Vegetarian Newsletter

A Horticultural Sciences Department Extension Publication on Vegetable and Fruit Crops

Eat your Veggies!!!!!

Issue No. 553 January 2010

Integrating cover crops and mulch in reduced-tillage spring squash (*Cucurbita pepo*) 'Delicata'

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Many growers appreciate the importance of soil quality on crop quality and yield. Reducing tillage is frequently associated with an increase in organic matter and biological activity, and a reduction in soil loss due to water or wind. Reduced-tillage vegetable production systems are being tested throughout the U.S (Abdul-Baki et al., 2005; Cher et al., 2006, Treadwell et al., 2007; Zhou and Everts, 2007). Unfortunately, these systems are also associated with an increase in weeds, especially small-seeded annual grasses, as well as a delay in crop establishment associated with cool soil temperatures. This project was designed to test several cover crop and mulch systems to evaluate the effect of ground cover on soil temperatures, weed density, and crop yield of spring squash (*Cucurbita pepo*) 'Delicata' (Figure 1).

Materials and Methods

Experimental Design. In this experiment, four production systems were tested using a randomized complete block design with four replications at the North Florida Research and Education Unit in Live Oak, Florida from October, 2008 to June 2009. All systems were managed according the USDA National Organic Standards on land that was not certified organic, but that had no history of prohibited materials for the previous five years. The systems were as follows: 1) Standard Grower Practice with a Weedy Fallow (SGP-WF): Overwinter weedy fallow, spring tillage, black plastic; 2) Standard Grower Practice with Cover Crops (SGP-CC): Winter cover crops terminated in spring with a mower, incorporated with a off-set rolling disk and followed by black plastic; 3) Reduced Tillage with Cover Crop Surface Residue (RT-ROLL): Winter cover crops terminated with a roller-crimper in spring; and 4) Reduced Tillage with Cover Crop Surface Residue covered by Landscape Fabric (RT-ROLL+FABRIC) (Figure 2).

Production. On October 28, 2008, winter rye (*Secale cereale* ‘FL 401’) was seeded to 90 kg ha^{-1} in a biculture mixture with an unnamed, commercially available cultivar of hairy vetch (*Vicia villosa*) seeded to 22.4 kg ha^{-1} in three systems (SPG-CC, RT-ROLL and RT-ROLL+FABRIC), while SGP-WF was allowed to establish with native vegetation. Each plot was 1.8m wide by 6m long. On March 26, 2009, cover crops were in the mid-to late bloom stage and were terminated with a flail mower and incorporated with an off-set rolling disk in SGP-CC and were terminated with a roller-crimper in RT-ROLL and RT-ROLL+FABRIC. Native vegetation in SGP-WF was mowed with the same flail mower, followed by disking with the rolling disk harrow.

On March 31, granular fertilizer (Nature Safe 8-5-5, Griffin Industries) was applied to all plots according to the University of Florida’s recommendations. Seventy-five percent of nitrogen (N) was applied before planting resulting in the following application: N at 160 kg ha^{-1}, phosphorus (P) at 100 kg ha^{-1} and potassium (K) at 100 kg ha^{-1}). In each system, fertilizer was added in the following manner: a subsurface shank created a furrow approximately 15 cm off-center on both sides of the anticipated crop line and 15 cm deep. Fertilizer was added to each furrow and furrows were closed by hand. Drip tape (John Deere, Roberts Ro-Drip, 8ml, 30 cm spacing at 91 L per hour per 30 meters) was applied to all plots. Plastic mulch was applied to SGP-WF and SGP-CC plots and landscape fabric (60 cm) was secured with ground staples over the rolled cover crop residue in RT-ROLL+FABRIC treatment. Squash seed was planted to 3.8 cm depth at 60 cm in-row spacing in each plot for a planting density of 8,970 plants ha^{-1}. Additional fertility was supplied by an injectable, flowable powder composed of finely ground soybean meal (Soyaplex-SP 8-1-2, NaEx Corporation). This material was applied through the drip system at a nitrogen rate of 2.9 kg ha^{-1} weekly beginning at week two (April 8, 2009) and continuing for nine weeks through week 11 (June 3, 2009). In addition, fish emulsion (3-1-1) was applied twice with a foliar application rate of 2.34 L ha^{-1} at week 4 (April 22) and week 6 (May 6) until run-off.

