

# CENTER FOR BIOLOGICAL CONTROL

## Newsletter

Florida A&M University  
COLLEGE OF AGRICULTURE AND FOOD SCIENCES  
Tallahassee, FL 32307



2020-2023

Volume 16

### Dual Strategy: “Push-pull” technique and companion planting in high tunnels

The sweetpotato whitefly, thrips and aphids are major pests of vegetable crops in the southeast U.S.A. and globally. This strategy involved the use of repellent plants (push component) and trap crops or plant volatile products (pull component). To complement the “push-pull” strategy, flowering companion plants are used to increase natural enemies (ex. predators and parasites) and evaluated for its efficacy to control the whiteflies. We evaluated the dual strategy of the combined use of “push-pull” strategy and companion planting in tomatoes and leafy greens in a top-vented high tunnel, at FAMU Research and Extension Center, Quincy, FL, in collaboration with Dr. Alejandro Bolques, FAMU-Cooperative Extension. In this study, repellent plants such as mustard, lemon grass, citronella, and society garlic were used as the “push” component in tomato crop. Preliminary laboratory evaluations of leaf acetate as a “pull” compound showed promising results. [continued on page 2].

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Dr. Lambert H.B. Kanga  
Director/Professor, FAMU-CBC

Dr. Jesusa Legaspi  
Co-Director, USDA-ARS-CMAVE-CBC

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Leafy green crop in top-vented high tunnel, FAMU-REC, Quincy, FL, January, 2020



Repellent “push” plants - society garlic, mustard, and arugula intercropped with leafy greens



#### Visit to USDA-ARS-CMAVE and CDC-EPI, UF, Gainesville, FL, September 22, 2022

(L-R) Dr. L. Kanga, Dr. M. Haseeb, Dr. J. Batalon, Dr. R. Mankin, Dr. D. Amalin, Dr. R. Meagher, Jr., Dr. J. C. Legaspi, Dr. A. Sharma, and Dr. I. Nurkomar, USDA-ARS-CMAVE

*Outlook for Optimism with Growth, Challenges and Changes*



Dr. Lambert Kanga

The Center for Biological Control (CBC) continues to excel in its mission although limited by reductions in budget and faculty as we come out of COVID19. Together with its federal agency partners (USDA-ARS and USDA-APHIS), the CBC remains committed to achieving successfully its goals and objectives.

The Center continues to offer programs to better serve its clientele and strengthen its collaborative linkages with national and international collaborators. The major priorities in the coming years are (a) the construction of a USDA-FAMU building to house and combine the expertise of the Entomology Program, the CBC and USDA partners, and (b) the expansion of breadth of research projects; (c) recruitment of students. The Center has made substantial efforts towards these priorities: (a) Florida A & M University has a Master Plan for the new building; (b) we continue to develop new projects; and (c) creating more opportunities for undergraduate and graduate students. The CBC will be receiving assistance from the FAMU administration for fundraising activities.

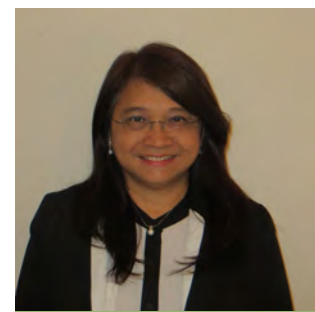
Appropriate staffing and facilities are critically important for the continued success of the activities of the Center. Currently, the CBC has hired a new faculty member for the Urban Entomology position.

Graduate student Jermaine Perrier was the 1st place Award Winner of the graduate student poster competitions at the Association of Research Directors Symposium (ARD) in 2019. Graduate student Sharise James was the 1st place Award Winner of the graduate student poster competitions at the Minorities in Agriculture, Natural Resources and Related Sciences annual meeting in 2022. Jermaine Perrier, CBC-CAFS was Award Winner (1st place) at the ARD. Graduate student, Alexander Orfinger won the 2023 John Henry Comstock Outstanding Graduate Achievement Award granted by the Southeastern Branch of the Entomological Society of America. Further, five students were recognized with “W. L. Peters Memorial Scholarship Awards” from the Reuben Capelouto Foundation. There are several other accomplishments of our faculty and students, as the CBC continues to gain worldwide recognition. We appreciate your continuing support of the Center as we move into the future. (submitted by Dr. Lambert Kanga and Dr. Jesusa Legaspi).

