots.

The researchers believe the higher yields in the organic treatments are due to the higher water holding capacity of the soils in the organic treatments, which received amendments of organic matter in the form of manure or legume green manures.

For more information, see the original article, which was published in the September 2003 issue of the American Journal of Alternative Agriculture (Lotter, D.W., R. Seidel, and W. Liebhart, 2003. *The performance of organic and conventional cropping systems in an extreme climate year*. American Journal of Alternative Agriculture 18(3):146-154.)

Also, a detailed story about the research appeared in the November 7 issue of The New Farm (www.newfarm.org). ❑

Insurance Coverage for Organic Crops

USDA Risk Management Agency (RMA), Raleigh Regional Office

Reprinted from USDA RMA Factsheet, October 9, 2003.

USDA Sets Guidelines to Provide Crop Insurance for Organic Farming Practices

The Agricultural Risk Protection Act of 2000 (ARPA) provides that organic farming practices be recognized as good farming practices. Prior to this ruling, crop insurance policies may not have covered production losses when organic insect, disease, and/or weed control measures were used and such measures were not effective.

Written Agreements

The Federal Crop Insurance Corporation (FCIC) has revised the Basic Provisions (04-BR) for 2004 to reflect the modifications made by ARPA. Crop Insurance will not be provided for any crop grown using an organic farming practice—unless the crop has a published rate on the county actuarial table, or a Written Agreement is requested. The organic farming practice may be insured through a Written Agreement if a rate for the organic farming practice is not specifically listed in the county actuarial rate table, according to 04-BR section 37(a). For the 2004 Crop Year a Written Agreement must be requested for the following crops: Apples, Cranberries, Forage Production, Forage Seeding, Grapes, Peaches, Small Grains, and Southern Potatoes. Written Agreements are not available for Catastrophic Risk (CAT), Income Protection (IP), Revenue Assurance (RA) plans of coverage or for pilot program crops, unless permitted by the crop provision.

Coverage Availability

Organic crop coverage for crop year 2004 will be available for both transitional and certified organic acreage in accordance with approved underwriting guidelines and procedures. Insurable damage caused by insects, disease, or weeds will be covered if recognized organic farming practices fail to provide an effective control. Damage caused by the failure of organic farming practices to control weeds due to an insured cause of loss is also covered. If any acreage does not qualify as certified organic or transitional acreage by the final acreage reporting date, such acreage will be insured under the provisions of the standard policy, and applicable rates and coverages for the conventional farming practice will apply.

Price Election or Dollar Amount of Insurance

The price elections or dollar amounts of insurance applicable to both certified organic acreage and transitional acreage will be the price elections or dollar amounts of insurance published by RMA for the crop for the current crop year. Price elections will not increase for the organic practice. The insured is required to maintain separate APH databases for "conventional and transitional or certified organic acreage." Premiums will be adjusted to recognize any additional risk associated with covering the organic crop acreage.

Crop Losses

Any loss due to failure to comply with the organic standards will be considered an uninsured cause of loss. Contamination by application or drift of any biological, chemical, or other agent that is prohibited under

INSURANCE ON PAGE 4

Transitioning to Organic Publication

The USDA's Sustainable Agriculture Network (SAN) has released a new bulletin on transitioning from conventional to organic agriculture.

"Opportunities in Agriculture: Transitioning to Organic Production" provides a detailed overview of organic farming and ranching. From designing profitable rotations and building healthy soil to controlling weeds and pests, the 32-page, color bulletin lays out strategies to convert successfully, including special sections on livestock production, and profiles of four diverse organic producers. The bulletin also covers typical organic farming production practices, innovative marketing ideas, new federal standards for certified organic crop production, and specific considerations for transition.

Preview or download the entire publication at http://www.sare.org/bulletin/organic/organic2003.pdf. Order free print copies by calling 301/504-5236 or e-mailing <san_assoc@sare.org>. Please provide your name, mailing address, and telephone number.

"Opportunities in Agriculture: Transitioning to Organic Production" is published by the Sustainable Agriculture Network (SAN) for the Sustainable Agriculture Research and Education (SARE) program. SARE is funded by the Cooperative State Research, Education, and Extension Service (CSREES), USDA, and works with producers, researchers, and educators to promote farming systems that are profitable, environmentally sound, and good for communities. SAN operates under Cooperative Agreement with CSREES to develop and disseminate information about sustainable agriculture.

