



MISSISSIPPI STATE
UNIVERSITY



Influences of Water Column Nutrient Loading on the Growth of Parrotfeather

By Ryan M. Wersal and John D. Madsen
Geosystems Research Institute

Nuisance growth of parrotfeather (*Myriophyllum aquaticum* Vell. Verdc.) has been attributed to high nutrient environments.

The uptake of nitrogen and phosphorus from sediments and their allocation have been documented in both natural and laboratory populations. But the growth of adventitious roots may allow uptake of water column nutrients in low nutrient environments. We wanted to determine if parrotfeather could survive through uptake of water column nutrients. We conducted Mesocosm experiments for 12 weeks in 2006 and 2007. Nitrogen (1.8, 0.8, and 0.4 mg L⁻¹ as ammonium nitrate) and phosphorus (0.09, 0.03, 0.01 mg L⁻¹ as potassium phosphate) concentrations were paired to identify a limiting nutrient and concentration.



Each combination was replicated 4 times in 1100 L tanks. We added nutrients weekly with water samples collected at 3, 6, 9, and 12 weeks. After 12 weeks, plants were harvested, sorted to emergent shoots, submersed shoots, stolons, and roots, and assessed for biomass. Emergent tissues were analyzed for nutrient content. The combination of 1.80:0.01 mg N:P L⁻¹ resulted in greater total ($p < 0.05$), emergent ($p < 0.01$), stolon ($p < 0.01$), and root ($p < 0.01$) mass. The combination of 1.80:0.03 mg N:P L⁻¹ caused increased stolon and root mass. The growth of submersed shoots did not depend on

either nutrient ($p = 0.99$) and are likely controlled by light intensity, photoperiod, and or temperature. Tissue nitrogen was greater for plants grown in the 1.80:0.01 mg N:P L⁻¹ treatment but these tissues had lower percent phosphorus than in other treatments. This may have occurred because nitrogen was supplied in excess, other treatments had luxury consumption of phosphorus or algae took up more phosphorus. These data provide evidence that parrotfeather requires high levels of nutrients to achieve nuisance levels. While plant mass was less when nitrogen was reduced, the plants survived. Survival through uptake of water column nutrients may be a mechanism for survival during adverse conditions or a means of long distance dispersal via fragments.

U.S. Geological Survey Nonindigenous Aquatic Species Webpage Data Entry

Beginning in the fall of 2009, the Geosystems Research Institute will be responsible for data entry of aquatic plant locations and developing additional aquatic plant fact sheets for

the site. Accessible at <http://nas.er.usgs.gov/>, the Nonindigenous Aquatic Species webpage and database has been a valuable resource for information and distribution data on all

nonnative aquatic species for decades. The physical home of the database is at the Caribbean Science Center in Gainesville, Florida. The program leader is Pam Fuller.

Inside this issue:

Early Detection and Rapid Response Toolbox	2
Quarantine Facility for Rearing Cactus Moth	2
Distribution of Cactus Moth Host	2
Cactus Moth Habitat Models and Genetics	3
Helping APHIS Find Cactus Moth	4
Cactus Moth Detection and Monitoring Network	5
Invasive Plant Atlas of the MidSouth	6

Special points of interest:

- *Advances in Cactus Moth Research*
- *Progress in Tracking Cactus Moth*
- *New Cactus Moth Trapping and Training*
- *Updates on CMDMN and IPAMS*
- *Coordination of GRI with other agencies*

National Early Detection and Rapid Response Toolbox Development

Geosystems Research Institute and the Invasive Plant Atlas of the MidSouth will be working with the National Biological Information Infrastructure (NBII), the Invasive Plant Atlas of New England, and U.S. Geological Survey in developing tools for a National Early Detection and Rapid Response (EDRR) toolbox. Led by NBII and the Invasive Species Information Node manager Annie Simpson, collaborators will include Randy Westbrook, Les Mehrhoff, Pam Fuller, Elizabeth Sellers, and others. The current NBII EDRR page can be viewed at <http://edrr.nbii.gov>. These tools will help local groups develop and implement plans for successful management of new invasive species.



