



COLLEGE of
AGRICULTURE,
FAMILY SCIENCES
and TECHNOLOGY

engage

2023 RESEARCH REPORT

There's an app for that!

Decision support system with artificial intelligence (AI) to benefit small farmers

Assistant professor Dr. Adel Moawad advises senior animal science majors Taeja Brisby and Jasmine Jordan in the laboratory.



inside

2 From the President

3 From the Dean

4 Arkansas to lead \$5 million grant- established center to advance robotics in poultry processing

7 A force to be reckoned with: Fort Valley State's first Meat Judging Team wins national award

10 Fort Valley State professor publishes first manual for veterinary technology students

12 Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) Training Conference and Career Expo

14 Student's research earns 3rd place at international conference

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On the Cover:

Researchers visit Georgia farms to aid in the development of a precision animal health management app that will benefit farmers' operations.

- 16** **Research at Fort Valley State draws attention of Utah State University**
- 18** **Fort Valley State University students explore West Africa and Belize, gain new insights**
- 20** **'I ♥ Ag'**
- 21** **Fort Valley State students engage in research, earn awards, participate in internships**
- 24** **Plant science students experience internships, research camps**
- 26** **COVER STORY: There's an app for that!**
- 30** **Fort Valley State awarded NextGen grant to cultivate student success**
- 32** **Emerging Scientist**
- 34** **USDA NIFA invests in research, Extension, education at 1890 Land-grant Universities**
- 40** **Published Works**
- 48** **News & Notes**

From the President



Greetings FVSU family and friends,

As the leader of Georgia's 1890 Land-grant University, I recognize how agricultural research helps to fulfill the land grant mission.

As a result, I am proud of the accomplishments of our agricultural research faculty, staff, and graduate students. Resilience and determination continue to be thriving attributes of all the individuals that make the mission come to life. Our students are

trailblazers in their disciplines and our faculty and staff are passionate, award-winning experts who continue to provide students with life-changing opportunities.

Through our agricultural research scientists focused efforts, FVSU is equipped to provide research-based programs, resources, and learning opportunities for students. These

efforts contribute to improving food and meat production and student learning experiences. Inside this issue, you will see a detailed illustration of the contributions, accomplishments, and opportunities of our stellar faculty and students. Learn about students studying abroad in Ghana and Belize, research faculty collaborating with top universities to use Artificial Intelligence (AI) in poultry processing, and faculty publishing manuals in their disciplines.

As you read this information, feel free to share this content with others. By sharing, you help to tell the story of our institution, help to inspire prospective students and help to advance agricultural research. Your support of our efforts is invaluable and appreciated. As we continue to serve our students and faculty, we ask that you stay connected with our efforts.

Best Wishes,

Paul Jones, Ph.D.

President, Fort Valley State University

From the Dean



Greetings,

It is an exciting time at Fort Valley State University!

As your new dean, I am delighted to lead the College of Agriculture, Family Sciences and Technology. The College of Agriculture is a unique and upstanding college with endless opportunities and a plethora of resources. At FVSU, we are in the empowering business, from students to faculty and staff. To illustrate the dynamic research and

scholarly achievements of the students, faculty, and staff, we have prepared a magazine that highlights our efforts and accomplishments. I am proud to say that our scientists successfully compete for external funds to conduct innovative research in food and plant sciences. Their work is communicated through numerous publications and research presentations. As a result, our research efforts benefit Georgia agriculture by helping to maintain and improve food security here and nationwide. In addition, our students travel abroad, gaining life changing experiential learning experiences, while conducting research, and competing with peers from other institutions across the country. Many

publish with their professors/ mentors and frequently earn top awards and recognition at professional conferences within their respective disciplines.

Furthermore, this publication highlights our graduate students and post-docs who work alongside our faculty as they conduct research that will assist their trajectory as they pursue research related careers in government, private industry, or academia. Some will opt to pursue a terminal degree in their field or become entrepreneurs. Moreover, our faculty are recognized in this publication for their diligence and hard work in their discipline or the impact they have had either on students or the community. None of these efforts would be possible without the generous support of our stakeholders and friends which include agencies such as the U.S. Department of Agriculture (USDA-NIFA), the Environmental Protection Agency (EPA) the National Science Foundation (NSF) and others, including our dedicated alumni and private industry partners.

As the dean of this great college, I am extremely grateful for this support. As we embark on another year, I hope you enjoy the valuable stories told in the 2023 issue of ENGageE. Remember that Fort Valley State University is here to serve not only students, but also communities through outreach programs and the latest research.

Respectfully,

Keith Howard, Ph.D.

Dean, College of Agriculture, Family Sciences and Technology
1890 Director for Research and Extension Programs

Arkansas to lead \$5 million grant-established center to advance robotics in poultry processing

Fort Valley State University research supports efforts

By FRED MILLER

University of Arkansas System Division of Agriculture

Contributed LATASHA FORD

Fort Valley State University

Researchers in Arkansas and two other states will be using a \$5 million grant to increase use of artificial intelligence and robotics in chicken processing to reduce waste in deboning and detect pathogens.

The grant from the U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) will establish the Center for Scalable and Intelligent Automation in Poultry Processing. The center, led by the University of Arkansas System Division of Agriculture, will join researchers from five institutions in three states in efforts to adapt robotic automation to chicken meat processing.

Project director Jeyam Subbiah said the Arkansas Agricultural Experiment Station, the research arm of the Division of Agriculture, will receive \$2.2 million from the grant primarily to focus on food safety automation for poultry processing plants. The grant is for four years.

Subbiah is a professor and head of the food science department for the Division of Agriculture and the Dale Bumpers College of Agricultural, Food and Life Sciences at the University of Arkansas.

The Georgia Institution of Technology, better known as Georgia Tech, is a major partner in the project, Subbiah said. \$2.1 million of the grant will go to Georgia Tech to focus on automating the processing lines that turn chickens into meat.

The remaining grant money will be divided between Julia McQuillan, Willa Cather professor of sociology at the University of Nebraska-Lincoln, and Brou Kouakou, associate dean for research at Fort Valley State University in Georgia.

Jeff Buhr, a USDA Agricultural Research Service scientist, will contribute his expertise in broiler physiology to guide robotic deboning of meat, Subbiah said.

Georgia is the nation's top broiler producer. Arkansas is number 3, according to 2021 figures from USDA.

Meeting the challenge

The recent impetus to automate chicken processing began with the COVID-19 pandemic, Subbiah said. The illness spread quickly among workers on the processing line. Since the worst of the pandemic, the poultry industry, like many others, has been having trouble hiring enough workers.

"Poultry processing lines began 70 to 80 years ago," Subbiah said. "Since then, there have been only incremental changes in technology. Today, there's a need for transformative change."

Robotic hands are not adept at holding a chicken, he said. New technology is needed



to prevent dropping slippery meats. Separating the carcasses into cuts of meat is also tricky.

“It’s hard enough to teach people how to use a knife with precision,” said Dongyi Wang, assistant professor of biological and agricultural engineering for the Arkansas Agricultural Experiment Station. “Robotics are fit for repetitive tasks but don’t do well with the precision needed to cut up chicken products.”

For example, he said humans could feel when a knife hits a bone. In contrast, existing automation in poultry processing, like deboners, wastes a lot of meat.

“Human deboners leave about 13 percent of meat on the bones,” Subbiah said. “Automated deboners leave 16 to 17 percent. On an industrial scale, that’s a significant loss in value. We will use artificial intelligence and virtual reality to improve precision and reduce wastage.”

Automation can relieve labor shortages, Subbiah said. It also allows plants to locate in rural areas with a smaller labor force but nearer poultry houses and with lower property costs.

Initially, people working remotely may help advance robotic processing. Subbiah envisions workers logging on from home with virtual-reality goggles and haptics gloves to control robots located miles away.

While working remotely, the labor force will teach artificial intelligence how to cut up chickens of varying sizes and shapes.

“Automated machines right now are programmed to debone or cut up chickens based on an average size and shape. But no chicken is that size or shape,” Subbiah said. “Robot-wielded knives cut meat poorly. The machines have

to learn how to adjust to the reality of random sizes and shapes.”

Research team

Arkansas’ research will involve scientists from at least three departments:

- Subbiah, Kristen Gibson and Philip Crandall from the department of food science — Gibson is also affiliated with the Center of Excellence for Poultry Science
- Casey Owens and Tomi Obe from the department of poultry science and the Center of Excellence for Poultry Science
- Dongyi Wang and Yanbin Li from biological and agricultural engineering — Wang also has an appointment in food science, and Li is affiliated with the Center of Excellence for Poultry Science

The primary focus of Arkansas Agricultural Experiment Station researchers will be to automate food safety practices. Subbiah said they will develop robots that monitor processing lines for pathogens like Salmonella and maintain clean and safe spaces and equipment.

Wang and Subbiah will also develop hyperspectral imaging to detect plastics in chicken meat, Subbiah said. Wang will also develop a mobile robot that is equipped with a biosensor invented by Li to produce a biological map of the facility. The “biomap” will be used to evaluate the efficacy of sanitation.

Where the biomap indicates potential hot spots, the robot will automatically collect swabs to test for bacteria. Gibson and Obe will analyze the biomap and develop strategies to enhance food safety.

Owens and Crandall will conduct outreach activities to extend new knowledge and technology to the industry.

Georgia Tech’s participating scientists are all faculty of the Georgia Tech Applied Research Corporation:

- Doug Britton, manager of the Agricultural Technology Research Program



- Colin Trevor Usher, senior research scientist and branch head of robotics systems and technology, Agricultural Technology Research Program
- Ai-Ping Hu, principal research engineer, Agricultural Technology Research Program
- Konrad Ahlin, research engineer, Intelligent Sustainable Technologies Division
- Michael Park, research engineer, Intelligent Sustainable Technologies Division
- Benjamin Joffe, research scientist, Intelligent Sustainable Technologies Division
- Shreyes Melkote, the Morris M. Bryan, Jr. Professorship in Mechanical Engineering, associate director of the Georgia Tech Manufacturing Institute and executive director of the Novelis Innovation Hub

Collaborative research

“We are thrilled to partner with our colleagues here in the Division of Agriculture, as well as our colleagues at Georgia Tech and the other participating institutions on this exciting project,” said David Caldwell, head of the Division of Agriculture’s poultry science department and director of the Center of Excellence for Poultry Science.

“We expect the findings from these coordinated research projects will be impactful for our stakeholders in the commercial poultry industry here in Northwest Arkansas and throughout the entire industry,” Caldwell said. “This project will help keep moving technology forward in processing and food safety of poultry.”

Britton said his team was very excited to work on this project with the University of Arkansas System Division of Agriculture, Fort Valley State University, and the University of Nebraska-Lincoln.

“The ultimate goal is to drive transformational innovation into the poultry and meat processing industry through automation, robotics, AI, and VR technologies,” Britton said. “Building on years of work in the GTRI Agricultural Technology Research Program, we are pleased to see that the

USDA-NIFA has chosen this team to continue these efforts.”


Hu said, “GTRI is excited to work on such an impactful project with our fellow institutions. The last few years have highlighted the need for new technological innovations in the meat and poultry production space, which we plan to address through robotics, virtual reality, and artificial intelligence.”

