SOUTHERN SARE
Sustainable Agriculture Research & Education

Common Ground

Autumn 2008

Bats in the corn field

After Frank Bibin used a SARE grant to help his pecan orchard kick the chemicals, he started on the sweetcorn field. His allies in this effort are bats, lots of them. About 4000 a night, give or take a 1000 or so.

In 1999 Bibin won a SARE producer grant to evaluate the potential for bats and wasps to protect his Georgia pecan orchard without chemicals. He used the grant funds to build bat houses and simple wasp shelters in hopes of attracting the insect eaters. It worked. For nearly a decade the bats, with some daytime help from paper wasps, have controlled pecan nut case bearer, fall webworm, walnut caterpillar, stinkbugs, twig girdler and hickory shuck worm, saving the farm more than $1000 each year in pecan pesticide costs.

Frank Bibin, left, and his son Sam assist entomologist James Dutcher in assessing corn earworm damage. Early season corn protected by bats had about half the ear worm damage as conventional corn treated with pesticides. The protection did not hold up for late season corn.

It was a red-letter day for Bibin when bat guano from his farm tested positive for corn earworm DNA as part of a study conducted by **Gary McCracken** for the CDC. While pecan pests affect only a small number of farms, corn earworms infest thousands of acres on farms in just about every state.

Larvae from corn earworm moths that eluded the bats did minimal damage to early sweetcorn.

Typical spray schedules are on three- or four-day intervals, using organophosphates or pyrethroid-based insecticides. Bibin had suspected that Mexican free-tail bats ate a lot of corn earworm moths; this was his chance to find out if they could help a farmer reduce or eliminate pesticides for corn ear worms.

In 2006 he submitted a new SARE producer grant proposal to test bats' effectiveness against corn earworm. He was awarded a little less than $1000 to cover the expenses of growing a quarter acre of organic sweetcorn as well as data collection and analysis. A control plot of sweetcorn was grown in nearby Tift County.

Both plots were planted with early, middle and late crops of sweetcorn. Each plot was monitored for corn ear worm damage. Samples from the

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Restructuring R&E

Southern SARE is restructuring the 20-year old Research and Education program granting process to address changing needs of producers, researchers and educators.

One urgent need is to support systems research over longer periods of time. Another need is to support SARE's quality of life mandate, which has taken a back seat to projects that help reduce the environmental impacts of agriculture.

Read story on page 8.

IPM Online

Southern SARE's curriculum *Integrated Pest Management for Organic Crops* is now online. From www.sare.org, click on "For Educators" on the left, then scroll down to "Southern SARE Integrated Pest Management for Organic Crops Curriculum".

Mother Earth News

Southern SARE projects are now reaching a broader audience through the **Mother Earth News** website. Southern SARE communications specialist **Gwen Roland** contributes about local food and sustainable agriculture. Each entry contains links to SARE project reports.

Keep up with the stories at www.motherearthnews.com by searching for Gwen Roland.

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Download or print any project report from the project data base at www.sare.org

For a mailed copy of any project report contact Southern SARE at:
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Bats in the corn field

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conventional site showed an average of 53% corn earworm damage between June 14th and July 5th. On Bibin's plot from June 24th to July 8, there was an average of 26% damage, roughly half as much.

There was no middle or late crop at the conventional site for comparison, but Bibin saw his earworm damage rise to 39% in the middle phase (July 8 – July 21) and to an average of 98% in the late phase (July 22-July 28), indicating the bats did not control corn earworm in the late phase.

Two corn fields were monitored for corn earworm moth flight with pheromone traps from the time of silking to harvest.

Brooks County Cooperative Extension agent and project cooperator Johnny Whiddon believes the high infestation during the late phase was due to the large increase in corn earworm moths at that time of the season. Approximately 5000 acres of unsprayed field corn had been planted for silage in the county, and the new generation of moths would have emerged in great numbers seeking suitable crops in which to lay eggs.