## Research & Outreach News

Dual Strategy: “Push-pull” technique (continued from page 1)

Companion plants included marigold, sweet alyssum and basil. In addition, MESA in the form of commercial “predalure” packets were placed inside the high tunnel. Preliminary results indicated a low population of whiteflies, thrips, and aphids throughout the cropping season. The main beneficial predators were big-eyed bug, minute pirate bug and whitefly parasites, *Encarsia* spp. and *Eretmocerus* spp. The dual use of the “push-pull” strategy and companion planting are promising cultural control methods in an integrated pest management program to control insect pests in high tunnels. [submitted by: Dr. J. C. Legaspi, USDA-ARS-CMAVE; funding provided by USDA-NIFA-OREI; Collaborators: FAMU, USDA-ARS-CMAVE, UF, and UGA.]



Dr. Jesusa Legaspi

The Center continues its support of academic programs with enrollment of more than 60% of the graduate student population in the College of Agriculture and Food Sciences. Faculty members and students of the Center

continue to succeed and raise our public professional profile. Dr. Lambert H.B. Kanga was the recipient of (a) the 2022 Integrated Pest Management (IPM) Award from the Southeastern Branch of the Entomological Society of America. He was also the recipient of the (b) 2022 Distinguished Research Award at Florida A&M University and (c) the 2021 Integrated Pest Management “Bright Idea” Professional Award by the Friends of Southern Integrated Pest Management (IPM) Professional Awards. Dr. Muhammad Haseeb was the recipient of (a) the 2019 Research Excellence Award by Florida A&M University and (b) the 2021 Teacher of the Year Award by Florida A&M University. The Center for Biological Control was the recipient of the 2021 International IPM Award of Recognition (team) by the International IPM Professional Awards.

Entomology 4-H outreach

The pipeline into science can never start too early. Insect Science Summer Programs promote curiosity, questions, and interest in the natural world, as well as in science. Summer programming was offered for youth in grades K-12. Every camp held in the College of Agriculture and Food Sciences highlighted Entomology. These camps included: The Food Science Enrichment Summer Program (FSSEP), Raising Agriculturally and Technically Literate Rattlers (RATLR Camp) and Ag-Discovery and Vet-Tech Camp, Forestry and Conservation Camp, and 4-H Cloverbud camp. Insect Science was also incorporated into community summer programs as well, Leon County Parks and Recreation Camps, Calhoun and Gulf County Home School Summer Program and also at Bay Leads in Bay County Florida. During each of these camps youth ages 5 to 14 were exposed to the wonderful world of insects and participated in insect collection, entomophagy, and competitions.

The Entomology Internship for high school students encouraged high school students and provided hands-on experience in Entomology through mini-research projects focused around economically important insects.

Do you know someone who will be interested next year, or do you have children you would like them to participate? Contact Sabrina Hayes: [Sabrina.hayes@famuedu](mailto:Sabrina.hayes@famuedu)



Summer camp at Smith-Williams Services Center, Tallahassee, for school kids July 6, 2022 attended by Ms. Peters, Ms. Hayes, Ms. Tanner, Dr. Kanga and Dr. Sharma. Graduate student Kiara Ivy and Maxo Etienne also interacted with students. (source: A. Sharma)



Summer camp, 2022 (source: J. Henderson)

Graduate student Jamesia Henderson showing insects to a visitor at Harambee festival, 2023



(L-R) Jacquez Daniels, Jamesia Henderson, and Kiara Ivy at 4-H outreach at Wesson Academy, 2022. (source: J. Henderson)



Dr. Lambert Kanga (Middle) with his students (source: Dr. L. Kanga)



PhD student W. Diedrick working in field, 2022 (source: W. Diedrick)