McQuillan, from the University of Nebraska-Lincoln, said it was exciting to be part of a multi-institutional team discovering innovative ways to improve poultry processing through automation. “As a social scientist who has studied work and health challenges and who is starting to work with extension faculty in Rural Prosperity Nebraska, this project provides great new opportunities,” she said.

McQuillan will study the effects of robotics on poultry industry laborers and how they perceive the technology.

“We hope eventually to bring new owner-operated businesses to rural areas,” McQuillan said. “Collaborating with food scientists, computer scientists, extension faculty and robotics engineers provides amazing opportunities to understand the meanings of innovations for entrepreneurs, workers, and other stakeholders, and to advance fundamental theories about science, technology, and society in sociology.”

Kouakou, from Fort Valley State University, will investigate the application of technology developed in this project to other meat processing industries. He said he was excited about working with this team of collaborators.

“Our state-of-the-art meat processing plant at the Georgia Small Ruminant Research and Extension Center on campus will serve as a resource to extend the technology developed by the Center for Scalable and Intelligent Automation in Poultry Processing to red meat species,” Kouakou said. “This research will greatly benefit our students and processors to observe artificial intelligence in meat processing.” 

A force to be reckoned with: Fort Valley State's first Meat Judging Team wins national award

The U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) supports 1890 Land-grant University students, as well as their institutions, to develop the nation's future science and agriculture leaders. The Meats Judging Program at Fort Valley State University (FVSU) is one of many examples of how an 1890 institute is cultivating the next generation of agriculturalists.





Team members Avience Baker and McKenzie McCluskey practice their judging skills in the Meat Technology Center on campus.

By LATASHA FORD

Seven FVSU students made history as the first Meat Judging Team for the historically Black institution. This all-female team of trailblazers is a force to be reckoned with after they competed for the first time in the 2023 Spring Intercollegiate Meat Judging contest, where they took home several awards.

Hosted by the American Meat Science Association (AMSA), the competition drew more than 300 students from across the nation, from Australia and Honduras to Greeley, Colorado. The FVSU team ranked in the top 10 of Division A with a ninth-place win and placed third overall in judging.

This accomplishment is especially rewarding because the group had only two months of one-day per week virtual training sessions and two in-person meetings prior to traveling to Colorado. They also participated in an intense week of in-person training prior to the contest.



The team ranked in the top 10 of Division A.

“We trained in the meat locker from early in the morning to about 10 p.m.,” said 19-year-old Nylah Simpson of Hinesville, Georgia. The animal science major placed 19th overall in judging.

All competing students judged beef, lamb and pork. The criteria involved knowing the various cuts, fat content and anatomy.

The students described the judging process as intricate and like speaking a different language.

“I want to be a large-animal veterinarian,” Simpson said. “Meat judging is a different world. I learned the inside and outside of a cow and humane ways to care for them. Everything I am doing is helping build my knowledge about the animal as a whole.”

Not only did Simpson earn a win, 18-year-old Raven McRae also placed fifth in lamb judging, and 19-year-old McKenzie McCluskey had a perfect score on the beef cut questions.

“It was a learning experience for me. We had to deal with cultural differences, but we worked hard as a group. We all came together despite the challenges and persevered,” said McRae, a freshman computer science major.

Although she has had some exposure growing up on a farm, it never occurred to the Decatur, Georgia, native that agriculture could be a career option. This experience has taught her that she can apply her knowledge and skills as a computer science major to support agriculture.

Shocked by her own perfect score, McCluskey of Cedartown, Georgia, said learning all the different parts of the animal has helped her in the classroom. The sophomore animal science major wants to be a veterinarian and work with breeding and artificial insemination.

Avience Baker, 32, of Covington, Georgia, said she not only gained a lot of knowledge but also friends. As a nontraditional student, she joined the team because she was intrigued.

“These group of ladies are very smart, and they helped me along the way,” she said.

The junior veterinary technology major plans to pursue veterinary school and is interested in doing research. She also aspires to own a farm and expose her son more to agriculture.

To know they represented FVSU as the first Black all-female team is monumental for the team.

“We are making history. This is a field that nobody expects women or Black people, in general, to be in,” Simpson said. “It’s special because we are bringing diversity to a field that I did not even know about.”

Simpson is a USDA 1890 National Scholar, along with 19-year-old Chantia Fletcher.

“It can be scary being a trailblazer, but with certain opportunities like these, you learn, grow and make it possible for others to follow the same path,” declared Fletcher, who is determined to forge a path for other young women.

The freshman veterinary technology major plans to pursue veterinary school after graduation. She takes advantage of experiences like these for a broader perspective.

“Everything truly comes together whether on a small scale or a larger scale,” said the Grayson, Georgia, native. “As I think about my career, I am considering where I can fit in, where I can help and how I can use my expertise to truly make things better.”

The team thanked Terrell Hollis, meat laboratory manager of FVSU’s Meat Technology Center and assistant farm manager, and Karla Hollis, USDA liaison, for their support and believing in them.

“They never gave up on us,” Simpson said.

Both mentors are proud of the students’ achievements. The development of the team was a partnership between FVSU’s Meat Technology Center and the USDA Agricultural Marketing Service’s Livestock and Poultry Programs.

“If it had not been for their support, then USDA would not have done the coaching and brought diversity and excellence into the meat judging competition. It was one of the goals of the AMSA to bring in students from Historically Black Colleges and Universities,” Karla Hollis explained. “These young ladies stepped up. Despite the challenges they had, they still rose to the top, and I am proud of them.”

***We are making history.
This is a field that
nobody expects women
or Black people, in
general, to be in.***

– Nylah Simpson, Animal Science major

The next step is to participate in additional competitions and become junior coaches and mentors for the succeeding cohort of team members.

Fletcher emphasized the importance of having a foundation, confidence and learning to navigate unfamiliar environments that can be challenging.

“Know who you are, where you come from and what you bring to the table,” she strongly advised. “When you have more experiences like that, you master it over time and there is no stopping you.”



To view a video about the winning team, visit
<https://youtu.be/jxDyXeocb4c>.

Fort Valley State professor publishes first manual for veterinary technology students



By LATASHA FORD

A newly published laboratory manual addressing clinical pathology and chemistry of veterinary technology is the first of its kind to enable veterinary technology students and practicing technicians to excel in their careers.

Fort Valley State University assistant professor Dr. Oreta Samples co-authored the book, “Laboratory Manual for Clinical Veterinary Technology,” along with Dr.

M. Scott Echols, an avian veterinary specialist.

The Master of Public Health Program coordinator said she and Echols met at a veterinary technology convention in 2009 in Reno, Nevada, where she shared her interest in publishing a laboratory manual to assist instructors and benefit students. She was already familiar with Echols as she had previously reviewed some of his books and videos during her stint as an

editor for the Book Review Column of the Veterinary Support Personnel Network (VSPN), an online community for veterinarians and veterinary technicians.

“He is one of very few people in the world who does bird surgery,” Samples noted.

Echols connected her with Teton NewMedia, the premier source for veterinary and human medicine books, which led to the birth of her first published book as a co-author.

This project is a labor of love for Samples because in 1995, when she started as a veterinary technician at FVSU, lab manuals for students did not exist. Therefore, she and other instructors began developing their own lab exercises.

“I kept them in notebooks and would revise them every year. I made notes about what worked, what didn’t work and what could be added,” Samples said.

The manual is a compilation of work that she started creating back in 1995. After years of writing and collecting, Samples is proud that the long-awaited exercises are now available for veterinary technology programs around the world. There are




20 chapters that fit students' needs. The manual also covers microbiology and a chapter on avian laboratory procedures, which Echols provided, along with photos for the book.

“Each chapter addresses a task that is required by the American Veterinary Medical Association’s (AVMA) Committee on Veterinary Technician Education and Activities (CVTEA) within their guidelines for accredited veterinary technician programs of which FVSU is one. Students must master these skills,” explained the MPH coordinator.

She added that one chapter identifies the three H’s of hematology (hematocrit, hemoglobinometer and hemacytometer). This includes

the importance of and instructions on mastering the laboratory skills associated with veterinary hematology, as well as explaining what the results mean. In addition, the manual includes lab guidelines and an online portion for instructors’ references.

With this project complete, Samples is now working on a companion volume in parasitology and other major projects.

“I am so grateful to Dr. Echols for getting my foot in the door because he was the one who believed in my vision and got me started in this genre, being able to publish for veterinary technicians,” Samples said. “It was a learning process for me. I am anxious to get the next one done.” 

Dr. Oreta Samples, coordinator of the Master of Public Health Program, published her first co-authored book in October 2022.

The “Laboratory Manual for Clinical Veterinary Technology” is available online:

Amazon
[bit.ly/3hAun1Z](https://www.amazon.com/dp/B0B8K1Z1Z1)

Taylor & Francis Group
[bit.ly/3hDd93X](https://www.tandfonline.com/doi/10.1080/10817731.2022.2111111)

Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) Training Conference and Career Expo

As the host institution, Fort Valley State University took about 30 students to participate in the 2023 37th annual Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) Training Conference and Career Expo in Atlanta. Students built connections, explored careers and enjoyed various fun activities. A group of FVSU students competed in the quiz bowl, earning the title of semi-finalists. In addition, Celaya Murray placed third in the public speaking contest, and Christian Miller was recognized as a 2023 Farm Credit VIP Scholar for MANRRS.

Dr. Keith Howard, dean of the College of Agriculture, Family Sciences and Technology, and Dr. Mohammed Ibrahim, associate dean for academics, connect with agricultural alumni and students participating in the conference.



Students and faculty enjoy the Black Tie Gala and Awards Banquet.



(Left) Celaya Murray joyfully holds her third-place award in public speaking.

(Below) Quiz bowl team makes the semi-finals.



(Above) Students show their Wildcat spirit!

(Right) Christian Miller is a 2023 Farm Credit VIP Scholar for MANRRS.



Student's research earns 3rd place at international conference

By **LATASHA FORD**

Fort Valley State University graduate student Amber Davenport is surpassing goals and making a name for herself in the science world.

Her poster presentation on nanotechnology secured a third-place win at the 11th annual hybrid conference of the American Council for Medicinally Active Plants (ACMAP) at the Inter American University of Puerto Rico this summer. Nanotechnology is an emerging scientific field that impacts food and agricultural systems. This innovative technology manipulates matter on the nanoscale (about 1 to 100 nanometers) to produce new structures, materials and devices.

The biotechnology major is using her research skills in the laboratory to create a nano biosensor, which operates like a pregnancy test, she described.

"I use nanoparticles to detect a toxin prevalent in peanuts. Aflatoxin B1 is naturally occurring and produced by fungi," Davenport explained. "It grows in the soil and is found on crops."



For that reason, the young scientist is creating a sensor that is easy to use by small-scale and commercial farmers to detect aflatoxins in peanuts.

"The optical sensor determines the presence of aflatoxin B1. I am using a spectrophotometer for ultraviolet-visible absorption, which gives the concentration of the aflatoxin in the solution," she said. "Because peanuts grow underground, they are susceptible. This is important in Georgia because we produce more than half of the country's peanuts."

