SDC-351 MEETING MINUTES
MARCH 3, 2013, BATON ROUGE, LOUISIANA

The annual meeting of the Southern Region Biological Control of Arthropod Pests and Weeds Work Group, operating under project SDC-351, was held on 3 March 2013 at the Hilton Hotel, Baton Rouge, Louisiana, from 2:00 to 4:30pm. The minutes of this meeting and the reports for 2012 activities summarized at the meeting are presented below.

Minutes

Call to order by Chair JC Chong and introductions. Minutes were taken by Secretary Greg Wiggins. State reports are listed following the minutes.

Attendance

Adam Alford, University of Arkansas
Kris Braman, University of Georgia
JC Chong, Clemson University
Jim Cuda, University of Florida
Jonathan Edelson, Oklahoma State University
Jerome Grant, University of Tennessee
Walker Jones, USDA-ARS, Stoneville, Mississippi
Tim Kring, University of Arkansas
Stephen Micinski, Louisiana State University
Carey Minteer, University of Arkansas
Bryan Petty, University of Arkansas
Ragu Sathyamurthy, University of Arkansas
Greg Wiggins, University of Tennessee

JC Chong offered to read the full minutes from 2012 meeting. Tim Kring put forward a motion to approve and submit the minutes from last year without reading, Jim Cuda seconded the motion: the motion passed.

Briefing by Jon Edelson: We are currently operating under a temporary measure, which is acceptable. The project proposal for the Southern Group (SDC-351) is in review, and this proposal will be sent to Washington shortly for approval. Directors think this working group is important. Keep operating as usual, and submit final report within 90 days of this meeting. Sequester cuts are as yet unknown, but 5-15% of Federal funds to experiment stations may be cut. The Directors feel that multistate research projects are important, so if USDA had to delete Hatch projects due to sequester/other budget concerns, NIFA would continue to fund. The floor was then open for questions. Jerome Grant asked if money cut from the budget will come back after sequester. Edelson: It is not known if money will return, but each agency will set priorities. Grant then asked about grants that are on an extension, and if they can be taken away as part of sequester cuts. Edelson: Probably not, but going forward, future funding amounts are unclear. Jim Cuda asked if one submitted a NIFA grant this year, will it still be considered. Edelson: Maybe, but that depends on where budget cuts occur. Grant asked if tuition can be included in these funds in coming years. Edelson: Not now, but maybe in the future. The Directors are not in agreement of what to do at this time.

The floor was open for comments and discussion. Jerome Grant asked if this group could do a regional publication on successes of this project. He suggested the publication could point out successes and be a resource for participants. The document also would explain the processes and expectations of biocontrol. Others suggested that the risks of biocontrol and risks of not doing biocontrol could be included and discussed in the publication as well. It could also be used as tool for administrators and policy makers to refer to if they needed resources/data to use to support future efforts. Publication could serve as a means for biocontrol workers to educate the public about biocontrol instead of others. Tim Kring suggested to circulate the idea to all membership, who would be interested in participating and get suggestions on what outlet to develop (refereed publication, web page, flier, other?). Tim Kring suggested this needs to be put out in multiple outlets: Maybe be funded through combined director funds. Jim Cuda suggested focusing on hugely successful cases and/or low risk cases, so not necessarily all PIs will have something in it. Jonathan Edelson said what is most needed is an impact statement detailing the importance of biocontrol to both the southeastern U.S. and the Nation, and how will biocontrol be important in the future. Ragu Sathyamurthy suggested using a paper about biocontrol in Australia as an example from which to work and to list positive and negative aspects for comparison of benefits. JC Chong pointed out that money is key to assessing impact, but biocontrol takes a long time to get that info (so how can long-term monitoring be funded to assess impacts). Edelson wanted to know what is known/published about negative host tests and things that were not released because they were deemed unsafe; how common is that? Can we include examples of this in the document to show the strictness of standards to be met before releases are approved? Kring stated we still only publish the successful or promising insects, not failures. Chong, Wiggins, and Sathyamurthy will work on an initial participation e-mail.

State Reports

Greg Wiggins – Summarized written report for Tennessee.

