from the

DIRECTOR

One of the Mississippi Agricultural and Forestry Experiment Station's stated goals is to conduct research that addresses real-life problems. In practice, this has meant being responsive to the needs of our clients and shaping our research programs to meet these needs. MAFES research programs are constantly evolving to help keep Mississippi producers viable and competitive.

Each year brings new challenges as well as opportunities for our producers. In recent weeks, House and Senate Farm Bill conference attendees reached an agreement on the terms of a new Farm Bill, which will undoubtedly have an effect on producers in Mississippi and elsewhere in the nation. The six-year deal will increase agricultural spending by 70 percent and should help producers who have been faced with record low prices for the past five years.

In Mississippi, the effects of the new Farm Bill will mean equitable payments for our cotton and rice producers. Cotton and rice production is very capital intensive, and cotton and rice farms are usually larger than Midwest corn and soybean fields to offset this large investment of capital. The payment limitations set by the Farm Bill should mean a much stronger safety net for our producers.

Counter-cyclical payments introduced in the bill will also boost farm commodities in Mississippi. Farmers will still have planting flexibility because payments will be based on base acreage and yield and not on what was actually produced, but assistance will be built in when market prices are below target prices.

Another positive aspect for Mississippi farmers is the requirement for country-of-origin labeling on meat, fish and produce in two years. This should allow our state's catfish producers to continue to provide consumers with the highest quality product that they have come to expect from Mississippi Delta farm-raised fish.

Altogether, the new Farm Bill promises something for all the farmers in our state. MAFES scientists will work hard to ensure that farmers will have the resources they need to make the most of the opportunities presented by this legislation.

This issue of *Highlights* features research geared toward effective disease and pest management, an ever-present challenge facing producers.

Millions of dollars are spent every year to control diseases and pests, and millions more are lost as a result of the damage caused by these invaders in farm plots. In some cases, these pests are old enemies that have adapted to traditional means of control; in others, the organisms involved are only now being identified. In all cases, MAFES researchers are finding ways to limit the damage to crops, meat, fish and our food supply, while keeping an eye to environmentally friendly methods.

I'm confident you'll find that MAFES research supports Mississippi farmers as they go about the business of feeding and clothing our society.

Vance H. Watson

Vance H. Watson
Director

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MAFES RESEARCH HIGHlights

MISSISSIPPI AGRICULTURAL AND FORESTRY EXPERIMENT STATION

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The Mississippi Delta is a major rice-producing area in the U.S.

Marco Nicovich

Research Center

By Charmain Tan Courcelle

Bring up the subject of Delta agriculture in a conversation and you're likely to hear talk of cotton and soybeans. But those in the know would tell you that the Mississippi Delta has also become a major national player in rice and farm-raised catfish production in recent decades.

Work at the Delta Research and Extension Center (DREC) has evolved to meet the changing needs of area producers. Whether it's been determining the best varieties of cotton, soybean, rice or corn to grow in the region or defining best management practices for crop and aquaculture production systems or solving crop disease and pest questions, DREC researchers have the goal of increasing economic profitability and improving the quality of life for Delta producers and residents. Following is a description of some of the research programs at the DREC.

Marco Nicovich

Flowering weeds, such as this vetch, harbor the tarnished plant bug, a cotton pest.

Controlling Emerging Pests Needed Part of New Insect Management Scheme

DREC researchers are developing insect management strategies to help cotton producers faced with a case of trading pests.

Bt cotton — cotton with built-in insect resistance — and the Boll Weevil Eradication Program have helped cotton growers reduce the amount of pesticides used for tobacco budworm, bollworm and boll weevil control. But reducing pesticide use has had an unintended side effect — the emergence of tarnished plant bugs and stink bugs as pests of cotton fields.

"On the one hand, it's a good thing that we've reached the point where we have low-insecticide management systems," said Aubrey Harris, MAFES entomologist. "But we've also opened the door for other pests to create problems. We've seen this to be particularly true for the tarnished plant bug and stink bug in cotton."

Harris said in the past, insecticides used for caterpillar pests and the boll weevil deprived occasional pests like tarnished plant bugs and stink bugs of the opportunity to flourish. For example, in 1995, before the introduction of Bt cottons and the Boll Weevil Eradication Program in Mississippi, 95,218 acres of the state's cotton fields were infested with stink bugs. In 2001, with lower pesticide inputs, 800,000 acres were infested, elevating the stink bug to the status of an "emerging pest."

Finding a solution to these emerging pests that balances environmental conservation with economic practicability is the goal of Harris' work. Last year, the scientist began assessing the use of crops, such as soybeans, as traps for stink bugs.

"Stink bugs prefer maturing soybeans to cotton," Harris said. "We wanted to find out whether we could

Supports delta agriculture

manipulate soybean planting dates and varieties so that any stink bugs present in a field stay in soybeans and out of cotton."

In 2001, Harris and his team tested this hypothesis using soybean maturity groups IV and V as their decoy crop. The group sampled soybeans and cotton for stink bugs during that year's growing season.

Results from this preliminary work were encouraging, Harris said. "We managed to keep stink bugs in soybeans and away from cotton."

Harris said the same strategy of varying planting dates will not work for tarnished plant bugs, which have a wide host range — more than 300 host plants are known — and move from wild host plants or corn to cotton early in the growing season. Instead, he thinks a strip or border of soybeans planted between corn and cotton plots may act as a temporary buffer to help manage this pest.

As part of his studies on tarnished plant bug control, Harris is determining how the order in which different crops are planted influences pest numbers and developing management schemes based on his findings. Nonchemical pest management strategies are especially important because the tarnished plant bug is resistant to a number of insecticides used in its control.

"Newer insecticides may eventually be developed for efficient control of the tarnished plant bug. But these same new products will probably be highly specific for one class of insects, increasing the cost of inputs from the need for multiple pesticide products," Harris added. "Management becomes more central to effective and economical pest control."

Harris said he hopes results from his studies will allow the full benefit of the Boll Weevil Eradication Program and insect-resistant crop technology to be realized.

"Eliminating key pests like the boll weevil and tobacco budworm removes the need for aggressive intervention. This means that simple, environmentally friendly solutions including trap crops and the use of natural pests can be explored," he said.

Marco Nicovich

Close-up of a cotton plant

Marco Nicovich

Research assistant Fanny Liu prepares a soil sample for nematode analysis.

Marco Nicovich

Close-up of an elutriator. DREC researchers use a combination of elutriation and centrifugation to isolate nematodes.

Marco Nicovich

This image shows a reniform nematode under a light microscope.

Survey Says — Nematodes on the Rise

Another threat to cotton comes from pests so tiny that their presence is hard to recognize except by the trained eyes of laboratory personnel. Worse yet, commercially available cotton varieties have little to no resistance to these minuscule invaders. A fact that has DREC scientists searching for the best and most accurate method to track and manage these pests.

Cotton nematodes are microscopic plant-parasitic worms that live in soil and feed on the roots of cotton. Nematode root damage to cotton plants results in stunting and can cause yield loss. Two of the most economically important species of these worms in Mississippi cotton fields are reniform and root-knot nematodes.

"The reniform nematode is a tropical nematode that has moved into Mississippi in the past 20 years and become a serious cotton pest," said Gabe Sciumbato, MAFES plant pathologist. "Cotton yields have been decreasing for a number of years, and these nematodes may be one reason why."

Soil analysis for nematodes is the best way to determine whether reniform nematodes are present in high enough numbers to cause yield losses. Because effective nematode control depends on the accurate identification of the type and numbers of nematodes in a field, Sciumbato and research assistant Fanny Liu assessed different methods of isolating nematodes from soil for lab analysis.

The scientists compared three common methods of extracting nematodes from soil samples. In one method, known as the Baermann funnel technique, soil samples are placed on a filter held up by a screen over a funnel. Nematodes in the sample move through the soil, past the filter and into the funnel where they are collected. A second method uses centrifugation and separates nematodes from soil particles and organic matter based on their densities. The third technique combines sieving through a series of wire meshes, a process called elutriation, with centrifugation to concentrate the number of nematodes collected from a soil sample.