Giant salvinia is an example of a new invader to the southeast that management would benefit from an EDRR approach.

Quarantine Facility for Rearing Cactus Moth Supporting Research and Identification

By **Richard L. Brown**
Department of Entomology

The approval of Standard Operating Procedures by USDA-APHIS for maintaining a quarantine facility in the Department of Entomology has resulted in a means for receiving egg sticks and young instar larvae for rearing to verify their identification. Larvae from Jefferson Parish, Louisiana were reared to obtain voucher specimens of adults for documenting this new distributional record of

the cactus moth. Larvae of native species have been obtained from western states to document their identity.

Research in the facility by Drs. Gary Ervin and Travis Marsico on the comparative fitness of *Cactoblastis cactorum* and *Melitara prodenialis* has provided secondary benefits in collaboration with Richard Brown.



Telemucha sp. (Ichneumonidae) – a parasitoid reared from *Melitara prodenialis*.

Two species of parasitoids of *Melitara prodenialis*, a tachinid fly and an ichneumonid wasp, and the fungus *Beauveria bassiana* has been identified as causing mortality to *Melitara prodenialis*; the parasitoids have been submitted to the USDA Systematic Entomology Laboratory for identification. The reason these parasitoids have not been found in *Cactoblastis*.

Distribution of *Opuntia* in the Region

By **Victor Maddox**
Geosystems Research Institute

A few new populations of *Opuntia* have been recorded in Mississippi recently. However with the recent detection of cactus moth in southern Louisiana, survey work has intensified in Louisiana.

The current number of reports in the Cactus Moth Detection and Monitoring Network database is at 236 for Louisiana, but additional reports continue to be added.

Surveys in Louisiana have detected a number of new populations of *Opuntia* spp. in the state.

Most are *Opuntia engelmannii* Salm-Dyck ex Engelm. on canal levees (Figure 1), on and around Fort Livingston, or planted in residential landscapes. It is possible that plants on levees are escapes from Fort Livingston located on Grand Terre Island near Grand

Isle to the south of the canal levees.

“(W)ith the recent detection of cactus moth in southern Louisiana, survey work has intensified in Louisiana.”

Opuntia engelmannii was apparently planted at Fort Morgan in Alabama for soil stabilization based upon personal communications with Fort Morgan personnel. It is possible

that similar planting took place many years ago at Fort Livingston. If so, its nativity in the area may be questionable.

Distribution of *Opuntia* in the Region (cont.)

Still, *Opuntia engelmannii* is well established on Grand Chenier in southwest Louisiana. *Nopalea cochenillifera* (L.) Mill. and *Opuntia ficus-indica* (L.) Mill. have also been identified in residential landscapes, but both are apparently uncommon.

Surveys continue in southern Louisiana for host populations. Many are accessible only by boat and scattered over a vast area of marsh and open water. Associate species have been recorded for a number of the *Opuntia engelmannii* populations on canal levees. They are generally associated with *Bac-*



Figure 1. *Opuntia engelmannii* Salm-Dyck ex Engelm. on a canal levee in southern Louisiana. This plant was not infested with cactus moth, but many others in the area are. (Photo by Victor Maddox)

charis halimifolia L., *Celtis laevigata* Willd., *Distichlis spicata* (L.) Greene,

Ilex vomitoria Ait., *Iva frutescens* L., *Lantana camara* L., *Melia azedarach* L., *Quercus virginiana* Mill., *Rubus trivialis* Michx., *Sesbania drummondii* (Rydb.)

Cory, *Solidago sempervirens* L., *Spartina patens* (Ait.) Muhl., *Teucrium canadense* L., *Triadica sebifera* (L.) Small., and *Zanthoxylum clavaherculis* L.

Other less common species were also associated with *Opuntia*, but the larger woody species appear to be better indicators since they are visible from greater distances (Figure 2). Currently surveys for the host continue in the Louisiana marsh particularly



Figure 2. Larger vegetation associated with *Opuntia engelmannii* Salm-Dyck ex Engelm. can be seen at a distance on canal levees in southern Louisiana. Taller vegetation is a potential host indicator. (Photo by Victor Maddox)

along canals. Data for each population will be collected and entered into the Cactus Moth Detection and Monitoring Network database.