### Genomic Assessments of Honeybee Health in Beekeeping Practices.

Studies were conducted on Honeybees (*Apis mellifera* L.) on selected biological parameters associated with honeybee health in two beekeeping practices (organic and conventional) looking into differential gene expression as related to Varroa mite (*Varroa destructor*) infestations levels in selected genes involved in nutrition and cellular defense [vitellogenin (Vg), malvolio (Mvl), prophenoloxidase (PPO)], genes involved in lifespan [superoxide dismutase (Sod 1), superoxide dismutase2 (Sod2)] and immune function genes [immune deficiency (Imd), spaetzle (Spz)]. The findings (first of this kind) demonstrated that (a) honeybees from organically managed apiaries produced significantly more brood than their counterparts in conventionally managed apiaries; (b) conventional apiaries had significantly higher loads of pesticides in bees and in wax; (c) an upregulation of prophenoloxidase (PPO) gene expression levels indicating highly stressed bees in conventionally managed apiaries; (d) high vitellogenin (Vg) gene expression levels suggesting increased longevity of bees in organically managed apiaries; (e) upregulation of malvolio (mvl) gene expression indicating better floral recruitment capabilities by bees in organically managed apiaries; (f) adult bees with no mite infestations from organically managed apiaries could mount an immune response through Spz and Sod 1 when challenged by increasing Varroa mite infestation levels than their counterparts in conventionally managed ones; and (g) The gene CYP9Q3 that detoxifies coumaphos and fluvalinate was upregulated in organically managed bees as compared to their counterparts in conventionally managed ones. Thus, honeybees managed organically had stronger immune response to pesticides, parasites and pathogens than their counterparts in conventionally managed hives. [submitted by Dr. Lambert Kanga]

### Dynamics of Populations of Beneficial Insects and Biological Control of Kudzu Bug

The kudzu bug (*Megacopta cribraria*) (Hemiptera) is a pest of concern in many soybean and legume producing states. *Paratelenomus saccharalis* (Platygastridae) is a known parasitoid of the kudzu bug, and a potential biological control agent. In this study, assessment of the presence and populations of the kudzu bug and its parasites in north Florida and South Georgia and levels of parasitism are assessed. Our data indicates that in both 2020 and 2021, *P. saccharalis* emerged from eggs of *M. cribraria* collected in Leon and Gadsden County. Parasitism was recorded for the recently discovered egg parasitoid in north Florida, *Ooencyrtus nezarae* (Encyrtidae). In assessing parasitism in the field, differences were observed in the average level of parasitism within the urban and forest areas in both years, and in the agricultural area for 2021. Study indicated that both *P. saccharalis* and *O. nezarae* exert some levels of natural control of the kudzu bug in the field and may be useful as biological control agents in an integrated pest management program. [submitted by Dr. Lambert Kanga]



Graduate student, Maxo Etienne, collecting kudzu bugs in the field. (source: M. Etienne)

Intraguild Interactions of Three Biological Control Agents of the Fall Armyworm *Spodoptera frugiperda* (JE Smith) in Florida



Dr. Jesusa Legaspi (Left) and Dr. M. Haseeb (Right) sorting out samples of the fall armyworm and its biological control agents in south Florida. (source: Dr. M. Haseeb)

The fall armyworm (FAW) is a polyphagous pest occurring worldwide. Global trade has not only assisted but accelerated its invasion into the Eastern Hemisphere. We evaluated three biocontrol agents that are natural enemies of Lepidopteran pests, the true bugs *Podisus maculiventris* and *Euthyrhynchus floridanus* (Hemiptera: Pentatomidae) and a parasitoid, *Cotesia marginiventris* (Hymenoptera: Braconidae). Depending on their intraguild interactions, these agents could potentially be useful for biological control of the fall armyworm. This study concluded that integrating these agents to control the FAW is a possibility; however, only under certain conditions. Investigations were focused on evaluating the predator–parasitoid and devised pairing interactions. Predator response to prey in a choice or no-choice scenario and choices based on olfaction or other bodily cues were studied under laboratory conditions. [submitted by Dr. Muhammad Haseeb, CBC-CAFS-FAMU; extramural funding provided by USDA-NIFA, CPPM Program; Collaborators: Univ. of Florida, and USDA-ARS-CMAVE]

Domestication of Chili Pepper Has Altered Fruit Traits Affecting the Oviposition and Feeding Behavior of the Pepper Weevil