"Our results have shown that the combination of elutriation and centrifugation provides the most efficient and reliable technique for us to extract reniform nematodes," Liu said.

Sciumbato and Liu have received a Research Enhancement Grant to survey for numbers and species of nematodes in cotton-growing counties in Mississippi. Don Blasengame, retired Mississippi State University Extension Service plant pathologist, conducted the previous nematode surveys and is collecting soil samples for the current effort. Three counties (Sharkey, LeFlore and Coahoma counties) were surveyed in fall 2001, and an additional seven counties will be surveyed each year after.

"Sharkey County was the most heavily infested," Liu said. "An estimated 88 percent of the cotton fields were infested with reniform nematodes. We also found a slight increase in nematode populations for LeFlore and Coahoma counties compared with survey data from 10 years ago."

The team is also working with help from research assistant Bart Freeland to map each collection site using global positioning systems (GPS) technology, which will allow the same site to be surveyed in the future. Survey results and GPS data will be used to develop maps showing the location, numbers and species of nematode present.

In addition, Sciumbato is collaborating with Harris to develop nematicide treatment protocols for cotton growers. Crop rotation is the best method of nematode control; however, this can be economically prohibitive unless a profitable nonhost crop can be grown as an alternative. Sciumbato and Harris are working toward

other methods that growers can use to control nematodes and still make a profit.

"We're looking for things that farmers can use right now to manage nematodes, including the incorporation of nematicides and the use of anhydrous ammonia as a nitrogen source," Sciumbato said. "Until cotton varieties with nematode resistance are available commercially, crop rotation is the best method of nematode control. However, if crop rotation is not feasible, nematicides may be needed to reduce yield losses."

Old and New Techniques Figure in Rice Breeding

Producers know that the weather, diseases and pests can wreak havoc in even the best managed fields, and rice farmers are no exception to this. MAFES researcher Dwight Kanter is leading a rice breeding effort at the DREC to develop rice varieties that can stand up to these challenges.

With more than 300,000 acres of rice fields — almost all of them in the Delta — Mississippi is the fifth largest rice-producing state in the nation. Kanter is working on finding new rice varieties that have improved yield and growth characteristics, disease and pest resistance and better milling quality, traits that he says will help the rice industry continue to grow in Mississippi.

"We're continuously trying to raise the yield bar for rice and developing superior cultivars with tolerance or resistance to disease and insects without sacrificing on quality characteristics," Kanter said.

Using locally adapted varieties and breeding lines, the top breeding lines from other states, the national and international rice germplasm banks and what he calls his personal elite lines as his source of parental materials, Kanter has made thousands of crosses all in the name of making improvements to currently available rice varieties.

One major accomplishment from Kanter's work was the development of the rice variety Priscilla. Priscilla is the first semidwarf rice variety in Mississippi with field tolerance to sheath blight — a fungal disease that reduces yields and milling quality. It yields an average of 16 bushels per acre more than Lemont, which has been the most popular variety in the state for many years. In 2000, three years after its commercial release, Priscilla accounted for 27 percent of the state's rice acreage.

Kanter said Priscilla took about 10 years in development using conventional breeding techniques. In recent years, a winter nursery has been established to reduce development time. In addition, Kanter hopes a one-year multistate collaborative project funded by the Rice Foundation will provide another technique to facilitate the rice breeding process.

The project involving Mississippi, California, Florida, Missouri and Texas will explore the use of marker-assisted selection for economically important characteristics. In marker-assisted selection the location of known genetic sequences, so-called markers, are used to locate genes controlling desirable traits.

The group will focus on plant type, blast disease resistance and grain quality (aroma) initially. Kanter said the technique offers the potential to more efficiently develop new rice varieties.

"In the case of blast disease resistance, for example, it's often difficult to tell whether you have a variety that is truly resistant. The right field conditions have to be present during each test for a good blast infection," Kanter said. "Marker-assisted selection removes the environmental variable. By looking at the markers present, you can positively determine if a cultivar has the trait you're interested in."

Marco Nicovich

MAFES rice breeder Dwight Kanter examines a rice variety growing in the DREC winter nursery.

Marco Nicovich

Close-up of a maturing rice head.

new fescue *may resolve* foaling *complications*


David Winton

By Linda Breazeale

Researchers are looking for the best of both worlds as they evaluate the benefits and risks of two types of fescue when consumed by broodmares.

Tall fescue is an important forage grass for horses and is grown extensively throughout the southern and northeastern United States. In the late 1980s, horse owners noticed increased foaling problems in mares pastured on fescue infected with an endophyte (fungus). The endophyte is beneficial to the grass but produces ergot alkaloids that are toxic to livestock and horses. Horses are most susceptible to toxic fescue during pregnancy.

"Some of the pregnancy complications include placental thickening, prolonged gestations, complicated deliveries, the absence or reduction of milk production and high foal mortality," said Peter Ryan, assistant professor at Mississippi State University and MAFES animal and dairy scientist. "Foal mortality is due to dysmaturity and oxygen deprivation that may result from poor blood flow to the placenta. Other problems with late-term foals include larger body size, abnormal and excessive hoof development and a higher incidence of stillborn births."


Jim Lytle

MAFES researchers are in the third year of a project to study the effects of toxic, endophyte-infected fescue; nontoxic, endophyte-infected fescue; and endophyte-free fescue on pregnancies in horses.


Linda Breazeale

CVM professor Richard Hopper, left, MSU student Marc Seitz, center, and MAFES animal and dairy scientist Peter Ryan examine a pregnant mare pastured on nontoxic, endophyte-infected fescue.

Late-term complications

The effects on late-term pregnancies were the focus for researchers in the first two years. During 2000 and 2001, 11 mares were grazed on toxic, endophyte-infected fescue, 11 were on nontoxic, endophyte-infected fescue and 12 were on endophyte-free fescue. Researchers collected blood and urine samples to perform hormone (progesterone and prolactin) and ergot alkaloid analyses. Newborns and the placenta were weighed at birth, and animal scientists watched for any abnormalities.

"Of the 11 mares on the nontoxic endophyte grass, only two had complications that were unrelated to fescue toxicity. Among the 12 mares on the endophyte-free pasture, only one required assistance during foaling," Ryan said. "Among the 11 mares on the toxic, endophyte-infected grass, all but one experienced complications, including retained placenta, prolonged gestation, reduced milk production (agalactic) and abortion, that were consistent with fescue toxicity."

Data from both years confirmed an increased risk to the foal when mares grazed on toxic fescue and minimal risk from the nontoxic, endophyte-infected fescue or the endophyte-free fescue.

Early-term exposure

In 2002, the third year of the study, researchers placed eight mares on each type of pasture before they were pregnant and kept them on those grasses to examine complications. Mares were monitored for early embryonic losses during the first 150 days of gestation.

Ryan said early-term exposure has never been studied thoroughly. The researchers wanted to determine if pregnancy complications depended on when mares were placed on the grasses.

"By mid to late spring of the first year, mares on the toxic fescue were performing poorly; of the five mares tested pregnant, two had lost their embryos. In the nontoxic fescue pasture, six mares were determined to be pregnant and progressing normally," Ryan said.

Jim Lytle

"The 2002 results of early-term exposure suggest increased difficulties impregnating mares grazing toxic fescue. But we don't have data from open mares monitored before and throughout their entire pregnancies," he said. "This study will be repeated in the spring of 2003."

Past challenges

The need for this type of research was magnified by extensive foal losses in Kentucky during the 2001 foaling season. Ryan said 5 to 10 percent of the 2001 foal crop was lost in Kentucky and neighboring states. An anticipated drop of 20 to 22 percent of the 2002 crop is expected due to the higher-than-normal incidence of early embryonic loss in the spring of 2001.

