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EL TROPICANO RIVERWALK HOTEL
SAN ANTONIO, TX

Student Oral Competition

Bachelor's

1-1. Comparison of boll injury, boll rot, and yield loss caused by two species of a boll-feeding sucking bug complex (Hemiptera: Miridae and Pentatomidae) on South Texas cotton

James P. Glover[1], Charlene Farias[2], Darwin J. Anderson[1] and Michael J. Brewer[3], [1]Texas A&M AgriLife Research and Extension Center, Corpus Christi, TX, [2]Texas A&M AgriLife Extension Service, Corpus Christi, TX, [3]Texas A&M Univ., Corpus Christi, TX

Caged field experiments were conducted to characterize the damage of South Texas coastal cotton from a species complex of boll-feeding sucking bugs, represented by one plant bug species (*Creontiades signatus*) and one stink bug species (*Nezara viridula*). Boll response to feeding injury from verde plant bug and southern green stink bug results in external and internal damage in the form of warts, galls, lint deterioration, and rot. Individual first position 3 day old bolls (11mm) and 5 day old bolls (17mm) were infested with each species separately, one insect per boll, for 3 days then terminated with pyrethrin insecticide. Groups of 20-30 verde plant bug and green stink bugs were caged and the test was replicated three times, along with the same number of uninfested controls. Bolls were rated at harvest on a 0 to 4 scale, corresponding to the number of damaged locules. Boll feeding by verde plant bug was concentrated on younger 3 day old bolls while older bolls were favored by southern green stink bug. Yield loss from southern green stink bug was equal to or greater then yield loss from verde plant bug. Frequency of rot vectored by southern green stink bug was significantly higher in 5 day old bolls than 3 day old bolls. Several implications of this work on detection protocols and economic thresholds for this species complex will be discussed.

1-2. Feeding ability of *Zelus tetracanthus* (Hemiptera: Reduviidae) on invasive saltcedar beetles (*Diorhabda carinulata*)

Samantha Kaiser, Beth Ferguson and J. Sunny Evans, Oklahoma State Univ., Stillwater, OK

Saltcedar, *Tamerisk* spp., is an invasive plant species introduced to the United States as an ornamental. Saltcedar spread and out-competed native plant species. A biological control agent, *Diorhabda carinulata* (saltcedar beetle), feeds on saltcedar, eventually killing the plant and limiting its movement further into the United States. The beetle is moving into Oklahoma and its impacts on the native insect populations need to be determined. The ability of a native assassin bug, *Zelus tetracanthus*, to consume the saltcedar beetle was studied. Colonies of *Z. tetracanthus* and *D. carinulata* were established in the lab. Trials incorporated 10 replications of the following combinations of the immature stages of both species: three *D. carinulata* instars were fed to five *Z. tetracanthus* instars. *Zelus tetracanthus* were fed fruit flies, then starved 24 hours prior to use in the study. Each instar of *Z. tetracanthus* was given one of the three *D. carinulata* instars. Fruit flies were used for the controls. *Zelus tetracanthus* were allowed to feed for 24 hours and then predation was recorded by counting dead *D. carinulata* larvae. All five instars of *Z. tetracanthus* were capable of consuming first instar *D. carinulata*, only 3rd through 5th instar *Z. tetracanthus* fed on second instar *D. carinulata*, and a majority of 4th and all 5th instar *Z. tetracanthus* fed on third instar *D. carinulata*, Results suggested that the size of the predator and prey determined the capability of *Z. tetracanthus* to feed on *D. carinulata* larvae.

1-3. Sexual behavior of the resurgent Turkestan cockroach, *Blatta lateralis* (Blattodea: Blattidae)

Manda Sechler, and Alvaro Romero, New Mexico State Univ., Las Cruces, NM

The Turkestan cockroach, *Blatta lateralis* (Walker) is a peridomestic urban pest that has resurged in the Southwestern United States. Despite the high prevalence of this cockroach in urban and rural areas, there is little information on their biology and behavior. A video tracking software was used to characterize sexual behavior of this species. Virgin adult females exhibit a characteristic calling posture in which the female stretches her hind legs and rubs 3 thoracic segments against a surface several times. The male recognizes the female by "smelling" her body and antennae with his antennae. After touching the female, the male raises his wings and female mounts the male under his wings. Then, the male steps back under the female and mating occurs. Female and male turn around and remain attached facing opposite directions. Calling occurred in both scotophase and photophase. The onset of calling activity in the scotophase commenced soon after lights-off and females remained calling for several hours before increasing this activity in the transition between light and dark. We hypothesize that calling behavior serves to attract males from a distance as well as to potentiate responses to putative contact sex pheromones.

1-4. Exploration of the bacterial community of three putative palm phytoplasma vectors

Chris M. Powell[1], Susan Halbert[2] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

Texas Phoenix Palm Decline (TPPD) and Lethal Yellowing (LY) are two phytoplasma-linked disease in palm. Phytoplasma causing these

disease are thought to be transmitted by three putative planthopper vectors. These insects have been morphologically and molecularly described, and have screened positive for the phytoplasma in question. These samples were subjected to 16S bacterial community sequencing using the Roche 454 platform. This provides new information regarding the bacterial community, present in putative vectors.

Ph.D.

1-5. Monitoring and management of *Culicoides* spp. (Diptera: Ceratopogonidae) in Texas white-tailed deer production facilities

Cassie A. Schoenthal, and Roger E. Gold, Texas A&M Univ., College Station, TX

The biting midge, *Culicoides* spp. (Diptera: Ceratopogonidae), is an important ectoparasite disturbing white-tailed deer (*Odocoileus virginianus*) populations in Texas. Biting midges are vectors of pathogens that cause epizootic hemorrhagic disease (EHD) and Bluetongue (BTV). These diseases are easily recognized and feared by white-tailed deer producers, yet there is limited literature on biting midge management. The hunting of white-tailed deer in Texas is a continuously growing industry with an estimated annual economic value of over $3 billion. The effective management of production animals is imperative to being competitive in this rising agriculture field. The aim of this study consists of estimating the number of *Culicoides* spp. on 24 deer farms over a two year period and sampling *Culicoides* spp. to determine virus serotype carried. Parameters include the farm location and weather. Preliminary data has shown that *Culicoides* spp. are active in the months of March to May and show the highest occurrence in August through October. Farm locations with the largest number of *Culicoides* spp. present are typically located near water sources. The relationship between biting

midges sampled and the number of diseased deer in the area will be an important statistic, leading to the development of insect management practices on deer production facilities. Health is a critical factor in successfully raising white-tailed deer, and it is becoming more evident to deer producers that insect control is the key.

