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# AAES Impact

RESEARCH NEWS FROM THE ALABAMA AGRICULTURAL EXPERIMENT STATION

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## Scientist finds glycerin makes for effective pesticides, herbicides

Sky-high petroleum prices and environmental concerns have fueled a dramatic, worldwide increase in the demand for and production of biodiesel in the past decade. And that biodiesel boom has created a glycerin glut.

The oversupply, and subsequent low cost, of crude glycerin—a byproduct of biodiesel production—could bode well for row-crop farmers, because research at Auburn shows glycerin can effectively control farmers' most troublesome soil-borne pests: nematodes.

Auburn plant pathologist and veteran Alabama Ag Experiment Station researcher Rodrigo Rodriguez-Kabana started looking into glycerin's potential as a pesticide in 2005 and saw early on that straight glycerin, when applied directly to the soil, can suppress crop-damaging nematodes.

But then, knowing that glycerin is a good solvent, he began combin-



**UNDER REVIEW—Rodrigo Rodriguez-Kabana, Distinguished University Professor of plant pathology at Auburn, evaluates the herbicidal capability of a glycerin-based composition he has developed as an affordable, effective biological control agent.**

ing the product with various naturally occurring, safe-for-humans compounds that are known to have pesticidal value, such as mustard oil and almond extract, and testing their effectiveness in greenhouse and in micro-plot trials.

To date, in the 89 nematode and 225 weed tests he's put his formulations through, he has identified specific compositions that are highly potent pesticides and others that provide broad-spectrum control of nematodes and other soil-borne pests as well as weeds and harmful fungi.

Rodriguez-Kabana already holds several patents on his formulations, which would not only cost significantly less than today's petroleum-based ag chemicals but be safe for the environment and for humans, too.

And, by the way, Rodriguez-Kabana has discovered that compositions based on biodiesel instead of glycerin also provide effective bio-control of pests, weeds and fungi.

All ingredients in all of his compositions are "things that occur naturally and already are used by humans," he says. That should speed up the registration process once the products have been presented to the EPA, he says. ♦

## Viruses, 'good' bacteria could help control ESC in catfish

It won't be a silver bullet, but new biotechnology being developed and tested at Auburn shows promise in protecting pond-raised catfish from enteric septicemia, a deadly infectious bacterial disease.

The disease, known as ESC, is caused by the bacterium *Edwardsiella ictaluri* and costs the industry as much as \$60 million a year. A few ESC antibiotics and vaccines have come on the market in recent years, but their efficacy varies, and the costs are prohibitive for some catfish growers. Besides, consumer demands for antibiotic-free food are growing.

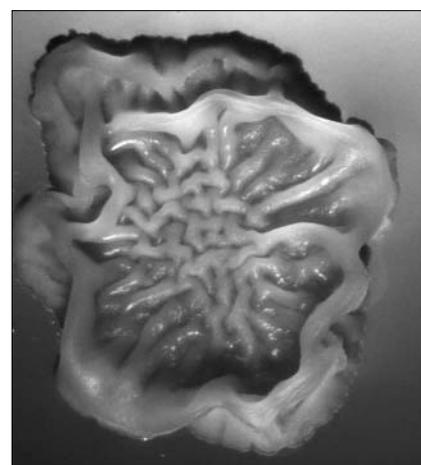
The Auburn research team, led by aquaculture epidemiologist Jeff Terhune and environmental microbiologist Mark Liles, aims to find an effective, affordable, biological means of controlling and preventing the disease. To accomplish that, the AAES scientists are developing nat-

urally occurring microorganisms—specifically, viruses and probiotic, or beneficial, bacteria—that work as biological control agents to reduce the numbers of ESC-causing bacteria in catfish producers' ponds.

The viruses, called bacteriophages, attack and destroy only specific bacteria. Phages specific to *E. ictaluri*, for instance, don't prey on any other type of bacteria.

The researchers first collected water samples from a number of commercial catfish ponds where ESC outbreaks had recently occurred. In their analyses of those samples, they have isolated three *E. ictaluri*-specific phages as well as 25 beneficial bacteria, all of which are easily reproduced in the lab, Terhune says.