Walker Jones – No written report submitted, but gave a brief on kudzu bug parasitoids, *Ooencytrus nezarae* (Encyrtidae) and *Paratelenomus saccharalis* (Platygastridae). Host testing well underway. Once completed they will petition for permission to release. Wants to organize collaborators, distribute parasitoids, and coordinate simultaneous evaluations. Want pre and post release surveys where they are released. Tim Kring wanted to know if releases would be focused on leading edges? Jones: Yes. Also, parasitoids were collected in various regions in Japan, so strains from the different region of origins can be match to climates in areas of release to optimize chances of establishment. Releases are proposed to be made in kudzu and allow parasitoids to spread out to soybeans.

Kris Braman – Summarized written report for Georgia.

Tim Kring – Summarized written report for Arkansas.

Jim Cuda – Suggested adding the ‘Objectives’ statements to the template for next year. Summarized written report for Florida.

Stephen Micinski – No report given for Louisiana State University, but is newly working on giant Salvinia control with weevils.

JC Chong – Summarized written report for Clemson.

JC Chong – Summarized written report for Brazil for Mark Culik.

JC Chong opened floor for officer nomination and election. Ragu Sathyamurthy volunteered and Tim Kring seconded the nomination. Nomination passed and Ragu Sathyamurthy is incoming Secretary. Greg Wiggins is incoming Chair.

Tim Kring put forward a motion to adjourn 2013 meeting, Greg Wiggins and other seconded the motion; the motion passed.

SDC-351 (formerly S-1034) ANNUAL REPORTS FOR 2012

NAME OF REPRESENTATIVE: Tim Kring
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UTILITY OF FINDINGS:
Three new natural enemies attacking the invasive spotted knapweed are now known from the southern US. One (*Urophoraquadrifasciata*) spread naturally from releases in the northern US, but studies indicate it has limited impact on the weed. Two other beneficial insects (the flower head weevil, *Larinus minutus* and the knapweed root weevil, *Cyphocleonus achates*) were intentionally established by this project in Arkansas via their redistribution from Colorado. Together, these species will help reduce the spread of this invasive species and suppress knapweed populations already established, thus reducing herbicide use in both public and agricultural lands. Reductions in knapweed populations will allow native species to reclaim the habitats invaded by this pest.Long-term evaluation study methods were developed as were remote sensing tools. Successful development and implementation of remote sensing tools to track the reduction of knapweedpopulations at the local and regional levels will allow their application for terrestrial weed biological controlprograms in Arkansas.These new methods will be essential in the cost-effective, long-term monitoring of the success of the spotted knapweed program in the southwest. Remote sensing tools that are developed will also be useful in other terrestrial weed biological control programs in Arkansas.

A new obligate pathogen of the small hive beetles, *Aethinatumida*, was discovered Arkansas.

This new pathogen may provide some level of biological control of the small hive beetle, an important pest of honey bees.

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José Aires Ventura, David dos Santos Martins

UTILITY OF FINDINGS

Our research results will be useful for preparing for establishment of and for management of invasive pests such as the mealybug *Maconellicoccus hirsutus* in Espírito Santo and other parts of Brazil and South America.

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UTILITY OF FINDINGS

Cave: Establishment of the Honduran parasitic fly *L. franki* will save populations of native Florida bromeliad species which are currently threatened and endangered due to the presence of the Mexican bromeliad weevil in the state. Information from biological studies of the weevil will help us better understand the ecology of the pest, as well as improve our method for mass-rearing L. franki. Introduction and establishment of *Phaenochilus kashaya* will potentially control populations of the cycad aulacaspis scale on ornamental cycads in Florida and native cycads in Guam. Development of augmentation biological control technology with field releases of insectary-reared predatory stinkbugs and green lacewings will provide organic growers a needed management tactic for controlling the yellowmargined leaf beetle on crucifer crops. Initial on-farm experiments with preliminary results from data analysis indicate that augmentative releases of the predatory spined soldier bug can have a significant effect in the control of yellowmargined leaf beetle populations in organically grown crucifers. The research on entomopathogenic fungal strains will determine those that are infective against the red bay ambrosia beetle under field conditions, cause epizootics, and reduce brood production in infested natural areas and commercial avocado groves. Biological studies will provide greater insight into biological control agent/pest interactions. Discovery and descriptions of new species will enhance our knowledge of biodiversity for biological control and protection of unique environments.