The pepper weevil is an economically important pest that causes major damage to the fruits of chili pepper varieties selected for consumption. However, the impact of this pest on wild and ornamental peppers remains unknown. Therefore, we studied the effect of chili domestication on the feeding and oviposition behavior of pepper weevils when exposed to wild chili, ornamental varieties, and varieties used for consumption. More specifically, we examined how changes in fruit and flower size, fruit thickness, spiciness level, and fruit position as a result of the domestication of chili peppers affected their susceptibility to this specialist pepper pest. In addition, we recorded that fruits and flowers from wild and ornamental plants were less susceptible to pepper weevil attacks than those from chili varieties selected for consumption. Our results have important implications for chili pepper breeders and could guide the selection of new resistant varieties against this pest. [submitted by Dr. Muhammad Haseeb, CBC-CAFS-FAMU; extramural funding provided by USDA-NIFA, CPPM Program; Collaborators: Betty Benrey, University of Neuchâtel]



From right, a) adult female pepper weevil getting ready for oviposition in the pepper stem; b) larval infestation in the pepper fruit; c) a teneral pupa of pepper weevil, d) exit holes of adult pepper weevils. Left., pepper cultivation with marketable fruits in the basket. (source: M. Haseeb)



Dr. Anamika Sharma joined CBC, FAMU as urban entomologist in January 2022

#### Dr. Anamika Sharma

I am an entomologist/insect ecologist with a focus on biological control and integrated pest management. I am extensively trained in insect ecology and various facets of insect-plant interactions. At the Center for Biological Control, my focus is on urban and agricultural insects. I am working on fire ants, termites, mosquitoes, and urban and agricultural invasive insect pests. I focus on research encompassing various aspects of the management of insect pests by using natural including predators, parasitoids, microbial agents (entomopathogenic fungi and nematodes), and other biorational products. Earlier, I worked in weed and insect biological control programs. Currently, I am supervising one master's student and several undergraduate students.



Dr. Alexander Gaffke joined USDA-ARS, and CBC, Tallahassee team in December 2021

#### Dr. Alexander Gaffke

Alex graduated with a Ph.D. in Ecology and Environmental Science from Montana State University studying the aggregation pheromone of the northern tamarisk leaf beetle. Research in his lab focuses on the integration of chemical ecology and biological control. Specifically, he is interested in understanding chemically mediated interactions between plants and insects and how these interactions can be applied to enhance biological control. Focus is on identification and isolation of pheromone and attractive or repellent plant compounds, developing lures, biological control of air potato, Chinese tallow, the Argentine cactus moth, and the harrisia cactus mealybug. The current members of his lab include John Mass and Jessica Griesheimer. John has been a long-time member of the Center of Biological Control and Jessica is a new master student at the University of Florida conducting research on the chemical ecology of air potato.

#### Impact of insect feeding on invasive air potato

Have you ever found yourself wondering why weeds are so good at growing back even after you have cut them down or pulled them up? In the case of the invasive vine air potato, mechanical damage to the plant does not cause changes to resource allocation, allowing the plant to put all its resources stored in its extensive root system back into growing. However, when the plant is fed on by the air potato leaf beetle, it results in massive changes to the plants metabolisms. Research conducted by USDA-ARS indicated that small amounts of feeding by the air potato leaf beetle on the plant can result in significant changes to the plants secondary metabolites, which functions as the plants immune system. Specifically, the plant induces a broad array of compounds, including nitrogenous compounds, to try and protect itself from the beetle. The induction of these compounds competes with other biochemical pathways in the plant, impacting its ability to regrow. This is one of the reasons that weed biological control with insects can be so effective! Research is ongoing, and the next phase of the project will incorporate how the plant responds to other insects, including generalist and specialists. This research was conducted by Dr. Alexander Gaffke and Ms. Jessica Griesheimer (submitted by Dr. A. Gaffke)



'Pizza trap' and 'Lollipop trap' setup for phorid survey  
(source: Dr. A. Sharma)



Dr. Anamika Sharma (Far Right) and graduate student Ms. Kiara Ivy (middle in left) setup traps at Lake city, on Feb 2023. Both were accompanied by ant lab members, CMAVE, Gainesville.  
(source: Dr. A. Sharma)

Evaluation of spread, establishment, and impact of natural enemies to manage imported fire ants [*Solenopsis invicta* in Northwest Florida.