"If we could repeat this project, we would plant the corn two weeks earlier," says Bibin. "We would also erect a new bat house closer to the corn plot because we have observed that as bats return to their roosts through the night there appears to be increased feeding activity closer to the roost."

For detailed information about Bibin's corn earworm research go to www.sare.org and search the project data base for Project FS07-212. To read about his pecan pest research using bats and wasps, search for project FS99-086.

The Bibin farm is a favorite hangout for observing bats in the wild.

Where the rubber meets the rows

Reed Hepperly conducts a field day about making potting mix from composted mushroom growing medium.

Inset photo: Lettuce seedlings three days after planting in HE Mix are larger and more vigorous than the seedlings in the commercial Sunshine Mix.

Product testing on real farms has ups and downs

Potting Mix

In **Puerto Rico, Reed Hepperly** grows oyster mushrooms in a mixture of recycled banana and plaintain leaves, palm fronds and grass. He noticed that during the process, the mushroom fungus breaks down the cellulose and lignin fibers, releasing nutrients that were previously unavailable. This gave him the idea for recycling the materials again to make a new product he could sell from his farm.

He used a **SARE producer grant** to experiment with composting the left over growing media into a potting mix for starting vegetable seeds. He used part of the grant money to pay for laboratory analysis of the nutrients as the spent medium was combined with amendments. The resulting mix, called Hepperly Enterprise (HE) was made of 30% composted mushroom spent media, 70% sandy soil and 1% perlite.

HE Mix was then compared to the commercial Sunshine Mix for starting lettuce, sorghum and mung bean seeds. Results show that the HE Mix promoted higher percentage germination of stronger and greener seedlings.

Read the complete report by searching for project FS07-213 at www.sare.org.

Bio Mulch

Three farms in Virginia: **Wheatland Vegetable Farms, Waterpenny Farm, and Appalachia Star Farm** grow several plantings of summer squash and tomatoes each year, and they all use black plastic mulch with drip irrigation. It seemed like a perfect situation for a **producer grant** to compare their usual plastic with biodegradable mulch. Each farmer substituted bio mulch on every fourth row and they kept track of expenses, yield and labor.

In most cases for both crops, the two mulches produced similar yields. . One notable exception was early squash on the one farm, Appalachia Star, that had a successful early planting. Regular plastic produced 63% more harvest. The producers suspect plastic's thicker ground cover provided more warmth during the early cold nights in Virginia.

The three farmers found out how difficult it can be to control variables for comparative on-farm research. Waterpenny Farm lost early squash and tomato plants to herbicide-contaminated mulch. Wheatland had already laid their early plastic by the time they could get the bio mulch, so they also used it only for later plantings.

Overall, the cost savings in labor and time helped biomulch slightly outperform plastic. It took an average of 20 minutes to pull up and dispose of one 300-foot row of plastic, compared to zero minutes for bio mulch. They calculated that a total switch to bio mulch would mean spending an additional $875/year at current prices, but that this amount would be almost cancelled out by savings in labor, transportation, and dump fees associated with plastic. If the price gap between plastic and bio mulch shrinks over time, bio mulch could clearly become the better buy.

The producers also noted that bio mulch allows for planting cover crops earlier since farmers don't have to make time for the laborious chore of pulling up and disposing of the black plastic.

Read the complete report by searching for project FS07-218 at www.sare.org.

Capillary Irrigation

Ellen Colodney of North Carolina's Coastal Plain Conservation Nursery tested whether advances in capillary irrigation mats make them a practical alternative to overhead irrigation of container plants. The verdict is "maybe".

While plants in gallon containers did well on just the capillary mats, smaller containers needed help from overhead sprinklers. When Colodney computed savings in fertilizer costs and fewer damaged plants from overhead irrigation, it appeared the mats will pay for themselves in one season if everything is working properly.

Leaks were the biggest problem, particularly since the drip lines are covered by multiple layers of specialized fabric, making them difficult to find.

