

THE UNIVERSITY OF MISSISSIPPI

FIELD STATION

"Nature's Laboratory at Ole Miss"

FALL 2009 NEWSLETTER

Workshops not just for students ...

Spiders spin sticky webs to catch their food – insects. Spiders and insects are distant cousins: spiders have eight legs, two fangs and are wingless whereas insects have six legs and usually two pairs of wings. Above is the impressive, but harmless, yellow garden spider *Argiope aurantia*. Like this beautiful spider, the Field Station is building a web – a web of partners and activities perhaps better referred to as a network, that will nourish our efforts to grow and diversify into the leading field station in the Mid-South.

The Field Station is a place where students and researchers can truly study and experience the web-of-life. We are in the process of working with the MS Dept of Wildlife, Fisheries and Parks' Museum of Natural Science to support two types of educational/training workshops for school teachers. We are especially interested in teachers because they offer tremendous



and activities for teachers on wildlife and the environment and "Wet" provides similar information for water education. Hosting these workshops at the Field Station encourages hands on activities for the teachers and, best of all, provides field trips on our 740 acres of forests, fields, marshes and ponds.

Supporting educational activities for Mississippi teachers will be one of the most exciting and rewarding activities we undertake on our journey to excellence – and fun too!

Ray Highsmith

leveraging – how many students does just one teacher influence during his/her career?

One of the workshops is called Project Wild and the other is called Project Wet. "Wild" provides instruction and curriculum guides

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STAFF ANNOUNCEMENTS

We are all a buzz about the newest member of the Field Station staff, entomologist, Dr. Abas Ali and his entomology laboratory. Dr. Ali graduated from the University of Agriculture in Faisalabad Pakistan with his Master's degree in Entomolgy and recieved his PhD in Entomology from Mississippi State University. He has joined the UM Field Station staff as a Senior Research Scientist in order to work on screening natural compounds from medicinal plants to use as natural insecticides. He is testing his work on the mosquitoes that are being raised in his lab, which thankfully, is in the back building.

We will miss Joko Sumiyanto who is returning to Oregon to be with his wife and then on to his native Indonesia after five years of work and research at the field station as research assistant to Dr. Moreas. During his five years at the field station he was part of the Echinacea project funded by NIH/NCCAM. He worked on the field plantings and in sample preparation. He also cultivated the Yacon, a Peruvian species that the potential as an alternative crop for Mississippi and has anti-diabetes properties.

Good luck to Jake Marquess who earned his PhD in Biology. After researching fire ants with Dr. James Anderson, Jake has accepted a post doctoral researcher position at the National Center for Physical Acoustics at the University of MS. His new research focuses on finding economical and effective methods of acoustic detection of the Formosan termite, *Coptotermes formosanus*, in buildings and trees.

Dr. Rita Moraes presented an abstract on the American Mayapple at the American Chemical Society's National Meeting held in Washington, DC. Dr. Moraes also published a chapter in Protocols for In Vitro Cultures and Secondary Metabolite Analysis of Aromatic and Medicinal Plants. Her chapter 31 is titled "The Role of Biotechnology in the production of the Anticancer Compound Podophyllotoxin".

Dr. Denizart Bolonhezi presented an article on peanut cultivars grown in a no tillage system at the XVI Internation Plant Nutrition Colloquium in Sacramento, CA. This year's theme of Plant Nutrition for Sustainable Development and Global Health drew more than 450 presenters from around the world.

Donor Information: Friends of the Field Station Account,
UM Foundation, P.O. Box 249 University, MS 38677

All photos by Michelle Edwards unless otherwise noted.

Research Spotlight : Soiless Culture for Medicinal Plants

Dr. Denizart Bolonhezi, visiting researcher from the Field Station of Agronomic Institute (APTA) in Sao Paulo, Brazil has had a busy year at the UM Field Station. He is collaborating with Dr. Rita Moraes, Research Associate Professor at the Field Station and Natural Products Center on campus, to develop protocols for her medicinal plant studies using soiless cultures, also known as hydroponic systems. For hydroponic culturing, plants are grown in the Field Station greenhouse using specially prepared liquid solutions of water and plant food, instead of fertilized soil. Dr. Bolonhezi brings valuable experience to the ongoing medicinal plant research here at the University of MS Field Station due to his many years of hydroponics cultivation research in Brazil as well as having taken two trips to Almeria, Spain, for intensive hydroponics training.

The two researchers are currently working on a variety of promising medicinal plants including Goats Rue, Stevia, Yacon, and the peanut. The first three plants and some of their relatives are of interest with respect to research on diabetes and obesity, nationwide epidemics in which Mississippi ranks at the top of the list. The peanut is an important source of resveratrol, a compound that could help reduce the risk of heart attacks and other cardiovascular problems. Dr. Bolonhezi and Dr. Moraes are comparing peanut cultivars to see if peanuts grown organically have more of this potentially helpful compound compared to conventional growing methods.