Red imported fire ants (RIFA), *Solenopsis invicta* Buren (Hymenoptera: Formicidae), are originally from South America but now infest over 128 million hectares of land in the United States. To manage this invasive pest natural enemies, such as insect-killing fungi, bacteria, and viruses from its native range are used to manage RIFA in the USA. Phorid flies (*Pseudacteon* sp.) have coevolved with RIFA in South America. They attack the ants by laying their eggs in the thorax and the larvae grow and feed on the head of the ant which leads to decapitation. In this study, we are surveying six species used for the experiment named *Pseudacteon culltellus*, *Pseudacteon curvatus*, *Pseudacteon littoralis*, *Pseudacteon nocens*, *Pseudacteon obtusus*, and *Pseudacteon tricuspis*.

These phorid flies, although released at different times, have a varied spreading range. In this study, we are surveying the I-10 corridor in the Northwest part of Florida (Tallahassee, Pensacola, Jacksonville, Gainesville, Panama City, Quincy, Jay, Macclenny, Lake City, and Blount-stown) to confirm the establishment and efficacy of phorid flies and the presence of other natural enemies including *Kneallhazia solenopsae*, *Vairimorpha invictae* (microsporidian pathogen), and *Beauveria bassiana* strain 447 (entomopathogenic fungus). We are using active and passive traps to survey the six phorid species. First set of surveys indicated presence of at least two phorid species at the selected sites. Funding was provided by USDA-APHIS [submitted by: Dr. A. Sharma].

Assessments of Biological Control Potential of two Mirid Predators against *Phthorimaea absoluta* in North Florida.

Predatory hemiptera *Macrolophus praeclarus* is assessed to manage *Phthorimaea absoluta* (Lepidoptera: Gelechiidae). This pest is a huge problem for tomato and has not arrived in USA yet. We are assessing the movement of predatory bug from tomato while they survive in field. In 2022, we tested tobacco as companion crop to conserve *M. praeclarus* in the field conditions. *Macrolophus praeclarus* are being reared in the lab. Collaborators: USDA-APHIS and FAMU.  
[submitted by: Dr. A. Sharma].



Field experiment at Quincy farm, FAMU, 2022 to evaluate movement of *Macrolophus praeclarus* farm on tomato and tobacco crops.



Steve Niedzwiedzki, Douglas Products gives a talk on fumigation at the 46th Annual FAMU Field Day and Workshop organized on 2nd and 3rd November 2022. (picture by Worrel Diedrick).

### Annual Entomology Field Day and Workshop, FAMU (2020-2022)

Florida A&M University Entomology has continued to have its annual pest control-focused conference each fall. On November 2-3, 2022, we hosted the 46th Field Day and Workshop, which was attended by almost 100 participants, in-person and virtually.



Dr. Robert Pereira from UF/IFAS gives a talk on termite management at the Northwest Florida Pest Management Conference, Feb 2023

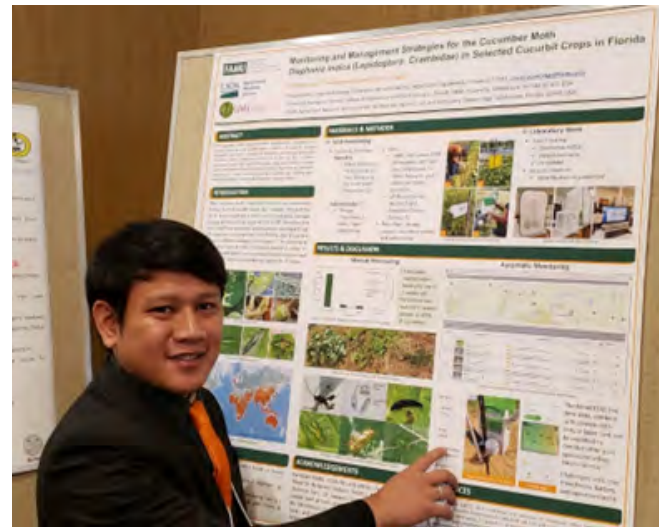
FAMU-UF Northwest Florida Pest Management Conference  
FAMU and University of Florida co-hosted the Northwest Florida Pest Management Conference in Niceville, FL, on February 28, 2023. The meeting educated pest management professionals on a wide range of topics including IPM traps, bed bugs, termites, and soil management. This conference was initiated in 2019. (details and picture by Dr. A. Sharma)



