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M. S. Student Competition

Resistance Testing for *Culex* and *Aedes* (Diptera: Culicidae) Mosquitoes in Mississippi. S. McInnis, H. Deerman, D. Yee, W. Varnado, and J. Goddard.

Mosquitoes can develop resistance to various insecticides used in public mosquito abatement programs. In Mississippi, unfortunately, there are no data available as to mosquito resistance to insecticides in mosquito populations. In this study, we collected mosquito eggs and larvae (Culex and Aedes) from sites throughout the state, reared them to the adult stage, and performed the CDC bottle bioassay protocol using malathion and permethrin on the specimens at the Mississippi Department of Health Public Health Laboratory in Jackson, MS. Preliminary data showed that there is insecticide resistance in Culex quinquefasciatus in several locations throughout the state of Mississippi.

Influences of Cultural Practices on Soybean Nectar Production. T. Smith, A. Catchot, J. Harris, N. K. Krishnan, J. Gore, and D. Cook.

Soybean nectar attributes to a large percentage of the nectar used in honey production in honeybee systems. The amount of nectar produced in each cultivar differs between those cultivars. Previous research has been done in the past to identify which certain cultivars produce the highest quantity of nectar. The objective of these tests was to identify which modern cultivars produced the highest amount of nectar based on a series of cultural mechanisms. Tests were conducted during the 2016 and 2017 growing season in the hills and delta region of Mississippi. The tests were also separated by planting date as well as being irrigated and non-irrigated. Flowers were pulled at peak nectar hours and weighed. After which the samples were centrifuged and placed in cold storage until analyzed by spectrophotometry. A number of varieties such as AG4633 and A5535 produced more amounts of sugar in the Hills region of Mississippi. Two varieties, AG3936 and AG3536, produced more in the Delta region. Average amounts of glucose were also observed to be in higher amounts in Hills region varieties, while average fructose is more abundant in Delta region varieties. A negative correlation between yield and total amounts of sugar was also observed.

Impact of Thrips Management in Flumioxazin Injured Peanut in Mississippi. J. Moor, J. Gore, A. Catchot, J. Sarver, and D. Cook.

An experiment was conducted in 2016 and 2017 in Stoneville, Mississippi at the Delta Research and Extension Center to evaluate the impact of at-planting insecticides and foliar applications of acephate for thrips management to flumioxazin injured peanut. Treatments were arranged as a split-split-plot within a randomized complete block design with 4 replications. The main-plot factor was flood irrigation at 2 levels, flooded and not flooded. The irrigation factor was included to maximize herbicide injury. The sub-plot factor was herbicide application at 2 levels. They included a pre-emergence application of flumioxazin (Valor® SX, Valent Co.) or no flumioxazin. The sub-sub-plot factor was thrips management at 4 levels. They included at-planting application of imidacloprid (Admire® Pro, Bayer CropScience), 1 or 2 foliar applications of acephate (ACEPHATE 90 WDG, Loveland Products.) at a rate of .5 pounds per acre, and an untreated control. Foliar applications were made 7 and 14 days after flooding. Thrips densities were measured weekly by removing 5 plants from each plot. The plants were washed in the laboratory in a solution of bleach and water and counted under a microscope. Thrips and herbicide injury as well as plant vigor was measured weekly by visual observation. Additionally, 5 plants were removed from each plot and weighed to determine biomass. Canopy width was measured

multiple times throughout the season. At the end of the season, plots were harvested and yields were determined.

Lab strain *Anopheles quadrimaculatus* midgut microbial community and the effects of wild larval rearing environments on microbiome and *Plasmodium berghei* infection and mosquito immune response. E. Moen and J. King.

Vector competence of mosquitoes has been linked to the conditions in which the larvae mature to adults. The microbial community obtained from their rearing environment is suspected to be one key factor in this interplay. A better understanding of the effect of rearing environment on microbiome and *Anopheles-Plasmodium* interactions could be useful for understanding observed lab vs. field differences in *Plasmodium* biology and help drive future control efforts. This study focused on the effects of larval rearing on microbiome establishment in a North American malaria vector. We used lab-strain *Anopheles quadrimaculatus* Say reared in 1) standard laboratory settings, and 2) in contained traps in the wild. As a control we included 3) an analysis of the gut microbiome from wild adults collected at each rearing site. Illumina-based 16S amplicon sequencing was used to determine the eubacterial content of the midguts from the adults. In an exploratory study, wild mosquitoes showed more variation in diversity at the bacterial phylum level than either lab-strain treatments. In lab-strain mosquitoes reared under clean conditions 40% of the total content was *Asaia spp*. However, in the wild mosquitoes, both had less than 2% of their total content represented by *Asaia spp*. Ongoing studies that further investigate the microbiome of lab-strain *An. quadrimaculatus* reared in the wild and their competency for harboring *Plasmodium berghei* infections will also be discussed.