Master's

2-1. Identification and manipulation of natural enemies of key arthropod pests in Oklahoma vineyards

Shane McMurry, Oklahoma State Univ., Stillwater, OK

Effective pest management in viticulture is important because wine production is an increasingly valuable industry in Oklahoma. Besides direct feeding damage, some pests are vectors for Pierce's disease, an economically destructive pathogen of grapes. However, there are problems associated with current overreliance on pesticides including: potential for environmental contamination, development of resistant pest populations, and reduction of important natural enemy populations. Integrated pest management (IPM) strategies include conservation of natural enemies (predators and parasitoids) via reduced chemical inputs and incorporation of plants between vine rows that serve as habitat and pollen/nectar sources for adult natural enemies. This study has two primary objectives. First, we aim to identify the arthropod predator and parasitoid fauna in Oklahoma vineyards using sticky cards and vacuum sampling at three chemical management intensities ranging from organic to conventional production. Our second objective is to manipulate the diversity and abundance of natural enemies using native plants between rows. We compared parasitoid abundance and diversity in response to three treatments of between-row plantings: 1) native flowering perennials, including *Monarda punctata*, *Asclepias tuberosa*, and *Coreopsis*

lanceolata; 2) native upright grass, *Pennisetum villosum*; and 3) pre-existing bermudagrass as a control. We hypothesize that the conventionally managed vineyard will have the lowest diversity and abundance of natural enemies while the organic vineyard will have the highest. We also expect to see more natural enemies in the flowering plant treatment compared to the upright grass treatment and bermudagrass control.

2-2. Grasshopper (Orthoptera: Acrididae) relative abundance and density: a comparison between standard and novel methods of sampling

Kenneth E. Masloski[1], Carmen Greenwood[2], Michael Reiskind[3] and Mark Payton[1], [1]Oklahoma State Univ., Stillwater, OK, [2]Murray State Univ., Murray, KY, [3]North Carolina State Univ., Raleigh, NC

Grasshoppers are an important part of the grassland ecosystem, greatly contributing to nutrient cycling and serving as prey items for small mammals, birds, and other arthropods. They may also be destructive pests, so extensive studies regarding the sampling of these insects have been performed resulting in the usage of sweep nets and density rings as standard methods of grasshopper detection. The goal of this study was to develop a novel method of sampling (called BAMN) that could simultaneously estimate relative abundance and density and compare its results to the two standard methods of grasshopper sampling on the Beaver River Wildlife Management area in Beaver County, Oklahoma. The relative abundance from the BAMN method of the 8 most abundant taxa were compared with those from the sweep net method and tested for significant differences ($p < 0.05$). The rate of grasshoppers caught from the BAMN method was compared with the density observed in the density ring method and tested for similar patterns of significance across four vegetation types ($p < 0.05$). Pearson correlation coefficients were also calculated for the rate of grasshoppers caught and the density of grasshoppers

observed. The rate was positively correlated with the density ($p < 0.05$), though no strong comparisons between relative abundance estimates or rate and density could be made. Grasshopper species composition observed from both sampling methods will also be presented.

2-3. A taxonomic and ecological survey study of solifuge species within Big Bend National Park, Texas. (Class Arachnida: Order Solifugae)

David Footle, Texas A&M AgriLife Research, Bushland, TX

Solifuges (Order Solifugae) belong to an understudied order of arachnids that reside in arid habitats throughout the world. Two families of solifuges have representative species that can be found in North America. A survey study of solifuge species was conducted during 2011 and 2012 within Big Bend National Park, Texas, U.S.A.; a national park containing part of the northern reaches of the Chihuahuan Desert. Solifuge specimens were collected using pitfall traps set up in arrays of 5 traps each, in 20 different locations throughout the park. Traps were set and filled with low-toxicity, propylene glycol based, antifreeze as a preserving and killing solution; and arrays included drift fencing between the traps and wooden covers to prevent large organism bi-catch and/or tampering. The traps were left open and running from May through October 2011 and again from March through October of 2012. Traps were checked and reset with fresh antifreeze each month during the two field seasons, and any specimens caught were collected for identification, sorting, and analysis. Ecological data for the trap arrays locations were collected including elevation, soil type, temporal data, and average temperature for regions of the park. Species richness and diversity will be analyzed as well as those ecological factors tested for effects on species presence. Species distribution maps will also be

created. This survey study will act to help lay the groundwork for any further study into the species of solifuges found in this region.

2-4. Unusual ovipositional behavior of the painted bug, *Bagrada hilaris* (Hemiptera: Heteroptera: Pentatomidae)

Melise Taylor and C. Scott Bundy, New Mexico State Univ., Las Cruces, NM

The painted bug, *Bagrada hilaris* (Bermeister) (Hemiptera: Heteroptera: Pentatomidae) is an Old World pest recently established in North America. Literature on the ovipositional behavior of *B. hilaris* is limited and variable. As part of a study on the seasonal biology of *B. hilaris* in New Mexico we observed unusual egg laying behavior in the laboratory: a female bug was seen pushing her abdomen into the soil and moving in a way to suggest that an egg was deposited and subsequently covered. Therefore, a detailed study on this behavior was initiated. Field-collected *B. hilaris* females (1-5 adults, each event) were placed in an ovipositional arena consisting of a cookie sheet (235mm x 350mm x 15mm) filled with ≈1 liter of non-homogenized soil. Behaviors were recorded with a Sony CX380 digital video recorder and later reviewed and time periods of all behaviors documented using the internal time stamp. Markers were placed at each event location. A total of 24 females were recorded resulting in documenting 116 complete egg-laying events. Since eggs were deposited beneath the soil, the exact moment of egg deposition could not be observed directly. Therefore, a series of videos were taken in which the ovipositional behavior was interrupted at one of four distinct periods (beginning and middle of stationary and egg deposition phases, respectively) to specifically determine when eggs were deposited. Distinct phases of ovipositional behavior were identified and described. To our understanding this is the first report of egg covering behavior observed in a stink bug.