Trip with Borlaug Research Fellow (L-R) Dr. T. Paris (UF), Ms. A. Robinson, Dr. I Nurkumar, Dr. M. Haseeb, Mr. L. Simeon, Ms. K. Brathwaite at UFREC, Quincy, FL

### Borlaug Research Fellow - Dr. Ihsan Nurkumar

Dr. Ihsan Nurkumar (Department of Agrotechnology Universitas Muhammadiyah Yogyakarta Indonesia) completed his three months exchange training successfully in USDA, FAMU project in the Fall of 2022. Drs. Haseeb and Legaspi co-hosted him. His major interest was on the biological control of invasive pests, and IPM traps. He presented his work on Monitoring and Management Strategies for Cucumber Moth *Diaphania indica* Saunders (Lepidoptera: Crambidae) at the World Food Prize.



Borlaug Fellow, Dr. Ihsan Nurkumar Presenting his research findings during the World Food Prize, Des Moines, Iowa, 2022. (source: Dr. M. Haseeb).





(L-R) Dr. Muhammad Haseeb and Dr. Lambert Kanga receiving International IPM Award of Recognition (Team) by the International IPM Symposium Awards Committee.



FAMU president, Dr. Larry Robinson and Faculty Senate President, Dr. Ann Cavazos presenting Dr. M. Haseeb, 2021 Teacher of the Year Award, Florida A & M University

### International IPM Award of Recognition (Team), 2022

Team of the Center for Biological Control was recognized at the 10th International IPM Symposium in Denver, Colorado, February 28, 2022, as the 2021 Recipient of the International IPM Award of Recognition (Team) by the International IPM Symposium Awards Committee. (Team included: Dr. Lambert H.B. Kanga, Dr. Muhammad Haseeb, Dr. Benjamin Hottel, Dr. Raymond Hix, Dr. Jesusa Legaspi, Dr. Stephen Hight, Dr. Wills Flowers, and Dr. Manuel Pescador).



Dr. Lambert H.B. Kanga (left) is the recipient of the 2022 Excellence in IPM Award by the Southeastern Branch of the Entomological Society of America (ESA President on the right).



Awards won by Dr. Lambert H.B. Kanga, (a) 2021 Southern IPM Professional Award and (b) 2021 Distinguished Researcher of the Year Award

## CENTER FOR BIOLOGICAL CONTROL NEWSLETTER



Entomology Week, October 2021, (L-R) Bethany Noel and Jamesia Henderson



Harambee Festival, 2022 (L-R) standing India Watson, Jacquez Daniels, Kiara Ivy; sitting (L-R) Kristen Joy Adkins, Jamesia Henderson



FAMU Entomology students,  
Tallahassee Science Festival, downtown Kleman Plaza, October 13, 2021



Monarch Butterfly Festival, 2022  
(L-R) Jacquez Daniels, Jamesia Henderson, and Kristen Joy Adkins

Collaborating agencies: USDA-APHIS, UF, UGA, FDACS, DLSU, MSU

### Current Graduate Students at Center of Biological Control

Worrel Diedrick (PhD candidate), Alexander (Alex) B. Orfinger (PhD candidate), Sharise D. James-Perez (Masters candidate), Jahlita Janeau (Masters candidate), Jamesia Henderson (Masters candidate), Kristen Joy Adkins (Masters candidate), Eric Toussaint (Masters candidate), Larisner Simeon (Masters candidate), Maxo Etienne (Masters candidate), Bethany Noel (Masters candidate), Kiara Ivy (Master's Candidate), Ann Marie Robinson-Baker (Masters candidate)



Entomology display during vice chancellor (Dr. Ray Rodrigues) visit Dec 6, 2022, (L-R) Dr. R. Hix, Dr. A. Gaffake, Ms. A. Robinson, Dr. M. Haseeb, Ms. K. Ivy, Ms. J. Griesheimer, Mr. W. Diedrick, Dr. A. Sharma, and Dr. L. Kanga.