Evaluating Fall Armyworm Thresholds in Whorl Stage Corn. K. Croom, A. Catchot, D. Cook, J. Gore, and B. Henry.

Currently, fall armyworm thresholds in whorl stage corn for the state of Mississippi are 100% infested plants before any insecticide treatment is warranted. Many have questioned the validity of this threshold. The purpose of this research is to research various infestation percentages in whorl stage corn and leaf loss as it affects corn yield. The paper addresses preliminary findings from research trials on how defoliation in whorl stage corn influences corn yield at various growth stages.

Diversity and Temporal Distributions of *Sphenophorus* spp. on Mississippi State University's Campus. R. J. Whitehouse.

Some species in the genus *Sphenophorus* (Curculionidae; Dryophthorinae; Rhynchophorini), commonly known as billbugs, are common turf and crop pests. On the Mississippi State University campus, a few of the many species of *Sphenophorus* can easily be found on sidewalks. Presented here are the preliminary results of a study looking at the temporal distributions of *Sphenophorus* spp. found around Mississippi State University's campus, focusing on the area around Chadwick Lake. Each week, starting in March, weevils were collected off of sidewalks and their general abundance recorded. So far, it has been observed that *Sphenophorus cariosus* (Olivier) and *S. venatus* (Say) have been present from March to August at fluctuating levels of abundance. Some of the other weevils found during this study are *S. inaequalis* (Say) and *Naupactus peregrinus* (Buchanan). As the study continues, more *Sphenophorus* spp. will be collected to help determine their seasonal distribution.

A Transgenic Approach to Controlling Tarnished Plant Bug (*Lygus lineolaris*) in Mid-South Cotton. J. C. Corbin, A. Catchot, and J. Gore.

Experiments were conducted to determine the impact of a new transgenic variety of cotton on the tarnished plant bug (*Lygus lineolaris)* populations and to assess future treatment thresholds in these varieties. By implementing this transgenic approach, the number of insecticide applications necessary were reduced compared to non-transgenic isolines.

Landscape-Level Contributions of Corn, Cotton, and Soybean in Mixed Production Systems for *Helicoverpa zea* Populations. T. Towles, A. Catchot, and J. Gore.

Helicoverpa zea is a major pest of corn, cotton, and soybean and is commonly controlled through the use of foliar applied insecticides or transgenic crops expressing the *Bt* gene. To prevent the selection of resistant populations, refuge systems have been implemented into the agroecosystem. To test the efficacy of these traits and efficiency of various refuge systems on *Helicoverpa zea*, an experiment will be conducted at the Delta Research and Extension Center in Stoneville, Mississippi. A field trial containing three refuge blend scenarios and three solid planting scenarios in field corn will be established in the 2017 growing season. Treatments consist of solid non-Bt, Trecepta, and VT Double Pro plantings. The refuge blends to be planted are 70:30, 80:20, and 90:10. Plots will be allowed to be naturally infested with *Helicoverpa zea*. After the immature zea exit infested ears and enter the soil for pupation, whole corn plants will be removed from the plots. Twenty-five moth emergence traps will be placed within each plot and monitored weekly for adult emergence. This experiment will be replicated four times. All data will be analyzed using SAS 9.4. Additionally, small plot cages will be placed over planting of *Bt* and non-Bt soybeans and cotton. Twenty-Five pairs of *H. zea* moths are to be released two times at peak bloom of both crops. Eggs and larvae will be counted in each treatment to determine ovipositional preference and larval survival.

Management of Rice Water Weevil in Water Conservation Rice Production Systems. R. Kelly, J. Gore, A. Catchot, D. Cook, B. Golden, and J. Krutz.

The rice water weevil, *Lissorhoptrus oryzophilus* (Kuschel), is the most important and economically damaging insect pest of rice globally. Water conservation has become an important issue in Mid-South agriculture over the last decade. Consequently, the biology of numerous Arthropod pests of rice are dependent on flooded conditions. The rice water weevil will only oviposit during flooded culture production. Considerable research efforts are currently aimed at developing water conservation systems for rice production in the Mid-South and research is needed to determine how water management practices impact pest populations. During the summers of 2017 and 2018, studies will be conducted to evaluate the impact of water conservation practices on rice water weevil management; as well as their temporal and spatial distribution in this culture. Results from those experiments will be discussed.