Opuntia and *Cactoblastis* Habitat Models and Population Genetics

By Gary N. Ervin
Department of Biological Sciences

Our proposed work for 2009-2010 encompasses three major areas of research – continued habitat modeling based on our large data set from the *C. cactorum* native range, more genetic studies in *Opuntia* and cactophagous moths, and experimental studies of growth performance of *C. cactorum* and native US cactus moths on native southeastern US *Opuntia* species.

A. Analyses of comparative growth chamber studies.

We initiated a controlled laboratory experiment to investigate unique defense responses from prickly pear hosts to feeding by *C. cactorum* (invasive moth) and *M. prodenialis* (native). This experiment also will provide a direct comparison of life history between these two cactophagous moth species including information about phenology, reproductive characteristics, and survival on their most commonly utilized Floridian host plant species (*O. humifusa* and *O. stricta*).

B. Analyses of genetic data resulting from Argentina sampling trips.

We completed genetic analyses for *C. cactorum* in its native range in Argentina, its invasive range in Florida, and for *Melipotis prodenialis* across its native Floridian range. These analyses have shown that *C. cactorum* has considerable geographically structured genetic diversity in its native range, similar to *M. prodenialis* in its native range. *Cactoblastis cactorum* in Florida has far less genetic diversity relative to its native range (5 vs. 55 COI haplotypes), but this diversity also is geographically structured, with a Gulf Coast clade, an Atlantic Coast Clade, and a more widespread clade overlapping these other two. These data support published inferences of multiple introductions to Florida, but only from the nearby Caribbean range. A manuscript on these findings is nearing completion and should be submitted during the next quarter.



C. Calibration of environmental tolerance models for *Cactoblastis*, based on data collected in the two Argentina research trips.

We have begun comparative habitat modeling approaches to test hypotheses regarding factors influencing the distribution of *C. cactorum* across Florida. This work, and a field study completed during summer 2008, suggest the moth's distribution is strongly influenced by the presence of its preferred host species (or that the two are mutually influenced by one or more other factors). We presently are expanding this work to evaluate potential habitat for the moth in areas of the Gulf Coast beyond the Florida-Alabama distribution. We also have begun work to integrate habitat modeling studies with results we have obtained to date from our genetic analyses (i.e., modeling habitat for specific genotypes). We have manuscripts in development based on this habitat modeling work.

Helping APHIS Find Cactus Moth

By Victor Maddox
Geosystems Research Institute

Since before the detection of cactus moth in Louisiana, MSU-GRI has coordinated and collaborated with USDA-APHIS in their efforts to eradicate cactus moth in the MidSouth. In early June MSU-GRI assisted USDA-APHIS with cactus moth surveys on the Mississippi barrier islands. Thousands of plants are inspected for cactus moth on Horn and Petit Bois Islands during these strategically timed surveys.

Following the detection of cactus moth in Louisiana MSU-GRI assisted with two sets of host/pest surveys in Southern Louisiana. The first set of surveys was conducted during the 3rd week of June and focused on all roads south of Highway 90 across southern Louisiana. The second set of host/pest surveys was conducted the last week of June. During these surveys, the first day was spent surveying by boat in the marsh south of Lafitte, LA (Figure 1). This survey was also organized to help train representatives with Texas in recognizing the various stages of pest activity and host damage (Figure 2). The remaining surveys were road surveys on and adjacent to Highways 45 and 23 south of New Orleans.



Figure 1. Boat Survey for cactus moth and hosts in southern Louisiana with USDA-APHIS representatives from LA, FL, and TX. MSU-GRI participated in this survey to collect host and pest data for the Cactus Moth Detection and Monitoring Network (Photo by Victor Maddox)



Figure 2. Joe Bravata with USDA-APHIS in Louisiana inspecting *Opuntia engelmannii* Salm-Dyck ex Engelm. for cactus moth while Maurice Duffel with USDA-APHIS in Florida records the GPS location. USDA-APHIS representatives from Texas participated in the survey as training for activities in Texas. (Photo by Victor Maddox).