Davenport said this research matters because aflatoxins affect agriculture not only in Georgia and the United States but also in other countries where they do not have the necessary resources to control the spread of this toxin.

"My method of detection is rapid, sensitive and selective to only aflatoxins. It does not require a lot of time or money," the FVSU Wildcat said. She added that she is making the nano biosensor sensitive because a small quantity of aflatoxins can make someone sick. Aflatoxins can cause

cancer, liver failure and many other diseases.

For Davenport, her love for science is centered on helping people.

“What drives me is making science practical, acceptable and applicable for people in different socio-economic classes and who may not have the same benefits as those living in a first-world country. I want to make an impact everywhere,” she said.

The Fort Valley, Georgia, native emphasized science is fun, but it answers the key question she explores every time with her work: How does this research impact the world?

“My research has broader impacts. Some years ago, 125 people died and about 317 people were affected with aflatoxicosis because of the inability to detect the toxin and there were no measures to prevent it,” she said. “Peanuts are valuable. It is the fourth most edible source of vegetable oil and the third most important source of vegetable protein across the world.”

The graduate student said to represent FVSU on an international level was a humbling experience. “I was honored and excited,” she said. She was among three other peers who presented at the conference and the only student from a historically Black university to place.

“I know that I belong here,” Davenport said with confidence. “To know that the work I have done is making a difference and being seen is rewarding.”

She applauded Dr. Nirmal Joshee, FVSU professor of plant science, who co-chaired ACMAP, and her adviser, Dr. Hari Singh, chair of the Department of Agricultural Sciences, who goes above and beyond to make sure she succeeds.

“I am proud of Ms. Davenport’s achievement,” Singh said. “I see her as a role model for aspiring graduates because of her passion for science and she’s motivated, a quick learner and always ready to help her peers.”

Davenport expressed, “Fort Valley State has done so much for me. I earned my undergraduate degree from FVSU in biology and now I am here getting my master’s degree in biotechnology. I made the best decision transferring to FVSU.”

Having a place at the table as a Black woman in the science field is monumental for the Warner Robins High School graduate. Davenport says she is making noise not only at her alma mater but internationally as well.

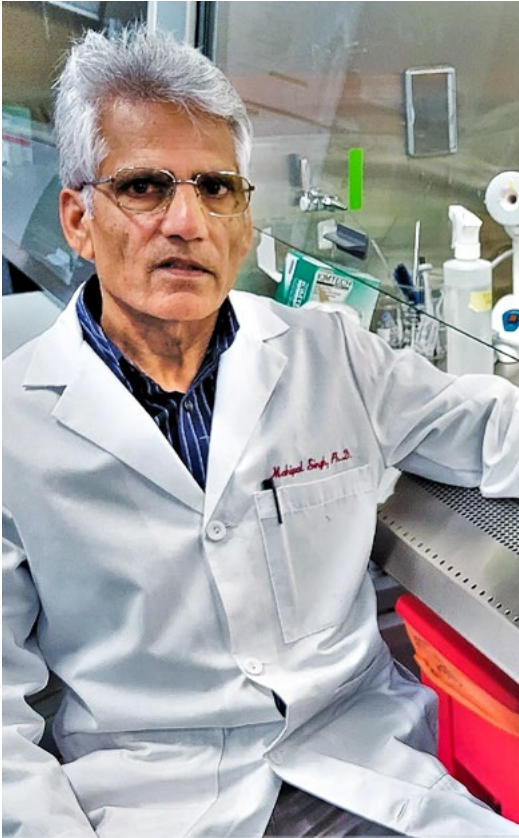
“I am grateful for the opportunity and connections. It feels good to make people proud and to be in a position where I am breaking the status quo and achieving the goals I set for myself,” she said. “This work gives me purpose and joy.”

In addition to her participation in Puerto Rico, Davenport presented her research at the 20th Association of Research Directors (ARD) Symposium in Atlanta and on FVSU’s Research Day, where she placed first for her oral presentation. She also participated in a workshop with the Alliance for Science in partnership with the Foundation for Food and Agriculture and interned in summer 2021 at the University of California, Davis, where she plans to pursue a doctorate in agroecology. 🌱



Biotechnology graduate student Amber Davenport’s love for science is centered on helping people.

Research at Fort Valley State draws attention of Utah State University



Dr. Mahipal Singh, professor of animal science and biotechnology, investigates postmortem tissues.

By **LATASHA FORD**

Dr. Mahipal Singh, a Fort Valley State University (FVSU) professor of animal science and biotechnology, gave an eye-opening glimpse into his research on postmortem tissues during a recent seminar at Utah State University (USU).

The experienced scientist and educator presented his work on the recovery of live and proliferative cells from postmortem tissues to graduate

students and faculty. He highlighted the potential use of postmortem tissues for the recovery of stem cells, cellular therapies in humans and veterinary medicine, and preservation of germplasm, which could be used to revive lost genetics in the future by somatic cell nuclear transfer (cloning).

Singh said USU representatives invited him to give a lecture for their seminar series after recently visiting FVSU's agricultural facilities. The two land-grant universities signed a five-year

memorandum of understanding in 2022, establishing a framework for the institutions to collaborate on activities of mutual interest.

"I had good interactions with several of the faculty members and graduate students," he noted. "I toured their farms and laboratories, including the integrated biosystems facilities, surgical suites and classrooms."

Singh said he was impressed with the institution's investments in animal agriculture. "I feel confident that we may have some collaborative projects in the future, creating more opportunities for faculty and student exchanges and sharing knowledge and ideas for mutual benefits," he added.

USU is conducting the monthly seminar series to feature research experts nationwide. Singh said the delegation was interested in his research on stem cell recovery. "We have a good niche in that area," he said.

The animal science professor began this study in 2015. His lab utilizes molecular biological, reproductive, surgical and cell culture methods, and uses mainly goat and sheep models. In addition, his current research efforts include investigating the effect of the melatonin hormone on fetal development, neonate survival and growth performance in goats.

Singh explained that goat meat and milk are major sources of livelihood for small farmers around the world and are rapidly expanding in the southern United States due to nutritional benefits, manageable operations and an influx of African, Hispanic and Asian populations.

“The industry suffers in production efficiency due to fetal and neonatal losses, as well as the seasonality of the reproductive cycles,” he said. “Low birth weight of the offspring is associated with an increased rate of mortality.”

Singh revealed recent studies in rats and sheep show that melatonin supplementation increases blood vascular circulation in the uterine wall of the placenta, resulting in an increase in nutritional and oxygen supply to the growing fetus.


“Such studies in goats have not been adequately undertaken,” he noted. “Although goats and sheep have similar physiological systems, it is not clearly established if melatonin has a similar effect in goats.”

For that reason, the objectives of this research are to assess the effect of melatonin supplementation during gestation on uterine arterial blood

I feel confident that we may have some collaborative projects in the future, creating more opportunities for faculty and student exchanges and sharing knowledge and ideas for mutual benefits.

- Mahipal Singh, Ph.D.

flow, fetal growth and neonate survival. Also, Singh will assess the effect of melatonin on in-vitro oocyte maturation and embryo development and determine the base levels of melatonin receptor expression in various tissues. These studies can provide a mechanism for goat farmers to use melatonin supplements to enhance neonate and infant survival, growth performance, reproductive performance and profitability.

“This project will also provide an opportunity for training the next generation of scientists in animal biotechnology and reproductive technology, in addition to increasing their competence for undertaking other challenging projects,” Singh expressed. 

Singh presents his research to graduate students and faculty at Utah State University.



Fort Valley State University students explore West Africa and Belize, gain new insights

By LATASHA FORD



Miniya Miller, agricultural economics major, balances a basket on her head while in Belize.

Seven Fort Valley State University (FVSU) agricultural science students took the trip of a lifetime to West Africa in November 2022 to learn about and absorb the operation of cocoa and shea butter production.

The enthused group consisted of six animal science majors and an agricultural economics major. The students embarked on an 11-day journey to Ghana and the Ivory Coast (Côte d'Ivoire) with Dr. Brou Kouakou, associate dean for research, and Dr.

Mohammed Ibrahim, associate dean for academics, in FVSU's College of Agriculture, Family Sciences and Technology. Latasha Ford, research communications manager, also joined the group to document the students' experiences.

During their international exploration, the undergraduates visited a cocoa farm in Adzopé, Côte d'Ivoire and learned about the cocoa production process by CAYAT (Coopérative Agricole de Yakassé-Attobrou).

Student Casey Hunter, animal science major, enjoyed immersing himself in the process.

"This experience and the knowledge I've gained have been so pivotal for me in wanting to become a change agent within the agricultural sector. I wish many more could experience this," he expressed.

In addition, the group visited the Cargill plant, laboratory and shipping facility in Abidjan, Côte d'Ivoire. Côte d'Ivoire produces about 43 percent of the world's cocoa, all from family farms. Cargill is one of the largest family-owned companies in the world.

Student Miniya Miller, agricultural economics major, was appreciative of the opportunity.

"We had the pleasure of touring the Cargill factory, where they produce cocoa beans," she explained. "We saw the manufacturing, scientific and business logistics aspects that people wouldn't think about when making chocolate." The group also visited a local artisan chocolate maker's shop.

Furthermore, the latter part of the trip to Tamale, Ghana provided the students with a firsthand look at how shea butter is made, the history of the Saakpuli Slave Market and Elmina Castle, and traditional dances.

The team is grateful to the Cargill company and, more importantly, to the West Africa group that hosted the trip in Côte d'Ivoire. The Center of Excellence for Global Food Security and Defense, funded by the U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA), supported this international learning experience.

Also, Miller had an opportunity to travel to Belize in May 2023 through



the Transfer Academic Achievement Program (TAAP). TAAP was developed to provide academic and personal support to transfer students who are in pursuit of a Bachelor of Science in Agribusiness and Food Industry Management at North Carolina Agricultural and Technical State University or a Bachelor of Science in Agricultural Economics at FVSU. This program is designed to enhance students' academic preparation, workforce development and readiness, and professional soft skills and international experiential learning.

“Study abroad (international experiential learning) does not only broaden the student’s horizon but also sets the student participant apart from their peers,” Ibrahim said.

In addition to Miller, FVSU students Faith Fantroy, Brice Paster, Christian Miller and Bryce Andreotti benefited from TAAP. Paster, Christian Miller and Andreotti received \$1,600 each over the duration of the grant. Fantroy benefited from professional development by attending the 2022 Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) Training Conference and Career Expo in Jacksonville, Florida, and biweekly Zoom meetings. ↩



(Clockwise from top left) Students learn the process of making shea butter in Ghana.

Fort Valley State University and North Carolina Agricultural and Technical State University students and faculty enjoy their trip to Belize.

Students explore a cocoa farm in Adzopé, Côte d'Ivoire.

Students, faculty and staff learn traditional dances in Tamale, Ghana.

'I ♥ Ag'

By LATASHA FORD

Samantha Sherman (known by many as Sam) loves science, gardening and birdwatching. She fit right in as an aggie Wildcat when pursuing a master's degree at Fort Valley State University. Sherman is originally from Scituate, a small town in Rhode Island, but has been living in Georgia for more than half her life. She earned a Bachelor of Science in biology from Middle Georgia State University in 2018 and then a Master of Science in biotechnology from FVSU in 2021. She is now extending her skills and experience at her alma mater as a research assistant in Dr. Nirmal Joshee's laboratory.