Threshold Refinement and Validation for Soybean Looper (*Chrysodeixis includes*) in Mississippi Soybeans. M. Huff, D. Cook, J. Gore, A. Catchot, F. Musser, and T. Irby.

The soybean looper, *Chrysodeixis includens*, is a major late-season defoliating insect pest of Mississippi soybeans. With over two million acres of soybeans planted in the state last year, proper control of this pest is important to prevent yield losses. Previous research has demonstrated that an economic threshold of 20% defoliation during the reproductive growth stages can prevent economic yield loss. Studies were initiated to determine the relationship between soybean looper densities and percent defoliation. Additional studies were initiated to compare the drop cloth and sweep net sampling methods and develop an equivalency between the two sampling methods. Since their introduction the diamide insecticides have been standards for soybean looper management. In recent years there have been reports of declines in performance of these products from commercial fields and field and laboratory experiments. Studies were conducted to evaluate the performance of diamide insecticides, as well as, alternatives in field experiments against soybean looper.

Ph. D. Student Competition

Crossbreeding *Amblyomma maculatum* group tick populations from distinct geographical regions within the United States. M. Allerdice, A. Snellgrove, J. Hecht, D. Delgado-de la Mora, J. D. Licona-Enriquez, J. Delgado-de la Mora, H. Yaglom, M. Casal, J. Goddard and C. Paddock.

Rickettsia parkeri is an emerging human pathogen transmitted in predominately subtropical regions of the United States by *Amblyomma maculatum*, the Gulf Coast tick. In 2014 and 2015, however, one confirmed and one probable case of *R. parkeri* rickettsiosis were reported from a semi-arid mountainous region in southern Arizona. The ticks involved were identified as *Amblyomma triste*, an ixodid tick species currently included in the *A. maculatum* tick group and considered very closely related to *A. maculatum*. Field studies in 2016 and 2017 revealed several widespread populations of these ticks in southern Arizona, however further analysis of the specimens collected indicates they cannot conclusively be morphologically assigned to either *A. maculatum* or *A. triste*. Recent genetic analyses suggest that these two-tick species are likely one contiguous species. To test this theory biologically, a study was initiated to crossbreed questing adult *Amblyomma* ticks collected in Arizona and Georgia in 2017 to determine their mating success. In addition to the Arizona/Georgia crosses, cohorts of ticks representing pure Arizona and Georgia populations were simultaneously fed on New Zealand White rabbits (*Oryctolagus cuniculus*) for comparison. The ongoing experiment indicates that these two geographically distinct populations of *Amblyomma* ticks willingly mate on rabbits. Preliminary data indicate that while Arizona females feed to repletion approximately 2 days more quickly than Georgia females, there is no significant difference between other measures of survival (feeding success, engorgement weight, preoviposition duration). Future analysis of hatching success, molting success, and fertility and fecundity will more clearly elucidate the taxonomic relationship between these two populations of *Amblyomma* ticks.

Early Season Insect Control Strategies for Winter Cover Crop-Soybean Systems. A. Whalen, A. Catchot, J. Gore, D. Cook, and T. Irby.

In recent years, Mid-South soybean fields planted behind winter cover crops have had increases in early season insect pest issues. Studies were developed to determine how cover crops, cover crop termination timing, and early-season pest control strategies affect insect damage to soybean yield in winter cover crop-soybean systems. Research plots were either planted with a blended cover crop treatment, a wheat cover crop treatment, or left fallow with a natural infestation of winter weeds in the fall periods of 2015 and 2016 in two Mississippi locations. Insect control strategy treatments consisted of a neonicotinoid seed treatment, a pyrethroid termination spray, a combination of the seed treatment and termination spray, an in-furrow insecticide application, a higher seeding rate, and an untreated control. Cover crop termination timings consisted of six, four, and two weeks prior to soybean planting and was accomplished through the use of an herbicidal foliar spray. Soybean plants were harvested at the end of the season and yield recorded.

Everything Gets Hotter When the Sun Goes Down. C. Speights, M. Hodge, and B. Barton.