Data on many new host populations were gathered during these surveys which is being entered into the Cactus Moth Detection and Monitoring Network (CMDMN) database for data sharing. Louisiana data from the database has been shared with USDA-APHIS. Sentinel site contacts in Texas have also been shared with USDA-APHIS.

Currently, MSU-GRI is working on sharing CMDMN host data for Texas with George Nash, USDA-APHIS. Some MSU-GRI surveys may take place in southern Texas to help USDA-APHIS locate host populations.

During cactus moth and host survey trips, invasive plant species data was also collected for the Invasive Plant Atlas of the MidSouth (IPAMS). Numerous data forms were collected during these trips including data on species new to IPAMS and federal noxious species. This data will also be available for sharing.

MSU-GRI continues to coordinate activities with USDA-APHIS to assist their efforts, which is especially important when there are USDA budget shortfalls. Trap lines are being established USDA in LA and TX and more host information and volunteers are needed in TX. MSU-GRI will continue to coordinate activities in these efforts.

New Web Page on the Cactus Moth and Related Native Species

By Richard L. Brown
Department of Entomology

A new web site on cactus moths in North and South America is in development by Thomas Simonsen and Richard L. Brown, with various author authors contributed selected pages. The site will cover 21 genera and include taxonomic and identification information, morphol-

ogy, life history, larval hosts, and images. At present the site includes this information for all *Cactoblastis* and *Melitara* species.

New information that is available on-line for the first time includes images of comparative morphology of *Cactoblastis* and *Melitara*, a synthesis of new information on life history and known hosts of *Cacto-*

blastis, a complete bibliography for *Cactoblastis* (with pdfs for some publications), and a compiled and categorized list of links to other sites. The site can be accessed at: <http://mississippientomologicalmuseum.org.msstate.edu//Researchtaxapages/CactusMoths/ListGenera.html>

Submission of Digital Images of Pheromone Trap Samples for Identification

By Richard L. Brown
Department of Entomology

Pheromone traps to monitor for presence of cactus moths are currently being operated in Alabama, Mississippi (Petit Bois and Horn Islands), Louisiana, Texas, Arizona, and California. Development of the cactus moth identification guide (Brown and Lee, 2008) has reduced the number of trap samples submitted for identification. Discovery of the cactus moth in Jefferson Parish, Louisiana has resulted in increased use monitoring and use of pheromone traps in other coastal Parishes of Louisiana and adjacent counties in Texas.

Many of the non-target species captured in pheromone traps can be easily distinguished from the exotic and

native cactus moths without microscopic examination. In the photograph of the trap sample shown here, submitted by Dr. Barron Rector, Texas A & M University Extension Service, the moths are easily identified as *Spodoptera exigua* by forewing pattern, especially the presence of yellow spots.



Photograph of pheromone trap sample from Texas with *Spodoptera exigua* moths.

Trap samples with moths oriented such that their forewing patterns are fully exposed often can be identified by digital photographs without the need of the costly and time consuming mailing of samples.

However, all digital images sent to Richard Brown via moth@ra.msstate.edu should be labeled with the trap number and the accompanying email message must include all trap data, including dates of trap operation, trap location, including county, location, and coordinates, collector of trap sample, and the contact email, phone number, and address of the submitter. All trap samples should be retained by the submitter until confirmation of the identification is made by email or phone.

“Dissection of Male Genitalia of the Cactus Moth” - A Training Video

By Richard L. Brown
Department of Entomology

The identification of the cactus moth can be dependent upon making dissections of the male genitalia for distinguishing this species from related cactus moths.

Proper methods for making dissections are known to many Lepidoptera specialists, but these have not been made widely

“Proper methods for making dissections are known to many Lepidoptera specialists, but these have not been made widely known to others who are involved in making diagnostic identifications.”

known to others who are involved in making diagnostic identifications.

A new video has been produced that covers the tools and reagents needed for making dissections and the detailed methods for cleaning, staining, and slide mounting the abdomen and genitalia. This video will be available on CD as well as on web pages, and as such will be the first video on dissection methodology that is available on line.