Why did you pursue becoming a Wildcat in agriculture at Fort Valley State University?

"I became interested in the biotechnology graduate program while I was an undergraduate at Middle Georgia State University. Dr. Nirmal Joshee came to talk about the program and his lab. I had already been interested in medicinal plants, as well as plant propagation and plant tissue culture, for some time. When I learned I could do that work at Fort Valley, I knew this would be a good place for me to pursue my master's degree."

Who or what inspired you to study your major?

"I was inspired by many of my past professors who helped me as an undergrad, as well as my parents who always pushed me to pursue my education."

What agricultural science project impacted your life as a student? Why?

"As a student, I always loved having science projects where we got to grow something. I can remember growing herbs in the classroom as an elementary student and using them to make a pizza sauce. I think it is great when we can put our time into making good high-quality food that we can enjoy eating."

Why did you return to your alma mater to lend your research skills?

"I decided to return to FVSU because I love the work I am doing here. It means a lot to me to be able to

continue working on the projects that have become so important to me. Being here gives me the opportunity to continue to learn about biotechnology while being able to share that same knowledge with others."

What are your duties as a research assistant? Do you work a lot with students?

"As a research assistant, I train graduate students and interns in the lab, teach the labs for graduate courses, maintain our in vitro germplasm composed of more than 25 plant species, oversee greenhouse operations, maintain lab equipment, order supplies for the lab and greenhouse, and conduct experiments in the lab."


What unique opportunities have you been afforded while serving in this role?

"I have been given the chance to serve as ambassador on the board of the American Council for Medicinally Active Plants. In addition to presenting at last year's conference and this year's upcoming conference, I helped organize last year's conference, as well as this year's upcoming conference, which will be at West Virginia State University this October. I have also been able to continue publishing my research, which is very important to me. I have published six peer-reviewed journal articles and one book chapter and have more manuscripts in the works for the future."

What is your elevator speech to encourage students to pursue a degree in agriculture?

"The things we need the most in life are food, clothing and shelter. If we don't have those basic needs met, we can't do much else. Agriculture is the way food is made available to the world, and it feels good knowing that I contribute to that. My contribution might be very different than my grandfather's (who was a farmer), but it is something I am very proud of."

How are you using your research experience to help others, and what are your future goals?

"I think being able to work with my students and teaching them in the lab is a great way that I can help others. Also, being able to publish the research I do for medicinal plants gives me a chance to help others in a couple of ways. First, by enlightening people about the medicinal plants I work with and to facilitate other researchers to do better work with these plants. For my future goals, I am interested in getting a Ph.D. soon so that I can have more chances to move further in research or academics." 

Fort Valley State students engage in research, earn awards, participate in internships

By **LATASHA FORD**

Nine Fort Valley State University (FVSU) students presented their research at the 2023 Emerging Researchers National (ERN) Conference in Science, Technology, Engineering and Mathematics (STEM) in Washington, D.C. The Scholarships in STEM scholars and four faculty members attended the conference, with some students earning awards.

The ERN Conference in STEM aims to help undergraduate and graduate students enhance their science communication skills and to better understand how to prepare for science careers in a global workforce.

Senior Jarred Johnson won first place in the computer science oral presentation. The 25-year-old computer science major said his research focused on an easy-to-use license plate detection model.

“It detects license plates and extracts the characters. My professor and I wanted to gauge its accuracy and efficiency,” he explained.

Johnson examined the model’s use in regular weather elements such as clear daylight and during conditions like fog and at night.

Kamora Payne and Jarred Johnson won second- and first-place awards, respectively, at the ERN in STEM Conference.





Students meet with Congressman Sanford Bishop.

“We found that the model was about 75 percent accurate in detecting a license plate in regular conditions,” he said. “For optical character recognition, it was about 30 percent efficient in extracting characters in regular conditions.”

Johnson said he gained a lot of new knowledge about programming languages. He said his win reaffirms all his hard work finally paying off. He added to be recognized at a conference of that magnitude shows that students who attend FVSU can do anything that the bigger institutions can do.

After graduation, the FVSU Wildcat desires to work in the software industry. He plans to apply for a summer internship to further expand his computer science skills. He also plans to pursue a master’s degree and doctorate to continue his research.

Johnson, who grew up in Iowa and Illinois, said his father introduced him to computers when he was 7 years old. He strayed away from it in high school but realized his passion for computers and working with software when he transferred to FVSU during his sophomore year.

“I decided to give it a shot and have loved it ever since. There are many opportunities at FVSU. You must be open and willing to network and talk to your professors,” he advised.

Another winner, Kamora Payne, took home second place in the poster presentation for biological physiology and health at the conference. The senior plant science-biotechnology major presented her research on investigating the effects of diet on lipid storage. She conducted studies using the fruit fly to evaluate diets that increase starvation resistance.

Comfortable and excited to share her research, Payne expressed that it was an interesting process.

“I found that there is a set point for obesity in species,” she said. “The environment plays a big role and can temporarily change the way your genes are expressed. If you starve yourself, you are going to store more fat because your body is trying to survive.”

While conducting this research, the 21-year-old interned at the University of Nevada in Las Vegas in 2022 for over two months.

“Winning was an eye-opener and reassured me that I am ready for graduate school,” she said. Payne aspires to pursue a doctorate in biomedical science and continue conducting health disparities research.

“My mom is big on organics and natural approaches, which sparked my interest,” she said. “Growing up in South Fulton, Georgia, there was a lack of access to things medically.” This also inspired her desire to open a wellness facility in her hometown.

“We are very proud of Ms. Payne and Mr. Johnson. They both have a bright

future,” said Dr. Sarwan Dhir, FVSU professor of plant biotechnology and director of multiple National Science Foundation (NSF) STEM programs. “This is a huge distinction that really reflects their backgrounds and showcases their commitment to academics and community service. They have exhibited scholarly excellence and are extremely involved on campus, making them top role models for others.”

Furthermore, junior Anijha Baker appreciated the opportunity to network at the ERN in STEM Conference. The 21-year-old plant science-biotechnology major also interned at the University of Maryland Eastern Shore (UMES) in the summer of 2022.

An FVSU 1890 scholar, Baker’s research focused on marine biology, where she experimented with *Sambucus nigra* extracts. During the

10-week internship, she gathered samples at Ocean Bay City. She worked with the U.S. Navy on finding a nontoxic method to remove bacteria from the bottom of boats.

“We made a paste to put on the bottom. We won’t know if it worked until about five or six years from now. The boat must sit in the water for many years,” she noted.

Baker said this experience taught her more about how things work in the lab. Since working with the U.S. Navy, the Fort Gaines, Georgia, native is interested in serving in the military and becoming a botanist.

This opportunity was supported by multimillion-dollar grants from the NSF HBCU-UP (HRD-2011903), S-STEM (DUE-1834046) and the Department of Education MSEIP (P120A2000016) at FVSU. ↩

Students are shown in the plant science laboratory with Dr. Keith Howard, dean of the College of Agriculture, Family Sciences and Technology, and Dr. Sarwan Dhir, professor of plant biotechnology.



Plant science students experience internships, research camps



By **LATASHA FORD**

Twenty-four Fort Valley State University plant science-biotechnology S-STEM scholars gained firsthand experience participating in a collaborative summer internship program at major research institutions across the nation.

These institutions included the University of Nevada in Las Vegas, the University of California-Davis, the University of Georgia (UGA), the University of Central Florida, the University of Pittsburgh, the University of Maryland Eastern Shore (UMES), Penn State University and the University of California, Berkeley.

Dr. Sarwan Dhir, an FVSU professor of plant biotechnology, advises the scholars, exposing them to various summer workshops, research camps and internship programs.

“Internships are valuable because they expose students to real-time, real-life jobs in a low-risk environment,” he said. “Our expectation that the students trained with the support of this program will boost their confidence in research and critical

thinking confirms that they should continue with their major and seek a career in the STEM field.”

Junior Jevon Clarke interned in the laboratory on campus in the summer of 2021, where he learned new techniques and connected with the agricultural community. The skills he gained helped when he interned in the Research and Extension Experiences for Undergraduates (REEU) program at UGA in the summer of 2022. His research focused on crop genetics and breeding.

The 20-year-old said FVSU provided a great foundation to practice those techniques and network during the two-month internship. He worked with other students from around the country.

“Everyone coming together with different learning styles and experiences, I was able to network

Plant science-biotechnology S-STEM students share their summer research experience with peers and Dr. Olufunke A. Fontenot, provost and vice president for academic affairs.

with them so that I could learn from them, and they could learn from me. I became more focused knowing that there are more people out there like me studying in the same area,” Clarke said.

The Orlando, Florida, resident grew up in an agricultural community in Jamaica. He said his experiences at FVSU have been rewarding. “This department has provided countless opportunities for me to make connections,” said the FVSU 1890 scholar.

He plans to pursue a master’s degree in plant breeding and work for the U.S. Department of Agriculture’s (USDA) Natural Resources Conservation Service (NRCS).

Junior Anijha Baker, also an FVSU 1890 scholar, interned at UMES in the summer of 2022. Her research focused on marine biology, where she experimented with *Sambucus nigra* extracts. During the 10-week internship, she gathered samples at Ocean Bay City.

The 20-year-old from Fort Gaines, Georgia, appreciated the support she received from mentors and graduate students at UMES. “I learned a lot,” she said. Baker plans to attend law school or pursue a forensic science degree.

Latavia Powell, a junior from Jacksonville, Florida, worked in the lab with Dhir and biology professor Seema Dhir, collecting tissue cultures of strawberries. “It’s been fun. I enjoy being under the hood and getting that hands-on experience,” she said. “I am learning a lot of techniques.”

The 20-year-old, who earned a biotechnology scholarship, said the more she gets involved, the more she is realizing her passion. “Plant science comes with so many options. There is a wide range of careers to pursue,” she said, noting she is interested in an internship at UGA.

Also interested in entrepreneurship, Powell recently started an eyelash business. After she graduates, she plans to attend esthetician school to become a certified lash technician. She desires to open her own shop offering various services, including creating a plant-based product line for lashes, hair or skin care.


J’lyscia Roberts, a sophomore from Warner Robins, Georgia, participated in research camps and worked in the lab on plant procedures. She is excited about possibly pursuing an internship at the University of Vermont.

The 19-year-old learned about FVSU’s agricultural programs from her mother, Josephine Felton, an FVSU alumna and staff member. She grew up knowing more about working in the field but enjoys lab work.

“I am interested in the medical field and medicinal plants,” she said, noting that she inherited land from her grandfather.

The young scientists advise students to get involved and take advantage of the many available resources on campus. Although FVSU may not have been their first choice, they are glad they became Wildcats due to the family-oriented environment and vast opportunities.

“Fort Valley is small but big,” Powell smiled. “I would not have changed my decision to come here.”