Data collection. Cover crop above-ground plant material was cut at the soil surface in a 0.5 m^2 frame, dried in a forced-air oven at 60 °C and weighed. Soil temperature was collected with four automated sensors that were placed 4 cm in depth in one plot in each system in the same replicate. Data was collected hourly. Weed density was evaluated on May 28 using a 0.6 m^2 frame. Weeds were identified by species, counted and grouped into either broadleaves or grasses/sedges for analysis. Squash was harvested on June 17, and mature fruit was counted, weighed and graded. Marketable fruit were considered to include fruit that was at least 15 cm in length, skin free from blemishes, uniform in color and typical for the cultivar. All data were analyzed using SAS (V. 9.2) general linear models, and when treatments were significantly different ($\alpha = 0.05$) means were separated using Least Significant Differences.

Results and Discussion

Cover crop biomass. The winter cover crops were slow to establish due to cold weather in October and early November. In the spring, neither hairy vetch nor rye produced as much biomass as we have observed in previous years at this location. The combined weight of rye and hairy vetch was 2,200 kg ha^{-1} on a dry weight basis, and was less than the 6,000 kg ha^{-1} recommended dry weight at cover crop termination if the cover crop surface residue is to be used a weed-suppressive mulch (Morse, 2001). No differences were observed for dry weight biomass among treatments planted to cover crops (data not shown).

Soil temperatures. Soil temperature was different among treatments and the effect of treatment varied depending on the time of day ($P < 0.0001$). For simplicity, seasonal means are presented in Figure 3. While evening temperatures were similar among treatments, daytime soil temperatures were greatest in SGP-CC and SPG-WF and lowest in rolled cover crop treatments (RT-ROLL and RT-ROLL+FABRIC). Temperature differences between the standard grower practice treatments and the rolled cover crop treatments were greatest during April when air temperatures were reaching highs in the low 30-degree Celsius range. We observed soil temperatures differed by up to 15 ^{o}C between treatments during the heat of the day. The optimum monthly temperature range for the best growth and yield of squash is 18-24 ^{o}C, with a maximum temperature around 35 ^{o}C (Maynard and Hochmuth, 2007). The rolled cover crop treatments consistently remained in the optimum range, while soil incorporated cover crops and weed treatments were considerably warmer during the daytime (Figure 3).

Weed density and biomass. Predominant weed species included yellow nutsedge (*Cyperus esculentus*), purple nutsedge (*Cyperus rotundus*), Florida pusley (*Richardia scabra*), crabgrass (*Digitaria sanguinalis*), catchweed (*Galium aparine*), pigweed (*Amaranthus* spp.), cutleaf evening primrose (*Oenothera laciniata*) and Virginia pepperweed (*Lepidium virginicum*). Rolled cover crop with no landscape fabric (CC-ROLL) predictably had the most weeds compared to remaining treatments, but it was surprisingly similar in weed density to treatments with black plastic (SGP-WF and SGP-CC) (Table 1).

Squash Establishment and Yield. Plant establishment was 80% on three plots all in replicate three, and 100% on remaining plots. Missing plants were immediately reseeded for a 100% stand. The total number of fruit harvested from treatments ranged from 24,456 to 35,541 per ha; very low numbers compared to commercial yields (Table 2). Many of the fruit were not marketable due to small size, and the greatest percentage of marketable fruit occurred in the SGP-WF and SGP-CC treatments. Similarly, total fruit weight was greatest in SGP treatments compared to ROLL treatments. Although soil temperatures approached the maximum recommended temperature for squash in SPG systems, those systems produced the greatest yield.

Three weeks prior to harvest, we observed chlorosis of mature leaves and attributed this to low potassium measured in plant tissues with a Cardy meter. However, following harvest, further investigation revealed extensive nematode damage to roots in nearly every plot, evidenced by the presence of galls typically caused by *Meloidogyne* spp. The last income-producing crop in that field was field corn in 2004, and subsequent crops were pearl millet (*Pennisetum glaucum*) and cereal rye (*Secale cereal*) with no fumigants or insecticides applied. The degree of infestation we observed would likely reduce yields of any crop.