"When a leak in a line occurs, that entire section fails," says Colodney. "If we can fix the problem, we will go ahead and buy more. I just wish they used a more durable drip tape to begin with. The replacement tape I've ordered is supposed to last 10 years."

Retrofitting costs and returns can be found in the final report for project FS06-199 at www.sare.org.

Catering to stink bugs

University of **Florida entomologist Russell Mizell** has a sneaky strategy when it comes to stink bugs. It could be called feeding the hand that bites you. He has designed a rotating menu of trap crops to lure the voracious insects away from cash crops. The trap cropping system can be customized for any planting season from spring to fall. It is farm-scale neutral and will work for organic or conventional farms.

Mizell used a Southern SARE **On-Farm research grant** to test a myriad of potential trap crops. He was seeking plants that would provide a steady source of food that is tastier to stinkbugs than the soybeans, peaches, pecans, grains or other crops a farmer might grow. The most desirable trap plants would be unappealing to deer while being attractive to as many stink bugs and leaf-footed bugs as possible. Seeds also would have to be widely available from commercial dealers.

Green stink bugs chow down on a millet seed head.

The orange Tachinidae fly lays its eggs on stinkbugs, and the larvae parasitize both the nymphs and adults. This beneficial insect also uses the pollen and nectar produced by the trap crop. Photos provided by Russ Mizell.

The tests were conducted for two growing seasons at the **North Florida Research and Education Center** in Quincy. Mizell's detailed final report reads like a detective novel with a distinct process of elimination. Some plants that showed promise didn't make the cut because they took too long to mature or didn't reach preferred height requirements or were difficult to manage.

So what were the most successful trap crops?

For earliest spring protection (March-April in North Florida), fall-planted triticale was found to thrive in the mild Florida winter plus attract a wide variety of stink bugs. Buckwheat and sunflower planted in the cool soils of early spring can be ready to lure the bugs when triticale gets past its prime. Additionally, buckwheat can be planted repeatedly throughout the growing season because its early maturation makes it a good relay crop between the other trap crops. For summer through fall plantings, sorghum and millet can be added to buckwheat and sunflower.

Along with identifying the most successful plants, Mizell gives recommendations for planting rotations from early spring through autumn because each plant has only a certain window of time during which it is irresistible to stink bugs. That timing depends not only on the stage of plant growth but on the stage of bug life.

All those variables are enough to make even an organic farmer want to reach for the nearest pesticide sprayer, but it wouldn't help much because stink bugs are notoriously tolerant to most pesticides. That's why Mizell's strategy is important for all farmers--organic, conventional or transitioning.

In his study of stink bug behavior, Mizell found that placement of the trap crops is also important. These pests prefer to travel Tarzan-like from plant to plant rather than streaming through corridors where they could be spotted by predators so the trap crops worked best when planted between the cash crop and whatever vegetation the bugs were migrating from.

In large fields this placement can be achieved through strip plantings. In smaller fields or home gardens, the trap crops can be planted as a perimeter band around the cash crops. On a very small scale, portable containers could be the most efficient way to use the trap crops. Mizell has access to used plastic plant containers, something that many growers can also obtain at little or no cost.

"These are big enough to plant two or three plant species in each. They hold water for a long period and they are portable," he says. "Smaller ones can be moved by hand, larger ones (10 to 20 gallons) by hand truck or frontend loader. With respect to the numbers of containers, I have not quantified that in an experiment, but my experience with stink bug behavior is that placement and quality of the seeds on the plants are more critical than numbers of containers."

He recommends adding a visual attractor to the containers, such as a 3 x 36-inch mailing tube or 5-gallon plant container on a pole. Paint the attractors safety-yellow to make them irresistible to stink bugs as well as their natural enemies. So what to do when you lure all those stink bugs to one place? They can be netted or trapped with simple homemade devices. See Mizell's illustrated instructions at http://ufinsect.ifas.ufl.edu/stink_bugs/stink_bugs.htm

For more information see the final report for OS06-029 in the SARE project data base at www.sare.org

Also see the website: http://ufinsect.ifas.ufl.edu/stink_bugs/StkBg-TpCrop-Poster.pdf

Breaking new ground for organic orchards

The first crop of organic apples funded by a Southern SARE **Research and Education Grant** has been harvested at the **University of Arkansas**. While it's satisfying to reach this milestone, project team leader **Curt Rom** is realistic.