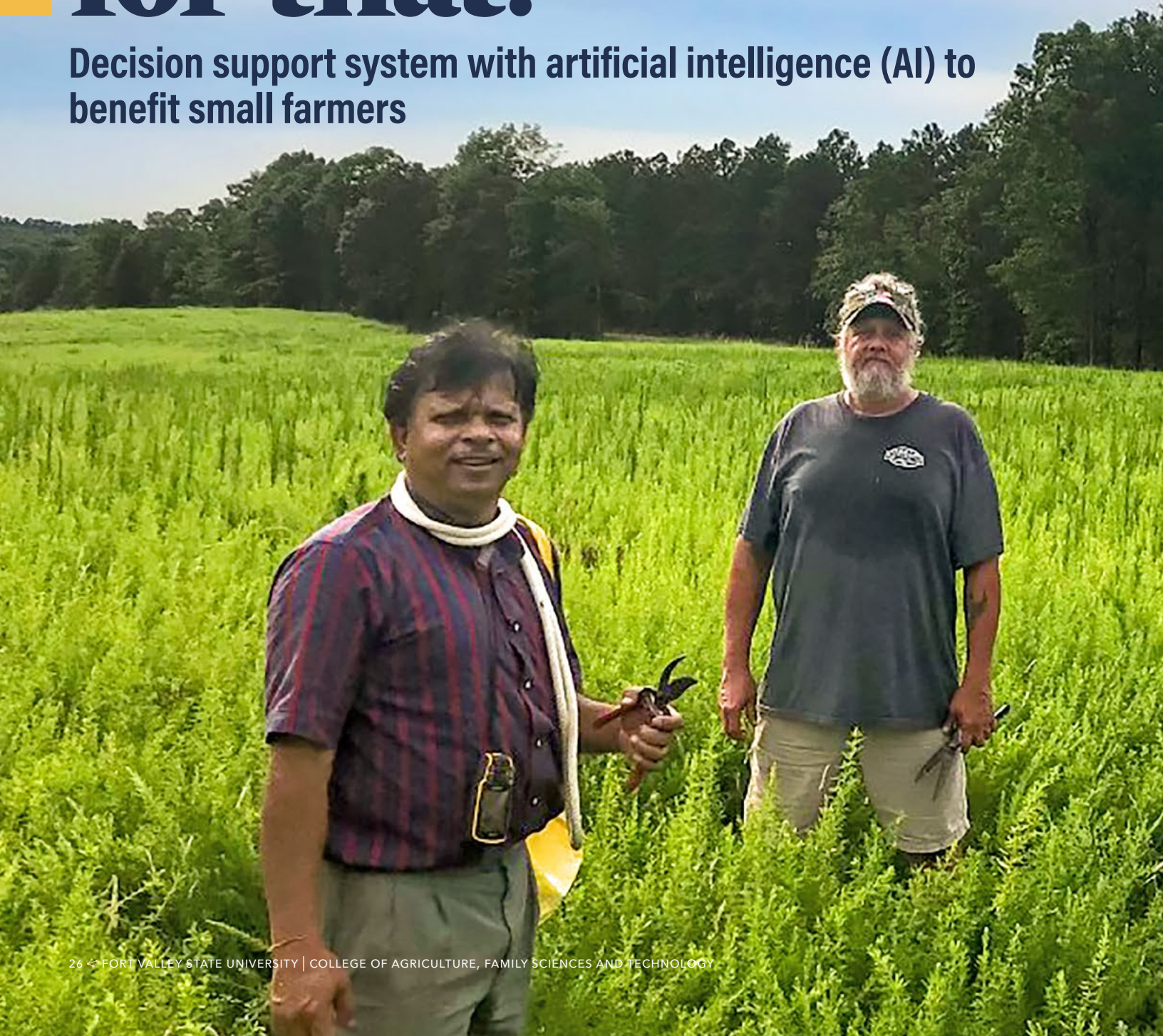
Multimillion-dollar grants from NSF HBCU-UP (HRD-2011903), S-STEM (DUE-1834046) and the Department of Education MSEIP (P120A2000016) at FVSU help provide financial support, cutting-edge research experiences and scientific meetings to students studying biotechnology. 

Students Jevon Clarke, Anijha Baker, J’lyscia Roberts and Latavia Powell work in the research lab with Dr. Sarwan Dhir, professor of plant biotechnology.



There's an app for that!

Decision support system with artificial intelligence (AI) to benefit small farmers



A photograph of two men standing in a lush green field. The man on the left is wearing a plaid shirt, a white cap, and glasses, holding a yellow measuring tape and a clipboard. The man on the right is wearing a light-colored short-sleeved shirt and a wide-brimmed hat with orange and yellow stripes. The background shows a dense line of trees under a blue sky with light clouds.

Small and limited-resource farmers in the southern U.S. and South Africa will soon have immediate access to their own personal veterinarian and agronomist with just a click of the finger.

Researcher Dr. Thomas
Terrill meets with
Georgia farmers.



Terrill and researcher Dr. Ajit Mahapatra visit farmers in South Africa.

By LATASHA FORD

Artificial intelligence (AI) and precision agriculture are on the rise as scientists explore emerging technologies for farmers to save money and increase productivity.

For that reason, Fort Valley State University (FVSU) researchers Drs. Thomas Terrill and Ajit Mahapatra are using a \$750,000 grant from the U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) to develop a precision animal health management app.

"This is an extension of the work we have been doing with the American Consortium for Small Ruminant Parasite Control. We have had a lot of success with the FAMACHA scoring card and medicinal plants," said Terrill, who is coordinator of the consortium as FVSU is its lead institution.

The animal science professor emphasized the purpose of this innovative project is to use geographic information systems (GIS) technology and AI computer modeling to develop an automated, cell phone-based decision support system for farmers in

the U.S. and South Africa to improve animal health in their small ruminants (sheep and goats).

For example, a farmer can take pictures of an ailing goat's eyes with a cell phone and then send the images through the downloaded free app. In response, the farmer will receive immediate information on how to improve the goat's health if it needs deworming.

"We found that many limited-resource farmers have access to mobile phones but not the expertise," Terrill noted. "They may not have the funds or access to a veterinarian who is an expert in caring for small ruminants. Farmers can monitor their animals, and the information through the app will help them save labor and money on medicine, increase productivity and prevent animal deaths."

Another benefit of using the app is a farmer can predict the best environment to grow medicinal plants such as sericea lespedeza, which is a high-tannin, perennial legume used for forage production.

"We are focusing on low input, simple technologies that are effective for small and limited-resource farmers. Sericea lespedeza (*Lespedeza cuneata*), an anti-parasitic forage plant, is well adapted to the southern U.S. and South Africa. We have a parallel system, where whatever we are trying out in Africa, we are also doing here," Terrill said.

The work will be completed in both countries to benefit primarily small and limited-resource livestock producers. Terrill said the modeling will be focused mainly on sustainable management of internal parasites in sheep and goats and will include identification of animals in need of treatment, production of bioactive

Farmers can monitor their animals, and the information through the app will help them save labor and money... We are focusing on low input, simple technologies that are effective for small and limited-resource farmers.

- Thomas Terrill, Ph.D.

(anti-parasitic) forages in different geographic regions and climates, and other novel (non-chemical) technologies.

The FVSU forage specialist and Mahapatra, food engineering professor, visited South Africa in January 2023 to kick off their project. On their 10-day trip, they visited several field research sites in various provinces of South Africa to plan their outreach activities. They met with partners Dr. Sudhanshu Panda from the University of North Georgia – Gainesville Campus, Dr. Eric Morgan from Queen’s University Belfast in Northern Ireland and Dr. Jan van Wyk from the University of Pretoria in South Africa. These scientists are experts in GIS technology, climate change and parasitology, respectively. The group also interacted with South African scientists, Extension specialists, farmers and agricultural business owners. Terrill said they received enthusiastic support for their project regarding the potential use of sericea lespedeza.

In addition, a GIS laboratory will be housed on campus to train FVSU students in AI. “We are hoping this will be the start of a new curriculum

here at Fort Valley,” Terrill said.

The overseas collaborators plan to visit FVSU for additional research and outreach planning. The team will incorporate drones to capture photos and collect data from transponders placed on

individual goats that will give off a radio signal to help monitor their activities. The scientists will examine differences over the seasons.

Once the decision support system app is implemented, farmers can use it anywhere in the world where livestock are raised.

This NIFA-funded project is for three years. The title is “Geo-information Technology and Artificial Intelligence Application Based Animal Health Management Decision Support System Development to Support Small-Holding Farmers.” ↩

Terrill conducts a meeting in South Africa to explore ways to improve animal health in small ruminants (sheep and goats) using a precision animal health management app.



Fort Valley State awarded NextGen grant to cultivate student success

Fort Valley State University (FVSU) will share in the benefits of an \$18 million grant awarded to 1890 land-grant partner Tennessee State University's (TSU) College of Agriculture to support the next generation of professionals in agricultural careers.

By **LATASHA FORD**

This U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) grant is through the NextGen grant program. The purpose is to enable minority serving institutions to build and sustain the next generation of the food, agriculture, natural resources and human sciences workforce. TSU's project entitled, "NEXTGENeration Inclusion Consortium for Building the Food, Agriculture, Natural Resources and Human Sciences Pipeline (FANHP)" is led by principal investigator Dr. John C. Ricketts, professor in the Department of Agricultural Sciences at TSU.

FVSU's College of Agriculture, Family Sciences and Technology (CAFST) received a \$1,316,596 subaward from this NIFA-funded grant for five years. Dr. Hari Singh, professor in the Department of Agricultural Sciences, is the principal investigator, and Dr. Mohammed Ibrahim, associate dean for academics in the CAFST, is the co-principal investigator.

Singh and Ibrahim explained that their main goal is to provide paid summer internships for high school students interested in attending FVSU and hands-on research engagements at other institutions for current students. Annual study abroad opportunities are part of the grant as well.

In addition, the FVSU research duo plan to establish and fund academic scholarships rewarding underserved students in-state and out of state involved in 4-H, Minorities

Dr. Mohammed Ibrahim, associate dean for academics, is shown with animal science major Nallely Mendez at the 2023 FVSU Research Day.



in Agriculture, Natural Resources and Related Sciences (MANRRS), Junior MANRRS and Future Farmers of America (FFA). This will help build student leaders in areas of need to support their development academically and professionally. Singh noted FVSU will also offer a USDA NIFA-funded College of Agriculture course sharing network called Parchment. This system will allow students to have access to different curricula in agriculture.

“The possibilities of this grant will boost the interest of students and help develop a workforce for the next generation,” Singh expressed. “The course serving network will be a major advantage.”

He and Ibrahim are excited about the scholarships, which is a financial benefit, but also the outreach students will experience through networking and developing relationships.

“Students acquiring soft skills will be tremendous,” Ibrahim said, referring to their participation in conferences and traveling abroad to immerse themselves in diverse cultures.

In addition to FVSU, TSU is partnering with faculty from Alcorn

The possibilities of this grant will boost the interest of students and help develop a workforce for the next generation.

– Hari Singh, Ph.D.

State University, the University of Houston, Chief Dull Knife College, Middle Tennessee State University, University of Tennessee – Martin, University of Tennessee – Knoxville, Virginia Tech, Vanderbilt University and the MANRRS organization.