Using those growing populations of phages and probiotic bacteria, the scientists now are focusing on improving the microorganisms'



**ATTACK, DESTROY—This highly magnified photo shows a beneficial bacterium, in back, attacking a bacterium that causes disease in farm-raised channel catfish.**

ability to kill the bacteria that cause ESC. They're also experimenting with different dosage levels and application techniques to find the most cost-effective strategy for catfish producers. ♦

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**IMPACT** is a quarterly newsletter the Alabama Agricultural Experiment Station (AAES) publishes to inform state and federal legislators, public policymakers and the general public about AAES research projects and how they affect all Alabamians. The AAES ([www.aaes.auburn.edu](http://www.aaes.auburn.edu)) is based at Auburn University ([www.auburn.edu](http://www.auburn.edu)). Contact **IMPACT** at 334-844-2783 or [jcreamer@auburn.edu](mailto:jcreamer@auburn.edu).

## Ag economist: Fertilizer cartels jeopardize global food supply

Three transnational corporations dominate the supply, trade and price of phosphorus, a nonrenewable plant nutrient that is essential for food production and for life.

That, Auburn agricultural economist Bob Taylor says, helps explain the dramatic increase in phosphorus fertilizer prices in the last few years.

Two of the corporate giants, he says, have a cartel sanctioned under the 1918 Webb-Pomerene Act, which basically gives them antitrust immunity to set prices above competitive levels. They also operate an export cartel sanc-

tioned by the Canadian government. The third corporation is a monopoly authorized by the Moroccan government.

Taylor, Alfa eminent scholar in ag economics and an AAES researcher, began examining the global phosphorus market in-depth last year. His conclusions—among them that inputs critical to food production are controlled by a handful of corporate cartels and politically unstable governments and that this poses a serious threat to the food supply and to food security worldwide—are cause for alarm.

Taylor recaps his findings in a sobering article, “Forget Oil, Worry about Phosphorus,” published online in September by The Daily Yonder. And in early October, he traveled to the nation’s capital to present to officials from the U.S. departments of justice and agriculture his analyses of what he deems a “grave and unacceptable” situation.

It is also a highly complex situation, as he explains in his online article. To access the article, go to [dailyyonder.com](http://dailyyonder.com) and search for the keywords *fertilizer cartels*. ♦

## Plant-propagation research could help stimulate village’s economy

In an Auburn University greenhouse, researchers are determining the fastest and easiest ways to propagate three uncommon plant species as part of a project designed to boost the economy of a village in northern Costa Rica.

The plants include a palm, a cactus and a water lily species, all native to Costa Rica.

In the study, horticulture associate professor and AAES scientist Amy Wright and graduate student Rachel Meriwether are propagating the plants from seeds and from cuttings and exposing them to various growing conditions. They are using the data they collect to develop propagation protocols for the three species.

Soon, Wright and Meriwether, working with National University of Costa Rica faculty, will begin teaching small-scale farmers in the economically stressed Costa Rican village of Caño Negro how to successfully propagate and produce the plants to sell on both the ornamental and fruit markets.

The plants also could be used to restore the ecosystem, which has been disrupted by an influx of large fruit companies that are converting land to pineapple production.

The study’s results will be significant to general science, too, as there is little to no published research on the propagation of these exact species. ♦



**CACTUS CUTTINGS**—Rachel Meriwether, horticulture graduate research assistant at Auburn, tends to a group of cuttings from an unusual cactus species native to Costa Rica.

## Trees, lovely landscaping can help cities boost tourism, study shows

*I think that I shall never see a tourist who dislikes a tree.*

Cities and communities looking to attract tourists—and tourists’ dollars—to their fair towns might want to consider investing in trees.

Granted, trees alone won’t lure tourists to a community en masse. But a just-completed AAES study by Yaoqi Zhang, who specializes in the social economics of forestry at Auburn, and horticulture faculty Jeff Sibley and Carolyn Robinson indicates that tourists are most

attracted to, and most likely to revisit and recommend, cities with well-designed landscapes that showcase lots of lovely trees.

Among the almost 400 people the scientists survey, 80 percent rated city beautification as important or very important to tourism development and identified city parks, green spaces and attractive



**Tourists value urban trees.**

landscaping that includes “the right trees in the right places” as essential to a positive image of a city. They also said tree selection should be based on, in order, seasonal color, symbolism to a town, species and shape.

Zhang, project leader, says the scientific data on the value of urban trees and striking landscapes to a community is an excellent resource for city and community leaders who are grappling with competitive land-use issues. ♦

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