Cactus Moth Detection and Monitoring Network Homepage

By Cliff Abbott
Geosystems Research Institute

The Cactus Moth Detection and Monitoring Network is continuing to provide critical information in the fight against the invasive and destructive cactus moth. The network current holds 7788 positive and negative pricklypear cactus surveys across the nation and Mexico with many more waiting to be entered. These sur-

veys are identifying 2560 populations of pricklypear cactus spanning 23 states and Mexico. Of those cactus populations, 103 are identified as positive locations for the cactus moth.

The network is also

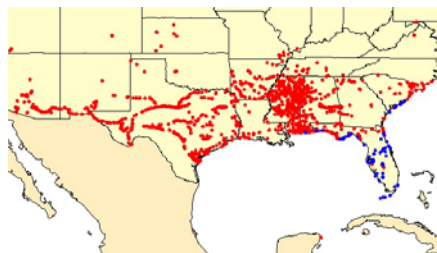


Figure 1. CMDMN Map shows positive *Opuntia* populations (red) and positive moth infestations (blue).

continuing to provide information about the leading edge of the moth’s advancements along the East and Gulf coasts. Recently, the cactus moth was detected in three Southeast Louisiana Parishes. The net-

Cactus Moth Detection and Monitoring Network Homepage (cont.)

work provided information about cactus locations in that area to assist in an extensive search led by USDA APHIS. GRI's Victor Maddox assisted USDA APHIS in searching for cactus locations and potential infestations in Southeast Louisiana. The result of this survey effort produced 69 cactus locations with 45 locations being positive for cactus moth infestations. Additional surveys were collected 30 June and 1 July 2009. The data is currently being prepared for entry into the

network. GRI has been planning software and hardware upgrades to the servers that house the Cactus Moth Detection and Monitoring Network. These upgrades have been plagued with problems with both the software and the hardware. Those issues have been worked through and the upgrades are now moving forward. The network can be visited at http://www.gri.msstate.edu/cactus_moth.

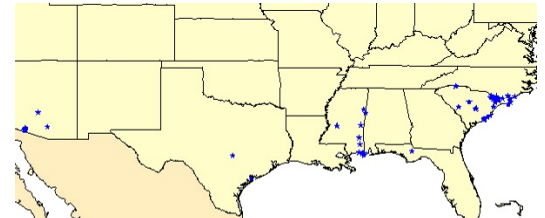


Figure 2. CMDMN sentinel sites are monitored on regular intervals for the presence of the cactus moth.

Invasive Plant Atlas of the MidSouth

By John Madsen
Geosystems Research Institute

The Invasive Plant Atlas of the MidSouth (IPAMS), accessible at <http://www.gri.msstate.edu/ipams>, is continuing to expand. IPAMS currently has 39 registered users from nine states (Alabama, Arkansas, Georgia, Kentucky, Mississippi, New Jersey, North Carolina, and Tennessee). We have trained 250 Master Gardeners to identify the forty invasive plant species on our target list. IPAMS currently has 6956 records of 160 plant

species from 31 US states. While our target is the MidSouth states of AL, AR, LA, MS, and TN, we accept data for a variety of invasive species from all of the US states.

We have recently completed the text for a field identification guide to our forty species of interest, which will be edited and printed for use this fall. In addition, we are almost finished with fact sheets for our forty species, which will include management information on each species.

We will be completing our training manual this fall, in time for scheduling training sessions for interested citizens in identifying our forty target species, and entering their observations into our web-based database.

Funded by the USDA CSREES, this program is partnering with USGS and NBII with data exchanges.



Publications for January—June 2009

Peer-Reviewed Journals

Dibble, E. D., and K. Kovalenko. 2009. Ecological Impact of Grass Carp: A Review of the Available Data. *Journal of Aquatic Plant Management*. 47:1-15.

Wersal, R. M., and J. D. Madsen. 2009. Combinations of diquat and a methylated seed oil surfactant for control of common duckweed and watermeal. *Journal of Aquatic Plant Management*. 47:59-62.