"Scientists have not found conclusive evidence for what caused the massive losses in 2001. Weather patterns, tent caterpillar infestations and cyanide from wild cherry trees have all been considered, as well as toxic fescue," he said. "Bluegrass is more sensitive to cold weather, so there may have been more fescue than normal last year."

Future hopes

Other universities have conducted studies on the effect of fescue on horses and cattle, but MSU is the first to study the effect of nontoxic, endophyte-infected fescue on horses. The grass is marketed by Pennington Seed under the name Max-Q. Pennington Seed and MAFES are cosponsoring the study.

David Lang, associate professor of plant and soil sciences, is part of the team analyzing the grass. Jessup is one of two varieties of nontoxic, endophyte-infected fescues developed by Mississippi native and MSU alumnus Joe Bouton, now a professor of agronomy at the University of Georgia. Researchers are monitoring the toxicity in fescue throughout its use from pasture to hay.

"In the toxic, endophyte-infected fescue, the toxin is present throughout the growing process and even in the hay after harvest. In the nontoxic varieties, the toxins remain near zero throughout the entire growing period," Lang said.

"Endophyte-infected fescue has greater stand survival, increased yield, improved seeding performance, increased insect resistance and enhanced drought tolerance," Lang said. "The hardy nature of the endophyte-infected fescue seems to make it the ideal choice for livestock forage. However, cattle, sheep and horses all exhibit various problems related to fescue toxicosis."

Sheep that are grazed on infected pastures have reduced reproductive efficiency, but they are less critically affected than cattle. Fescue toxicosis in cattle elevates body temperature and respiration rates and leads to reduced milk production and poor reproductive performance. Vascular constriction, or reduced blood flow to extremities, can cause cattle to lose parts of their ears and tails and lead to hoof sloughing.

"We need to find the best of both worlds — a grass that is hardy in hot, humid areas, yet will not cause health problems in livestock," Lang said.

Study partners

"You cannot do a study of this magnitude without the help of many people. Countless students and others took part in late-night foal watches and data gathering," Ryan said. "Other researchers from the animal and dairy science department include Brian Rude and Scott Willard. From the College of Veterinary Medicine, David Christiansen, Richard Hopper and Dan Scruggs were very important in the research."

Researchers at other universities also were involved.

"Ergot alkaloids were sent to Nick Hill at the University of Georgia for analysis, and Carol Bagnell at Rutgers University studied the relaxin component that impacts placental dysfunction," Ryan said.

Researchers Seek to control introduced

By Charmain Tan Courcelle

ANY military strategist would tell you that knowing your enemy is critical for success on the battlefield. MAFES scientists are applying this strategy to wage a war on a marauding pest.

The Formosan subterranean termite, *Coptotermes formosanus*, is a nonnative species of termite. Experts consider it to be one of the most aggressive and destructive species of termite in the world.

It's believed this pest first entered the southeastern United States on crated military supplies returning from the Pacific theater after World War II. Since then, Formosan subterranean termites have spread from their initial points of entry in New Orleans and Lake Charles, La.; Galveston and Houston, Texas; and Charleston, S.C., into nine Southeastern states. Formosan subterranean termites are also present in California and Hawaii, and it appears that this termite may be spreading beyond these borders, further through the country.

MAFES and other Mississippi State University scientists are working to determine the extent and severity of Formosan subterranean termite infestation in Mississippi and changes to the population over time, and to assess methods of termite management and control. These studies may uncover a chink in the termite's armor that could be used in the development of methods to control this pest.

Jennifer Carroll, CREC

Research technician David Lee checks an underground bait station for termites.

Neighborhood watch targets intruders

One method of termite control that is being evaluated is an area-wide management strategy. Cathy Hollomon, MAFES environmental scientist, is part of a team at the Coastal Research and Extension Center that is assessing this strategy in partnership with Operation Full Stop, the national campaign against Formosan subterranean termites led by the U.S. Department of Agriculture's Agricultural Research Service (ARS).

Unlike native subterranean termites, Formosan subterranean termites do not have to return to underground nests after foraging. If sufficient moisture is available, for example from leaking pipes, this species can build nests above ground in walls or live trees. Formosan subterranean termites are not restricted to dead trees and processed wood for food — any material containing wood fiber, or cellulose, is a potential food source for this species. And because of the large size of Formosan subterranean termite colonies, this pest consumes more wood than its native cousin.

To prevent further destruction and infestation by Formosan subterranean termites, project scientists have designed and are assessing an area-wide termite control approach. This strategy protects all structures within a given area or neighborhood by eliminating or reducing the size of the termite colony. Conventional barrier treatment methods only protect individual structures and don't reduce or eliminate a colony.

Formosan subterranean termites are social insects that forage over wide areas and develop more extensive colonies than native species. Because of this behavior, scientists say treating single buildings to manage Formosan subterranean termite activity is not an effective method of control. The colonies continue to grow and the termites find sustenance elsewhere, destroying buildings and infrastructure along the way.

"With an area-wide approach to termite control, the entire colony is affected, not just individual termites. So, this approach should eliminate or at least reduce the threat of further infestation," Hollomon said.

In earlier studies, Hollomon and colleagues investigated the extent of the Formosan subterranean termite

Marco Nicovich

Research assistant Lynn Prewitt inoculates an agar plate with a candidate termite biological control agent.

Jennifer Carroll, CREC

Visiting research scientist Larry Etheridge prepares a sticky trap for the alate monitoring studies.

problem in Mississippi. Using sticky trap monitoring stations to survey for alates — the winged, reproductive form of termites — the team confirmed the presence of Formosan subterranean termites in Mississippi. Ongoing annual surveys are providing a measure of the spread and severity of Formosan subterranean termites in the state.

"Based on our survey for the presence of alates, we also determined the locations for the area-wide management studies," Hollomon said.

The scientists established 12 study sites within neighborhoods at the Keesler Air Force Base in Biloxi and began monthly monitoring for Formosan subterranean termites in September 2000. Each study site has underground bait stations placed in a grid pattern around centers of high alate capture. Since March 2001, monitoring stations with positive hits for Formosan subterranean termites have been baited. The bait used is made up of a matrix developed by ARS scientists, and laced with diflubenzuron, a toxin that disrupts formation of the termite's outer shell. Hollomon said foraging worker termites, which provide food for the colony, bring the toxin back to the nest and contaminate other members of the colony.

"The toxin eventually kills termites that have visited the baited monitoring stations and consequently others in the colony, including the queen," she said.

"So far, our preliminary data look promising, but we need to continue with these area-wide studies to see how effective the method is."

In the meantime, alate monitoring studies to track the occurrence and spread of Formosan subterranean termites in Mississippi continue each spring. As a result of this work, Hollomon and coworkers have also confirmed the spread of Formosan subterranean termites into forested areas.

"This is the first time we have seen spread from urban areas into naturally forested areas," said Jennifer Carroll, MAFES research associate. "We're excited about this finding because these colonies provide us with a 'field lab' to study the behavior of Formosan subterranean termites in natural environments, away from man-made structures."

Scientists involved in the project hope their studies in the "field lab" and with the area-wide management systems will lead to effective baiting techniques and methods to detect termite activity and to eliminate Formosan subterranean termite populations.

Jennifer Carroll, CREC

Technician Jimmy Spigener sets up a sticky trap monitoring station.

Marco Nicovich

These liquid cultures could contain natural fungal enemies of the Formosan subterranean termite.

Planned reunion brings termites and natural enemies together

Because the Formosan subterranean termite is not native to the U.S., it has no natural predator in this country. MSU forest products scientist Susan Diehl is working with ARS scientists to identify organisms from the termite's original home that might be used as biological control agents.

In its native land, enemies like the fungi *Metarhizium anisopliae* and *Beauveria bassiana* keep the Formosan subterranean termite in check. Diehl is screening fungi isolated from soil and termite samples collected in China by her ARS collaborators for these and other natural foes.