The NextGen grant program is a part of USDA NIFA’s \$262.5 million investment in institutions of higher education to develop future diverse agricultural professionals. The program is funded by President Joe Biden’s Inflation Reduction Act. Of the 33 awarded projects across 24 states, only five were awarded in Tier 3, projects up to \$20 million and including at least three institutions across two states. ➔

Dr. Hari Singh, professor in the Department of Agricultural Sciences, reviews poster presentation by Marian Perez, 2023 plant science biotechnology graduate and valedictorian, at the 2023 FVSU Research Day.



Emerging Scientist

Conqueror: Fort Valley State student graduates with career in animal science

By LATASHA FORD

Animals have always fascinated Jalani Brown. Following her childhood passion, the 22-year-old pursued her purpose of contributing to agriculture with a career in animal genetics.

The Fort Valley State University Wildcat walked across the stage on May 13 to receive her master's degree in animal science. Proud of her success, she said before the big day that the occasion will be bittersweet because her experience at the historically Black university (HBCU) has been excellent ever since her freshman year.

Therefore, Brown continued her education at FVSU after earning a bachelor's degree in animal science in 2021.

"During my undergrad, I gained the experience that I needed in classes like ruminant nutrition, reproductive physiology and animal breeding. I felt like I could get a job after I graduated, but I wanted to expand those skills," she said.

Dr. Adel Moawad, FVSU assistant professor of animal science, encouraged her to return to the classroom, where she specializes in animal reproduction research.



"I feel like Fort Valley State has helped me develop my skills so that I can go into the workforce and be great," Brown said.

However, her love for animals began way before she stepped onto FVSU's campus. A native of Norcross, Georgia, Brown was exposed to agriculture at a young age.

"I grew up watching Animal Planet and National Geographic on television with my grandmother," she said. "I started watching Dogs 101 and making flashcards with facts about dogs. The passion grew as I got older."

In addition, the enthused scientist got involved in 4-H and poultry judging. Her grandfather also introduced her to raising chickens.

"My parents and I had about 11 chickens at one point in the suburbs. My dad built a big chicken coop in the backyard," she beamed. "It gave me an appreciation for people who take care of animals. It is a lot of work."

Learning about FVSU's animal science program, its status as an HBCU and 1890 Land-grant University, and the family-oriented environment inspired her to apply.

Throughout her time on campus, the scholarship recipient used her skills to present at events such as the Association of Research Directors (ARD) Conference and the Professional Agricultural Workers Conference (PAWC). She took home the first-place award in the graduate oral presentation at the PAWC. Also, she won first place in the graduate oral presentation for her research on the “Effects of L-Carnitine Dietary Supplementation on the Quality of Goat Semen” at the 2023 FVSU Research Day.

Her research involved investigating the effects of feeding L-Carnitine in powder form to goats every day for about two months. She conducted this study by collecting blood samples throughout the experiment.

“I looked at viability, concentration, abnormality, motility and testosterone. I wanted to see if the overall quality of the semen was better,” Brown explained. “The purpose of this research is to help meet the high demand for goat meat. If farmers can purchase this simple L-Carnitine powder, their goats can have better sperm quality and better fertility rates.”

As a result, she discovered that the L-Carnitine powder increased the goats’ testosterone, which heavily corresponds with fertility, between 30 and 60 days. Somewhat timid, Brown said her research efforts have prepared her for public speaking and networking.

“It has also perfected my work ethic,” she noted.

These experiences have led to her landing a career opportunity before graduation. She will begin the next chapter of her life as an in vitro fertilization (IVF) technician at Trans Ova Genetics. The company

provides industry-leading reproductive technologies to breeders looking to advance and extend superior genetics. Brown will train in Texas for three to six months. Her training will include working in the IVF laboratory, combining embryos and sperm. She is stationed at the company’s new facility in Lawrenceville, Georgia, which will serve producers throughout the Southeast region of the country.

Brown is appreciative of her FVSU professors, especially Moawad for his mentorship. She said the institution is a close-knit community. She advises students to get to know their professors and other students. Although she enjoyed her years at FVSU, Brown is ready to move forward and apply all that she has learned.

“I’ve come, I’ve conquered, now I am ready to go out into the world and contribute,” she said. “I am excited to fulfill this lifelong passion I have had for animals and to benefit people in agriculture.” 🔄

Jalani Brown wins first place in the graduate oral presentation at the 2023 FVSU Research Day.



For more information about the animal science graduate program at FVSU, visit <https://ag.fvsu.edu/animal-science>.

USDA NIFA invests in research, Extension, education at 1890 Land-grant Universities

Research at Fort Valley State University is published and presented through scholarly journals and shared through presentations at scientific conferences globally. In addition, FVSU researchers receive external funds by applying for competitive grant programs and establishing relationships with public and private industry organizations. Below is a list of published works, presentations, and industry partnerships established by FVSU agricultural research faculty and staff from 2022-2023.

the test product; and (3) evaluate the consumer acceptance of formulated vegetable oils through sensory testing of potato chips fried in formulated oils.

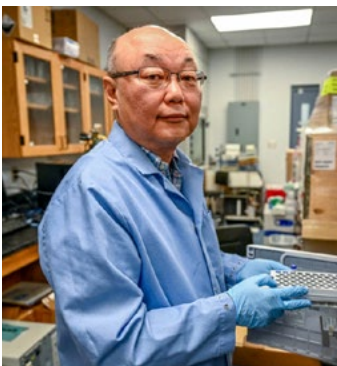
Who will benefit from the research?

This project will benefit the edible oil and snack-food industries as well as oilseed producing farmers, create opportunities for diverse student groups at Fort Valley State University (FVSU) to gain hands-on experience modifying vegetable oils and frying processing technologies, and help scientists and scholars improve their technical and communication skills. Furthermore, suggested reliable blended frying oils will be used as a guideline to develop new oilseed varieties for plant scientists.

Projected impact (how will it change lives)?

The outcomes of this project will suggest the physicochemical properties of blended vegetable frying oils that will be used as a guideline to develop new oilseed varieties for frying oil, accumulate the knowledge of deep-fat frying applications, and broaden the application to other food products containing vegetable oils. This project will also benefit the edible oil and snack-food industries, create opportunities for diverse student groups at FVSU to gain hands-on experience modifying vegetable oils and frying processing technologies, and help scientists and scholars improve their technical and communication skills.

Counting the Sunflower Oil Shortage Impact on Frying Oil through Oil Blending Application



Researcher: Dr. Jung Lee

Purpose and goal of the project?

The ultimate objective of this project is to develop an appropriate blended frying oil as an alternative to high-cost sunflower oil without changing the unique flavor profile and stability of fried foods, addressing the global shortage of sunflower oil and its impact on food security. Such an alternative can serve to reduce the high demand of sunflower oil caused by disruptions in the global supply chain and improve the quality of fried food products. The specific objectives of this proposal are: (1) develop formulate applicable vegetable oils that have an ideal fatty acid profile for deep-fat frying by blending readily available vegetable oils based on their fatty acid composition; (2) determine the flavor stability and quality of formulated vegetable oils using potato chips as

Why should people care?

This project will provide reliable blended frying oils as an alternative to high-cost sunflower oil without changing the unique flavor profile and stability of fried foods, addressing the global shortage of sunflower oil. The outcome of this research project will also provide a sustainable answer to global food security concerns.

Awarded amount and grant number?

Award Amount: \$277,902.00

Award Number 2023-38821-39923

US-Ghana Collaboration: Developing FVSU's Capacity in Ag Research, Education and Extension to Enhance Faculty and Students' Experiential Learning



Researcher: Dr. Ajit Mahapatra

Purpose and goal of the project?

This multidisciplinary, multi-institutional, and international integrated project addresses USDA-NIFA Program Priority Area “Global Food Security and Agricultural

Biosecurity” and supports NIFA’s global engagement initiative for advancing the U.S. agricultural goals. Likewise, this project is in line with Fort Valley State University’s (FVSU) Strategic Plan of 2020-2025, ensuring FVSU’s role in international leadership and to develop state-of-the-art academic programs, new initiatives, and services to increase enrollment and retention.

The overall goal of this project is to establish capacity building in US-Ghana collaboration at FVSU for providing students with opportunities of experiential learning in next generation food systems and emerging technologies (ET). The collaboration among FVSU, University for

Development Studies-UDS (Tamale, Ghana), Purdue University (PU, West Lafayette, IN), and USDA-ARS (Tifton, GA) will explore each other’s research and teaching potential for training students in the critical area of food safety and security. The project will adopt a four-prong approach to achieve the overall goal via a combination of research, teaching, faculty preparation, and outreach activities. It will provide opportunities for FVSU and UDS faculty and students to participate in short-term exchange programs to work on their research projects.

Nonthermal processing methods including microwave heating, UV-C, and pulsed UV light technologies will be used for degradation of aflatoxins in sorghum and high iron millet. Sensing systems (SS) will be designed and developed for managing and controlling aflatoxin during production, processing, storage, and transportation of sorghum and high iron millets in northern Ghana. Postharvest technologies and integrated pest management (IPM) strategies will be carried out to control storage pests, mold growth, and aflatoxin contamination for the preservation, sustainable production, and use of sorghum and high iron millet. Experiments will be conducted to evaluate the efficacy of local botanical powders and vegetable oils against the key storage pests infesting sorghum and high iron millet in northern Ghana. Modern breeding techniques, DNA markers, and Genome-Wide Association Study (GWAS) will be used for identification and characterization of sorghum and high iron millet germplasm lines for resistance to grain mold and aflatoxin accumulation in grains. Educational and training materials in ET including Artificial Intelligence (AI), Internet of Things (IoT), SS, and Agri-Artificial Neural Network (A-ANN) will be developed for students’ training.

Outreach efforts will address extension goals of transferring new technologies and products of research to small-scale producers, processors, packers, and other customers, and stakeholders. Workshops will be organized to provide hands-on training to faculty, field agricultural staff, and the target farmers on effective grain storage

and sustainable pest management strategies for sorghum and high iron millet in northern Ghana.

Who will benefit from the research?

Students, faculty, and researchers; sorghum and high iron millet small-scale producers, processors, extension professionals, field agricultural staff, packers, customers, and other stakeholders.

Projected impact (how will it change lives)?

The project will provide students, faculty, and researchers from FVSU, UDS, PU, and USDA-ARS with opportunities to develop global perspectives, cultural awareness, and competitiveness in next generation food systems and ET via experiential learning.

Establishing an US-Ghana partnership offers FVSU students and faculty the opportunity to study, participate in advanced research, and travel internationally via exchange programs to better understand the culture of African nations through Ghana, thereby further their success as global leaders. Importantly, the research team will address the problem of aflatoxin in sorghum and high iron millet.

It will enhance the quality of research that students' experience along with improved appreciation of different cultures. The teaching modules' pedagogical design will help place students in team-oriented, problem-solving, decision-making situations in the context of real-world experiences.

It will enrich the academic preparation of selected faculty in agrotechnologies and its instruction delivery.

Why should people care?