Cuda: Brazilian peppertree, *Schinus terebinthifolia*. In the March 2012 rearing attempt, 92 nymphs of C. terebinthifolii successfully initiated galls but none developed past instar II. The second rearing attempt in August 2012 did result in an F1 generation. Adults were released into cages on 21 August and eggs were observed on most plants within 3 days. A single Brazil haplotype A plant supported complete development to the adult stage. The first F1 adult (male) emerged on 26 October 2012. In total, 20 F1 adults emerged through 19 December, requiring 67-121 days to develop from egg to adult. This is the first time that a complete generation of the psyllid was produced in the laboratory.

During this reporting period, two release petitions were prepared and submitted to the TAG for review/comment. In August 2010, we received the response to TAG Petition Number 09-09, "Proposed field release of Episimus *unguiculus* Clarke (Lepidoptera: Tortricidae), a nonindigenous leaflet rolling moth from Brazil for classical biological control of Brazilian peppertree, *Schinus terebinthifolia* Raddi (Sapindales: Anacardiaceae)". In total, 13 reviews were received; only 2 of these reviewers recommended that the agent not be released. Comments made by the TAG members who requested additional information or data and/or recommended that the insect should not be released were addressed (with key references where appropriate); the revised petition was re-submitted in September 2012. A release petition titled, "Proposed field release of *Apocnemidophorus pipitzi* (Faust) (Coleoptera: Curculionididae), a nonindigenous stem boring weevil from South America for classical biological control of Brazilian peppertree, *Schinus terebinthifolia* Raddi (Sapindales: Anacardiaceae)", was prepared and submitted to the TAG in October 2012.

Cuda: hydrilla, *Hydrilla verticillata*. Subproject #1.1) No-choice developmental tests with neonate larvae revealed that the fundamental host range of C. lebetis included not only on hydrilla, but also several other aquatic plants in various families, suggesting that this insect is not

a hydrilla specialist. In paired-choice bioassays, larval colonization of Elodea canadensis Michx. (Hydrocharitaceae) and Najas guadalupensis (Spreng.) Magnus (Najadaceae) was greater than colonization of hydrilla. Behavioural bioassays in a Y-tube olfactometer and in Petri dishes suggested that neonates were not able to locate host plant material whereas older larvae were successful in finding hosts. In paired-choice oviposition tests, adult females discriminated between potential oviposition sites, with greater numbers of eggs laid on E. canadensis and N. guadalupensis than on hydrilla. To establish the thermal limits and cold tolerance for establishment of C. lebetis (Subproject #1.2), temperature-dependent development, cold tolerance and the potential distribution of the midge were investigated. Results showed that optimal temperatures for larval development were between 20 and 30°C, no larvae developed at 10 C, and only one larva completed development at 35 C. At 5 C, 100% mortality was reached after approximately 14 days. At 10 C, some larvae were still alive after 16 days. The estimated lower and upper developmental thresholds were 10.53 and 36 C, respectively. These data were used to construct a map of the potential number of generations/year of C. lebetis in Florida. Data from the cold tolerance study, in conjunction with historical weather data, were used to generate a predicted distribution of C. lebetis in the USA. A distribution also was predicted using an ecological niche modeling approach by characterizing the climate at locations where C. lebetis is known to occur, and then finding other locations with similar climate. The distributions predicted using both modeling approaches indicated that much of the southeastern USA was climatically suitable for C. lebetis. Efficacy of combining C. lebetis with the fungal pathogen Mt (Subproject #2.1) was assessed. Initial tests showed that the insect and fungus were compatible with each other, and that combining them reduced hydrilla biomass by ~50%. For demonstrating a novel integrated strategy for controlling hydrilla (Specific Aim #3), a breeding colony of C. lebetis was established and is currently producing a surplus of around 15,000 eggs every 3weeks since September. Approximately 10,000 eggs were supplied to FAMU collaborators for their research and demonstration experiments.