“It is very important to have scientists such as Dr. Bolonhezi come to the Field Station to work with our staff so that we can learn new techniques and develop long-term partnerships”, said Field Station Director Ray Highsmith. “Brazil is the fourth largest country in the world and has an incredible diversity of plants and animals so developing collaborations with their scientists to exchange ideas and information is highly desirable

and we are very pleased with the progress to date, not only with Dr. Bolonhezi and other colleagues, but also with Brazilian institutes and government agencies.”

Drs. Moraes’ and Bolonhezi’s ultimate goals are to help improve the biomass yield and quality of medicinal plants and to develop potential new crops for small farmers in the region. “It has been a great pleasure to work with Denizart,” says Dr. Moraes, “he contributed to implementing the production of medicinal plants using hydroponics to improve the quality of the final products. We hope to continue this collaboration with the Agronomy Institute of Campinas so that other research scientists there can join us for periods of six months to a year as Visiting Researchers.”

“I am sure about the great potential of soiless culture for medicinal plants, and I hope to continue in this partnership with the Field Station,” said a confident and smiling Bolonhezi.



Partnership with the USDA Sedimentation Lab grows

Clean water has always been a precious commodity, but recent droughts and regional “water wars” underscore the importance of protecting and conserving it. One of the biggest threats to the country’s water supply is contamination from pesticides and excess fertilizers that can come from either agricultural or urban sources.

But one of the world’s most common food crops may provide the key to solving this problem. A research collaboration between the U.S. Department of Agriculture’s Agricultural Research Service and the University of Mississippi is studying whether rice might be used to mitigate pesticide and fertilizer runoff.

Researchers at the ARS National Sedimentation Laboratory Water Quality and Ecology Research Unit in Oxford have teamed up with the UM Field Station for the project. Matt Moore, ecologist at the “Sed Lab,” directs an ongoing study that focuses on rice and its ability to take up pesticides and nutrients (fertilizer) from agricultural runoff water. An aquatic plant and a food source, rice is a major production crop in California and the Southeastern U.S., and in developing and populous countries all over the world.

“In today’s economy, agriculture has to maximize the use of limited resources,” Moore said. “I’ve worked with pesticide remediation through constructed wetlands and drainage ditches for over a decade, and the challenge is to always try to think outside the box. I kept asking myself, ‘What’s a plant that loves water, is not threatening to other plants and grows quickly?’ One drive home to the family farm in Arkansas answered the question – rice.”

Modern farming operations depend on pesticides and fertilizers for higher crop production. These chemicals may eventually drain off to local streams, rivers and lakes, possibly making the water

dangerous for human consumption and wildlife. “Just think of the environmental potential,” Moore said. “If rice crops can filter out pesticides and nutrients from storm water runoff but still not transfer the pesticide up to the actual seed, you could use a rice field to clean runoff water and produce a food crop. It’s the best of both worlds, potentially.”

Moore and his team plant rice in study plots at the Field Station. When the plants reach a certain age, Moore releases specific concentrations of pesticides into the plots’ water supply, simulating storm runoff. Rice samples are collected at measured time and distance intervals for chemical analyses to see if the plants indeed take up the pesticides and nutrients, thus reducing concentrations in the water.

If rice does diminish the impact of pesticides and nutrients on runoff water, this could have major implications for the agricultural industry and individual farmers. First, though, scientists must determine how the pesticides and excess nutrients affect rice grains that are to be harvested for food. If rice does concentrate these compounds, is the rice safe to eat?

“I am wrapping up a greenhouse experiment to hopefully start to address those very questions,” Moore said. “We’re in the final weeks of rice growth. When the rice matures, we’ll harvest the plants and seeds separately to see if the pesticides traveled to the seeds.”

Whether the seeds contain pesticide residues will determine which direction the research heads next.

Rice is not the only plant that may be useful to help treat runoff from agricultural fields. Wetlands, of course, have an abundance of aquatic plants.

“Wetlands are known to decrease sediment, nutrients and pesticides in runoff waters,” says Richard Lizotte, first year



research ecologist at the Sed Lab. To understand this important function of wetlands in more detail, he and his team are conducting a series of experiments at the Field Station using constructed wetlands and comparing the results to similar experiments (but on a larger scale) in Mississippi Delta wetlands.

Lizotte's research focuses on a better understanding of wetland efficiency in mitigating complex chemical mixtures found in agricultural runoff. He wants to learn how various chemical combinations potentially alter plant and wetland mitigation capabilities.