Understanding the effects of climate change on trophic interactions is important for evaluating community structure in an ecosystem. One climate factor impacting species, global warming, is often studied by elevating a constant or daytime temperature. However, many warming effects are extremely context dependent. For example, in some places nighttime (minimum) temperatures are increasing at a faster rate than daytime (maximum) temperatures. This asymmetric warming could have important implications for ectotherms that have thermal optimums for traits such as survival and reproduction. For example, increasing the minimum temperature could push an organism towards its thermal optimum, thus positively impacting performance. Alternatively, increasing a daily maximum temperature could push an organism past its thermal optimum, thus negatively impacting performance. We investigated the impacts of four different warming regimes on top-down control and predator foraging efficiency using a simple food chain comprised of plants, aphids and lady beetle predators. To evaluate top-down control, plants were grown in 3-liter pots within environmentally controlled chambers. Our experiment crossed temperature regimes (ambient (24°C/14°C), day/night warming (28°C/18°C), day warming (32°C/14°C), and night warming (24°C/22°C)) with food chain length (plants only,

plants and aphids, or plants, aphids, and lady beetles). To evaluate predator foraging efficiency, lady beetles and aphids were placed in individual deli containers inside each chamber. We recorded the number of aphids eaten during the daytime (6:00-18:00) and nighttime (18:00-600). Preliminary data suggest that predators did an effective job of decreasing aphid population growth in warming treatments. Additionally, predator foraging efficiency appears to increase with temperature regardless of time of day. While preliminary, these results demonstrate that the effects of environmental change are context dependent and different outcomes emerge depending on the details of manipulations.

A Survey of Mississippi Mosquitoes' Blood Meal and Malaria Parasites. J. Aycock, J. Goddard, and D. Outlaw.

Malaria (Order Haemosporida), along with many other pathogens, are transmitted to vertebrate hosts through the salivary glands of various mosquito species. Research on these vectors has been far behind that of the parasites and the vertebrate hosts, both of which have seen a resurgence in the last few decades, particularly in linking the relationship between the vertebrate host and the parasite. The purpose of this survey was to determine the vertebrate blood meal of various mosquito species throughout several counties in Mississippi and identify any malaria parasites carried by the mosquito. Of ~27,000 mosquitoes collected in Mississippi in 2013, 90 specimens were engorged with a viable blood meal. Each mosquito was identified and processed for DNA extraction, and three polymerase chain reactions were performed to identify the bloodmeal, the malaria parasite, and any ambiguous Culex spp. This project is the first of its kind in Mississippi and has provided substantial information on the transmission patterns of malaria within mosquitoes.

Caterpillar Pest of Peanut in Mississippi. B. Lipsey, J. Gore, A. Catchot, D. Cook, J. Sarver, and J. Bond.

A complex of defoliating caterpillars commonly infest peanut, *Arachis hypogaea* L., in Mississippi and often require management with foliar insecticide applications. To better understand the complexity of the defoliating complex infesting Mississippi peanut, multiple grower fields across the state were surveyed bi-weekly. Four regions were established with multiple sub-locations within each region to ensure a suitable distribution. Two fields at each sub-location were sampled using two different methods and pests were recorded. The sampling methods included drop cloth and sweep net samples. A total of 100 sweeps and 4 drops were taken at each sub-location. A total of 9 species of were recorded throughout the year. They included bollworm, *Helicoverpa zea* (Boddie); fall armyworm, *Spodoptera frujiperda* (J. E. Smith); yellowstriped armyworm, *Spodoptera ornithogalli* (Guenée); cabbage looper, *Trichoplusia ni* (Hübner); southern armyworm, *Spodoptera eridania* (Stoll); beet armyworm, *Spodoptera exigua* (Hübner); green cloverworm, *Hypena scabra* (Fabricius); velvetbean caterpillar, *Anticarsia gemmatalis* (Hübner); and granulate cutworm, *Feltia subterranean* (Fabricius). Differences in the complex were observed among regions. Granulate cutworms, fall armyworms and velvetbean caterpillars were the most predominate species found using a drop cloth across all regions. Predominate species varied tremendously by region using the sweep net method.

Impact of Early Season Management Decisions on Soybean Yield. J. North, A. Catchot, J. Gore, D. Cook, T. Irby, and J. Orlowski.

Neonicotinoid insecticide seed treatments are currently used in all row crops throughout the Mid-South region of the United States. They are used for their high degree of efficacy on early season pests that occur at the early growth stages of row crops. Recent studies have shown that neonicotinoid insecticide seed treatments showed a value of yield increases as well as positive net returns when utilized in soybeans. Seed treatments are one of several management tools adopted by soybean producers to achieve maximum yields across the Mid-South. A study was conducted to show the effect of stand loss on soybean yield at different plant populations and

timings of plant loss. The treatments in this study included six different soybean plant populations: 185,250; 247,000; 308,750; 370,000; 432,250; 494,000 plants ha-1 and timings of plant loss at V1 and V4. Another study was conducted to maximize soybean yields using plant populations, seed treatments, and planting dates. The treatments in this study included six different soybean plant populations: 185,250; 247,000; 308,750; 370,000; 432,250; 494,000 plants ha-1; three different seed treatments: untreated, base fungicide only, and insecticide + base fungicide; and two different planting dates: Mid-May and Mid-June. Plots were scouted weekly and insecticide applications were applied when insect thresholds were reached. Our findings determined that increasing seeding rates could compensate for stand loss, however, there is a potential risk because higher seeding rates are not as profitable when no stand loss occurs.