Products & Disseminaton- Hydrilla IPM RAMP Project Banner, Extension Professionals Association of Florida Annual Meeting, Lake Buena Vista. Sept 2012 (Display, 150 Viewers); Implementing an Educational Campaign: New IPM Strategies for Hydrilla Management (1 PowerPoint, 41 slides); Hydrilla IPM RAMP Project, Association of Natural Resources Extension Professionals Conference, Hendersonville, NC (National Invited Presentation); Educational campaign implementation: IPM strategies for hydrilla management, Central District Extension Faculty Symposium, UF/IFAS Sumter County Extension Office, April 2012 (Regional Invited Presentation); Hydrilla IPM RAMP Project, UF Water Institute Symposium. Gainesville, FL. 2012 (State Invited Presentation); New IPM Approach for Managing Hydrilla in Florida, Florida Aquatic Plant Management Society, St Augustine, FL, Oct 2012 (State Invited Presentation); Hydrilla IPM RAMP- Starting a Statewide Project, Association of Natural Resource Extension Professionals Conference, Hendersonville, NC (Poster); Hydrilla IPM RAMP- Starting a Statewide Project, UF Water Institute Conference held in Gainesville, FL. (Poster); Educational Campaign Implementation: IPM Strategies for Hydrilla Management, 2012 Central District Extension Faculty Symposium, Bushnell, FL (Poster). Natural Resources for Educational Campaign Implementation: IPM Strategies for Hydrilla Management, 2012 Central District Extension Faculty Symposium, 1st Place Poster Award.

Legaspi: The results of our tests will assist in development of the “push-pull” strategy to manage insect pests in conventional and organic grower’s fields for sustainable management of

horticultural and vegetable crops.

Leppla: mole crickets, *Scapteriscus* spp. Nematac S is no longer available and the nematode use patent terminated in the fall of 2012, so there is no limitation on producing and marketing the nematode. The nematode project accomplished commercial production, application and limited field evaluation, built and deployed nematode application equipment, trained Extension agents and others in nematode application, and vastly reduced pest mole cricket populations and associated damage. Pest mole crickets still damage pastures in some places in Florida but are suppressed by the natural enemies that are well established across the state. It is estimated that pest mole cricket populations have declined as much as 95% in most areas of Florida. A cooperative project has been developed at the FAMU Center for Biological Control to determine the economic benefits of mole cricket biological control. By the end of 2013, the project survey will provide an indication of the current level of mole cricket damage to Florida pastures and interest in using the nematode.

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UTILITY OF FINDINGS

Insecticide- induced non-target mortality is influenced by turfgrass genotype and may depend on mode of action of insecticide, type of host plant resistance and plant morphology and architecture. Insecticidal soap combined with green lacewing larvae provided equivalent control of azalea lace bugs as the standard synthetic organic insecticides acephate and imidacloprid.

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UTILITY OF FINDINGS:

The cereal aphid + parasitoid 'Glance n' Go' sampling and management plan continues to be a reliable and efficient approach to integrating the impact of natural enemies into insect pest

management plans for winter wheat in the Southern Plains. Studies on Intraguild dynamics among aphid parasitoids and Coccinellidae predators (native versus exotic) in winter wheat agroecosystems continue to reveal the competitive advantage displayed by *Lysiphlebus testaceipes* in the Southern Plains. Understanding source-sink relationships for insect natural enemies in biofuel crops will provide baseline data required for designing pest management programs that focus on conservation of beneficial insects. Characterizing entomopathogenic nematode community composition and generalist predator assemblages in riparian zones heavily encroached upon by *Tamarix spp*. in western Oklahoma will allow for more holistic analyses on the process influencing the outcomes of this classical biological control program. Describing entomopathogenic nematode community composition and activity in organic beef production systems is providing pest management data to producers who are transitioning to these systems.