Simpson, A., C. Jarnevich, J. Madsen, R. Westbrook, C. Fournier, L. Mehrhoff, M. Browne, J. Graham, and E. Sellers. 2009. Invasive species information networks: collaboration at multiple scales for prevention, early detection, and rapid response to invasive alien species. Submitted to *BioDiversity*.

Robles, W., J. Madsen and R. Wersal. 2009. Lake-wide temporal surveys to assess aquatic vegetation and herbicide efficacy of waterhyacinth (*Eichhornia crassipes*) control in Lake Columbus, Mississippi, USA. Submitted to *Journal of Aquatic Plant Management*.

Wersal, R. M., J. D. Madsen, J. H. Massey, W. Robles, and J. C. Cheshier. 2009. Dark exposure to enhance applications of diquat and carfentrazone-ethyl for control of parrotfeather and Eurasian watermilfoil. Submitted to *Journal of Aquatic Plant Management*.

Non-Refereed Conference Abstracts

Madsen, J. D., R. M. Wersal, and T. E. Woolf. 2009. Eurasian Watermilfoil

Monitoring and Management Assessment in the Pend Oreille Lake and River System, Idaho. Western Aquatic Plant Management Society Annual Meeting, Honolulu, HI: 30 March - 1 April 2009.

Madsen, J. D. and R. M. Wersal. 2009. Efficacy of Combinations of Endothall with 2,4-D and Triclopyr For Enhanced Control of Eurasian Watermilfoil with Low Contact Time. Western Aquatic Plant Management Society Annual Meeting, Honolulu, HI: 30 March - 1 April 2009. [Abstract]

Madsen, J. D., R. M. Wersal, and K. Getsinger. 2009. Efficacy of combinations of endothall with 2,4-D and triclopyr for enhanced control of Eurasian watermilfoil with low contact time. Mid-

Publications for January—June 2009 (cont.)

west Aquatic Plant Management Society 29th Annual Meeting, March 1-4, 2009. Chicago, IL.

Madsen, J. D., and G. Ervin. 2009. The Invasive Plant Atlas of the Mid-South. Weed Science Society of America 2009 Annual Meeting. Orlando, FL.

Madsen, J. D., R. M. Wersal, and K. Getsinger. 2009. Efficacy of Combinations of Endothal with 2,4-D and Triclopyr For Enhanced Control of Eurasian Watermilfoil with Low Contact Time. Northeast Aquatic Plant Management Society 10th Annual Meeting, January 19-21, 2009. Saratoga Springs, NY.

Madsen, J. D., R. M. Wersal, and M. L. Tagert. 2009. Littoral Zone Survey of the Ross Barnett Reservoir (MS) for Invasive Species Management. Southern Division of the American Fisheries Society Spring Meeting, 15-18 January 2009. New Orleans, LA.

Non-Refereed Conference Papers

Madsen, J. D., and G. Ervin. 2009. Update on the Invasive Plant Atlas of the MidSouth. Mississippi Exotic Pest Plant Council. Jackson, MS.

Wersal, R. M., and J. D. Madsen. 2009. Comparison of Subsurface and Foliar Herbicide Applications for Control of Parrotfeather (*Myriophyllum aquaticum*). Weed Science Society of America 49th Annual Meeting. Orlando, FL.

Madsen, J. D. 2009. Introduction to the Symposium: Invasive Plant Web-Accessible Databases and Volunteer Monitoring Programs. Weed Science Society of America 2009 Annual Meeting. Orlando, FL.

Prince, J. M., D. R. Shaw, J. D. Madsen, J. L. Harvill, G. Ervin, S. Samson, and J. Martin. 2009. Local-scale GIS Modeling of Eurasian Watermilfoil. Proceedings Southern Weed Science Society / Weed Science Society of America Abstracts. Orlando, FL.

In-House

Madsen, J. D., Cheshier, J., Phuntumart, V., Thum, R., & Welch, M. 2009. Eurasian Watermilfoil Survey Of Three Reservoirs In The Lower Clarks Fork River, Montana: II. Taxonomic Analysis Of Native And Nonnative Watermilfoils. Geosystems Research Institute Report 5035. Mississippi State University: Geosystems Research Institute.