General Session

A Push-Pull IPM Strategy for Invasive Ambrosia Beetles in Ornamental Nurseries. C. T. Werle, J. J. Adamczyk, C. M. Ranger, B. J. Sampson and P. B. Schultz.

Exotic ambrosia beetles (Coleoptera: Curculionidae) are important pests in ornamental tree nurseries. While adult females are highly attracted to ethanol-baited traps, they can fly past traps to attack susceptible crops within nurseries. Verbenone is used to deter bark beetle attacks, and has shown promise as an ambrosia beetle deterrent. For these reasons, we tested a peripheral ring of ethanol-baited intercept traps (pull) and verbenone emitters (push) on baited trees at two locations in South Mississippi. Over the course of a month during peak ambrosia beetle activity, numbers of new beetle galleries on baited trees were counted and circled to prevent recounting. Counts of galleries were then normalized and subjected to analysis of variance to determine treatment efficacy for traps, verbenone and the combination of both. Results across two years of field trials in Mississippi revealed traps made a greater impact (16% reduction) on beetle attacks than did verbenone (no reduction). While verbenone appears to be an ineffective push component for a push-pull strategy, there is hope that another product such as kaolin or insecticidal netting can be paired with perimeter traps to yield greater protection of tree crops, and potentially allow for a reduced insecticidal input at ornamental nurseries.

Mississippi Bug Blues – Invasive Awareness, Conservation, and Biodiversity. J. Sanders, J. Hill, and J. Seltzer.

Mississippi Bug Blues is an educational outreach program of the Mississippi Entomological Museum. Established in 2012, this program has since become the state's leader in invasive insect species awareness. Through partnerships with the Starkville Oktibbeha Consolidated School District's award winning YES (Youth Environmental Science) Program, local 4-H Leaders, The Mississippi Department of Wildlife & Fisheries, and other experts within the state's science community, over 15,000 people of all ages are reached each year. Inroads have also been made into educating the public on the insect's role in biodiversity and conservation with invitations to several new events including the Neshoba County Conservation Carnival attended by over 400 5th graders, and the Mississippi Museum of Natural Science's NatureFEST attended by thousands of residents from all over the state. Because of its great success and ever increasing reputation, Mississippi Bug Blues is now looking to expand its audience with a focus in 3 key areas: Establishing a local and nationwide sponsorship program, partnering with Mississippi State University to create customized events and exhibitions, and developing a mobile museum to better serve more school districts and events throughout the state. No matter what opportunities arise, the goal of Mississippi Bug Blues remains constant: To educate the public in innovative and exciting ways that challenges them to view the world around them and the things in it with more curiosity, care, and consideration.

Female Reproductive System Morphology and the Development of a Physiological Age-Grading System for Female *Bagrada hilaris* (Hemiptera: Pentatomidae). M. Grodowitz.

Bagrada hilaris (Burmeister), an invasive stink bug from Africa, India and Asia, first was detected in the U.S. in 2008, and it now can be found in southern and central California, Arizona, southern Nevada, east central Texas, and northern Mexico. It prefers wild and cultivated mustards but also can feed on non-brassicaceous plants like corn and sunflower. The female reproductive system of B. hilaris consists of a pair of ovaries composed of five to seven tubule ovarioles where the follicles develop and mature. The ovarioles can be subdivided into two distinct regions; the distal germarium and the tubule vitellarium. Ovaries are telotrophic wherein nurse cells are housed in the distal germarium. Each ovary connects to the lateral oviduct which then combines into the common oviduct. The continuum of ovarian development was divided into two broad categories; nulliparous and parous. The nulliparous category was divided further into three stages (N1, N2, and N3) based on ovariole differentiation and maturity of the most proximal follicle. The parous category also was divided into three stages (P1, P2, P3) based on follicular relic appearance. Follicular relics are epithelial cells that are shed from the ova during ovulation; they collect at the base of the ovariole. With successive ovulations they compress, resulting in changes in the appearance of the follicular relics. Higher numbers of eggs were associated with the latter parous stages, with an average of 79.2 eggs (+8.5 SE) for the P3 stage compared to 27.1 eggs (+3.5 SE) for the P1 stage.