Sorghum and high iron millet are important staple cereals that are considered climate-smart crops. It is estimated that 5%-30% of the world's cereal grains are destroyed due to molds and mycotoxins, causing a loss of about one billion metric tons of agricultural produce and food products. Insects and molds are the main reasons for postharvest loss of cereal grains during storage, leading to production of mycotoxins. Aflatoxin contamination is a major factor for reducing African agricultural commodity

competitiveness for export. Hence, preservation and decontamination of cereals is essential to reduce postharvest losses with improved preservation methods for increasing food security and sustainability. Therefore, a comprehensive, multi-prong approach involving nonthermal processing methods, AI, IoT, SS, IPM, and GWAS proposed in this project will help in controlling the complex aflatoxin problem and improve the health, income, and livelihoods of farmers, farm households, and consumers.

Awarded amount and grant number?

USDA-NIFA, 2023-2026, \$599,130.

Grant accession number: 1030429.

Developing the Next Generations of Minority Leaders in Pest Management for Food and Agriculture in a Changing Climate



Researcher: Dr. George Mbata

Purpose and goal of the project?

This project addresses the development of new IPM (integrated pest management) leaders using innovative strategies of recruitment, retention, and experiential learning opportunities.

Over the years (2000-2023), the entomology program at Fort Valley State University has prepared undergraduate students for graduate programs. As many as 80 students completed undergraduate research projects in various aspects of postharvest Entomology and 40 of these students proceeded to institutions like Florida A&M University, University of Florida, University of Georgia, Purdue University, Pennsylvania University, etc. for graduate studies. Several students found jobs in USDA ARS labs, and in agricultural related industries.

Entomology faculty at FVSU have participated in several USAID international programs aimed at capacity building and reduction in postharvest food losses due to infestation by arthropods and microbial contamination. FVSU entomology program is well positioned to train manpower that will address the mitigation of postharvest food losses that will be exacerbated due to climate change. This project on postharvest IPM addresses the development of new leaders using innovative strategies of recruitment, retention, and experiential learning opportunities. It is also concerned with the establishment of pathways towards an equitable and diverse workforce for U.S. agriculture. The goals of the proposal are aligned with the strategic priorities of Fort Valley State University (FVSU), an 1890 Land grant institution as well as those of USDA's goals (5 and 6) to build next generation of a diverse, skilled and knowledgeable USDA workforce.

Who will benefit from the project?

The project will ensure infusion of skilled manpower in Agriculture both at the rural and cooperate level in the southern United States.

Projected impact (how will it change lives)?

The impact will include equipping student participants with usable skills in IPM of crop pests to be ready for the job market upon graduation. The project will ensure equitable participation of diverse groups in IPM of crop pests.

Why should people care?

Crop pests significantly reduce yield. Impact of arthropod pests are becoming exacerbated because of the reduction in the IPM tools effective against the pests due to insects becoming resistant to chemical pesticides, and the delisting of some chemical pesticides because of their deleterious impact on the environment and on beneficial organisms. In addition, climate change has impacted pest population dynamics, such as shorter population turnovers. Skilled manpower will be needed to maintain surveillance over pest populations to ensure that changes in pest populations are detected before economic injury levels are reached.

Awarded amount and grant number?

\$490,660.80

Federal Award Number: 2023-70508-40531
Grantees: Florida A & M University (Lead Institution) Subaward Institution: FVSU

Building Capacity in Assisted Reproductive Technologies (ARTs) at Fort Valley State University (FVSU): Strategies to Improve the Efficiency of In Vitro Embryo Production (IVEP) and Artificial Insemination (AI) in Small Ruminants



Researcher: Dr. Adel Moawad

Purpose and goal of the project?

The proposed project seeks to establish assisted reproductive technologies (ARTs) research and teaching facility at Fort Valley State University to

provide opportunities for underrepresented students to be trained and acquire skills in these technologies. This will give them the capabilities to complete their undergraduate and graduate degrees in agricultural and biomedical sciences and ultimately pursuing a career in embryology, andrology, animal reproduction, human fertility, or biotechnology. Another research goal of the project is to utilize ARTs especially AI and IVEP to improve the reproductive potential and production in small ruminants.

The specific research objectives of the project are: 1. To evaluate the effects of dietary supplementation of L-carnitine on the quality and fertility of goat and sheep semen, 2. To investigate the effects of L-carnitine supplementation to semen extender on the viability and fertilizing ability of frozen/thawed spermatozoa in small ruminants, 3. To test the impacts of L-carnitine

or CoQ10 inclusion during IVM of sheep and goat oocytes on their nuclear maturation, spindle configuration and mitochondrial activities, 4. To study the influences of L-carnitine or CoQ10 supplementation during IVM on in vitro embryo development following IVF of small ruminant oocytes.

Who will benefit from the research?

The project will provide opportunities for underrepresented ethnicities or economically disadvantaged groups to be trained and acquire skills in these technologies. This will give them the capabilities to complete their undergraduate and graduate degrees in agricultural and biomedical sciences and ultimately pursuing a career in embryology, andrology, animal reproduction, human fertility, or biotechnology.

The proposed project will build on these skills to greatly enhance the education, research and outreach capacity of our students, staff, and faculty in the areas of ARTs to allow this work to have even greater impact on animal and human fertility throughout the U.S. and the world.

The proposed project would have a high impact, not only on the students, but also on our community and farmers by holding training workshops/seminars to educate the farmers on semen quality, cryopreservation, and AI.

Projected impact (how will it change lives)?

Fort Valley State University is a world leader institute for research in small ruminant reproductive physiology, nutrition, milk and meat production, and biotechnology, as well as sustainable parasite management. The project investigator (PI, Dr. Moawad) is a member of The National Goat Consortium (NGC). NGC is an initiative of 1890 Land Grant Institutions that was established in 2010, it works in partnership with other land grant institutions, non-profit organizations, government, and other stakeholders to promote the goat industry. The PI has extensive experience with ARTs particularly AI and IVEP and he worked in collaboration with other Co-PIs from FVSU for more than 2 years in many projects associated with bovine artificial insemination and small ruminant male and female fertility. Through these ongoing studies we were able to train many

undergraduate and graduate students on the AI procedures as well on several other ARTs such as estrous synchronization as well as pregnancy diagnosis by rectal palpation and ultrasound. Expanding the AI facility at FVSU through the proposed project will enhance our student training, hand on experience and research skills. It would likely increase the enrollment, retention, and graduation rates by opening new arenas for the students to be involved in internships and other activities related to their career interests and academic path. The proposed project would have a high impact, not only on the students, but also on our community and farmers by holding training workshops/seminars to educate the farmers on semen quality, cryopreservation, and AI. The Co-PIs at FVSU comprise an animal nutritionist and small ruminant research specialist of over 20 years (Kouakou et al., 2008), an animal biotechnology specialist with an extensive experience in molecular biology and in-vitro cell culture (Singh and Sharma, 2011). Beside a reproductive physiologist with an over 30 years of experience in small ruminant research and education. A veterinarian with tremendous experience with animal disease and veterinary surgery as well as livestock production and extension specialist with over 17 years' experience in small ruminant production management and AI workshops (Whitley and Jackson, 2004). This expertise has allowed our university to be a leader in development and integration in livestock reproduction and management, reproduction biotechnologies as well as animal biotechnology. The proposed project will build on these skills to greatly enhance the education, research and outreach capacity of our students, staff, and faculty in the areas of ARTs to allow this work to have even greater impact on animal and human fertility throughout the U.S. and the world. Part of this project will be to create a state-of-the-art facility in AI and IVEP at FVSU, which will greatly increase opportunities for experiential learning in ARTs for both undergraduate and graduate students at FVSU and other participating institutions. All products and techniques developed during this project can be adopted by other institutions in the U.S., and those in Egypt, where small ruminants make a significant contribution to national economies.

Any technologies that will be developed for small ruminants in this project will also have application to larger ruminants, like beef and dairy cattle, camels, buffaloes, llamas and alpacas, and exotic wildlife. The proposed project will have high impact, not only on animal production, but will also potentially enhance the biomedical research and ARTs in human. In last decade, small ruminants are not only used as valuable livestock producing meats, milk, wool, and fibers, but also became important large animal models for use in biomedical research to mimic human diseases, as many rodent models do not show the same disease phenotype as observed in humans. Compared to cattle, sheep and goats are more suitable as animal models with a reasonable size, and a short reproduction cycle, and cost-efficiency (Polejaeva, 2021). This interest in biomedical models may become a new force to drive the development of small ruminants ARTs. Through our project we expect that the development of small ruminants IVEP would be beneficial for both agricultural sheep and goat production and biomedical research.

Why should people care?

The global population is expected to rise from a current level of ~7.7 billion to ~9.7 billion by 2050. Per capita meat, and milk consumption is predicted to increase 20% during this period, mainly due to the increasing affluence of the middle classes in Southeast Asia. Contemporary farming practices cannot deal with this demand and will place an intolerable burden on the climate given that livestock production already contributes to 18% of the Earth's global warming. Solving these problems necessitates producing increased amounts of meat and milk from fewer animals. The USA is a world leader in developing livestock with superior genetic traits that drive increased productivity through greater feed conversion efficiencies, improved disease resistance, and higher fertility. Farm animals' reproductive performance determines the profitability and the intensity of genetic improvement of sires and dams. Reproductive inefficiency is one of the most important causes of economic losses in animal industries in the US and throughout the world. Despite of the remarkable advancement that has been made in the field of reproductive

physiology in recent years, infertility due to low conception rate and high embryonic mortality rate remains a major problem. To meet future needs and to be able to sustain agricultural production, agricultural research and its applications need to use all emerging technologies one of which is assisted reproductive technologies (ARTs). Growth in small ruminant (sheep and goat) production has gained tremendous interest in the USA over the last few decades, particularly in the southeastern U.S. Small ruminants have potential for meat and milk production as well as in biomedical and reproductive research. ARTs particularly artificial insemination (AI) and in vitro embryo production (IVEP) is still not-well-developed in sheep and goat compared to cattle and there is a room for further improvement. A strong, well-trained workforce in the agricultural and biomedical sciences is essential to provide the resources necessary to feed the growing population and helping people to alleviate their health issues. This effort requires innovative solutions that will come from a workforce with a diverse background. To this end, the proposed project seeks to establish ARTs research and teaching facility at Fort Valley State University to provide opportunities for underrepresented students to be trained and acquire skills in these technologies. This will give them the capabilities to complete their undergraduate and graduate degrees in agricultural and biomedical sciences and ultimately pursuing a career in embryology, andrology, animal reproduction, human fertility, or biotechnology. Another research goal of the project is to utilize ARTs especially AI and IVEP to improve the reproductive potential and production in small ruminants.

Awarded amount and grant number?

Collaborators (Co-PIs) outside FVSU:

Irina Polejaeva- Utah State University, USA

Iman Shaheed- Cairo University, Egypt

Younis Abdelmoneim- Mercer University, USA

Awarded amount and grant number?

Awarded amount: \$599,670.00

Grant No. 2023-38821-39935

Published Works 2022 – 2023

Research at Fort Valley State University is published and presented through scholarly journals and shared through presentations at scientific conferences globally. In addition, FVSU researchers receive external funds by applying for competitive grant programs and establishing relationships with public and private industry organizations. Below is a list of published works, presentations, and industry partnerships established by FVSU agricultural research faculty and staff from 2022-2023.

Ajit K. Mahapatra, Ph.D.