CBC at Grape Harvest Festival August 20, 2022. (L-R) Dr. A. Sharma, Mr. A. Orfinger, Dr. I. Nurkumar, Dr. M Haseeb, Ms. K.J. Adkins, Ms. B. Noel, Mr. L. Simeon, Ms. I. Watson, and Ms. K. Ivy

Student news



PhD Candidate-Worrel Diedrick was invited as keynote speaker at the International Conference for Food, Science and Nutrition, February 2023

Master's student, Kristen Joy Adkins stood first for Speech competition in the MANRRS national conference in 2021



TFLA student Caleb Lofton watering tomato plants in FAMU green house, July 2022

TFLA student was hosted at CBC

Caleb Lofton, a high school student was hosted at CBC by Dr. A. Sharma in association with Tallahassee Future Leaders Academy (TFLA).

Student Graduated (2020-2022)

- 2020 – MS graduates - Tashani Brown, Jasmine Moffet
- 2021 – MS graduates – Almando Morain, Chinemenma Okorojin
- 2021 – BS graduate – Kristen Joy Adkins
- 2022 – MS graduate – Breonna Davis



PhD Candidate - Alex Orfinger won ESA Southeastern Branch John Henry Comstock Award, 2023



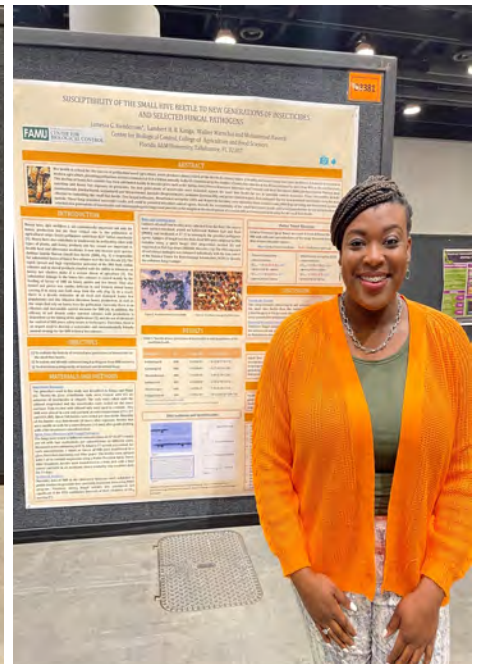
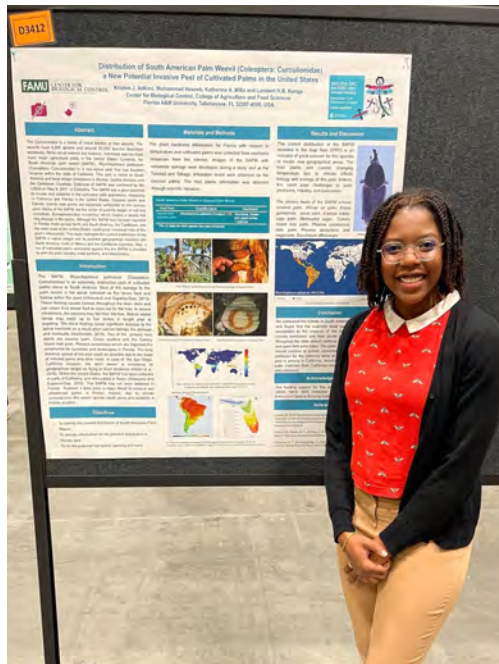
Master's student, Sharise James stood first for her poster presentation in the MANRRS national conference in 2022

This award is given by the ESA National Office to outstanding Ph.D. students. There are six annual awards, one given to a graduate student from each Branch to promote interest in entomology at the graduate level and to support attendance at the ESA annual meeting. Each award consists of an all-expenses-paid trip to the ESA national meeting, a \$100 cash prize, and a certificate. Expenses paid include reimbursed airfare, free hotel arrangements and meeting registration, and a per diem allowance. In addition to the prizes offered by the ESA, SEB will also present the awardee representing SEB a \$200 cash prize and an award plaque at the SEB annual meeting. Mr. Alex Orfinger is working on a Ph.D. in the cooperative Ph.D. degree in Entomology. His co-major advisors are Drs. Raymond L. Hix, and Andrew Rasmussen. His dissertation proposal is titled "Phylogenetic Systematics and Ecology of Eastern North American *Polycentropus sensu stricto* (Trichoptera: Polycentropodidae)," [Source: Dr. Raymond Hix]

Alexander Orfinger received the Best Graduate Poster Award at the virtual 2022 HBCU Agricultural Students Conference.