2-5. Effects of acclimation temperature on the critical thermal limits of the tawny crazy ant (*Nylanderia fulva*)

Lance Umlang[1], Danny L. McDonald[2] and Jerry L. Cook[1], [1]Sam Houston State Univ., Huntsville, TX, [2]Texas A&M Univ., College Station, TX

Temperature can be considered among the most pervasive abiotic factors contributing to the success of invasive species due to its direct effects on the biochemical processes of organisms. Data concerning the influence of changing temperature on such physiological parameters can be useful for predicting future range distributions of an invading species such as the tawny crazy ant (*Nylanderia* fulva), however such data are unavailable at present. Critical thermal (CT) maxima (CTMax) and critical thermal minima (CTMin) were determined for workers of the tawny crazy ant, *Nylanderia fulva*. Ants used for CT testing were taken from polygynous colonies collected from three locations in southeastern Texas. CT testing was performed following seven day acclimation periods at one of six randomly assigned experimental temperatures: 10, 15, 20, 25, 30 and 35^{o}C. Analysis of the mean CT values recorded for ants from all three locations revealed significant changes in magnitude across the range of experimental acclimation temperatures used during both CTMax and CTMin tests. Average CT values ranged from approximately 49.2 – 50.7^{o}C (CTMax) and 4.9 – 5.2^{o}C (CTMin) across the three *N. fulva* populations. A significant interaction effect was also observed between the location tested and the acclimation temperature used for both CTMax and CTMin testing. The data collected during this study are among the first reported for the tawny crazy ant in the United States and represent valuable progress towards further understanding of the physiological tolerances of this invasive species.

2-6. Degree day requirements for the development of *Bactericera cockerelli* (Hemiptera: Triozidae) from South Texas

Milo Lewis[1], Kevin Heinz[1], Elizabeth Pierson[1] and Jerry Michels[2], [1]Texas A&M Univ., College Station, TX, [2]Texas A&M Univ., Bushland, TX

Zebra chip (ZC) is a wide-spread disease of potatoes (*Solanum tuberosom*) putatively caused by the bacteria '*Candidatus* Liberabacter solanacerum,' which is vectored by the tomato/ potato psyllid (TPP) (*Bactericera cockerelli).* Current management of ZC relies on multiple calendar applications of insecticides with up to an average of 9.5 insecticide applications per growing season in some states. Also, a growing body of evidence suggests that TPP are developing a resistance to some insecticides. In response to these concerns, we develop a degree-day (DD) model based on constant temperature studies, a linear model, and a non-linear model in order to create a tool which will allow growers to predict within field peaks of TPP and thus, reduce and better time insecticide applications around the predicted peaks of TPP. Field validation of the preliminary DD model indicates that we are able to predict the second within field peak of TPP with 55% accuracy by using the first within field peak as a biofix. The rate of successful prediction may be improved by completing constant temperature studies and by testing high and low temperature thresholds given by different methods of estimation.

2-7. Computational prediction of miRNA regulation in Asian citrus psyllid (*Diaphorina citri*) life stages

Juan Macias-Velasco[1], Ginny Soong[2], Wayne B. Hunter[3] and Blake R. Bextine[2], [1]The Univ. of Texas Health Science Center at Tyler, Tyler, TX, [2]Univ. of Texas at Tyler, Tyler, TX, [3]USDA, Agricultural Research Service, Ft. Pierce, FL

MicroRNAs (miRNA) are small RNA molecules involved in the post-transcriptional regulation mechanism, RNA interference (RNAi). Unlike other small RNAs such as small interfering RNA's (siRNA), miRNAs are encoded in genomes. Itis theorized that miRNAs play a key role in developmental regulation. The targets of 132 mature miRNAs in transcriptomes of three Asian citrus psyllid (Diaphorina citri) life stages wereextrapolated using the miRanda algorithm. The predicted targets were then identified using BLAST2GO annotation. miRNAs appear to show life stage activity; implying variable importance of miRNAs. Predicted miRNA targeting is broad. Many potential targets for pest-management purposes have been found.

2-8. Detection and molecular characterization of phytoplasma in palm and insect host species in Texas and Florida

Lauren Lambeth[1], Susan Halbert[2] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

Agricultural and ornamental palm tree species in both Florida and Texas contribute significantly to the economic industry of both states. Threatening a variety of important palms species, Lethal Yellow (LY) and Texas Phoenix Palm Decline (TPPD) are emerging lethal diseases that affect several palm tree species in Florida; whereas TPPD currently affects only species in Texas. Both of the casual agents are classified as symbiotic phytoplasmic bacteria that are difficult to

detect due to the lack of a cell wall, rendering them unculturable. These pathogens are transmitted to naïve plant hosts by phloem feeding insect vectors. There are two possible insect suspects; leafhoppers (Cicadellidae) and planthoppers (Fulgoridae). From these there have been three potential suspects in Florida and Texas; Cixiidae (*Haplaxius crudus* which has been confirmed as a positive for LY and negative for TPPD), Flatidae (*Ormenaria rufifascia*), and Derbidae (*Omolicna* sp.). In most locations where these pathogens occur the vector complex has not yet been identified, thus management of this disease is difficult. In this study, 18 symptomatic palm core samples from Florida were obtained and 470 corresponding insect samples were collected and placed on an artificial feeding media (feeding sachet). Symptomatic palm core samples were also obtained from several Southern Texas locations. Phytoplasma presence was investigated in the all of the core samples, insect samples, and feeding sachets using the traditional Nested PCR method. In addition to this, a Real-time PCR approach using EvaGreen was designed to create a rapid technique for phytoplasma detection.

Student Poster Competition

Bachelor's

P1-1. Analyzing the diet of the Texas Field Cricket using lab and field based approaches (Orthoptera: Gryllidae: *Gryllus texensis*)

Kerstin Alander[1], Rebecca Clark[2] and Spence Behmer[2], [1]Texas A&M Univ., Bryan, TX, [2]Texas A&M Univ., TX

Although crickets (Gryllidae) are typically considered omnivores, little research has investigated the exact content of their diet. In a similar species, dietary preferences were shown to be tied to trade-offs between fecundity and flight in lab-reared, female morphs: short-

winged, flight-incapable (SW) females with heightened egg production preferred a protein-based diet, while long-winged, flight-capable (LW) females preferred a carbohydrate-rich diet. To discover the composition of the diet of both males and females in the wild, crop contents of wild caught *Gryllus texensis* (*n*=12) were examined and contents identified as either plant, animal, or "other" (detritus). Gut contents of *G. texensis* indicated a majority preference for plants, with 7/12 having only plant matter, 3/12 with both animal and plant; one with animal only; and one with detritus. To determine how *G. texensis* females and males regulate nutrient intake, a laboratory diet preference "choice" test was performed: *G. texensis* (*n*=87) were placed in cages and allowed to select between protein- and carbohydrate-biased food dishes. After 5 days, crickets were re-weighed and the amount of diet consumed was measured. Males of both morphs selected carbohydrate-rich diets, while females made variable feeding choices. *G. texensis* is a primarily plant-feeding, opportunistic omnivore that regulates nutrient intake based on behavioral needs. Dietary preferences cannot be determined simply based on family-level generalizations (Gryllidae); factors like sex and morph need to be considered, too.