Researchers Seek to Control Introduced Pest (continued)

Diehl's team at MSU is isolating individual microbial species from each ARS sample. Her group will then determine the best culture, or growth, conditions that will allow accurate identification of candidate biological control agents based on their composition and concentration of fatty acids, a molecular component of cells.

Diehl said the task of identifying helpful fungal species rapidly is made difficult because there is limited information about fungi that can cause disease in termites and other insects, so-called entomopathogenic fungi.

"Most identification databases are for medically important fungal species," she said. "We hope to improve the current fungal pathogen databases, which should increase our ability to pull out fungi that seem promising as termite biocontrol agents."

Improvements to the databases will also provide an analytical tool to identify fungal isolates or strains that may be hazardous, she added.

The screening process is the first step in a long battery of tests that any potential biocontrol agent needs to pass before it can be adopted for use. Once Diehl's team has provided ARS scientists with a list of potential agents and their identifying characteristics, her collaborators will need to determine whether their biology and host range make them safe for use in the United States — nonthreatening to humans, animals, native plants and beneficial insects.

"After these extensive tests, the final challenge will be whether we can introduce a termite pathogen that can survive conditions in New Orleans or anywhere else that it's introduced, that can be incorporated as part of a bait system and that will be effective in killing Formosan subterranean termites," Diehl concluded.

Editor's Note: Cathy Hollomon has relocated outside the U.S. The Formosan subterranean termite project at the Coastal Research and Extension Center is being continued by Carroll, MAFES scientists Linda Andrews and Christine Coker, and other research personnel at the station.

Study Searches for fungus, disease, yield *Connection*

By Charmain Tan Courcelle

Experiment Station researchers are determining whether fungi are responsible for some of the seedling diseases and low grain yields seen in Mississippi.

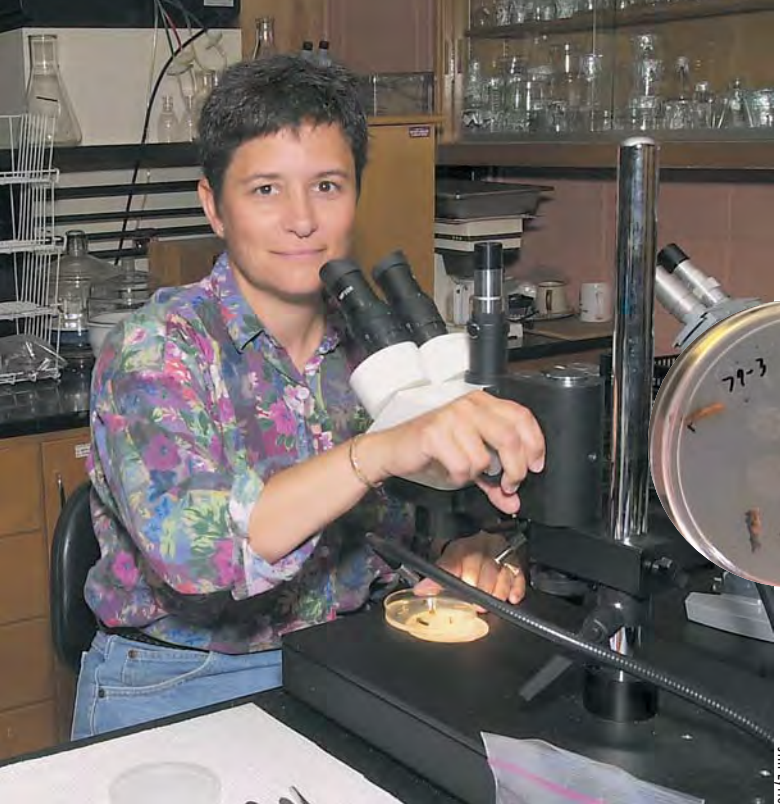
Larry Trevathan, MAFES plant pathologist, is identifying fungal species common to corn production systems in Mississippi and looking for a link between fungal occurrence in the roots of this crop and subsequent seedling disease.

Plant-infecting fungi are found commonly in agricultural soil where they use crop residue as a source of nutrition during the winter and between crops. These fungi can also be found in untreated seed. While fungicides have been somewhat effective as control agents, their success depends on timely and accurate diagnosis of a fungal disease — a task made difficult by the similarity of symptoms for different diseases.

"We initially wanted to identify fungal pathogens that are most active under the corn production systems found in the state," Trevathan said. "A second goal was to find fungal species that might be useful in the future as agents of biological control."

One challenge facing researchers is that fungus-infected plants do not always show outward signs of disease.

"In most cases, you find visually discernible symptoms of a fungal infection," Trevathan said. "But sometimes you don't see symptoms at all, and you're left with the question, 'is this variety growing and producing yields to its full potential or is it infected with



Jim Lytle

Research associate Maria Tomaso-Peterson uses a light microscope to identify fungal species based on their physical characteristics.

a fungal species that is not causing symptoms but is affecting plant productivity?'"

In a three-year study, Trevathan looked at the effect of tillage systems (no-till and conventional), soil types (silty clay and silt loam soils) and planting date on the population and variety of fungal species found in corn. He also collected corn seedlings at three, 10, 17 and 28 days after planting to determine which fungal species are important disease agents at different times in the seedling stage of the plant life cycle and the effect infecting fungi have on subsequent grain yield.

"We found *Fusarium* species consistently in Mississippi soils and most frequently in silty clay. This is important because members of the Fusarium genus are some of the most serious seedling disease pathogens in the state," Trevathan said. "*Trichoderma* species were another well-represented class of fungi."

Results from this study showed a correlation between the incidence of fungal root infection and seedling disease severity. Trevathan also saw the highest incidence of seedling disease in tilled plots planted on the latest corn-planting date in silty clay soil.

He did not find a connection between root infection and yield or between disease severity and yield. Instead, corn grain yields appeared to be most affected by the type of tillage system used. No-till systems produced consistently higher grain yields on the silty clay and silt loam soils.

The researcher said his most significant finding, however, was the presence of fungi that have both disease-causing and nonpathogenic members in his samples.

"That means there's the potential to characterize both fungal pathogens and control agents out of the same population," he said.

Nonpathogenic species of fungi could be used to competitively exclude or displace disease-causing members from crops, Trevathan said. They could also "prime" a plant's antifungal defenses.

For the next phase of his studies, Trevathan will determine whether the presence of seedling disease fungal pathogens influences the development of stalk rot, a disease of mature corn that reduces yields and can result in plant death. He said work in other states suggests some fungal species that cause seedling disease have roles in stalk rot, but such a connection has not been investigated in Mississippi corn production systems.

Another question that Trevathan would like to answer is related to the role of environmental stress on plant pathogen infection. Moisture is the number-one limiting factor to corn production in Mississippi. One management strategy that has been adopted to address this problem is early planting, he said.

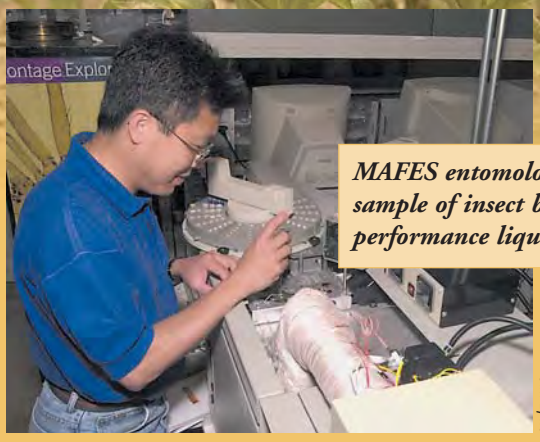
"But if you plant early, there is more stress on the plant from the cool to cold, moist to wet soil conditions. We want to know whether this stress provides an advantage to plant pathogens that would be removed if planting is accomplished at a later date."