Recent Additions and Developments in the Mississippi Entomological Museum. R. J. Whitehouse, R. L. Brown, and T. L. Schiefer.

The Mississippi Entomological Museum (MEM) now contains more than 1.8 million insect specimens. In the last five years, the MEM has seen a growth of about 30% annually as a result of field collections and donations. Recent field work has been conducted in the Ouachita Mountains in Arkansas, northeastern Georgia, several states in the Southeast and Southwest, and Panama. The MEM has recently acquired the insect collections from the University of Mississippi and the University of Louisiana Monroe. With these donations came a significant collection of grasshoppers, a substantial collection of Mississippi beetles, and many Lepidoptera, including twelve specimens of the extinct xerces blue butterfly.

Chronic and Hidden Effect of Imidacloprid (Neonicotinoids) on Honey Bees, *Apis mellifera*. Y. C. Zhu, J. Yao, and J. Adamczyk.

Foraging bees, if accidently exposed to insecticide sprays, may fall to the ground in a few minutes, followed by a period of tremor/hyperactivity, paralysis, and eventual death. Sublethal exposure to neonicotinoid insecticides may cause impaired learning, memory loss, disorientation, and loss of coordination and flight ability in honey bees. Insecticidal acute toxicity in honey bees and many other insects is usually assessed by recording 48-hour mortality. However, it is not well described whether bees continue to die after 48 hours. Moreover, it is not clear that surviving bees, after exposed to insecticide spray drift or insecticide residues, are able to return to the hive safely and resume normal flight and foraging activity. To elucidate post-treatment impact of imidacloprid (a widely used foliar insecticide) on honey bees, we simulated field sprays in this study by treating honey bee workers with a modified Potter Spray Tower. Seven concentrations (from residue level to LC75) of an imidacloprid formulation (Advise 2FL) were used to spray seven day old workers. Results showed that survivors from imidacloprid spray treatments walked normally inside cages just as those sprayed with water-only (control). But, the imidacloprid-sprayed survivors could not take off normally compared to the control, even after imidacloprid treatment for 8 days. The data suggested that foraging bees might not be able to return to bee hives if they are accidently exposed to insecticide spray.

Integration of Biological Control and Transgenic Insect Protection for Mitigation of Mycotoxins in Corn. M. Weaver.

Field trials were conducted over two years in two states (MS and TX) to examine the efficacy of biological control of aflatoxin in corn and the interactions with other mycotoxins and transgenic

insect protection. Corn hybrid N78N3111, expressing the Cry 1Ab, Cry3A and Vip3Aa20 insecticidal proteins, was nearly 100 percent free from corn earworm damage and generally≥ 50% as much fumonisin contamination as compared to N78NGT, a near isogenic corn hybrid without insect protection. This insect protection, however, did not significantly prevent aflatoxin contamination. Soil application of non-aflatoxigenic biocontrol strains of *Aspergillus flavus* significantly reduced aflatoxin concentrations in corn. Biocontrol strain 21882 of A. flavus was especially effective, reducing aflatoxin contamination by about 90 percent over the seven field trials. There was no significant interaction between the insect protection and biocontrol treatments. Although no synergies were detected, the reduction of mycotoxins by both strategies supports application of both strategies in tandem. Economic factors external to the cost of the technologies will be a major determinant if the mycotoxin mitigation attained by use of these technologies will have a positive economic benefit.

M. S. Poster Competition

***Trichapion rostrum* (Say) (Brentidae; Apioninae) infestation of *Baptisia alba* (L.) Vent.. R. J. Whitehouse.**

A population of *Baptisia alba* (Fabaceae) (White Wild Indigo) in Oktibbeha County, Mississippi was found with a heavy infestation of brentid weevils identified as *Trichapion rostrum* (Say). The weevils were observed in high numbers ovipositing on the plants on the side of the road. Forty-nine seed pods were collected and held for maturation of the weevils. After two months, the seed pods were opened and 94 larvae, 61 pupae and 138 adults were collected. 100% of the pods were infested, and a majority of the seeds the pods showed heavy feeding damage and were unlikely to be able to germinate.

Ph. D. Poster Competition

Sugarcane aphid, *Melanaphis sacchari* and Grain Sorghum: Implications for Honeybees, *Apis mellifera*. W. Crow, A. Catchot, J. Gore, S. Stewart, and S. Steckel.

This paper will address honeybee, *Apis mellifera* populations at various grain sorghum growth stages with ranging amounts of sugarcane aphid, *Melanaphis sacchari* honeydew. In addition, this paper will also focus on the insecticidal uptake of seed treatments for the control of sugarcane aphids in grain sorghum pollen sources.

