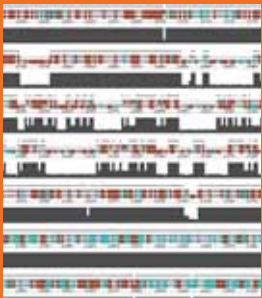


CLEMSON

# IMPACTS

Mobile  
biofuels plant  
cuts energy  
bills

CLEMSON UNIVERSITY PUBLIC SERVICE ACTIVITIES - SPRING 2010



Control for nematodes in cotton  
DNA story text  
Studies help plants survive  
Battling ornamental pests

# Vice President's Message



With these reports represent some of the impacts that Clemson PSA is having across the state.

Sincerely,

A handwritten signature in black ink that reads "John W. Kelly". The signature is written in a cursive style.

John W. Kelly  
Vice President for Public Service and Agriculture

**more articles:**  
[www.clemson.edu/public/impacts/](http://www.clemson.edu/public/impacts/)

## CLEMSON<sup>®</sup> PUBLIC SERVICE ACTIVITIES

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Photo by Peter Hull

## Site-specific controls for nematodes in cotton

By Peter Hull

A groundbreaking study is developing new technologies for site-specific detection and control of plant-parasitic nematodes in cotton.

Every year, about 10 percent of U.S. cotton production is lost to nematodes, causing losses of more than \$300 million to the \$6 billion crop. Yield losses in individual fields may reach 50 percent.

The multi-state, multi-disciplinary research, led by Clemson, is seeking either to lower the use of high-risk pesticides – such as carbamates and soil fumigants – or to optimize the use of nematicides in cotton crops in the southern U.S. Results likely will have lasting environmental benefits while reducing pesticide costs for growers.

Funded by a USDA grant, the research involves scientists from biosystems engineering; entomology, soils and plant sciences; the Edisto Research and Education Center; and the Cooperative Extension Service.

For more information: Ahmad Khalilian, 803-284-3343 x 230, [akhliln@clemson.edu](mailto:akhliln@clemson.edu).

## Learning from soybean elders

By Peter Kent

Older varieties of soybeans may hold the answer to how new varieties can ward off stress from disease and pests, especially the parasitic soybean cyst nematode.

Plant scientist Halina Knap is exploring the little-understood mechanism used by some ancestral soybean varieties to sense the presence of the nematodes and produce a natural defense.

Identifying the genes and pathways used by older varieties can lead to development of resistant modern soybean varieties. This can reduce the need for chemical controls, protect the environment and reduce growers' costs.

Soybeans are a major row crop in the U.S., valued at more than \$27 billion. The soybean cyst nematode causes crop losses of \$500 million each year.

For more information: Halina Knap, 656-3523, [hskrpsk@clemson.edu](mailto:hskrpsk@clemson.edu).

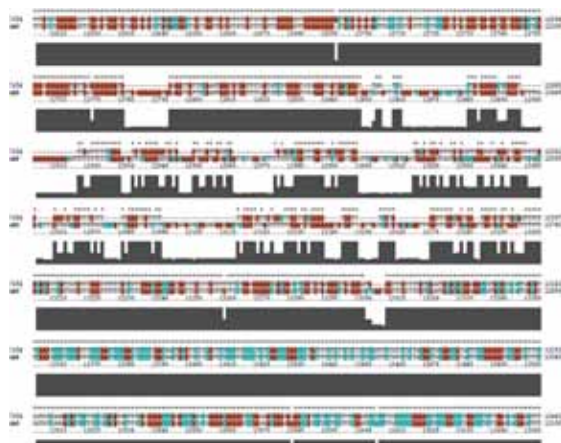


Photo courtesy of Halina Knap

## Sandhill Farmers Market opens in May

By Donna Bowen

The Sandhill Farmers Market opens on Tuesday, May 3 from 2 to 7 p.m. and runs until November 22, 2011.

The market, located at the Sandhill Research and Education Center in Columbia, is home to over 53 vendors selling fresh

local produce, meat, poultry, eggs, butter, milk, cheese, honey, plants, flowers, shrubs, and baked goods and many organic products. An "Ask a Master Gardener Booth" is also available for anyone with questions on lawn and garden problems.

"The community has embraced the Sandhill Farmers Market as a place for people to find high-quality produce and other fresh, nutritious products for feeding their families," said Judy Gaskins, market coordinator.

Nearly 48,000 customers attended the 2010 market, with vendors reporting almost \$250,000 in gross sales. The 2011 market is shaping up to be even bigger.

For more information: Judy Gaskins, 803-699-3190, [jgaskin@clemson.edu](mailto:jgaskin@clemson.edu).



Photo by Clemson University

## Canning and preserving can stretch your grocery budget

By Peter Kent

Canning and preserving can extend summer's bounty of fruits and vegetables and save on grocery bills. It may be an old-time skill, but it takes up-to-date information to safely preserve fresh foods at home.