Madsen, J. D., & Cheshier, J. 2009. Eurasian Watermilfoil Survey of Three Reservoirs in the Lower Clarks Fork River, Montana: I. Results of the Field Vegetation Survey. GRI Report #5033. Mississippi State University: Geosystems Research Institute.

Madsen, J. D., Brown, R., Ervin, G., Shaw, D. R., Abbott, C. F., Maddox, V. L., Wersal, R. M., McBride, D. W., & Madsen, N. 2009. Research to Support Integrated Management Systems of Aquatic and Terrestrial Invasive Species: Annual Report 2008. GRI Report #5030. Mississippi State University: Geosystems Research Institute.

Maddox, V. L., & Kelly, L. S. 2009. Ornamental grasses for the MidSouth landscape. www.msucare.com. Mississippi State, MS; Mississippi State University Extension Service, Mississippi State University. P2532.

Madsen, J. D., & Wersal, R. M. 2009. Aquatic Plant Community and Eurasian watermilfoil (*Myriophyllum spicatum* L.) Management Assessment in Lake Pend Oreille, Idaho for 2008. GRI Report #5032. Mississippi State University: Geosystems Research Institute.

Wersal, R. M., Madsen, J. D., & Tagert, M. L. 2009. Littoral Zone Aquatic Plant Community Assessment of the Ross Barnett Reservoir, MS in 2008: A Four Year Evaluation. GRI Report #5031. Mississippi State University: Geosystems Research Institute.

Byrd, J. D., Jr., Maddox, V. L., & Westbrook, R. 2009. Kudzu [*Pueraria montana* (Lour.) Merr.]. www.gri.msstate.edu. Mississippi State, MS; Mississippi State University: Geosystems Research Institute. 50XX. In press.

Maddox, V. L. 2009. Invasive Species Identification and Management. Agriculture Club Meeting, Oktibbeha County Extension Office, Starkville, MS.

Professional Presentations

Madsen, J. D., Brown, R. L., Ervin, G., Maddox, V. L., & Abbott, C. F. 2009. Update on the GRI Cactus Moth Detection Network. Invasive Species Working Group. Teleconference: National Biological Information Infrastructure, Invasive Species Information Node. June 2009.

Madsen, J. D. 2009. Evaluating Environmental Impacts of Aquatic Plant Management Techniques: Examining Direct and Indirect Effects. Aquatic Vegetation Control; Balancing Habitat and Nuisance. Elkhart, IN: St. Joseph River Basin Commission and Aquatic Ecosystem Restoration Foundation.

Madsen, J. D., Wersal, R. M., & Tagert, M. L. 2009. Survey of the Ross Barnett Reservoir (MS) for Invasive Species Management. Pearl River Valley Water Supply District Board of Directors Meeting. Jackson, MS.

Maddox, V. L. 2009. Invasive Species Identification and Management. Agriculture Club Meeting, Oktibbeha County Extension Office, Starkville, MS.

Fleming, J. P. 2009. Aquatic Biodiversity and Invasive Species. 2009 Alabama State Envirothon. 4H Center, Columbiana, AL.

Maddox, V. L. 2009. Invasive species information and plant identification. 2009 Hattiesburg Garden and Patio Show, 27-29 Mar 2009, Hattiesburg Convention Center, Hattiesburg, MS.

Maddox, V. L. 2009. Invasive Plant Species. Master Gardener Training, 26 March 2009, Bost Extension Center (videoconference), Mississippi State University, Mississippi State, MS. Presentation (2 hrs).

Maddox, V. L. 2009. Plant identification and invasive species information. 12th Annual Jackson Garden and Patio Show, 13-15 Mar 2009, Mississippi Trade Mart,



MISSISSIPPI STATE
UNIVERSITY



GEOSYSTEMS RESEARCH INSTITUTE
WWW.GRI.MSSTATE.EDU/IPAMS

Phone: 662-325-2428

Fax: 662-325-7692

E-mail: jmadsen@gri.msstate.edu

Publications (cont.)