Trevathan said he believes the results from this and future studies will help producers develop improved pest management practices for fungi and give them confidence to make adjustments in production practices.

Jim Lytle

Graduate research assistant Lucas Pitre and Tomaso-Peterson examine a plate containing fungi isolated from corn seedlings.

Pheromone Regulation Provides Key to corn earworm control



Jim Lytle

MAFES entomologist Peter Ma injects a sample of insect blood into a micro-high performance liquid chromatograph.

By Charmain Tan Courcelle

Pheromones — those chemicals that stimulate courtship, mating and other social behavior in animals and insects — may one day be manipulated to manage the corn earworm. MAFES entomologist Peter Ma is discovering how the corn earworm pheromone production pathway is wired and searching for ways to short-circuit the process in the insect.

Controlling agricultural pests through their pheromones is not a new strategy. In the past, saturating amounts of pheromones have been discharged in orchards and fields to jam the come-hither signal sent by female moths. The released cloud of synthetic pheromone effectively damps any individual scent trail left by a female, preventing the male moth from finding a mate — a process known as mating disruption.

However, while pheromone release presents an attractive ecological approach to insect control, effective and practical methods of distributing this family of chemicals are still being developed. These efforts are made even more complex because the success of the pheromone-release technique depends on the physical characteristics — slope, shape, size, wind conditions and canopy — of the orchard or field to be treated. Ma's solution is to prevent any of the sex attractant from being made in the insect at all.

"If we can disrupt the synthesis of pheromone, we can in theory interfere with mating and egg laying," Ma said.

The corn earworm is an agricultural pest that costs farmers in the South an estimated $2 billion annually in crop losses and chemical control expenses. Although corn is the earworm's preferred host, cotton, tomatoes, soybeans and other plants can also serve as food sources for this pest.

Several generations of corn earworm develop every year in Mississippi and the rest of the South. Corn earworm populations increase with each successive generation and as the season progresses. Ma's approach could help reduce the pest's numbers while providing the same environment-friendly advantage seen with pheromone release.

Ma is studying an insect neuropeptide that affects the synthesis of sex pheromones in the corn earworm. Pheromone biosynthesis activating neuropeptide (PBAN) is a short peptide sequence (33 amino acids) that is processed from a larger precursor protein together with four other related peptides. Ma's first task is to determine whether PBAN functions alone or in some combination with its sister peptides to regulate sex pheromone production.

"We want to know what the peptide profile is when sex pheromone is at its peak in the earworm's blood — is only PBAN present? Or are there other peptides in the blood as well?" Ma said. "This should help us understand how the switch for pheromone production works."

Because the amount of circulating PBAN and PBAN-related neuropeptides is diluted in the insect's blood, Ma has adapted an existing chemical separation technique — micro-high performance liquid chromatography (micro-HPLC) — to increase the sensitivity of peptide detection and isolation in his samples.

Jim Lytle

The identity of each HPLC-purified peptide is then confirmed using matrix-assisted laser desorption/ionization mass spectrometry, which gives an accurate measurement of molecular masses in biological tissues and individual cells, Ma said.

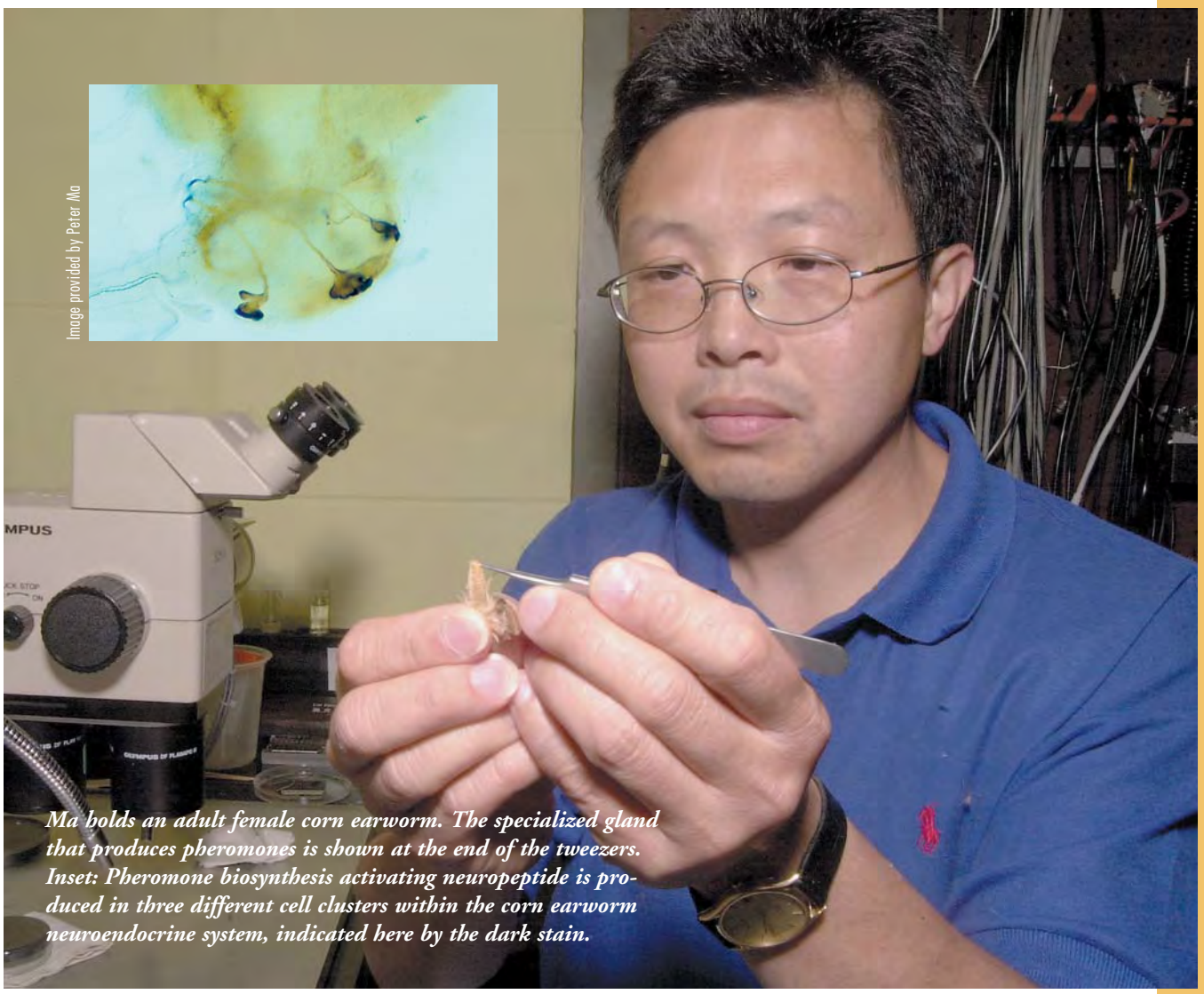
Using these techniques, Ma has determined which cells in the corn earworm produce PBAN and its sister neuropeptides. He has also found that while sex pheromone is used by female moths to attract males, PBAN, which controls sex pheromone production, is made in both females and males. And the neuropeptide is made in corn earworm larvae, which don't have pheromone glands.

"This suggests PBAN may have other functions besides sex pheromone regulation, which are dependent on the growth stage of the insect," Ma said.

If this is true, scientists may have yet another way of stopping the corn earworm by interfering with its development from caterpillar to adult moth.

Previous work that Ma was involved in showed corn earworms infected with baculovirus — an insect pathogen — carrying the PBAN precursor protein survived for a shorter amount of time (a reduction of 19 to 26 percent depending on insect growth stage) than those infected with a control baculovirus. Ma said he hopes an improvement in the killing efficiency of baculovirus can be made based on his new studies of the PBAN peptide family.