P1-2. Field trial of entomopathogenic fungi against Asian Citrus Psyllid (*Diaphorina citri*) in General Terán, Nuevo León, Mexico

Jose Rodriguez-Contreras[1], Fernando Sanchez-Pedraza[1], Celso Morales-Reyes[1], José I. Lopez-Arroyo[2] and Sergio Sanchez-Peña[1], [1]Universidad Autonoma Agraria Antonio Narro, Saltillo, Mexico, [2]Campo Experimental General Terán, INIFAP, General Terán, Nuevo León, Mexico

The Asian citrus psyllid (ACP) *Diaphorina citri* (Hemiptera: Liviidae) is a worldwide citrus pest; it is the main vector of the bacterium *Liberibacter* that causes Citrus Greening Disease. The dispersion of this vector throughout the world and its high populations, limited ability to control with conventional pesticides.

An alternative is biocontrol with entomopathogenic fungi. A field application of three fungal species (spores/ml), *Isaria fumosorosea* ($1.2X10^8$), *Metarhizium brunneum* ($1.6X10^8$), *Beauveria bassiana* ($1.3X10^8$) and a mix of the three fungi ($1.4X10^8$) (Ascomycota: Hypocreales) were tested and ACP adult mortality was compared. Fungi were applied in citrus orchards (*Citrus sinensis* var. Valencia) at General Terán, Nuevo León, Mexico. Fungi were cultivated on agar; conidia were suspended in water + 0.05% surfactant (Bionex™). Two fine mesh cages with 20 ACP adults were placed over shoots [one on the north and one on the south side of trees (13 trees/fungus)]. Fungi were sprayed inside cages**.** Corrected mortality values were: *B. bassiana* (40%), *M. brunneum* (27%), *I. fumosorosea* (27%) and the mix of three fungi (42%); all fungal treatment values are different from the control and non-different among fungi (ANOVA, $p<0.05$). Fungi may be a potential to become a tool in an ACP IPM program.

P1-3. Morphological description of *Monoctenus sanchezi* male (Hymenoptera: Diprionidae)

Salvador Ordaz[1], Gabriel Gallegos[1], Sergio Sanchez[1], Rebeca Gonzalez[1], Jeronimo Landeros[1] and Macotulio Soto[2], [1]Universidad Autonoma Agraria Antonio Narro, Saltillo, Mexico, [2]Instituto de Ecología A. C., Xalapa, Mexico

The male of the sawfly *Monoctenus sanchezi* Smith (Hymenoptera: Diprionidae) is a harmful species on *Juniperus flaccida* trees at Sierra de Alvarez, San Luis Potosi. This insect was described based on morphological characters of body and genitalia from one of the few males found in Mexico. Adult males were collected at Sierra de Alvarez during August and September 2012. The collection area is located in 22º 12' 08.1" LN and 100º 37' 45.9" LW and 1820 meters. Collected males were preserved in ethanol 90%. The whole insect body was photographed. Photographs were taken with an Olympus

SZ51 dissecting microscope and a compound microscope Carl Zeiss Primo Star.

P1-4. The effectiveness of different primer sets on detecting the presence *Trypnosoma cruzi* in *Triatoma gerstaeckeri*

Ashley Greenlee[1], Chissa-Louise Rivaldi[1], Blake R. Bextine[1], G. Schuster[2] and Scott Henke[2], [1]Univ. of Texas at Tyler, Tyler, TX, [2]Texas A&M Kingsville, Kingsville, TX

Kissing bugs (Family: *Reduviidae,* Subfamily: *Triatominae*) are Hemipteran insect pests and serve as a reservoir for the protozoan parasite, *Trypanosoma cruzi*, that causes Chagas disease. Chagas disease can be life threatening to the cardiac system and GI tract. Many *Triatoma* species are found across North, Central and South America. However, the ones associated with *T. cruzi*, were located in South America, Mexico, and Texas. The samples used in this study were collected in southwestern Texas and were all *Triatoma gerstaeckeri*. Presence of *T. cruzi* was determined and the effectiveness of different primer sets was determined. Three different primer sets (18s, glutathione peroxidase, and 67/34) were used. All samples were extracted using the cTAB method and appropriate PCR protocol per primer set. Preliminary results thus far conclude that one primer set may give a positive result, but another set will give a negative result on that same sample. Since there is no vaccine for Chagas disease, vector control and blood screenings are the best methods to lessen the incidence. Accurate representation of *T. cruzi* in *Triatoma* can be of assistance to vector control.

P1-5. Movement of entomopathogenic nematodes (*Heterorhabditis* spp. and *Steinernema carpocapsae*) in non-sterile substrate under laboratory conditions

Antonio Padilla, Luis Rojas, Fausto Ortiz, Gerardo Franco, Gregorio Estrada, Yuliana Anzures and Sergio Sanchez-Peña, Universidad Autonoma Agraria Antonio Narro, Saltillo, Mexico

Entomopathogenic nematodes are an alternative for biocontrol of insects due to their broad host range and their ability to search for insects. These nematodes enter their symbiotic bacteria in hosts which kills hosts by causing septicemia within 48 hrs. In this experiment we evaluated the movement in moist paper and soil, of infective juveniles of three species of entomopathogenic nematodes: commercial strains of *Heterorhabditis bacteriophora* and *Steinernema carpocapsae* (from Koppert Ltd.) and one native strain (*Heterorhabditis* nr. *marelatus*, from Saltillo, Mexico). Plastic ducts (120 x 1 cm x 4 mm deep) were filled with moistened paper or soil. Approximately 1000 nematodes were placed into duct and movement was evaluated at 48, 72 and 96 h. On non-sterile moist soil and commercial *H. bacteriophora*, 26% juveniles moved 20 cm, 5.8% moved 25 cm (48 h), 9.16 % moved 62 cm (72 h) and 14.16 % moved 71 cm (96 h); and for commercial *S. carpocapsae*, juveniles moved only 15 cm (48h). For native *H.* nr. *marelatus*, 30% moved 30 cm, and 7% of juveniles moved 80 cm on moist paper (72 h). Movement capability is an important parameter to be tested before use of nematodes in insect biocontrol.