Factors Affecting Foraging Honey Bee Exposure to Neonicotinoid Seed Treatments in Midsouthern U.S. Cotton Fields. A. Whalen, J. Gore, A. Catchot, S. Stewart, G. Lorenz, D. Cook, F. Musser, J. Harris, N. Krishnan, and J. Adamczyk.

There have been recent reports of declining honey bee populations around the world. One suspected cause is the widespread use of pesticides in agriculture. Foraging honey bees can utilize agronomic crops as both pollen and nectar sources. Honey bees have been reported foraging on cotton nectar from extra-floral nectaries during vegetative growth and from floral nectaries during reproductive growth. Experiments were conducted to examine potential exposure routes of neonicotinoid seed treatments to honey bees in Midsouthern U.S. cotton fields. Neonicotinoid seed treatment compounds were studied to determine the rate at which they diminish in crop tissue during cotton development. Tissue samples were collected during plant development from the newest growth on the plant and analyzed for neonicotinoid compounds from seed treatments applied before planting. There was a considerable reduction in neonicotinoid compounds from seed treatments found in plant tissue during development. Little to no neonicotinoid compounds were found in cotton tissue from samples taken at the start of reproductive growth. Another area of research included the observation of honey bee foraging activity in Midsouthern U.S. cotton fields. Cotton fields were scouted for foraging honey bees at three-time intervals during the day in both vegetative and flowering cotton. More honey bees were observed in flowering cotton than in vegetative cotton, and more honey bees were observed

foraging in vegetative cotton during the mid-day than in other times during the day. There were no differences in honey bee foraging behavior for different times of day for flowering cotton. Therefore, foraging honey bees in the Midsouthern U.S. are not exposed to high concentrations of neonicotinoids from seed treatments through cotton pollen or nectar. Although nectar available during reproductive growth could potentially contain neonicotinoid compounds from seed treatments, foraging activity is not as prevalent at that stage of cotton development than during reproductive growth stages.

General Session Posters

First Confirmed Case of a Fungal Epizootic Infecting Wild Populations of Spotted Wing Drosophila, *Drosophila suzukii*. B. Sampson, B. Smith, M. Butler, T. Mann, B. Layton, R. Cowles, D. Li, S. Dara, and J. Adamczyk.

We report on the first confirmed case of a fungal (*Entomophthora spp*.) epizootic on wild spotted wing Drosophila (SWD), *Drosophila suzukii* (Matsumura), populations visiting fig trees in Central Mississippi. Host behavior is typical of other fly hosts infected with *Entomophthora*; flies seek high spots in moist and dark microhabitats. Infection may be further enhanced when males copulate with diseased female SWD. The unusually cool and rainy June in Mississippi may have spurred this epizootic, providing some hope that this disease could be exploited to control SWD during the summer months.

A List of Ants (Hymenoptera: Formicidae) Collected During the 2017 William H. Cross Expedition to the Ouachita Mountains of Arkansas with New State Records. J. A. MacGown, S. Wang, J. G. Hill, and R. J. Whitehouse

The 2017 William H. Cross Expedition, an annual collecting trip conducted by the Mississippi Entomological Museum, was held from 19 to 24 June 2017 at the Ouachita Mountains Biological Station (OMBS) in Polk County, Arkansas. We focused our collecting efforts on the mountainous Ouachita Mountains Biological Station, but we also collected at various sites within the Ouachita National Forest, at Queen Wilhelmina State Park, Big Fork Creek Natural Area, and Stone Road Glade Natural Area. During a five-day period, we collected 63 species of ants, including six species not previously reported for Arkansas: *Brachyponera chinensis* (Emery), *Hypoponera inexorata* (Wheeler), *Strumigenys angulata* Smith, *Strumigenys creightoni* Smith, *Syscia augustae* Wheeler, and *Temnothorax longispinosus* (Roger).

Revision of Gymnoscirtetes (Orthoptera: Acrididae: Melanoplinae): A Genus Endemic to the Southeastern Coastal Plain. J. G. Hill

The genus *Gymnoscirtetes* (Orthoptera: Acrididae) is endemic to the Coastal Plain of southeastern United States where it is restricted to Florida, central and southern Georgia, and extreme southeastern Alabama. Two species (*Gymnoscirtetes pusillus* Scudder and *Gymnoscirtetes morsei* Hebard) have been assigned to this genus. Over most of the range, these tiny, slender grasshoppers are inhabitants of flatwoods, and borders of bayhead, bog, hydric hammocks, swamps; though, occasionally they can be found in sandhills. Given the growing interest in the biodiversity of the North American Coastal Plain, and the recent classification of the region as a biodiversity hotspot, *Gymnoscirtetes*, a genus endemic to the region was selected for revision. Based on morphological features of the males, Gymnoscirtetes easily divides into two distinct species groups. The *Morsei* group contains *G. morsei* and one new species, and the *Pusillus* group contains *G. pusillus* and three new species.