Submitted by Olga Wickerhauser, NJAES Sustainable Agriculture Coordinator ❑

Spinach IPM Field Guide

Compiled by Joanne M. Whalen, Specialist in IPM, University of Delaware, Martin Spellman, Extension Associate, University of Delaware, Wesley Kline, Cumberland County Agricultural Agent, RCE and Shirley Kline, Horticultural Consultant

Reprinted from Integrated Crop & Pest Management Field Guides & Database, Rutgers Cooperative Extension, 2000. For the entire manual or individual crop field guides, contact Rutgers Cooperative Extension of Cumberland County, Extension Education Center, 291 Morton Ave., Millville, NJ or call 856-451-2800.

Pre-planting Decisions:

1. Site selection and crop rotation for disease management.
   - Three year rotation with non host crops
   - Deep plow crop residues and avoid planting in fields adjacent to previous year's spinach crop.
2. Use resistant varieties for **blight** (MR) and **white rust** (RW).
3. Use a combination of cultural practices to reduce problems from **seed corn maggot**.
   - Plow down cover crops 3 to 4 weeks before planting.
   - Completely bury cover crops or previous crop residues to reduce adult fly attraction to rotting organic matter.
   - Reduce use of heavy manure applications and let age before incorporation.
   - Attach a set of drag chains behind planter to reduce moisture gradient.
   - During cool, wet conditions; use a broadcast insecticide application.
4. Lime and fertilize according to soil test recommendations.
5. Use the information obtained from scouting weeds the previous year to select recommend control strategies for those weeds. Match preplant incorporated and preemergence herbicide rates to soil type (obtained by mechanical analysis) and percent organic matter in each field.

Spring Planted Spinach

Pest	Damaging Stage	Monitored Stage	Sampling Method	Sampling Frequency	Threshold	Notes
Flea Beetles	adult larval	adult	Monitor newly emerged plants for pitting or irregularly shaped holes. Pay particular attention to outside rows.	2 - 3 times per week	Several damaged rows.	**Treatment:** Spot treatment of outside rows can be effective in controlling flea beetles.
Aphids	all	all	Random sample 10 plants in 10 locations. Examine undersides of leaves & count # aphids.	weekly	**Seedlings:** 1 aphid/ plant **Established plants:** 4-10 aphids/ plant	If population is localized, spot treat. Overuse of pyrethroids kills predators/ parasites that help keep populations under control.

See Spinach IPM Field Guide page 7

Fall Planted and Overwintered Spinach

Sample 10 plants in 10 random locations unless otherwise stated.

Pest	Damaging Stage	Monitored Stage	Sampling: Method	Sampling: Frequency	Threshold	Notes
Garden Webworm **Beet Webworm**	larval	adult larval	Check leaves & buds of small plants.	weekly	5% of plants infested with small larvae	**Treatment:** Treat before significant webbing has occurred.
Beet Armyworm	larval	Adult larval	Count # of larvae per plant	2x/week	**Seedlings:** one larva/10 plants **Established Plants:** one larvae/2 plants	**Sampling:** Begin sampling as soon as seedlings emerge.
Aphids	all	all	Check underside of leaves	weekly	**Seedlings:** one aphid/plant **Established plants:** 4-10 aphids per plant	If population is localized, spot treat. Overuse of pyrethroids kills predators & parasites that help keep aphid populations under control.
Leafminers	larval	larval	Sample as soon as plants emerge.	weekly	50% of plants have eggs or mines **OR** > 1 mine/leaf on average. **Near Harvest:** 4% of leaves with mines	Continuous use of Lannate for Lepidopterous larvae may result in leafminer outbreaks.

All Plantings

Disease	Sampling	Frequency	Threshold	Notes
Downy Mildew (Blue Mold)	Begin scouting after emergence. Random sample 10 plants in 10 locations.	Weekly	presence	Downy mildew is not a problem when temperatures exceed 90°F.
White Rust	Random sample 10 plants in 10 locations looking for yellow lesions with white blister-like pustules on underside of leaves. Tissue next to pustules may turn brown. Make sure to scout field edges.	Weekly	presence	Disease development favored by clear, relatively warm (about 72°F), dry days followed by cool nights with free moisture on leaves.
Leaf Spots	Random sample 10 plants in 10 locations.	Weekly	presence	**Treatment:** apply controls when disease is first noticed. Disease favored by long periods of 90-100% relative humidity, night time leaf wetting & temperature of 77-86°F.

Contributors: Gerald M. Ghidiu, Extension Specialist in Entomology and Stephen A. Johnston, Extension Specialist in Plant Pathology (posthumous), Rutgers Agricultural Research & Extension Center, Bridgeton, NJ

Scouting procedures, thresholds, and crop management recommendations have been compiled from a number of sources and may not be valid for all areas within the Mid-Atlantic Region. They are meant to be used as guidelines. As such, they should be validated on small acreages before relying on them. No guarantee of their validity, success, or failure to perform in the field is implied or expressed. Consult your local Cooperative Extension Agent for additional information or assistance.

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