P1-6. Detection of phytoplasma in plant and insect hosts causing Lethal Yellow and Texas Phoenix Palm Decline in Florida

Mikayla Adkison[1], Lauren Lambeth[1], Susan Halbert[2] and Blake R. Bextine[1], [1]Univ. of Texas, Tyler, TX, [2]Florida Dept. of Agriculture and Consumer Services, Gainesville, FL

Lethal Yellow (LY) and Texas Phoenix Palm Decline (TPPD) are two different phytoplasmic diseases that have severely impacted the agricultural and ornamental palm species in Florida. Phytoplasma are cell wall-less bacteria that are transmitted to naïve plant hosts via phloem feeding insects such as leafhoppers (Cicadellidae) and planthoppers (Fulgoridae). From these there have been several possible insect vectors in Florida such as *Haplaxius crudus* (Cixiidae), *Ormenaria rufifascia* (Flatidae), and *Omolicna sp.* (Derbidae). In most places where these pathogens occur the vector complex has not yet been identified due to the difficulties of isolating phytoplasma DNA. Because of its low abundance in plants and its phloem-limited location, management of this disease is extremely challenging. In this study, 18 symptomatic palm core samples from Florida were collected and DNA extracted using DNEasy plant kits. Insect samples were obtained from several corresponding symptomatic palms resulting in a total of 470 insects. DNA was extracted using CTAB extraction protocol and followed by Nested PCR employing LY group-specific 16S rRNA primer pair LY16Sf2/LY16-23Sr2, then visualized on agarose gels. Phytoplasma presence was confirmed in a total of 13 core samples and 23 insects: seven *Haplaxius crudus*, twelve *Ormenaria rufifascia*, and four *Omolicna sp.*. The presence of phytoplasma in the various insect samples does not confirm positive insect transmission; however, it does provide an opportunity for future research to focus on these potential vectors in more detailed transmission studies.

P1-7. Determining genetic structure of the painted bug (*Bagrada hilaris*) populations

MacKenzie F. Patton[1], Chris M. Powell[1], Darcy A. Reed[2], Thomas M. Perring[2] and Blake R. Bextine[1], [1]Univ. of Texas at Tyler, Tyler, TX, [2]Univ. of California, Riverside, CA

The painted bug (*Bagrada hilaris*) is native to India and Africa, where it has been a serious agricultural pest of Brassicaceae crops. The insect has a wide host plant range, feeding heavily on cole crops, such as mustard, cabbage, and cauliflower. The painted bug has recently been identified in California, Arizona, New Mexico and even as far as Texas. It may be that individuals from India and Africa have induced a founder effect when they migrated to the western United States. This could potentially cause a change in genetic populations or a resistance to an insecticide. Cytochrome oxidase subunit 1 (CO1) is a mitochondrial gene that is related to insecticide resistance. In this study, CO1 has been utilized to determined genetic variation of painted bug populations from California via Sanger sequencing. This will help determine if there is genetic variation and possible insecticide resistance among different populations.

Master's

P2-1. Where the wind comes sweepin' down the plain: an update on vector-borne disease research in Oklahoma

Jaclyn Martin[1] and Bruce Noden[2], [1]Oklahoma State Univ., Stillwater, OK, [2]Polytechnic of Namibia, Windhoek, Namibia

Arthropod vectors along with the diseases they transmit continue to be important for public and veterinary health in the South-Central United States. Dominated by tick-borne illnesses, Oklahoma ranks second in the United States for Rocky Mountain Spotted Fever

(RMSF) cases with the American Indian population reporting the highest incidence rate in the nation. While *Rickettsia rickettsii* is present, the influence of other Spotted Fever Group rickettsia remains to be discovered. Other tick-borne diseases present in Oklahoma include Ehrlichiosis (*Ehrlichia chaffeensis*, *E. ewingii*, and *E. canis*), Tularemia (*Francisella tularensis*), Anaplasmosis (*Anaplasma phagocytophilum)*,Cytauxzoonosis (*Cytauxzoon felis*), Canine hepatozoonosis (*Hepatozoon canis*), Lyme disease (*Borrelia burgdorferi*), and Southern Tick Associated Rash illness (*Borrelia lonestari*). Additional vector-borne diseases with limited ecological understanding for Oklahoma are West Nile Virus, cutaneous leishmaniasis (*Leishmania sp*.), and dog heartworm (*Dirofilaria immitis*). Potential emerging diseases found in surrounding South-Central states include Heartland virus and Chagas disease (*Trypanosoma cruzi*). Developing molecular tools and fine scale modeling techniques will help to evaluate the extent of these pathogens in Oklahoma.

P2-2. Biological control of juniper sawfly (*Monoctenus sanchezi* Smith), Hymenoptera: Diprionidae *in vitro*

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Conifer Woodland and other forest trees are an important habitat for biodiversity because they develop environmental functions such as hydrological cycle regulation, water and carbon capture, soil conservation, and many other benefits for men and environment as well. Important to Mexico and other countries is conservation and recuperation of vast forests, jungles and deserts that have been degraded by abiotic factors like weather, land use change, urban area expansion as well as biotic factors such as excessive logging, pests, human behavior. In 2007 at Sierra de Alvarez, San Luis Potosi defoliation on *Juniperus flaccida* caused by saw fly

Monoctenus sanchezi was detected. This work was conducted at Universidad Autonoma Agraria Antonio Narro, where were isolated and purified entomopathogenic fungi obtained in field for characterization and evaluation in vitro. Four treatments were performed with 6 replicates each and mortality of larvae was observed every 24 hours. The treatments used were *Beauveria bassiana, Metarhizium anisopliae, Trichothecium* sp and a control. Data were analyzed using a completely randomized design with interactions between treatments. Best mortalities were observed at 144 hours after application, which were given by *M. anisopliae*, with 98.33 %, followed by *B. bassiana* with 71.57 % and 40 % of *Trichothecium* sp, while the control showed a mortality of 6.6 %. This indicates that the best treatment under laboratory conditions was *Metarhizium*due because it killed most of pest population even at early hours of evaluation.

P2-3. Single imidacloprid drench and control of *Diorhabda* on athel tree (*Tamarix aphylla*) at Ojinaga, Chihuahua, Mexico

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The athel tree, siempreverde, rompeviento or pinabete (*Tamarix aphylla*) is an exotic tree, important for shade and wind protection in northern Mexico. This tree is severely defoliated by *Diorhabda* beetles introduced for biocontrol of more invasive *Tamarix* spp. This damage is relevant in communities at the Rio Grande and Conchos rivers. Insecticide treatments (one drench, 70 gr. A.I. imidacloprid x single tree, trees > 12 tall and >1m trunk diameter) for control of *Diorhabda* on athel trees at Ojinaga, Chihuahua, Mexico were evaluated. Two sites were treated (A and B) and one control site (C). After 116 days, fresh foliage of athel was taken from treated and control trees, and fed to *Diorhabda* adults. We evaluated: droppings (excrement) produced, and insects showing irreversible knockdown and convulsions. After 14 hours on foliage (control trees), 100%

insects produced high amounts of droppings, and showed 0% knockdown; for insecticide sites A and B, 100% and 86.6% produced low amounts of droppings, and 33.3 % and 42.2% showed knockdown, respectively; only foliage from treated trees (B and C) induced knockdown. We assume that beetles feeding on treated foliage were rapidly intoxicated and knocked-down, being prevented from continuing feeding and ingesting a rapidly lethal dose of insecticide. The amount of droppings and number of knocked-down insects were significantly different among treated and control trees (Kruskal-Wallis test, $p<0.05$). After 116 days control trees differed form treated trees which had 0 insects counted/two minutes/tree. Drench application of imidacloprid can be a simple tool to reduce the undesirable defoliation of athel trees in Chihuahua.