Summary

Our objective in this experiment was to evaluate the effect of ground cover on soil temperatures, weed density, and crop yield of spring squash. Despite extensive nematode damage, yield differences were observed among cover crop systems and were influenced by weed and most likely soil temperature data. Soil incorporated cover crops and weeds, and a production system of black plastic and drip irrigation performed better than rolled cover crops under the conditions of this experiment.

For more information on reduced tillage vegetable production, visit UF-IFAS EDIS at http://edis.ifas.ufl.edu/ and for a series of educational videos based on results from land grant university research, visit the national Extension website at: http://www.extension.org/article/18368.

Literature Cited

Abdul-Baki, A. A.,W. Klassen, H. H. Bryan, M. Codallo, B. Hima, Q. R. Wang, Y. Li, Y.-C. Lu and Z. Handoo. 2005. A Biologically-Based System for Winter Production of Fresh-Market Tomatoes in South Florida. Proc. Fla. State Hort. Soc. 118: 153-159.

Cherr, C. M, J. M. S. Scholberg and R. McSorley. 2006. Green manure as nitrogen source for sweet corn in a warm-temperate environment. Agron. J. 98:1173-1180.

Maynard, D. and G. Hochmuth. 2007. Knott's handbook for vegetable growers. 5th Edition. John Wiley and Sons, Hoboken, New Jersey.

Morse, R. D. 2001. No-herbicide, no-till summer broccoli – quantity of rye and hairy vetch mulch on weed suppression and crop yield. P. 83-91. In: J. H. Stiegler (ed.) Proc. Southern Conservation Tillage Conference for Sustainable Agriculture. Oklahoma City, OK.

Treadwell, D. D., N. G. Creamer, J. R. Schultheis, and G. D. Hoyt. 2007. Cover Crop Management Influences Weed Suppression in Organically Managed Sweetpotato Systems. Weed Tech. 21(4):1039-1048.

Zhou, X. G. and K. L. Everts. 2007. Effects of host resistance and inoculum density on the suppression of fusarium wilt of watermelon induced by hairy vetch. Plant Dis. 91(1):92-96.

Figure 1. Early fruit set on squash (*Cucurbita pepo*) 'Delicata'.