"In orchard terms, a three-year old orchard is just a young child," says the career pomologist.

It takes about a 10-year minimum to do orchard research, according to Rom. There's a year of prep work before trees can be planted. Then there's an establishment phase of a couple of years before a first crop can be harvested. Next there's an adaptation phase, or apple adolescence, followed by maturity and then maximum production before old age brings a new set of management techniques.

Such long-term research requires more than a one- or two-season funding commitment, so it's no wonder that organic orchardists feel neglected by research. Rom used his Southern SARE grant to start establishing some best management practices for organic orchard nutrition that would take the knowledge base to the first harvest.

In a survey of organic fruit tree growers, the team found out that management practices varied widely and often organic orchards were malnourished when compared with conventionally grown orchards. Conventionally managed orchards have the option of applying nitrogen fertilizer as needed for growth and fruit production. Organic orchards must depend on manures, ground covers and other nutrition sources that are not as precisely timed or as precisely measured.

The team set out to find the best organic nutritional sources by evaluating the effects of three organic fertilizer treatments and four groundcover treatments on a newly planted orchard.

"These are some of the strongest and healthiest trees I have ever grown in an experimental orchard," says Rom.

He noted that trees grown with municipal green compost, or using wood chip mulch to suppress weeds grew as strongly and had foliar nitrogen contents similar to those grown in a conventional orchard using herbicides and fertilizers. The trees with green compost and wood chip mulch produced an economic crop in the third season which is the goal of any orchard. They also noted that a living ground cover mulch produced a relatively strong tree but prevented or inhibited cropping.

"The competition from a living mulch during tree establishment and development is probably more than the tree can physiologically tolerate to produce a crop in the early stages," said Rom.

Working with organic fertilizers of either composted chicken litter or a certified organic fertilizer source will take some more experimentation to determine the proper time and rate of application to achieve tree growth and nutrient levels to optimize the trees' productivity. The system become a bit more complicated with biological weed control of composts and mulches, and organic fertilizers which then activate soil biology in different ways than has been observed in conventional orchards. The time of the season, and the form in which nutrients become available to the tree is different than when water soluble chemical fertilizers are applied.

"There is still lots to be learned," summed up Rom.

Horticulture technician Heather Friedrich managed the harvest while Rom is participating as a Fulbright Scholar in Italy. The topic is sustainable and organic production systems--not of fruits--but of vegetable crops. Time was one reason for the change of subject.

In the four-month period of the fellowship, not much can be done with tree fruits, but it is enough time for Rom to study vegetable crops in both the field and in high tunnels. Another reason the career pomologist desired to expand his research into vegetables came about as a natural consequence of looking at agriculture as an entire system, rather than as components existing in isolation.

" As we develop our sustainable and organic program at the University of Arkansas to address both farmer and community needs, I feel we need more expertise with vegetable crops," he says. "Most of our small scale farm systems will produce both fruits and vegetables. I need to have some expertise with both to be a better scientist, horticulturist, and service to my state. So, I decided to go the road less traveled for a pomologist and study vegetables."

University of Arkansas organic apple trees could still be producing research data when volunteers, Cabe Cox and Gabe Craig, who helped with the first harvest are in college. Photo by Heather Friedrich

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Marine shrimp go inland

Southern SARE has funded research projects about freshwater shrimp for more than a decade. Now the results are in from the first evaluation of *marine* shrimp as an inland crop.

A graduate student project at **Tuskegee University** led by master's candidate **Anthoney Deanes** under the guidance of his professor **Ntam Baharanyi** has concluded that land-locked south central and west Alabama seems to be suitable places for raising saltwater shrimp.