A new Clemson Extension program – Carolina Canning – offers canning and preserving workshops across the state, as well as up-to-date information on a new website, Facebook page and Twitter account. The program is made possible by a grant from the S.C. Department of Agriculture.

"For years, canning was something grandmothers did and now home food preservation has become very popular with younger generations," said Susan Barefoot, Extension program team leader for food safety and nutrition.

"You can stretch your food dollars by canning or freezing local vegetables and fruits from S.C. Certified growers and sellers, as well as from your own garden," she said.

For more information: Susan Barefoot, 864-656-3140, [sbrft@clemson.edu](mailto:sbrft@clemson.edu), or Kimberly Baker, 864-232-4431, [kabaker@clemson.edu](mailto:kabaker@clemson.edu).

Carolina Canning: [http://www.clemson.edu/extension/food\\_nutrition/canning/](http://www.clemson.edu/extension/food_nutrition/canning/)

Facebook: <http://www.facebook.com/pages/Carolina-Canning/154004811319982/>

Twitter: <http://twitter.com/CarolinaCanning>



Photo by Donna Bowen

## Genetic studies help plants survive adverse conditions

By Peter Kent

South Carolina's reduced rainfall amounts make it more difficult for crops to thrive.

Molecular biologist Hong Luo's research focuses on how to genetically improve crop plants, including turfgrass, switchgrass, soybeans and cotton.

"Many people do not realize that turfgrass is part of the state's agriculture industry," said Luo. "We are looking at how to help it grow in stressful environments, such as drought or where the water may have a high salinity level."

In research funded by USDA, he and plant physiologist Haibo Liu look for genes that regulate traits to help the plants flourish. They also look for ways to improve the plants' ability to perform under adverse environmental conditions and ensure that the genes are not transferred to other plants.

Photo by Peter Kent

For more information: Hong Luo, 864-656-1746, [hluo@clemson.edu](mailto:hluo@clemson.edu).

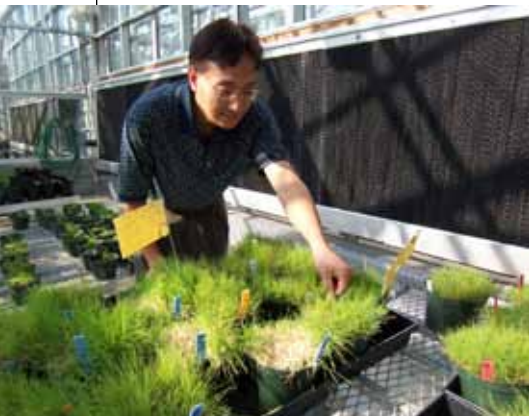


Photo by Peter Kent

## Curbing a critter's yen for cotton

By Peter Hull

The furry-looking insects start their development smaller than the head of a pin, but the caterpillars soon develop an appetite for cotton.

To demonstrate the insects' destructive power, Clemson entomologist Jeremy Greene planted two cotton varieties — one genetically modified to provide protection from caterpillars, one not — at the Edisto Research and Education Center in Blackville.

The non-protected cotton was planted in a pattern that spelled the word "Tigers." Aerial photographs taken near harvest show that the genetically modified crop survived intact, while the unprotected plants provided three square meals a day for the caterpillars.

Cotton is a \$46 million crop in the Palmetto State involving hundreds of farms and thousands of jobs. Nearly all cotton varieties planted in South Carolina contain genes found in the naturally occurring *Bacillus thuringiensis*, or Bt, that help the plant make its own insecticide.

For more information: Jeremy Greene, 803-284-3343, [green4@clemson.edu](mailto:green4@clemson.edu).



Photo courtesy of Jeremy Greene



## 'Screenhouse' helps ensure healthy peach trees

By Peter Kent

Peach growers across the Southeast are planting healthy, productive trees in part because of the good start they get at Clemson's Musser Fruit Farm.

Plant virologist Simon Scott has been testing peach trees and directing the Southeastern Budwood Program. Funded by peach growers and nurseries in South Carolina and Georgia, the program ensures that commercial peach cultivars are free from plum pox and other viruses that reduce crop yield and fruit quality.

Tested trees are sent to nurseries in Tennessee that propagate new planting material. The nurseries produce more than three million trees annually that are distributed throughout the Southeast.

During testing, the peach cultivars are housed in a screened environment — a screenhouse — to minimize exposure to insects and any viruses the pests may transmit.

The screenhouse at Clemson was funded by the USDA and is one of three U.S. centers testing temperate fruit trees — peach, almond, cherry, apricot, apple, and pear.