The gene encoding PBAN is found in other insects, such as cockroaches and flies, and arthropods like ticks and centipedes as well, Ma said. So, information on PBAN gene function in the corn earworm may also apply to other insect and arthropod pests.



Ma holds an adult female corn earworm. The specialized gland that produces pheromones is shown at the end of the tweezers. Inset: Pheromone biosynthesis activating neuropeptide is produced in three different cell clusters within the corn earworm neuroendocrine system, indicated here by the dark stain.

Jim Lytle

Mix of raw oysters

By Charmain Tan Courcelle

That raw oyster appetizer might sound tempting, but you may want to consider eating it later in a meal. MAFES food microbiologist Douglas Marshall has found eating raw oysters on an empty stomach can increase the risk of food poisoning. And taking an antacid beforehand could make the situation even worse.

Marshall led a team that determined the effect of antacids on the survival of *Vibrio vulnificus*, a bacterial pathogen found naturally in oysters and other shellfish, in the stomach and intestines. The study was part of a larger effort to understand how this potentially deadly bacterium interacts with its environment.

"Infection with *Vibrio vulnificus* is very rare, but if you get it, you have about a 40 percent chance of dying," Marshall said. "So, why do some people get *V. vulnificus* and die, while for most it's no big deal, they don't get sick and they never know they were exposed?"

One reason most people never get food poisoning from *V. vulnificus* is the bacterium can't survive the trip through the acid environment of the stomach. Marshall said he wanted to know whether this would change if that acidic environment became altered by antacids.

"We know there's an increased risk of infection with other common food-borne pathogens when antacids are consumed because of reduced stomach acidity. What we didn't know when we started this study was how *V. vulnificus* would behave in a less aggressive stomach environment," Marshall said.

Unable to find a suitable model of the human gastrointestinal tract for their studies, Marshall and his team constructed their own system out of glass beakers, circulating pumps, a warm water bath and solutions that mimic the digestive fluids found in the stomach and intestines.

"Our model simulates the dynamics of the gastrointestinal system and allows us to follow food as it passes through the 'stomach' and 'intestine,"' Marshall said.

Mississippi State University has applied for a patent for the group's invention.

The team added sterilized, raw oysters that had been "chewed" in a blender with a simulated saliva solution to

Marco Nicovich

The mechanical gut mimics the action of the human gastrointestinal tract.

& antacids *Can Spell Disease*

the mechanical digestive system. They then added *V. vulnificus* at levels found in Gulf Coast oysters and the equivalent of two teaspoons of liquid antacid to the stomach.

Samples from the device's stomach and intestinal compartments were tested for living *V. vulnificus* cells at regular intervals after the "meal." The researchers also assessed the survival of a phage of *V. vulnificus*, which is being considered as a biological control agent for the pathogen.

Results from the bacterial growth assays showed *V. vulnificus* was eliminated from the stomach within 30 minutes. But when antacid was used, Marshall's group could find surviving bacteria in the stomach for up to two hours — the antacid-neutralized environment had little effect on the pathogen's numbers.

However, the *V. vulnificus* phage was more resistant to acidic environments than its host and showed promise as a biological control agent, Marshall said.

More surprising to the team was what they found in the intestinal compartment. *V. vulnificus* that survived the stomach's acid treatment were able to quickly multiply within the intestinal compartment. Up to 100 million *V. vulnificus* cells could be found in a milliliter of intestinal fluid. With antacid use, this number increased another tenfold.

"The liquid content of the stomach empties into the intestinal tract quickly in the first 10 to 20 minutes of eating," Marshall said. "Because oysters are semisolid and eaten as appetizers, they would most likely empty from the stomach easily."

Marshall explained this rapid stomach emptying rate would decrease the amount of time *V. vulnificus* was exposed to stomach acid and allow living bacteria to be delivered to the intestine where they could readily multiply.

"Even a meal of just one oyster could carry more than 100,000 *V. vulnificus*," Marshall said.

Because the stomach's emptying rate slows as more food is ingested to allow the small intestine to complete its processing of the stomach's contents, *V. vulnificus* bacteria consumed after the first 30 minutes of eating would more likely be exposed to gastric acid.

"So, individuals, and especially high-risk individuals, may want to eat oysters later in a meal to give the acid in their stomachs a chance to kill the bacterium," he said.

Marshall conducted this research with then-graduate research assistant Jaheon Koo and research scientist Angelo DePaola of the U.S. Food and Drug Administration's Gulf Coast Seafood Laboratory. Results from this research were published in *Applied and Environmental Microbiology*.

Photo Courtesy of USDA

Marco Nicovich

Marco Nicovich

MAFES food microbiologist Douglas Marshall treats an oyster sample before adding it to a simulated digestive tract.

in brief

Marco Nicovich

preserving identity
adds cost & value to crops

By Bonnie Coblentz

One of many changes in agriculture is a move to produce crops with specific traits for particular end uses, but producing those crops can be risky business.

An identity-preserved crop is one in which specific genetic traits are known to exist. Special steps have been taken in buying, planting, harvesting and storing the genetically modified seed to ensure crops with these traits are not mixed with other crops.

Darren Hudson, MAFES agricultural economist, recently studied the extra costs and risks associated with growing identity-preserved crops.

"Advances in biotechnology have allowed for the production of crops that are tailored toward the needs of the end consumer," Hudson said. "Convincing producers to grow these crops can be a challenge because they are new, and there are added costs."

Examples of genetically modified crops with carefully preserved identities include golden rice, high-lysine soybeans, and high-oil corn and soybeans. The high-oil grains and high-lysine soybeans are used to improve feed productivity, and golden rice is high in vitamin A.

When farmers plant a crop with specific genetically modified traits, that grain must be tracked at all points and separated from traditional grains in storage. Because the grain has certain known, special traits, it can be sold for a premium, but there are also added production costs.

"There are physical costs of having to maintain separate equipment and storage, and the farmer has to devote time and energy into developing a procedure to follow to be able to document these separate measures," Hudson said. "We don't know what all the added costs are at this point because some of these products aren't on the market yet."

Hudson cowrote a study on the cost of identity preservation with Tom Jones, retired agricultural economist with Mississippi State University's Extension Service. This study, which appeared in the December 2001 issue of the *Journal of Agricultural and Applied Economics*, estimated the added production cost of identity preserved soybeans to average 46 cents a bushel in Mississippi.

Because of this added cost and without a guarantee that there will be a continuing market for genetically modified crops, many producers are hesitant to produce identity-preserved crops.

"Since a lot of these products are not on the market, producers don't have a full idea of what the intrinsic costs are. Most are being grown under contract at this point," Hudson said. "There's always risk, but identity preservation itself does not add a lot of price risk. The risk is if you invest money in seeders or on-farm storage and you have a one-year contract, who's to say they're going to come back next year with another contract."

Uncertainties in the market are mostly due to the new technologies' progress through the approval process and the acceptance or skepticism they receive from consumers.

"As the markets develop, there is some concern whether buyers will be there, but as the markets stabilize, the risks associated with producing the identity-preserved crop lessen and the premiums paid for the crop will likely decline," Hudson said.

The number of Mississippi producers growing identity-preserved crops is low, but so is the number of identity-preserved products available. Hudson said he expects both the number of such products to grow, and with it, the number of state producers growing these crops.

"I think Mississippi producers are looking at the process with a healthy skepticism and are carefully examining the costs and benefits to them," Hudson said.

Fred Foulk, University Relations

From left to right, BASF Corporation research scientist Bobby Watkins, MAFES weed scientists Dan Reynolds and David Shaw, BASF Corporation research scientist Alvin Rhodes and Jud Skelton, director of development for agriculture and life sciences at MSU, pause in front of a mobile chemical handling unit donated by BASF Corporation for safe pesticide handling.

Conference Assesses Space-Based Research Efforts

By Charmain Tan Courcelle

Jim Lyrle

ASTA project coordinator David Laughlin, left, enjoys a conversation with Remote Sensing Technologies Center director David Shaw during a conference break.