Like any other real estate, marine shrimp habitat is all about location, but with the price of coastal real estate rising along with environmental concerns about agricultural production near sensitive wetlands, pond acres for raising marine shrimp have been shrinking.

Brackish water aquifers and clay soils that make good ponds are common across southcentral and western Alabama so agricultural economics graduate student Deanes, agricultural economist Baharanyi and aquaculture engineer **Barrett Vaughan** set out to determine whether marine shrimp could be a viable crop so far from the coast. Since it is such a new field of study, they relied on case studies. Six existing farms of varying sizes that raise marine shrimp were surveyed to ascertain performance of these farms.

The full details of the study can be read in the final report, but to summarize the findings, scale was a crucial factor in profitability. At 2004 expenses and selling prices, the 50-acre enterprise budget appeared to be lucrative if the market is established. The farmer would only have to sell his product for $5.70 per pound to cover all of the production costs. At that time the market price was $7.00 per pound. The expected production level is 2,625 pounds per acre; however, the break-even production level to cover all expenses at that time was only 1,534 pounds per acre.

On the other hand, a farmer with only five acres of pond would have to sell his shrimp for $8.72 per pound to cover all of the production costs at 2004 prices ,and raise 3,050 pounds per acre to break even. Those numbers led researchers to conclude that shrimp production would not be feasible as the sole crop on a small farm. However, if variable costs could be controlled, marine shrimp might be feasible as one alternative crop on a small diversified farm.

More research is needed on all aspects from production through waste management and marketing before researchers will know for sure whether raising marine inland shrimp could be sustainable, not just economically viable. As with any new industry, infrastructure (availability of post-larval shrimp, feed and processing facilities) could make or break a producer. Other factors are climate, fuel costs, electricity, market supply and disease outbreaks. And as with any enterprise, there's waste to manage.

"If the industry becomes large enough management of the water might become an issue," says Deanes. "Water management was not explored by my study. "

As for marketing marine shrimp, there's plenty of opportunity for researchers to look into, according to Deanes. It's difficult to compete with imported shrimp on price, but more consumers and institutions are seeking local foods, which could make Alabama shrimp sell for a premium. Tests conducted by rural community and economic development specialist **Nii Tackie** and colleagues at Tuskegee University found that 36.7% of participants preferred saltwater shrimp, 16.7% preferred freshwater shrimp, and 36.7% didn't have a preference.

The fact that shrimp remains the top seafood in the United States gives researchers a large and eager audience for their findings..

For the detailed final report go to the Project Database at www.sare.org and search for project GS04-036.

Alabama farmer Lee Jackson, Jr., expertly casts a seine to harvest shrimp. Raising shrimp offers a farmer the opportunity to learn new skills, find a broader market and perhaps add another attraction for agritourism. Photo by Barrett Vaughan, state sustainable ag coordinator from Tuskegee University.

Which SARE grant program for you?

Southern SARE administers six grant programs, each with its own priorities and audiences. The process begins with the release of calls for proposals for each of the programs. The SSARE web site www.southernsare.org is the quickest way to receive the calls for proposals as soon as they are released. If you prefer a mailed copy of any of the calls for proposals, contact Paige Patton at (770) 412-4787 or info@southernsare.org

Research and Education Projects generally are conducted by interdisciplinary, multi-institutional, and often, multi-state research teams coordinated by a principal investigator from a non-governmental organization, university or governmental agency. These projects include farmers as participants.

2009

March	Call for preproposals released
June	Preproposals due
August	Full proposals requested
Nov.	Full proposals due

2010

February	Administrative Council announces grant awards

Graduate Student Awards are intended for full-time graduate students (masters or Ph.D.) enrolled at accredited colleges and universities in the Southern Region. Up to $10,000 will be awarded to each successful applicant for up to three years of project activities. The funds are paid directly to the university for use on the graduate student's project.