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UTILITY OF FINDINGS

A better understanding of the impacts of natural enemies is crucial to the development of an integrated pest management program. Knowing the predominant natural enemy species of the oak lecanium scale and Melanaspis deklei, we can design follow-up experiments to determine the actual impacts of these natural enemies in regulating the scale insects populations and the methods to employ to enhance their effectiveness. Since the parasitoids and predators of oak lecanium scale are active during the time of crawler emergence, we will have to revise the typically recommendation of spraying insecticides during the time of crawler emergence for scale insect control in order to minimize the negative impacts of the insecticide applications on the natural enemy populations. For Melanaspis deklei, topical application for crawler control may not be the best option because the natural enemies are always presence. In this case, a specific period may need to be identified for targeted application knowing full well that some of the natural enemies may be impacted. Understanding how the natural enemies move within the same landscape may be the key to design such a targeted spray program to avoid eliminating the entire population and allow rapid recolonization by the natural enemies. Evaluating the compatibility of pesticides with biological control agents is an important step in designing an effective biological control system, particularly in ornamental plant system where the extremely low economic threshold necessitate the use of pesticides. Results from these studies will allow ornamental plant producers and landscape care professionals to select pesticides that are the most compatible with natural enemies, thus reducing the pest population and conserving the natural enemy populations at the same time.

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UTILITY OF FINDINGS:
Biological control is crucial to controlling hemlock woolly adelgid as it is the only viable management tool for hemlocks over vast areas, and also has the potential to permanently reduce population densities of hemlock woolly adelgid. Therefore, improving and expanding mass production of biological control agents, predaceous beetles, is of utmost importance. Discovering and utilizing new release areas, especially those on the western edge of expansion of hemlock woolly adelgid in Tennessee, will enable personnel to better plan predator releases to improve the chances of reducing populations of this invasive pest in these newly infested areas, which should ultimately reduce the damage that this pest may cause to hemlock forests.

The recovery of *S. tsugae* in new areas in the Great Smoky Mountains National Park and Blackberry Farm is promising and indicates this species is established at multiple locations. Understanding the role of biotic and abiotic factors in establishment and recovery of *S. tsugae* will greatly enhance their use in biological control efforts against hemlock woolly adelgid. Temperature and elevation are among the most important factors which influence establishment of *S. tsugae*. The documented inverse relationship of year of release to establishment and recovery indicates that *S. tsugae* requires more time to reach detectable levels after establishment. Releases of *S. tsugae* at freezing or below freezing temperatures may hinder their establishment. Releases of these introduced predators at the right time of year and at appropriate elevations will enhance biological control efforts against hemlock woolly adelgid, especially in the Great Smoky Mountains National Park.

Emergence traps have proven to be a useful and versatile tool to detect *L. nigrinus* in sites where it has been released and has established. This tool may be used to enhance recovery efforts and support the use of these sites as field insectaries, where beetles can be collected and relocated to new areas.

Documenting that hybridization occurs in areas where both the native and introduced *Laricobius* species occur is important to establish a comparative baseline for future studies. It is unclear if the level of hybridization (ca. 8.9% of specimens examined from Elkmont and Blackberry Farm) is yet biologically significant, and the rate of hybridization is currently unknown. Specimens of *Laricobius* continue to be collected and will be analyzed to gain a broader understanding of the prevalence and extent of hybridization between these predatory species in natural areas.

A complex of natural enemies has been released against the hemlock woolly adelgid in the southeastern United States. These species complement each other, as they feed on various life

stages and at varying times of the year. Two predator species are established at numerous locations in the southeastern U.S.; research at the University of Tennessee has demonstrated that both species can survive together on the same infested hemlock tree. Predator compatibility will elicit a more efficient and successful program for control of the hemlock woolly adelgid. Research on recovery and establishment of introduced predators in the Great Smoky Mountains National Park continues to provide valuable information about *S. tsugae* and *L. nigrinus* establishment in the Park, as well as expectations for recovery.

Emerald Ash Borer: Studies on emerald ash borer and its parasitoids in the south are at early stages. Biological control is the most promising broad-scale management option, but, as with many biological control programs, these introduced parasitoids may take years to establish and exert reduction of EAB populations. Thus, the development and evaluation of management efforts may take time before they can lessen the impact of EAB in the south. Additional parasitoid releases and evaluation of native parasitoids will continue in 2013.