*For more information: Simon Scott, 864-656-5745, [sscott@clemson.edu](mailto:sscott@clemson.edu).*



Photo by Peter Kent



Photo by Clemson University

## Tiny worms cause costly crop loss

By Peter Kent

Nematodes affect all crops and cause \$80 billion of crop losses worldwide each year. Accurate nematode identification is critical in the management of turfgrass, field and fruit crops, and vegetables.

Nematologist Paula Agudelo teaches a nematode identification course on the Clemson campus and in other countries to increase the efficiency of professionals in plant pathology and nematology. The training also helps minimize the parasite's spread and prevent nematodes from crossing national borders.

Since the program began in 1982, more than 500 professionals from 40 states and 25 countries have been certified to identify potentially harmful species of nematodes. The next course will be held May 21-28 in Clemson.

*For more information: Paula Agudelo at 864-656-5741, [pagudel@clemson.edu](mailto:pagudel@clemson.edu), or [www.clemson.edu/esps/plantpath/nematology/nematode.htm](http://www.clemson.edu/esps/plantpath/nematology/nematode.htm).*

## Diagnostic tool kit protects strawberry crop

By Peter Kent

Research to control brown rot in peaches is now being used to control fungal diseases in strawberries.

Fruit disease specialist Guido Schnabel worked with University of Georgia scientists to develop a diagnostic kit that helps peach growers select the most effective fungicides for sustained disease control.

Now he and University of Florida colleagues are applying the technology to fungal diseases that threaten the nation's \$2 billion strawberry crop.

"We've developed a kit that will enable growers to determine the fungicide resistance profile in their respective areas," said Schnabel. "We collect diseased fruit, conduct a sensitivity test, and within three days we can determine what works and what doesn't. This information allows science-based, location-specific disease management."

California, Florida, Oregon and North Carolina are major strawberry producers. South Carolina producers grow strawberries as a small, high-dollar specialty crop, totaling about 700 acres statewide. The multi-university research is funded by a USDA grant.

*For information: Guido Schnabel, 864-656-6705, [schnabe@clemson.edu](mailto:schnabe@clemson.edu).*



Photo by Clemson University



Photo courtesy of Greg Yarrow

## Workshop helps landowners control feral hogs

By Peter Kent

South Carolina is home to the nation's sixth largest population of wild hogs, with estimates ranging from 275,000 to 300,000 hogs throughout all 46 counties. They destroy wildlife habitats by rooting and wallowing, and can transmit diseases to livestock and humans.

To help control the growing population, wildlife ecologist Greg Yarrow is on a statewide task force. In June he will lead a workshop for Southeastern landowners, land managers and natural resources professionals at the Sandhill Research and Education Center in Columbia.

"Controlling feral hogs is a real challenge," said Yarrow. "It is time-consuming, expensive and frustrating."

The workshop will bring wildlife experts from across the region to share information on the most effective control techniques to reduce feral hog populations and associated problems.

*For more information: Greg Yarrow, 864-656-7370, gyarrow@clermson.edu.*

## Mobile biofuels plant cuts energy bills

By Peter Kent

Biofuels could become a significant resource to meet South Carolina's energy needs. Fuels produced from plants, microbes and waste oils have a lower carbon footprint and can form the basis for a new industry.

Biosystems engineer Terry Walker is leading research on biofuels processing using a state-of-the-art mobile processing plant from Piedmont Biofuels. It is also used for demonstrations around the state.



Photo by Clemson University

The pilot plant gives Clemson the ability to

convert potentially all waste oils on the campus to high-grade biodiesel. Using waste oils instead of petroleum-based fuels can save the university up to \$30,000 per year.

*For more information: Terry Walker, 864-656-0351, walker4@clermson.edu.*

## Champagne yeast helps brew biofuel

By Peter Kent

The same yeast that plays a role in making champagne corks pop is helping brew renewable fuel from plants.

Clemson bioengineer Sarah Harcum ferments processed switchgrass, a plant easily grown in South Carolina, to make bioethanol. She is part of a Clemson-Savannah River National Laboratory team funded by the U.S. Department of Energy to develop biofuels that will decrease America's dependence on oil.

Switchgrass is a second-generation biofuel, which is a non-food crop used to make ethanol. The research team focuses on freeing the plant sugars from cellulose, which plants use for cell walls. Harcum then mixes champagne yeast and an enzyme with the plant sugars to brew bioethanol.

*For more information contact Sarah Harcum at 864-656-6865 or harcum@clermson.edu.*



Photo by Rebecca Dalhouse





Photo by Clemson University

## Conserving natural enemies to battle ornamental industry pests

By Peter Kent

Scale insects – smaller than one-half inch in diameter – can destroy ornamental shrubs and trees. The pest sucks juices from the plants, reducing new growth and causing leaves or entire branches to drop.

Clemson entomologist Juang-Hong Chong is leading a team of scientists in the Carolinas, Virginia and Georgia to develop an integrated pest management strategy for scale.