Spatial technologies have provided producers and agribusinesses new methods to manage their crops, animals and land. But the same technologies have also presented a number of challenges, including how to manage the information generated. MAFES scientists met last winter to assess their efforts at helping growers face these problems.

Working under the auspices of the USDA-funded Advanced Spatial Technologies in Agriculture (ASTA) project, the group of 20 MAFES scientists are exploring how best to use spatial information in the areas of soil fertility, pest management and animal and aquaculture production. Members of this group are also developing engineering technologies that will improve accuracy and facilitate automation in these systems.

David Laughlin, MAFES agricultural economist and ASTA project coordinator, said the conference provided project scientists the opportunity to evaluate their progress, as well as the progress of their peers, and to identify future research priorities and directions. In addition, a panel of industry and academic scientists with similar research programs from outside of Mississippi State University helped review the project.

"Another goal for the conference was to promote communication among scientists involved in different aspects of the project and to encourage new collaborations," Laughlin said.

The ASTA project has grown from an initial set of eight subprojects in 1997, which was the first year of funding, to more than 20 projects in 2001. Over its five-year history, the project has brought more than $3.5 million in federal grants to MSU and provided leveraging for other funds.

Laughlin said spatial technologies have changed the face of agriculture. At MSU, scientists are using remote sensing, yield monitors and global positioning systems and geographic information systems technologies to address agribusiness needs and to assist with decision making in precision farming and natural resource management.

"The ASTA project addresses the breadth of issues facing our producers in this state, but the results of this research will also apply to other areas of the country," he said.

MSU Ag Research Ranks in Top Five

A report from the National Science Foundation ranks Mississippi State fifth in the nation in funding for research in the agricultural sciences.

The university generated $68.4 million in research and development expenditures for the agricultural sciences in fiscal year 2000, an increase of almost 18 percent over fiscal year 1999 figures. MSU previously ranked eighth in agricultural sciences research.

Vance Watson, interim vice president for the MSU Division of Agriculture, Forestry and Veterinary Medicine and MAFES director, said the achievement reflects the commitment the state has to agriculture and the economic importance of the agricultural sector in Mississippi and the region.

"Our move up to the No. 5 spot is a direct result of the dedication of our faculty and staff. They have stepped up and leveraged the investment made by the state of Mississippi. Their commitment has increased the quality and level of agricultural research conducted at this university," Watson said.

Agricultural research dollars at MSU are divided among MAFES, the College of Veterinary Medicine, Forest and Wildlife Research Center and MSU Extension Service, which provides the university's main outreach effort.

Other universities included in the top five list are the University of California at Davis ($128 million), University of Georgia ($87.4 million), University of Florida ($87.3 million) and North Carolina State University ($70.1 million).

CALENDAR OF UPCOMING EVENTS

July 9, 2002
Turfgrass Research Field Day, MSU

August 8, 2002
Agronomic Row Crops Field Day, North Miss. R&E Center, Verona

August 14, 2002
Cotton Field Day, Delta R&E Center, Stoneville

August 15, 2002
Rice and Soybean Field Day, Delta R&E Center, Stoneville

Sept. 28, 2002
North Miss. Garden Expo, North Miss. R&E Center, Verona

Oct. 18-19, 2002
Fall Flower & Garden Festival, Truck Crops Branch, Crystal Springs

November 21, 2002
MSU-MAFES Annual Production Sale, MSU

in brief

MAFES Researchers Write for Cotton Books

Marco Nicovich

MAFES scientists Aubrey Harris, left, and Charles Snipes pose with the books they helped author and edit.

By Bonnie Coblentz

Two MAFES researchers helped compile a reference book series on various aspects of cotton production.

Charles Snipes and Aubrey Harris were authors and editors in the Cotton Foundation Reference Book Series, published by the Cotton Foundation, an affiliate of the National Cotton Council. Snipes coauthored three chapters and was one of two editors for the edition on harvest management. Harris coauthored a chapter on boll weevil eradication in Mississippi and was one of six editors for the edition on boll weevil eradication.

"We tried to write in terms that would be beneficial to a large group, including university researchers, consultants and growers," Snipes said.

Cotton Harvest Management: Use and Influence of Harvest Aids, book five of the series, is based on five years of research conducted in 11 to 15 locations across the Cotton Belt. Data from this research were used to substantiate the harvest aid management procedures discussed. Snipes, plant physiologist and weed scientist at the Delta Research and Extension Center (DREC) in Stoneville, worked on this book.

Harris worked with James Smith, DREC head, to write a chapter about boll weevil eradication in Mississippi. The chapter appears in book six of the series, titled *Boll Weevil Eradication in the United States since 1999.* The book emphasizes the people, places and events in the boll weevil eradication story.

"The audience will be researchers, Extension specialists and agents, policy makers interested in the boll weevil eradication program and its application to future regional programs, and many growers," Harris said. "This is probably the biggest region-wide pest management program that has ever been implemented."

The Southeastern Boll Weevil Eradication Foundation named Harris to the committee of six that organized and edited the book. Since 1995, Harris has been chairman of the Mississippi Boll Weevil Eradication Technical Advisory Committee. He is a research entomologist at the DREC.

The Cotton Foundation released these reference books in December 2001.

Inventor's Gift Holds Engineering Promise

Marco Nicovich

From left to right, North Farm superintendent Mitchell Roberts, MAFES agricultural engineer Filip To, Rotifer inventor Norman Haigh and MSU mechanical engineering professor Bill Jones discuss applications for the patented excavator.

By Charmain Tan Courcelle

Mississippi State University engineers will improve and develop new applications for a recently patented rotary excavator.

Norman Haigh of Natchez said he invented the rotary excavator — called a Rotifer in the patent application — to address the need for a fast, efficient and economical method for draining land in flood plains like the Mississippi Delta before development. He assigned 50 percent of the patent rights to his invention to MSU.

The Rotifer is a self-propelled rotary excavator that can make a three-by-three-foot trench at a rate of approximately three feet per minute depending on soil conditions. It uses lasers to guide the position and depth of a rotary cutting device during drainage ditch formation and maintenance. Included in the Rotifer design is an adjustable shield that directs the spray of excavated soil (the spoils).

"The original intent for the excavator was to help make drainage ditches or to make them perform better," said MAFES agricultural

Updated Fishy Software Supports Catfish Industry

By Bonnie Coblentz

Catfish producers have an updated tool to help them remain afloat in financial hard times.

Fishy 2002 is the latest version of computer software developed in1982 at Mississippi State University to aid the aquaculture industry. Wallace Killcreas, Fishy programmer and MAFES agricultural economist, said the program aids management and decision making.

"Adequate records and up-to-date management tools are essential in any agricultural operation in good and bad times," Killcreas said. "Good records are a necessity for income tax preparation, for making decisions on whom to do business with and in deciding how to best manage future production."

Fishy 2002, like its predecessors, keeps records of all aspects of fish production, and it analyzes and makes reports that allow farmers to track fish numbers, feedings, weights and sizes.

Fishy supports historical and simulated information with preprogrammed background data. Producers enter historical data such as feed given, fingerlings stocked and fish moved. Simulated information includes such future aspects as harvest schedules and potential fish production. Background data includes feed conversion ratios and feeding calendars.

Killcreas is urging catfish farmers who aren't already using the free software to begin before the production season gets under way this year.

"Fishy can be used to book your feed for next year," Killcreas said. "Feed needed, coupled with current feed price, can be used to aid in obtaining a line of credit this year."

The current version provides simple screens to allow users to enter data for fixed costs such as land and equipment and annual operating expenses. These data are combined with Fishy simulated data to estimate future profitability of the fish farm.

Farmers can use Fishy to schedule future harvests if they enter current data on each pond. This allows producers to know which pond to harvest next if a particular pond cannot be harvested.