P2-4. CO_2 emission from fed or starved *Reticulitermes flavipes* (Isoptera: Rhinotermitidae)

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Reticulitermes flavipes is a keystone decomposer of cellulosic material on the Tallgrass Prairie Preserve in northeast Oklahoma, feeding on native grasses and shrubs. Termite contribution to both soil and atmospheric CO_2 on prairies is not well quantified. We designed this study to quantify and compare termite-produced CO_2 between fed and starved groups of *R. flavipes.* Data reported here were determined using acid-base titrations. During 10 days, groups of 50 termite workers fed *Pinus radiata* sawdust produced 64.91 ± 7.33mg CO_2-carbon, whereas starved 50-worker groups produced 20.89 ± 1.13mg CO_2-carbon. Groups of 100 feeding or starved workers produced 82.33 ± 0.24mg and 33.92 ± 3.23mg of CO_2-carbon, respectively. Regression analyses for 100-worker groups calculated r^2 values of 0.9811 and 0.8238 for fed and starved termites, respectively. The difference in r^2 values could demonstrate physiological stress in starved *R. flavipes* resulting in increased

variability in CO_2 output. Overall, feeding workers produced more CO_2 compared with starving workers. This study will help us design methodologies to investigate termite-produced CO_2-carbon flux on the Tallgrass Prairie Preserve.

P2-5. Identification of the gut microbiome of *Triatoma gerstaeckeri* using next generation sequencing

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The Triatominae subfamily of Reduviidae (Hemiptera), collectively known as kissing or conenose bugs, consists of hematophagous insects which serve as vectors for the kinetoplastid parasite *Trypanosoma cruzi*, the causal agent for Chagas disease, or American trypanosomiasis, in humans. The disease currently affects between seven and eight million people in North and South America. Prior analyses suggest relationships between the presence of *T. cruzi* and endosymbionts in the digestive tract of members of Triatominae. In this project, the microbiota of *Triatoma gerstaeckeri* was catalogued using next-generation 454 pyrosequencing of the 16S gene. Identifying components of the microbiome in a culture-independent manner could expand on the knowledge of relationships previously limited by older technology. Specimens were obtained in Kingsville, Texas and included male and female insects, as well as those that had and had not taken a bloodmeal before collection. Extractions of DNA were performed on tissue from the caudal region of the abdomen of each specimen. *T. cruzi* presence was detected with PCR analysis, and the presence of *T. cruzi*, as well as other variables, were compared with the bacteria present in each specimen.

P2-6. Behavior of experienced and inexperienced *Diaeretiella rapae* (Hymenoptera: Braconidae) exposed to winter wheat and canola

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Canola (*Brassica* sp.) has been increasingly used as a rotational crop with winter wheat (*Triticum aestivus*) over the past decade in Oklahoma. As canola acreage changes every one to two years, the pests associated with the plants also change. *Diaeretiella rapae* is a parasitoid wasp that utilizes aphids as hosts and successfully completes its lifecycle in aphid species found in wheat or canola. The response of *D. rapae* to wheat or canola was observed for: wasps that were exposed to wheat through development within bird cherry oat aphid (*Rhopalosiphum padi* L.) or exposed to canola through development within cabbage aphid (*Brevicoryne brassicae* L.), Experiments were conducted to examine the preference of inexperienced (wasps were removed from the mummy host before emergence) and experienced wasps (emerged naturally from the mummy host) to determine if the wasp learns to recognize habitat during larval development or following emergence as an adult. Colonies of *D. rapae* were maintained in both wheat and canola and mummies were removed and placed individually into small vials. The behavior of adult *Diaeretiella rapae* that had emerged within 24 hours was observed in a two-armed olfactometer when given a choice between uninfested wheat and uninfested canola plants. Experienced wasps reared in bird cherry-oat aphid that feed on wheat were attracted to the plants, but the majority did not choose one preferentially. Preference of inexperienced wasps raised in bird cherry oat aphid that feed on wheat in addition to trials for wasps raised in canola are pending.

P2-7. Comparison of potato psyllid (*Bactericera cockerelli*) populations from North America and Central America

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Zebra Chip is a disease that causes damage to potato crops, mainly from North America and Central America. The disease is caused by *Candidatus* Liberibacter solanacearum and is transmitted to plants by the potato psyllid (*Bactericera cockerelli*), a serious pest of solanaceous crops. While the potato psyllid is native to the United States and Central America, the pathogen has not always been found in all areas where the potato psyllid persists. Rather, the disease range has expanded north and south from Southern Texas and Northern Mexico over the past ten years. In this study, the complete mitochondrial genome for the potato psyllid was sequenced and potato psyllids populations from Texas and Central America were compared by analyzing their mitochondrial genome. Also, comparisons of sequences of not putative insecticide resistance genes were made.

P2-8. Regulation of *Solenopsis invicta* virus-1 by RNA interference in the red imported fire ant

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Solenopsis invicta Buren (red imported fire ant) is an economically important urban pest native to South America that has few natural enemies in the southern United States. The *S. invicta* virus-1 (SINV-1) is a picorna-like single stranded positive sense virus only known to affect *S. invicta*. RNA interference (RNAi) is a known regulator of RNA viruses in biological systems and is an emerging biologically

based insect control method. The purpose of this study was to determine if RNAi could be used to down-regulate SINV-1 in *S. invicta*. Down-regulation of SINV-1 was attempted by introducing novel double stranded RNA constructs (dsRNA) coded for SINV-1 viral genes to *S. invicta* colonies infected with SINV-1. By down-regulating select viral genes in SINV-1 infected colonies, viral titers may be reduced. In conclusion, the introduction of dsRNA was shown to regulate viral titers of SINV-1 in *S. invicta* colonies.