2009

March	Call for proposals released
June	Proposals due
August	Administrative Council announces grant awards

Professional Development Program Projects train agricultural information providers in sustainable agriculture techniques and concepts.

2009

March	Call for preproposals released
June	Preproposals due
August	Full proposals requested
Nov.	Full proposals due

2010

February	Administrative Council announces grant awards

Producer Grant Projects are developed, coordinated and conducted by producers or producer organizations. These projects are generally located in one state, often on one farm. There is a $10,000 limit for funding proposals submitted by an individual producer and a $15,000-limit on proposals submitted by producer organizations.

2009

September	Call for proposals released
November	Proposals due

2010

February	Administrative Council announces grant awards

On-Farm Research Projects are conducted by agricultural professionals such as extension agents, NRCS and/or NGO personnel who currently work with farmers and ranchers. Cooperators must include at least one producer at all stages of the project. Funded for a maximum of $15,000 for up to two years of activities.

2009

September	Call for proposals released
November	Proposals due

2010

February	Administrative Council announces grant awards

Sustainable Community Innovation Projects link sound farm and nonfarm economic development with agricultural and natural resource management. Applicants may be farmers, ranchers, researchers, community organizations, environmentalists, ag and community development professionals, entrepreneurs, governmental and non-governmental organizations. Funded for a project maximum of $10,000 for up to two years of activities.

2009

August	Call for proposals released
October	Proposals due
December	Administrative Council announces grant awards

Restructuring R&E

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In order to better accommodate long-term research more suitable for systems projects and to attract more projects addressing quality of life issues, Southern SARE is introducing more defined entry levels for Research and Education grants. Starting in March 2009 the R&E call for proposals will have three categories of **New Research Grants**. Proposals can address production research or postharvest/food systems research or production/ postharvest combined research. Within those categories applicants can apply for three levels of funding: developing/ planning project; preliminary research project; full systems research and eduction project.

Another innovation, **Long-term Systems Grants** will fund full systems research teams that have had successful research projects but need long-term support to build on the infrastructure in place.

Along with those two Southern Region innovations, soon all four regions will have **SARE-State Matching Grants** to fund a set of coordinated activities in research, extension and teaching to help individual states increase capacity and long-term commitment to sustainable agriculture. Congress will have the option of appropriating funds for Matching Grants once SARE's national funding amount tops $15 million. That increase could come in 2010 since the funding level is currently at $14.9 million.

To help southern states be ready to take advantage of the matching grants, S-SARE is offering State Matching Planning Grants with proposals due December 1. See the cfp at http://www.southernsare.uga.edu/currentcalls/MATCHINGPLANNINGCFP.doc

Read the details of all these new opportunities at http://www.southernsare.uga.edu/documents/AdvancingSustAg.doc

Organic orchards

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Such an expansion brings changes.

"One of the changes I am undergoing is the reversal of two decades being a "reductionist scientist" and independent researcher. Now I have to view big pictures and work in a multi-disciplinary way. I would not be in our projects if not for the involvement of entomologist **Donn Johnson**; ag environmental economist **Jennie Popp**, soil ecologist/ biologist **Mary Savin** and fruit education outreach specialist **Elena Garcia** as well as technicians **Heather Friedrich** and **Jason McAfee**. We are a team of many disciplines."

While funding for vegetable research is more available than the long-term funding required for orchard research, Rom is always thinking ahead.

"We are planning fund-raisers to develop some flexible funding for our research and outreach program," he says, "and to develop some scholarships for students who want to grow food ."

Some of those plans include working with local restaurants to host a "Sustainability Concert Festival" and an "Organic Dinner under the Stars" in the research plots.

As for the organic apple research started with the SARE grant, the team has won a grant from the USDA Integrated Organic Program to continue for four more seasons with the chance for renewal through another four seasons. So it appears this young orchard will have a full life of providing research data for organic growers.

Read the complete final report by searching the project data base at www.sare.org for project LS05-176.

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