"By diligently entering data such as feed fed, fish stocked, fish lost, fish moved and fish harvested every week, Fishy will accumulate records and give you reports from your farm that will help you plan for next year," Killcreas said.

Fishy's chronological pond report can provide detailed information on all of a particular pond's events. If a pond is a poor producer, the farmer can review the pond report and possibly develop new management strategies to improve it.

"Since feed is still nearly 50 percent of fish production cost, Fishy provides for close feed scrutiny," Killcreas said.

One of Fishy's more popular features is its cost. It can be downloaded free from MSU at *www.agecon.msstate.edu/wek*, or producers can call (662) 325-2672 to order a copy on CD.

engineer Filip To. "But there are opportunities for many other uses. For example, the excavator could be used to construct building foundations or to build and maintain water, sewage and other pipelines.

"The technology can also be fitted with other mechanisms to allow the excavating and transporting of spoils to be performed in one operation — a cost-saving capability for many applications."

To leads a team effort to extend the range of applications for the excavator. During the first phase of development, the group will automate navigation and control of the rotary cutting device, which now has to be steered by the excavator operator. They will also adapt the technology for other nonfarm operating environments.

"This rotary excavator is a good 'platform' on which other applications can be developed," To said. "We're very excited about the opportunity to further develop this technology. We would like to invite and work with equipment manufacturers to explore the possibilities."

MSU owns a full-scale working prototype of the excavator that was built by Bobby Ewing of Jonesville, La., and donated by Haigh. University researchers will use the prototype in field tests and during development studies.

Marco Nicovich

The Rotifer sprays the spoils from a newly formed ditch.

updates

MSU Researcher Honored for Weed Science Research

David Shaw

A Mississippi State University weed scientist was named Fellow of the Weed Science Society of America (WSSA), one of the highest distinctions a member of the Kansas-based organization can achieve.

David Shaw, MAFES weed scientist, received the honor during the society's recent annual awards program in Reno, Nev. He was cited for his research accomplishments in the areas of remote sensing applications in agriculture, weed control and weed management, as well as his leadership in the field of weed science.

WSSA was founded in 1956 and has 2,500 members located around the country. The professional organization promotes the development of weed science and technology and provides support for weed science research, education, extension and regulatory efforts.

"To be inducted as a Fellow into your professional society is an honor and indicates that your peers respect and acknowledge your superior contribution to your field," said Frank Matta, MSU's interim head of plant and soil sciences. "Dr. David Shaw has made significant contributions to weed science research and to the Weed Science Society of America. It is fitting that he is recognized for his outstanding accomplishments."

Shaw, a Mississippi native who grew up in Oklahoma, received his bachelor's degree from Cameron University and his master's degree and doctorate from Oklahoma State University.

He joined the MSU faculty in 1985 and has served as director of the Remote Sensing Technologies Center since its creation on the MSU campus in 1999. Shaw is a William L. Giles Distinguished Professor.

Got Questions about American Poultry History? See MSU Prof

Yvonne Vizzier Thaxton

By Sammy McDavid, University Relations

A Mississippi State poultry scientist is the new president of the American Poultry Historical Society.

Yvonne Vizzier Thaxton, a professor in the university's poultry science department, is leading a national organization of nearly 300 members.

An independent body founded in 1952, APHS works to collect and preserve industry records, photographs, materials and objects for archiving at the National Agricultural Library near Washington, D.C. It also selects individuals for the National Poultry Hall of Fame.

Thaxton is a former Huntsville, Ala., resident who holds bachelor's and master's degrees from Mississippi University for Women and a doctorate from Auburn University. She joined the MSU faculty in 1999 after three decades in the poultry industry.

While the United States is the world's largest producer and exporter of poultry meat, Thaxton said chickens are not native to this country. "They first appeared in early America as 'left over' provisions on ships from Europe," she added.

Thaxton said the U.S. industry came into being during the mid-20th century with the selling of birds that had passed their peak in egg production. "It was after World War II that the shift took place from backyard egg production to today's sophisticated operations," she explained. "The modern poultry industry uses birds that were developed by selective breeding to produce either meat or eggs for market."

She said federal statistics show nearly 35 billion pounds of broiler meat were produced last year, of which turkey meat made up more than 610 million pounds. In addition, about 70 billion eggs rolled out for worldwide sale.

Linda Breazeale

MAFES Director Vance Watson, left, receives the Southern Regional Informational Exchange Group's outstanding service award from Clarence Watson, MAFES associate director. Vance Watson was recognized for his service in crop variety testing.

MAFES Names New Associate Director

Clarence E. Watson

Clarence E. Watson, Jr., former interim head of the Department of Plant and Soil Sciences at Mississippi State University, has been named associate director of the Mississippi Agricultural and Forestry Experiment Station effective Feb. 19.

As associate director, Watson will be responsible for planning and managing the Experiment Station's research efforts. He joins Marty Fuller, MAFES associate director for external affairs, and Vance Watson, MAFES director, in leading the research organization.

"Dr. Clarence Watson brings a unique mix of training and experience to this position," said Vance Watson, who is also interim MSU vice president for agriculture, forestry and veterinary medicine. "I'm confident that he will provide excellent leadership as part of the MAFES management team."

MAFES was established through provisions in the Hatch Act of 1887, which provided federal funds for research and experiment stations at land-grant universities, and subsequent state legislation enacted in 1888. The Experiment Station serves Mississippi through research programs in agriculture, forestry and related sciences.

Clarence Watson will provide oversight to MAFES grants and contracts, research enhancement and federal data reporting and analysis. In addition, he will serve as a mentor to new MAFES faculty.

Watson holds bachelor's and master's degrees in agronomy from New Mexico State University. He earned his doctorate in crop science from Oregon State University.

Watson joined the MSU faculty in 1976. He has conducted research to improve forage, row and food crops. His work has led to more than 200 publications, including four book chapters.

Since 1992, Watson has served as head of the MAFES Experimental Statistics Unit. He has also served as an administrative adviser to the MSU Extension Service Priority Program Group for corn, soybean, horticulture and the green industry. In addition to his service at MSU, Watson has served as a consultant to the Midamerica International Agriculture Consortium, an organization that supports the development of agriculture and natural resources programs in Mexico and Kenya.

Pounders is New Research Horticulturist

Cecil Pounders

Cecil Pounders is a new research horticulturist at the Coastal Research and Extension Center. He is conducting research to develop new cultivars of plants for the ornamental and green industries.

Pounders comes to MAFES following 14 years as manager of a private nursery. During this time, Pounders also served as a research consultant to Alabama A&M University's horticulture program and collaborated with Flowerwood Nursery to develop new clones of perennial and woody ornamentals with increased market potential and value.

Pounders has a bachelor's degree in ornamental horticulture from Auburn University, a master's degree in horticulture from the University of Minnesota and a doctoral degree in plant science from Alabama A&M University.

Matta Named Interim Plant and Soil Sciences Head

Frank Matta

Frank Matta has been named interim head of the Department of Plant and Soil Sciences at Mississippi State. His appointment was announced Feb. 19.

Matta, a research horticulturist and 17-year MSU faculty member, succeeds Clarence E. Watson, Jr., who was named associate director for the Mississippi Agriculture and Forestry Experiment Station. Matta will serve in this role until a permanent head has been appointed.

"Dr. Matta has long service and experience with the plant and soil sciences department," said Vance Watson, interim vice president for agriculture, forestry and veterinary medicine. "I'm confident that he'll provide excellent leadership with his understanding of the department's goals and mission."

Matta earned his bachelor's degree in biology and master's degree in horticulture from New Mexico State University. He holds a doctorate in horticulture from Texas A&M University.

Matta began his career at MSU in 1986. He has conducted research on peaches, pecans and small fruits, and he is responsible for statewide fruit research at three Experiment Station locations.

Before coming to MSU, Matta served as resident director of the Agricultural Science Center at New Mexico State University Agricultural Experiment Station.