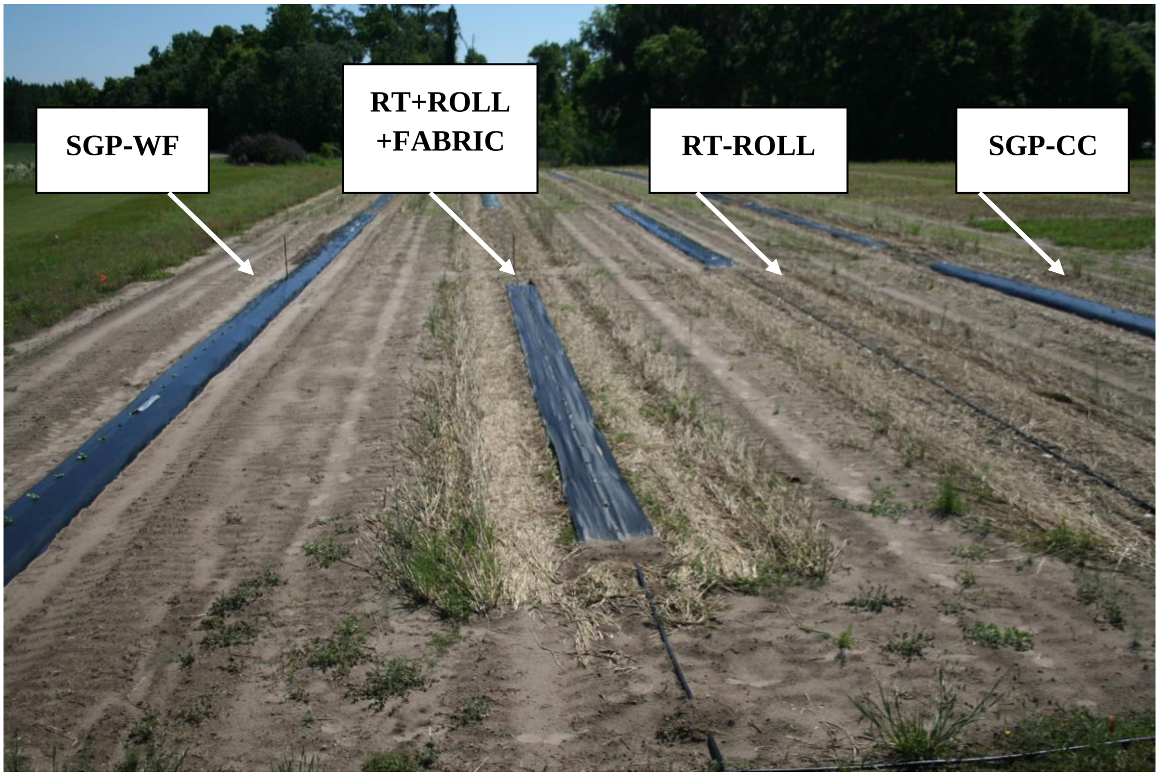

Figure 2. Four spring squash production systems tested in Live Ok, FL: Standard Grower Practice with a Weedy Fallow (SGP-WF): 1) Overwinter weedy fallow, spring tillage, black plastic; 2) Standard Grower Practice with Cover Crops (SGP-CC): Winter cover crops terminated in spring with a mower, incorporated with a off-set rolling disk and followed by black plastic; 3) Reduced Tillage with Cover Crop Surface Residue (RT- ROLL): Winter cover crops terminated with a roller-crimper in spring; and 4) Reduced Tillage with Cover Crop Surface Residue covered by Landscape Fabric (RT-ROLL+FABRIC).

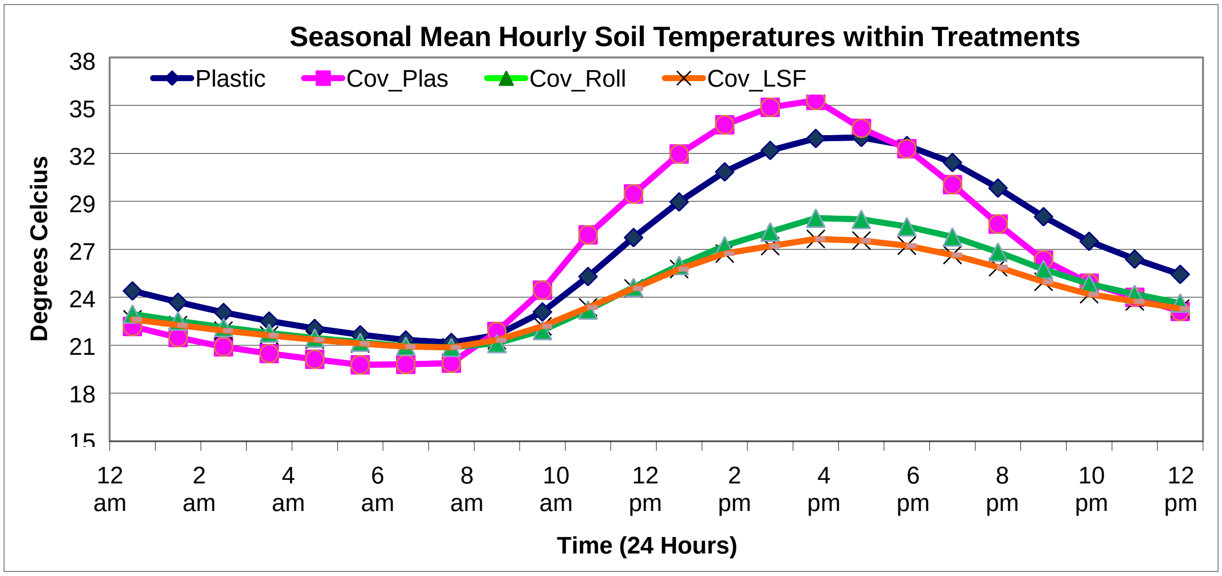

Figure 3. Mean soil temperatures in treatments during squash production in Live Oak, FL in spring 2009 over a 24-hour period. Treatments are as follows: SGP-WF = standard grower practice, winter weedy fallow; SGP-CC = standard grower practice, winter cover crop; CC-ROLL = winter cover crop terminated by rolling; and CC-ROLL+LSF = winter cover crop terminated by rolling and covered with landscape fabric.