P2-9. Inoculation of bean with endophytic Metarhizium brunneum: lack of strong effects on whitefly, *Trialeurodes vaporariorum*

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Endophytic entomopathogenic fungi living in crop plants pose an interesting possibility for insect control. We tested the effect of endophytic, entomopathogenic fungus *Metarhizium brunneum* upon greenhouse whitefly (*Trialeurodes vaporariorum*) developing on pinto bean (*Phaseolus vulgaris*) plants. The *Metarhizium brunneum* strain was isolated from soil at General Terán, Mexico. Bean seeds were inoculated by covering them with *Metarhizium* spores, then planted in peat moss. Resulting plants were harvested after 30 days and 10 mm^2 leaf explants were placed on potato dextrose agar (PDA). Endophytic fungal growth from explants was reisolated on agar plates. The capability of *Metarhizium* to grow as endophyte in bean plants was thus verified. After reisolation from plants, *Metarhizium* spores from PDA were inoculated onto harvester ants, *Pogonomyrmex barbatus*. *Metarhizium* was then reisolated from infected insects onto agar. Spores obtained were inoculated as described onto bean seeds that were planted in soil. 148 plants (2 full-leaves stage) were exposed to a whitefly colony for 48 h in two tests. After oviposition, adults were removed and nymph development was evaluated on infested

plants. 3557 eggs and 2636 adults were counted in two trials. In the first trial, egg-to adult development was 76% (control) and 80% (fungus-treated plants); in the second trial, egg-to adult development was 62.3% (control) and 55.3% (fungus-treated plants). Seed treatment as described with an endophytic, insect-pathogenic strain of *M. brunneum* did not clearly influence *T. vaporariorum* development from egg to adult on *P. vulgaris* plants. More, comprehensive tests are required to critically evaluate the effect of endophytes on this insect host.

P2-10. Oral delivery assay of double - stranded RNAs (RNAi constructs) in the potato/tomato psyllid, *Bactericera cockerelli*

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The potato/tomato psyllid, *Bactericera cockerelli*, is a serious and economically important pest of the potato, tomato and other solanaceous crops. This insect is the putative primary vector of the phytopathogenic bacterium *Candidatus* Liberibacter psyllaurous (solanacearum) which causes the Zebra Chip of potato. This disease has caused millions of dollar loss to the potato industry. Management of this pest by down-regulation of endogenous mRNA using RNAi technology is possible. In this study, a feeding assay had been developed for the oral delivery of dsRNA (RNAi constructs). Different fluorescent compounds were used for the feeding assay and survival assay to determine the level of ingestion that occurred. Thirty teneral adult psyllids were offered sachet that contains artificial diets amended with fluorescent compounds and monitored for ten days. To determine if selected dsRNAs crossed the gut barrier and enter the hemolymph, fluorescently labeled dsRNA probes were used to document the presence of dsRNA in the hemolymph and to the different organs. Individual psyllids were dissected and the presence of labeled probe in the specific tissue was identified by PCR and visualized by fluorescence microscopy.

Ph.D.

P3-1. First report of the invasive leafhopper, *Balclutha rubrostriata* in Oklahoma

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Balclutha rubrostriata (Melichar) (Hemiptera: Cicadellidae), native to southeastern Asia, is an invasive leafhopper in the United States. It was first identified in the U.S. as the most abundant species in a 2008 arthropod survey in Bexar County, Texas, and has since spread rapidly throughout Texas and southeastern Louisiana. The red-streaked leafhopper belongs to a genus that is known to contain virus and phytoplasma vectors. In the U.S., it is collected primarily from the invasive grass *Bothriochloa ischaemum* (L.), King Ranch Bluestem, which poses an ecological threat to native Oklahoma grasslands. To determine the status of this leafhopper within Oklahoma, ten locations in central Texas, south, and central Oklahoma were sampled with a 12-inch sweep net. Thirty to 40 sweeps were taken from mixed grasses including King Ranch Bluestem and Bermudagrass and frozen at -20˚C. Leafhoppers were then placed in 95% ETOH and examined using a Wild BX5 stereomicroscope. Four of the ten samples, including collections from Payne, Oklahoma, and McLain counties in Oklahoma, contained leafhoppers identified as *B. rubrostriata* using morphological characteristics of the genitalia. Continued spread of the red-streaked leafhopper along with the invasive plant species King Ranch Bluestem seriously threatens native species complexes in native grasslands.

P3-2. Levels of phosphine resistance in populations of *Cryptolestes ferrugineus* (Stephens) (Coleoptera: Laemophloeidae) from stored grain in Oklahoma

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Phosphine gas (hydrogen phosphide or PH_3) is the method of choice worldwide for fumigating stored grain and grain value-added products for the control of stored-product insect pests. In many countries, phosphine resistance in stored-product insect pests has been reported as a major problem presenting challenges to the continued effective use of this fumigant. Strong phosphine resistance was found in Oklahoma populations of *Rhyzopertha dominica* (F.) (Coleoptera: Bostrichidae) and *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae) in 2012. In 2013, high phosphine resistance frequencies were found in several populations of *Cryptolestes ferrugineus* (Stephens) (Coleoptera: Laemophloeidae) collected from various wheat storage facilities in Oklahoma. Based on the *C. ferrugineus* resistance frequencies reported in 2013, we conducted tests to determine the levels of phosphine resistance in populations that had the highest resistance frequencies. The same previously established protocols for dose-response tests used in earlier studies were followed. Results of this study will be presented and their implications discussed.

P3-3. Investigating possible routes of fumigant penetration into eggs of *Carpophilus hemipterus* (Coleoptera: Nitidulidae) and *Plodia interpunctella* (Lepidoptera: Pyralidae) using osmium tetroxide as a model molecule

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The egg is the most fumigant tolerant insect stage. There are variations in how eggs of different species respond to the same fumigant. Differences in egg respiratory systems may affect gas diffusion and overall fumigant penetration. We developed a prototype for investigating respiratory structure-mediated gas diffusion in *Carpophilus hemipterus* (L.) (Coleoptera: Nitidulidae) and *Plodia interpunctella* (Hübner) (Lepidoptera: Pyralidae) eggs using osmium tetroxide (OsO_4) as a model molecule. OsO_4 is a biological fixative that reacts with unsaturated double bonds in lipids and proteins and changes the color of tissues to dark brown or black. Fumigations using OsO_4 were conducted in such a way that gas penetration into different regions of *P. interpunctella* and *C. hemipterus* eggs could be visualized. Light microscopy images showed evidence of greater interaction between OsO_4 and egg tissues in regions where aeropyles are localized. *P. interpunctella* eggs showed relatively concentrated shades of dark brown at the anterior and posterior ends where aeropyles are present but not in the middle region where aeropyles are absent. In *C. hemipterus* eggs, dark brown color was observed at the tip where 2 aeropyles are located but not in other regions where aeropyles are absent. Untreated eggs were uniformly cloudy white. For both species, initial quantification of elemental osmium in the interior of treated eggs showed higher osmium concentrations in areas where aeropyles are present. These preliminary results seem to suggest aeropyles are the major route for gas diffusion in insect eggs and their abundance or lack thereof may affect fumigant penetration.