Alex Orfinger, Award winner, Florida Association of Aquatic Biologists (FAB) 2019, 2022



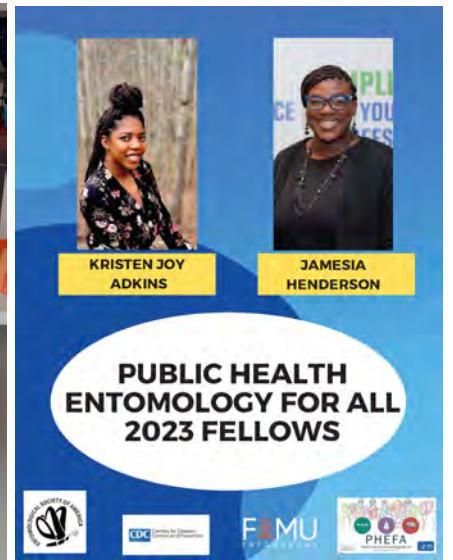
(L-R) Ms. Bethany Noel, Ms. Kristen Joy Adkins, and Ms. Jamesia Henderson presented their work at ESA annual meeting in 2022 at Vancouver, Canada



Mr. Worrel Diedrick and Ms. Breonna Davis presented their work at ARD meeting, 2022



Ms. Kiara Ivy presented her work at student appreciation week, 2023



Ms. Kristen Joy Adkins, and Ms. Jamesia Henderson has successfully acquired internships at Centers for Disease Control and Prevention.

Dr. Norman Leppla, presented on 'Recent History and Future Trends in Biological Control' at ESA 2022, Vancouver, Canada.

Dr. Lambert H.B. Kanga was selected as the keynote speaker for the 2023 Principal Investigators' Appreciation and Researchers of the Year Awards Luncheon on April 28, 2023, at FAMU.



FAMU Entomology Club of Excellence at STEM Day April 1st, 2023. Officers, (R-L) Ms. Jamesia Henderson (Vice President), Ms. Kristen Joy Adkins (President), Ms. Kiara Ivy (Historian)



Entomology Club logos, 2023

Undergraduate students heading for their summer experience 2023

Monica Ronden: Plant Science for Global Food Security (An international research experience for undergraduates) at IRRI, Philippines (through Office of International Agriculture-NSF funding)

Jacquez Daniels: 10-week summer research program at the University of Nebraska-Lincoln (Beneficial Insects Protection Research and Extension Experience (REEU).

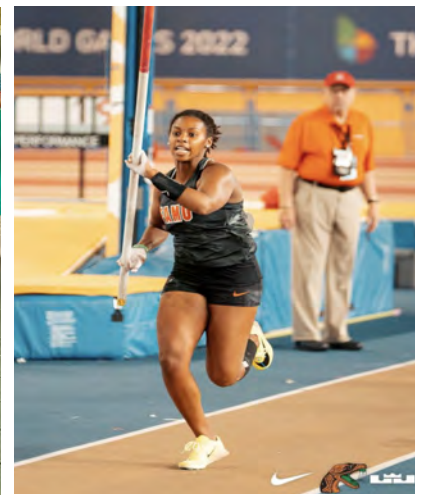
India Watson: 10-week summer research program at the University of Nebraska-Lincoln (Beneficial Insects Protection Research and Extension Experience (REEU).

Entomology Club

FAMU Entomology Club is in full swing with about 15 members in it. Officers have attended several outreach activities and created new logos.



Students attending Agri-Fest, 2023



Graduate student, Ms. Kiara Ivy, won SWAC 2023 Indoor Pole Vault Championship.

Peer-reviewed Publications and Book Chapters (2020-2022)

Almarinez, B. J. M., Barrion, A. T., Navasero, M. V., Navasero, M. M., Cayabyab, B. F., Carandang VI, J. S. R., Legaspi, J. C., Watanabe, K. and Divina M. Amalin. Biological Control: A Major Component of the Pest Management Program for the Invasive Coconut Scale Insect, *Aspidiotus rigidus* Reyne, in the Philippines. 2020. *Insects*, 11, 745; <https://www.mdpi.com/2075-4450/11/11/745>

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