"There's an old saying, you are what you eat, and that also applies to what you drink," said Ray Highsmith, Field Station director. "In this case, we have two Sed Lab teams devoting their efforts to improving both food and water quality through controlled study of individual food plants and communities of natural wetland plants. I, for one, am very glad they're doing this research."

The National Sedimentation Laboratory, a unit of the USDA-Agricultural Research Service, conducts interdisciplinary research dealing with the processes of soil erosion; transport and deposition of sediment; movement of chemicals on upland areas and in streams; the impact of agricultural practices, in-stream structures and bank protection on these processes; water quality; and the ecological well-being of streams.



Ralph Powe Research Award

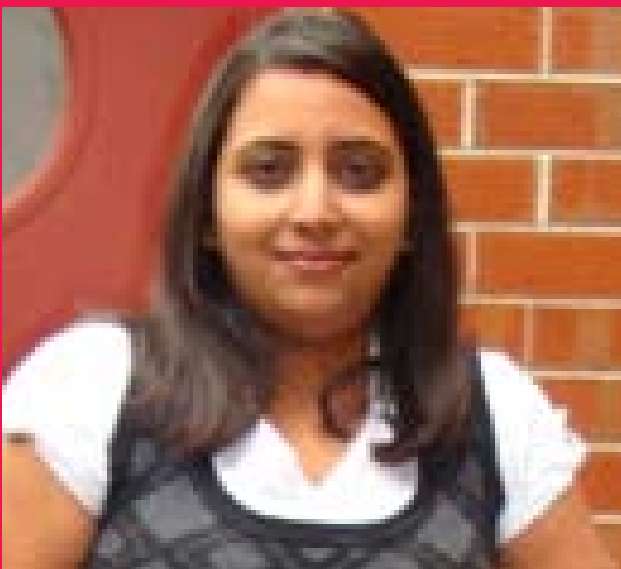
The UM Field Station annually awards grants-in-aid of \$500 each to graduate students working on projects in which the majority of the research is conducted at the Field Station.

These research grants honor the numerous contributions of Dr. Ralph Powe, who was the first chair of the UM Field Station Advisory Board.

Recipient of the Powe award, Clint Helms, graduated with a Master of Science in Biological Science. His thesis was titled "The Effects of Competition on the Nitrogen Uptake Ability of *Juncus Effusus*; An In-Situ Field Experiment at the University of Mississippi Field Station". We wish Clint all the best as he attends seminary in Kentucky.

Rani Menon, Powe awards recipient and Ph.D. graduate student in the UM Biology Department attended the Society of Wetlands Scientists student competition and won 2nd place for best student presentation for her poster and oral presentation of "Microbial Enzyme Activity and Microbial Community Structure in Vegetated and Unvegetated Agricultural Drainage Ditch Soils of Mid-South USA"(Co-authors C.R. Jackson and M.M. Holland) The 9th annual competition attracted 108 students and took place in Madison, WI . Congratulation Rani!

**Powe Award Deadline for 2010 :
February 15, 2010**



Neighbors: Mr. Bobby Jordan

Mr. Bobby Jordan, a native of Abbeville, has lived and worked on Bay Springs Road for more than 40 years. A great friend and neighbor of the field station, he helped construct ponds with his bulldozers when it was "nothing but swamp". For forty years he owned and operated his business, Jordan Saw Mill, just down the road. "I've sold lumber to every-



one in Mississippi and all over the south," he said. Now retired, Bobby rents out his extra shop buildings to the University's Mississippi Mineral Resources Institute. The MMRI crew also work with two of the National Institute of Undersea Science and Technology's divisions, the Undersea Vehicle Technology Center and the Seabed Technology Research Center. In addition to being director of the Field Station, Dr. Highsmith is Executive Director of NIUST. The NIUST executive offices and undersea vehicle shop are located at the Field Station. Mr. Jordan bought the land where his house and shops are now from Ms. Mildred Roberts in 1993 and retired in 1999 from the lumber business. Retirement has not slowed Bobby down much, his shop is full of projects in all different stages of completion. (His hand built wagons are nothing short of amazing!) He enjoys his projects, including raising a small herd of cattle, and his time with his two granddaughters who live close by. When asked about the Field Station, he said, "It's the best thing that could have happened out here." We concur.

Visitors to the Field Station



Katherine Fields Intro to Photography class



Senator Cochran's Staff stops by for a visit and a tour



Water Valley kids tour the Field Station



Mr. Billingsly toured the Field Station and met with the staff



Dr. Rita Moraes and Dr. Denizart Bolbenzi presentation



Arne Dierks volunteers to help Andrea during her presentation to the staff



Lafayette Elementary School 2nd grade tours the field station greenhouse



Our Mission: *To foster ecosystem stewardship by providing a natural laboratory for research, education and service.*



University of Mississippi

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