P3-4. Quantification of the physiological impact of Hessian fly (*Mayetiola destructor*) feeding on post-vernalization winter wheat

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The Hessian fly, *Mayetiola destructor* (Say) can be an important but inconsistent pest of Kansas wheat but may become more consistent with increased no-till land management. Resistant wheat varieties have been a popular way to control Hessian fly infestations but little work has been done to determine how Hessian flies negatively impact wheat plants infested in the spring, post-vernalization, if there is a negative impact on the plant even if it doesn't lodge, and if seedling plant resistance will continue to protect these plants. Field and greenhouse trials were conducted from 2010-2013 to determine the impact of spring larval feeding on three varieties of hard red winter wheat rated as susceptible (Fuller), intermediate (Armour), and resistant (Duster) for the Hessian fly. Caged plants were infested at the flag leaf stage of development (Feekes 7.0 to 9.0) with mated, adult female Hessian flies and offspring were allowed to develop to the flaxseed stage. Mature wheat was hand harvested and data recorded including stem height, spikelets per spike, average number of seeds per spikelet, and seed weight per spike. Preliminary results indicate that the susceptible wheat variety, Fuller and the intermediate variety, Armour, both have significantly reduced plant height, fewer seeds per spikelet, and reduced seed weights compared to plants not infested with Hessian flies. Duster, a wheat variety with a high resistant rating did not show any significant negative impacts related to Hessian fly larval feeding.

P3-5. Habitat, trap-type, and seasonal associations of nine endemic insects of the Monahans Dune System

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Nine rare and endemic insect species (*Anomala suavis, Epitragosoma arenaria, Nicagus occultus, Prionus arenarius, Prionus spinnipenis, Polyphylla monahansensis, Polyphylla pottsorum, Stenopelmatus monahansensis,* and *Trigonoscutoides texanus*) are known to occur only within the Mescalero-Monahans sand dune system of western Texas and eastern New Mexico. Prolonged drought, water table reductions, loss of dune-stabilizing vegetation, and land-uses including oil and gas developing (and fracking) are potential threats to the survival of these species. Basic data (distributional, phenological, ecological and biological) are needed to support conservation recommendations. Objectives of this study were (1) to determine total numbers of our focal insects collected across seven semi-permanent trapping stations across open and vegetated dunes, (2) to determine efficacy of trap type for each species and (3) to explore seasonal associations of trap catches per species. Seven insect collecting sites were established during March-April 2013 at the Monahans Sandhills State Park on open and vegetated sand dunes, each consisting of a Townes trap, 10 pitfall traps and a solar-powered, continual UV light trap. Samples from each site were collected at least monthly and mostly at biweekly intervals. Overall results show that *P. arenarius, P. monahanensis, P. spinnipenis,* S. *monahansensis*, and T. *texanus* were collected in larger numbers on vegetated dunes, whereas *A. suavis* and *P. pottsorum* were collected in larger numbers on open dunes. *Epitragosoma arenaria* was collected in similar numbers from both habitats. UV light and pitfall traps were the most effective trap types for most species. Based on trap captures, phenological data, length of adult emergence period, peaks of emergences and cumulative degree days are provided.

P3-6. The role of insect succession in composted and non-composted beef cadavers and the effect of composting on volatile organic compounds

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Commercial livestock facilities are faced with the challenge of disposing of a significant number of cadavers each year. One increasingly popular way of dealing with excessive amounts of dead animals is composting. The cadavers are buried in carefully selected media creating a barrier between the dead tissue and the surrounding environment. Dead tissue can release compounds that not only contaminate the soil environment but also the groundwater and nearby surface water. Arthropods and microbes aid significantly in the decomposition of exposed animal cadavers. Animal mortality compost is designed to facilitate decomposition without the aid of carrion feeding insects and reduce the presence of common pathogens associated with animal waste and dead tissue. The goal of this study was to evaluate insect activity associated with composted and exposed beef cadavers, specifically filth flies that can serve as mechanical vectors of important human pathogens such as *E. coli* 0157:H7. Greater numbers of insects were trapped overall at the exposed animal site than the composted animal site ($p=0.2730$). Additionally, the number of filth flies was significantly lower at the composted site ($p=0.0009$). Volatile organic compounds were also sampled in this study, and known fly attractants such as dimethyl disulfide were inhibited by the composting process. Lastly, carrion feeding insects were collected from each of the exposed animals and documented. These species are important in the field of forensic entomology. Implementing composting programs at livestock facilities could reduce the risk of flies spreading harmful pathogens to surrounding areas including farms that grow fresh produce.

P3-7. Seed treatment of beans, *Phaseolus vulgaris*, with endophytic *Beauveria bassiana*, and whitefly population dynamics: is there an effect?

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It has been shown that plants colonized by endophytic fungi obtain protection against insects. In this study bean plants (*Phaseolus vulgaris*) were inoculated with *Beauveria bassiana*, to evaluate the effect of the fungus on greenhouse whitefly, *Trialeurodes vaporariorum*. The *Beauveria* strain was isolated from soil (Saltillo, Mexico), then inoculated on superficially-disinfected bean seeds, by exposing these to a sporulating culture of *Beauveria*. Plants were obtained from seeds, and after 30 days, leaf explants were taken from plants and placed on potato dextrose agar (PDA). Endophytic fungal growth from explants was reisolated on PDA. The endophytic capability of this *Beauveria* strain was therefore verified. After reisolation from plants, and to test its virulence, the fungus was passed on harvester ants, *Pogonomyrmex barbatus*, and afterward was recovered in culture medium. Spores obtained were inoculated as described onto bean seeds, used to obtain 220 plants (2-leaves stage); these were randomly exposed to hundreds of whiteflies in a mesh cage. After oviposition, adults were removed and oviposited eggs were counted; emerged adults were counted a month later (for a total of 7944 eggs and 6430 adults). In test 1, egg-to-adult development was 83.2% (*Beauveria*) and 71.3% (control plants). In test 2, egg-to-adult development was 88.4% (*Beauveria*) and 81.2% (control plants). Egg numbers and population trends for whiteflies in both control and endophyte-inoculated plants were thus very similar. Whitefly development (from egg to adult) was not influenced when growing on *P. vulgaris* plants inoculated as seeds with an insect-pathogenic strain of *Beauveria bassiana* capable of endophytic growth. Possible reasons are low endophyte establishment, or lack of fungal toxins or infection capabilities on this host system.