Mississippi Bug Blues – Invasive Awareness, Conservation, and Biodiversity. J. Sanders, J. G. Hill, and J. Seltzer.

Mississippi Bug Blues is an educational outreach program of the Mississippi Entomological Museum. Established in 2012, this program has since become the state's leader in invasive

insect species awareness. Through partnerships with the Starkville Oktibbeha Consolidated School District's award-winning YES (Youth Environmental Science) Program, local 4-H Leaders, The Mississippi Department of Wildlife & Fisheries, and other experts within the state's science community, over 15,000 people of all ages are reached each year. Inroads have also been made into educating the public on the insect's role in biodiversity and conservation with invitations to several new events including the Neshoba County Conservation Carnival attended by over 400 5th graders, and the Mississippi Museum of Natural Science's NatureFEST attended by thousands of residents from all over the state. Because of its great success and ever-increasing reputation, Mississippi Bug Blues is now looking to expand its audience with a focus in 3 key areas: Establishing a local and nationwide sponsorship program, partnering with Mississippi State University to create customized events and exhibitions, and developing a mobile museum to better serve more school districts and events throughout the state. No matter what opportunities arise, the goal of Mississippi Bug Blues remains constant: To educate the public in innovative and exciting ways that challenges them to view the world around them and the things in it with more curiosity, care, and consideration.

Results from the Regional Identification Center of the USDA-APHIS (Raleigh Hub) for the 2016-2017 Wood Boring Beetle Surveys, Including New State and County Records. J. L. Seltzer, T. L. Schiefer, and R. L. Brown.

The Mississippi Entomological Museum (MEM) serves as a Screening and Identification Center for the USDA-APHIS (Raleigh Hub), funded annually through the USDA Farm Bill. The Screening and Identification Center provides screening and identification services for state run Cooperative Agricultural Pest Surveys (CAPS) programs and USDA exotic pest surveys for the past ten years. During the 2016-2017 trapping year, samples were received from Alabama, Georgia, Kentucky, Mississippi, Tennessee, North Carolina, and South Carolina. These included Lindgren Funnel trap samples run for exotic wood borers/bark beetles and *Sirex* Woodwasps, pheromone traps for a wide range of Lepidopteran pests, and hand collected samples of suspect insects. A total of 8572 samples were submitted for screening and identification between July 1, 2016 and June 30, 2017, of these 4027 samples were for exotic bark beetles. Results from screening these 4027 exotic bark beetle samples are reported in this poster.

Diet Overlaid Bioassay for Monitoring Resistance Levels in Tarnished Plant Bug. M. Portilla, and R. Luttrell.

A laboratory diet bioassay was developed using a laboratory susceptible population of the tarnished plan bug, *Lygus lineolaris* (Palisot de Beauvois), as a potential new tool to study susceptibility of this insect to neonicotinoid, sulfoxamine, organophosphate, and pyrethroid insecticides (thiamethoxam, sulfoxaflor, acephate, and permethrin, respectively). The diet bioassay was compared to the traditional glass-vial. The new bioassay determined LC50 values by feeding adult tarnished plant bugs known doses of the insecticides overlaid on diet in a 10% solution of honey water for sulfoxaflor and 10% acetone in water solutions for permethrin, acephate, and thiamethoxam. Eleven experimental repetitions used Fn even-aged (1-2 d old) mixed sex insects obtained as eggs from separate cohorts (2000 adults) from a laboratory colony established from A. Cohen at MSU and maintained at ARS-USDA since 1998 were evaluated. Both diet overlaid and glass-vial bioassays used dose-response (mortality) regression lines to calculate LC50 values for each insecticide at 0 d, 1 d, 2 d, and 3 d after exposure. Results indicated that glass-vial bioassay exhibited higher variability in susceptibility among replications to permethrin, sulfoxaflor, and thiamethoxam than that of diet overlaid bioassay at all times of evaluation. Lower variability in susceptibility to acephate was observed among replications in glass-vial that it was in diet overlaid assays. The baseline data for both bioassays provide a basis for comparison to determine changes in resistance in future monitoring studies.