The team is studying oak lecanium scale that targets oak trees and has severely infested nurseries and urban

landscapes in the southern U.S. They will gather life history information, determine the diversity and effectiveness of natural enemies and use both chemical and biological controls.

A model that combines temperature and insect life stages will be developed to determine the exact timing of pesticide applications during the most vulnerable period of the pest's life.

Chong hopes that using less toxic, more targeted insecticides at the proper time in the pest's development will conserve natural enemies that may be killed by broad-spectrum insecticides. The research is funded by a USDA grant.

For information: Juang-Hong Chong, 843-662-3526 x 224, [juanghc@clemson.edu](mailto:juanghc@clemson.edu).

## Watershed stewardship tools are online

By Peter Hull

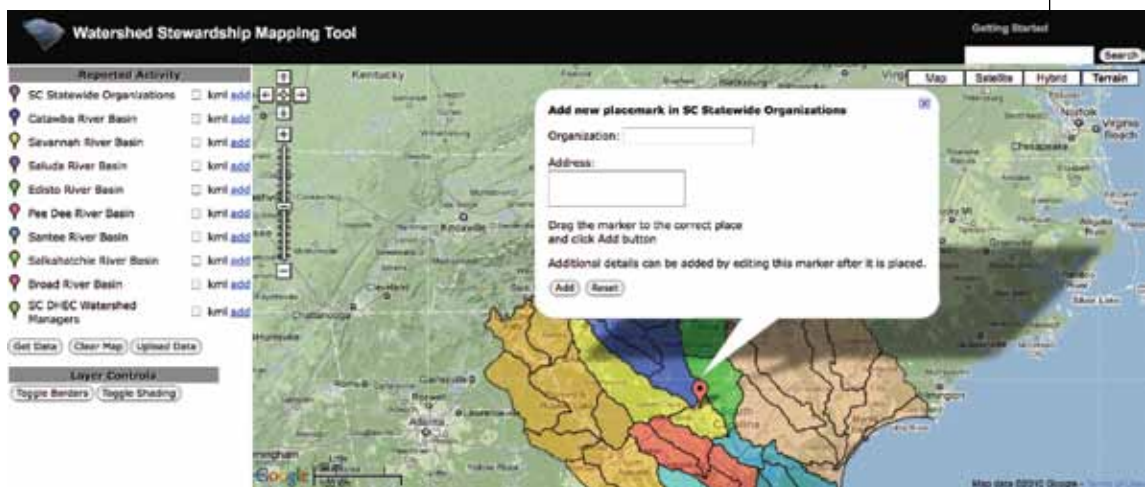
Carolina Clear has launched online tools for citizens and organizations interested in water quality, responsible development and environmental stewardship.

A watershed stewardship-mapping tool connects volunteers with groups that seek to protect and restore watersheds. Residents interested in wildlife habitat may want to help restore shorelines and wetlands. Those interested in fishing may get involved in reporting sediment erosion, which can harm the ecological health of a stream.

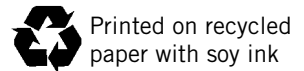
"Concerned residents can be watershed stewards, and there are many roles to play," said Katie Giacalone, Carolina Clear's statewide coordinator.

A watershed is the area where all of the water that drains from the land goes into the same point on a stream, lake or other water body. In South Carolina, watersheds are located in eight major river basins: Broad, Catawba, Edisto, Salkahatchie, Saluda, Santee, Savannah and Pee Dee, all of which contain sub-basins.

Contact: Katie Giacalone, 843-554-7226 x 115, [kgiacal@clemson.edu](mailto:kgiacal@clemson.edu), or [www.clemson.edu/carolinaclear/](http://www.clemson.edu/carolinaclear/)



Address service requested



## Pigweed poses stubborn problem for row crops

By Peter Kent

Mike Marshall is as pigheaded about weed control as pigweed is prolific. Pigweed (Palmer amaranth) can produce up to 650,000 seeds per plant, making it a devastating weed in row crops, says Marshall, Extension weed specialist at the Edisto Research and Education Center in Blackville. The weed can grow two inches a day up to seven feet or more, crowding out crops, and is so tough that it can damage harvesting equipment.

Over the past 15 years, pigweed has adapted so herbicide is not as effective as it once was. The situation could lead to higher food prices because of lower crop yields and rising farm costs.

Marshall and other Clemson scientists are coming up with ways to control pigweed. Some are high-tech, such as satellite-guided precision weed-killer treatments, and some are low-tech – pulling the weeds by hand.

“We have to use the herbicides we have wisely and keep chipping away at the whole landscape of weed resistance in cotton, soybeans, corn, wheat and other crops in South Carolina to manage the problem until we get new tools,” says Marshall.

*For more information: Mike Marshall, 803-284-3343 x 228, [marsha3@clemson.edu](mailto:marsha3@clemson.edu).*



Photo by Clemson University