Table 1. Weed density of grass plus sedge weeds and broadleaf weeds per 0.6 m^2 in squash (*Cucurbita pepo*) 'Delicata' produced in four cover management treatments in Live Oak, FL in May 2009.

Treatment[z]	Grasses/Sedges	Broadleaves	Total
SGP-WF	12.00b[y]	0.50	12.50b
SGP-CC	17.00b	4.75	21.75b
CC-ROLL	60.25a	20.00	80.25a
CC-ROLL+LSF	9.75b	3.50	13.25b
Significance	*0.0216*	*NS*	*0.0004*

[z]Treatments are as follows: SGP-WF = standard grower practice, winter weedy fallow; SGP-CC = standard grower practice, winter cover crop; CC-ROLL = winter cover crop terminated by rolling; and CC-ROLL+LSF = winter cover crop terminated by rolling and covered with landscape fabric.

[y]Mean separation within column by Fisher's protected LSD at 0.05. NS = not significant.

Table 2. Number, quality and weight of harvested squash (*Cucurbita pepo*) ‘Delicata’ produced in four cover management treatments in Live Oak, FL in May 2009.

Treatment[z]	No/Fruit Plant	Average kg/fruit	Marketable No. per ha	Total No. per ha	Total Wt kg/ ha
SGP-WF	1.60a[y]	0.196a	19,846a	35,541a	4360a
SGP-CC	1.45ab	0.216a	15,003a	32,080ab	4792a
CC-ROLL	1.10b	0.156b	7,662b	24,458b	3446b
CC-ROLL+LSF	1.20ab	0.168b	7,699b	26,481ab	3731b
Significance	*0.1030*	*0.0018*	*0.0025*	*0.1030*	*0.0018*

[z]Treatments are as follows: SGP-WF = standard grower practice, winter weedy fallow; SGP-CC = standard grower practice, winter cover crop; CC-ROLL = winter cover crop terminated by rolling; and CC-ROLL+LSF = winter cover crop terminated by rolling and covered with landscape fabric.

[y]Mean separation within column by Fisher’s protected LSD at 0.05. NS = not significant.

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Stinger Labeled in Florida

By: William M. Stall, Professor Emeritus
Horticultural Sciences Department, Gainesville, Florida

Stinger (Clopyralid) has received labeling in Florida for use in cabbage, Chinese cabbage (bok choy, napa), and Chinese mustard cabbage (gai choy).

Stinger may be applied post emergence on these crops for the control of several broadleaf weeds including clover, ragweed and smart weed. One to 2 broadcast applications may be made at 1/4 to 1/2 pint per acre, not to exceed 1/2 pint per acre per year. A preharvest interval of 30 days is in effect.

Growers must have the supplemental label in hand at application. Check the full label for plant-back restrictions.

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New Third-Party Labels for Dual Magnum

By: William M. Stall, Professor Emeritus
Horticultural Sciences Department, Gainesville, Florida

Transplanted Head and Stem Brassica Subgroup 5-A

Dual magnum provides preemergent weed control. The transplanted cabbage label has been expanded to include the head and stem subgroup including cabbage, Chinese cabbage (napa), broccoli, Chinese broccoli, Brussels sprouts, Chinese mustard, cauliflower, cavalo broccoli and kohlrabi. Applications of 0.67 to 2.0 pints per acre may be made to transplants that are 5 weeks old or grown in 1" diameter cells or larger. Use the lower rates on course-textured soils and the higher rates on soils high in organic matter. The Chinese varieties are more sensitive to injury and application should be at the lower rate.

Eggplant

Eggplant has been added to the Third-party pepper label.

A pre-transplant application may be made to the soil surface of pre-formed beds at 0.67 to 1.0 pint per acre prior to laying plastic.

A post-transplant application may be made as directed, shielded spray to row middles between plastic rows at 1 pint per acre. A preharvest interval of 60 days is in effect. These labels must be in possession of the grower at the time of application.