Jackson, MS.

Maddox, V. L. 2009. IPAMS – Invasive plant species. Weed Biology and Ecology, 10 Mar 2009, 152 Dorman Hall, Mississippi State University, MS.

Maddox, V. L. 2009. Identification of invasive and other plant species. 2009 Gulf Coast Garden and Patio Show, 27-28 Feb – 1 Mar 2009, Mississippi Coast Coliseum, Biloxi, MS.

Maddox, V. L. 2009. Invasive Plant Species Problematic to Golf Courses and the IPAMS Database. Turf Seminar, 128 Dorman Hall, Mississippi State University, MS.

Leveraging Proposals Submitted

Madsen, J.D. 2009. Publication of a field guide of invasive plants in the Mid-South. NREE RREA Project, Mississippi State University, Aug – Dec 2009, \$5,000. Pending.

Madsen, J.D., V.L. Maddox, and R.L. Brown. 2009. Cactus moth response west of Mississippi: Survey, training, assessment and verification. USDA APHIS PPQ Cactus Moth National Program, July 1, 2009 – March 31, 2010. \$55,705.76. Pending.

Madsen, J.D., G.N. Ervin, C. Brooks, V. Maddox, L. Mehrhoff, R. Westbrook, and T. Feria. 2009. Development Of A National Early Detection And Rapid Response Training Program For Invasive Plants In The United States. USDA CSREES AFRI Program, January 1, 2010 – December 31, 2012. \$499,290.45. Pending.

Shaw, D. R., G. N. Ervin, D. Grebner, S. Grado, C. Brooks, J. D. Byrd, and D. Jones. Evaluating network approaches to reducing the spread of cogongrass (*Imperata cylindrica*) in the southeastern United States. US Department of Agriculture Competitive Grants Program, \$497,225. 2010-2012. Pending.

Coordination for January–June 2009

Mississippi Cooperative Weed Management Agreement (CWMA), May 21, 2009:

Steering Committee: John Byrd and John Madsen

Research Committee: John Madsen (Chair), Gary Ervin, John Byrd

Education Committee: John Byrd (Chair), John Madsen

Survey Committee: Victor Maddox (Chair)

Invasive Species Working Group teleconferences, last Thursday of each month, team member has participated each month.

NBII Content Workshop, February 3-5 2009, Baltimore, MD. John Madsen attended.

National Invasive Weed Awareness Week, February 22-27 2009, Washington, DC. David Shaw and John Madsen attended.

Council for Agricultural Science and Technology (CAST) Board Meeting, March 18-20 2009, Washington, DC. John Madsen attended.

Ervin and colleagues in the MSU Department of Biological Sciences continue collaborations with Dr. Guillermo Logarzo and Laura Varone at the South American Biological Control Laboratory in Buenos Aires, Argentina. They are collaborating in the design of studies to examine the degree of isolation among *Cactoblastis cactorum* genotypes identified through ongoing genetic research.

Victor Maddox logged the following trips, working with USDA-APHIS:

Mississippi barrier islands with USDA-APHIS. 9-11 Feb 2009. Inspected thousands of host plants during cactus moth first cycle surveys. No visuals for cactus moth.

Mississippi barrier islands with USDA-APHIS. 10-12 Jun 2009. Inspected thousands of host plants for cactus moth. No visuals for cactus moth. Approximate first instar larvae found were native cactus moth (confirmed by Richard Brown).

Southern Louisiana with USDA-APHIS. 17-19 Jun 2009. Conducted cactus moth and host road surveys south of Hwy 90 across southern Louisiana.

Southern Louisiana with USDA-APHIS. 29-30 Jun to 1 Jul 2009. Assisted with cactus moth and host boat surveys south of Lafitte, LA and conducted cactus moth and host road surveys south of New Orleans. New cactus moth infestations identified and many new host populations documented.

Mississippi barrier islands with USDA-APHIS. 30-31 Mar 2009. Inspected thousands of host plants for cactus moth. No visuals for cactus moth.