To obtain the labeling or for more information on the 24(c) registration contact: Third Party Registrations, Inc., Maitland, Florida, or call (321) 214-5200.

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Issue No. 553 January 2010

Biography: Vance Whitaker, UF/IFAS, Strawberry Breeder

By: Vance Whitaker, Assistant Professor
Gulf Coast Research and Education Center, Balm, Florida

My initiation to horticulture took place as a child, growing up in the small town of Oak Ridge, NC amidst rolling hills and tobacco fields. There I cultivated a love for plants and eventually went to North Carolina State University to study horticulture. At NCSU I received my BS in Horticultural Science and a second BS in Agricultural Business Management. I later pursued my graduate studies at the University of Minnesota, earning a MS in Horticultural Science in 2003 and a PhD in Plant Breeding and Molecular Genetics in 2009. There my research objective was to characterize genetic resistance to black spot disease of rose. My academic connection to strawberries was through my advisor, Stan Hokanson, a former USDA strawberry breeder, and Jim Luby, fruit breeder at Minnesota. In August, 2009 I moved to Florida with my wife Terri and my children Isaac (4 yrs) and Claire (2 yrs).

My principal duty as the UF strawberry breeder and geneticist is to direct and oversee the breeding program at the Gulf Coast Research and Education Center, developing cultivars with superior performance in central Florida. I believe that continued gains can be made in several important areas including early yield, fruit size, flavor, and disease resistance. Cultivar development will be enhanced through genetic characterization of these traits and through collaborative research with a statewide team of UF researchers in the areas of genomics, pathology, production, and postharvest physiology.

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Biography: Mercy A. Olmstead, UF/IFAS, Stone Fruit Extension Specialist

By: Mercy A. Olmstead, Assistant Professor
Horticultural Sciences Department, Gainesville, Florida

I grew up in the Detroit suburb of Warren, Michigan where my mother and grandfather sparked my interest in horticulture. We seemed to be the only family with several fruit trees in our backyard, which all of the neighbors enjoyed.

I received my M.S. Degree from Washington State University in Horticulture (Viticulture) investigating cover crop systems in wine grape vineayrds, and a Ph.D. from Michigan State University in Horticulture (Stone Fruit; 2004), where I studied scion-dwarfing rootstock systems in sweet cherries. I came to the University of Florida as the new stone fruit extension specialist in Horticultural Sciences in July 2009 from Washington State University, where I was the viticulture (grape) extension specialist. My statewide responsibilities include stone fruit extension and research to address key production issues in peaches, nectarines, and plums. My main research interests lie in scion-rootstock relations, nutrition management, and optimizing orchard production practices. I recently authored and now maintain the UF Stone Fruit Research and Extension webpage which houses information on peach, nectarine, and plum management (http://hos.ufl.edu/stonefruit).

I enjoy traveling around the state, walking around and working in the orchards, and exploring the beautiful landscape of Florida. My husband (Jim) and I have a two-year old daughter, Lillian, who also romps in the sand with us and our two cats.

My office is located at the Horticultural Sciences Department, Gainesville, Florida. I can be reached at (352) 392-1928 x 208, or by e-mail at mercy1@ufl.edu.

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Friday, Feb. 26, 2010 (Time: 1-4pm)
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A $25.00 fee and registration must be postmarked two weeks prior to classes starting (Jan. 22). After that date fee is $35. The fee for this course is normally $50; however, due to grant funding it is temporarily discounted to the amounts listed above.

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Risk Management
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What is Annie's Project?

Annie's Project is a 6 week course designed especially for farm/ranch women. Sessions will combine lecture, discussion, individual and small group activities, and software training.

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The program is in honor of Annie Fleck, a woman that lived in a small town in Illinois. She spent her lifetime learning how to become a better business partner with her husband.

Risk Management

Annie's Project

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Objectives

Annie's Project is a comprehensive educational program and support network for women in agriculture designed to:

(1) Deliver technology training to farm women, enhancing their business skills
(2) Develop a support network, which is essential for continuing education and self-help.

At the end of the program, farm women will have increased their knowledge about:

1. Making critical decisions for their operation; asking the right questions
2. Sustainability of their farming operation
3. The importance of implementing risk management strategies
4. Knowing who and where their local/regional resources and support are

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