RECENTLY FUNDED PROPOSALS:

1. US-Ghana Collaboration: Developing FVSU's Capacity in Ag Research, Education, and Extension to Enhance Faculty and Students' Experiential Learning, USDA-NIFA, 2023-2026, \$599,130.
2. Enhancing Food Safety in Pecan Processing, USDA-ARS, 2022-2026, \$431,686/year.
3. Assessment of Agronomical Factors for Harvest Maturity and Yield of Peanut Using Sensor-based System and Economic Appraisal (FVSU-Purdue University), Southeastern Peanut Research Initiative Committee / Southern Peanut Farmers Federation/National Peanut Board, 2022-2023, \$25,000.
4. Predicting Harvest Maturity and Enhancing Yield and Quality of Peanuts Using Sensor-based System and Economic Appraisal (FVSU-Purdue University), Geor-

gia Peanut Commission, 2022-2023, \$15,000.

USDA OR INDUSTRY COLLABORATIONS AND PARTNERSHIPS:

1. USDA-ARS, SEA, SE Fruit and Tree Nut Research Center, 21 Dunbar Rd., Byron, GA 31008.
2. USDA-ARS, SEA, Crop Genetics and Breeding Research Unit, 115 Coastal Way, Tifton, GA 31793.
3. Integrated Sensing and Smart Solutions Center, Electrical and Computer Engineering Technology Department, Purdue University, West Lafayette, IN 47907.
4. University for Development Studies, POB TL 1350, Tamale, Ghana.

PRESENTATIONS, ABSTRACTS, (WITH STUDENTS AND FACULTY):

1. Arthur, V.*, H.L. Degala, R. Gyawali, A.K. Mahapatra, and J.H. Lee. 2023. Pulsed-UV light inactivation of *Escherichia coli* (ATCC 8739) on pecan halves. American Society of Agricul-

tural and Biological Engineers (ASABE) Annual International Meeting, 8-12, 2023, Omaha, NE.

2. Afrin, A*, H.L. Degala, R. Gyawali, A.K. Mahapatra, and J.H. Lee. 2023. Efficacy of Lemon Grass Oil in Reducing *Escherichia coli* on Pecan Halves. American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, July 8-12, 2023, Omaha, NE.
3. H.L. Degala, K. Talari*, A.K. Mahapatra, and R. Gyawali. 2023. Qualitative assessment of pulsed UV-light processing on shelled pecans. American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, July 8-12, 2023, Omaha, NE.
4. Konkayala, S.L.*, A.K. Mahapatra, H.L. Degala, and R. Gyawali. 2023. Combined effect of copper and organic acids treatments against *Escherichia coli* in goat meat. American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, July 8-12, 2023, Omaha, NE.
5. Panda, S.S., T.H. Terrill, A.K. Mahapatra, E. Morgan, A. Siddique, A.A. Pech-Carvantes, and J. A. Van Wyk. 2023. Precision Agriculture Decision Support System Development as a WebGIS Dashboard for *Lespedeza Cuneata* Production Quality and Quantity Management. American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, July 8-12, 2023, Omaha, NE.
6. Panda, S.S., A. Siddique, T.H. Terrill, A.K. Mahapatra, E. Morgan, A.A. Pech-Carvantes, and J.A. Van Wyk. 2023. Remote Animal Health Management with Artificial Intelligence -Integration of Geospatial Technology,

- Precision Agriculture, and RFID Telemetry. American Society of Agricultural and Biological Engineers (ASABE) Annual International Meeting, July 8-12, 2023, Omaha, NE.
7. Panda, S.S., T.H. Terrill, A.K. Mahapatra, A. Siddique, P. Jat, and A.A. Pech-Cervantes. 2023. Artificial Neural Network Modeling Approach to Estimate Nutritional Quality of *Lespedeza Cuneata* to Support Small Ruminant Healthy Production. Presented at the AI in Agriculture: Innovation and Discovery to Equitably Meet Producer Needs and Perceptions, April 17-19, 2023, Orlando, FL.
 8. Mahapatra, A.K. 2023. Pulsed Ultraviolet Light Treatment of Meat. Invited Speaker at the Georgia Association for Food Protection Spring Meeting, May 10, 2023, Athens, GA.
 9. Mahapatra, A.K. 2023. Predicting Harvest Maturity and Enhancing Yield and Quality of Peanuts Using Sensor-based System and Economic Appraisal. Presented at the Georgia Peanut Commission's Annual Research Day, February 8, 2023, Tifton, GA.
 10. Mahapatra, A.K., D. Shapiro-Ilan, and C. Bardsley. 2022. Enhancing Food Safety in Pecan Processing: Research Collaboration between USDA-ARS and Fort Valley State University. Presented at the UGA Pecan Research Workshop, College of Engineering, University of Georgia, August 7 - 8, 2022, Athens, GA.
 11. Degala, H., A.K. Mahapatra, and K. Talari*. 2022. Pulsed UV-light Inactivation of *Salmonella* on Shelled Pecans. Institute of Food Technologists (IFT) Annual International Meeting, July 10-13, 2022, Chicago, IL.
 12. Mahapatra, A.K., R. Gosukonda, B.K. Biswas, and H.L. Degala. 2022. Artificial Neural Network Models for the Prediction of Thermal Properties of Stevia Powder. Presented at the American Council for Medicinally Active Plants, Inter American University of Puerto Rico, June 28-July 2, 2022, Barranquitas, PR.
 13. Degala, H.L., I. Vyas*, and A.K. Mahapatra. 2022. Effect of Pulsed UV-Light on Qualitative and Quantitative Characteristics of Beef, Chicken, and Pork. Presented at the American Society of Agricultural and Biological Engineers Annual International Meeting, July 17-20, 2022, Houston, TX.
 14. Mahapatra, A.K. and H.L. Degala. 2022. An Overview of Pulsed Ultraviolet Light Processing to Improve Shelf Life of Meats. ARD Symposium, April 2-5, 2022, Atlanta, GA.
 15. K. Talari*, H.L. Degala, and A.K. Mahapatra. 2022. Efficacy of pulsed ultraviolet light in inactivating *Salmonella* on shelled pecans. ARD Symposium, April 2-5, 2022, Atlanta, GA.
 6. Mbata, G. N., Li, Y., Shapiro-Ilan, D.I. 2022. Evaluation of chemical and microbial control options for *Pangaeus bilineatus* (Say) (Hemiptera: Cydnidae) infesting peanut crop. Pest Management Science. Pest Manag Sci 2022; 78: 4719-4727
 7. Li, Y., Mbata, GN., Simmons, A., Punnuri, S., 2022. Susceptibility of snap bean cultivars to the sweet potato whitefly, *Bemisia tabaci*, in the southern United States. Crop Protection 159
 11. <https://doi.org/10.1016/j.cropro.2022.106022>

CONFERENCE PAPERS

1. Mbata, G., Li, Y., Simmons, A., Punnuri, S. Progress in whitefly-research at Fort Valley State University. 2023 Southeast Regional Fruit and Vegetable Conference. Savannah, GA. Jan 5-8,2023.
2. Mbata, G. N., Li, Y., Simmons, A., Shapiro-Ilan, D. Greenhouse virulence of entomopathogenic nematodes to the sweet potato whitefly, *Bemisia tabaci*. 2023 Joint SEB & APS-CD Meeting.
3. Li, Y., Mbata G. N., Simmons, A. Effect of the sweet potato whitefly, *Bemisia tabaci*, infestations on different squash cultivars under field conditions. 2023 Joint SEB & APS-CD Meeting.
4. Mbata, G. N., Li, Y., Simmons, A., Shapiro-Ilan, D. Progress in whitefly-research at Fort Valley State University. USDA ARS Southern Whitefly Project Meeting, Athens, Georgia, February 16, 2023.
5. Li, Y.; Mbata, G.; Simmons, A. Population dynamics of insect pests and beneficials on different snap bean cultivars. The 85th Annual Meeting of the Georgia Entomological Society; Unicoi State Park and Lodge, Helen, Georgia, April 2023.

George N. Mbata Ph.D.

JOURNAL PUBLICATIONS

1. Ofuya, T. I., Okunlola, A. I., Mbata, G. N. 2023. A review of insect pest management in
2. vegetable crop production in Nigeria. Insects 2023, 14, 111. <https://doi.org/10.3390/insects14020111>
3. Li, Y., Mbata, GN., Simmons, A. 2023. Population dynamics of insect pests and beneficials on
4. different snap bean cultivars. Insects 2023, 14, 230.
5. <https://doi.org/10.3390/insects14030230>

Published Works 2022 - 2023

6. Li, Y.; Mbata, G.; Simmons, A. Field evaluation of squash cultivars for susceptibility to the sweet potato whitefly, *Bemisia tabaci*, infestations. 2023 Entomological Society of America Southeastern Branch Meeting; Little Rock, Arkansas, March 2023.
7. Danso, J.; Mbata, G.; Holton, R. Preharvest insect pests of peanuts in selected regions in Georgia, USA. 2023 Entomological Society of America Southeastern Branch Meeting; Little Rock, Arkansas, March 2023.

POSTER PRESENTATIONS

1. Singh A.; Li, Y.; Mbata, G. Laboratory virulence of entomopathogenic fungus, *Beauveria bassiana*, to the maize weevil, *Sitophilus zeamais*. 2023 Entomological Society of America Southeastern Branch Meeting; Little Rock, Arkansas, March 2023.
2. Li, F.; Li, Y.; Mbata, G. Management of *Pangaeus bilineatus* (Say) with entomopathogenic nematodes. 2023 Entomological Society of America Southeastern Branch Meeting; Little Rock, Arkansas, March 2023.
3. Garland, K.; Mbata, G.; Shapiro-Ilan, D. Management of small hive beetles with entomopathogenic nematodes. The 85th Annual Meeting of the Georgia Entomological Society; Unicoi State Park and Lodge, Helen, Georgia, April 2023.

ACTIVE GRANTS

1. USDA-NIFA NEX GEN Research Grant
Year of Grant: 07/10/2023 -06/30/2028
Grant#: NEXTGEN Proposal #2022-11878
Grant Title: Training next gen-

eration Entomologists
Grantees: Florida A & M University, Fort Valley State University, University of Florida, etc
Subaward amount: 494,000.00

2. USDA -Agricultural Research Service
Year of Grant: 09/10/2021 -09/30/2024
Grant #: 58-6066-0-061
Title: Sustainable conservation of pollinator
Grantees: George Mbata and David Shapiro-Ilan
Amount: \$72,642
3. USDA-ARS: Grant #: 58-6080-9-006
Title: Managing Whiteflies and Whitefly-Transmitted Viruses in Vegetable Crops in the Southeastern U.S.
Year of Grant: 09/10/2019 -09/30/2024
Grantees - UGA, FVSU (George Mbata and Somashekhar Pun-nuri) USDA ARS South Carolina
Subaward Amount: \$2,132,800
4. USDA-NIFA-AFRI
Year of Grant: 2016 - 2023; Grant #: 2016-69008-25089
Title: Critical Agricultural Research and Extension: IPM Package for the Management of *Pangaeus bilineatus* (Say) Using a combination of biological and chemical insecticides.
Amount: \$200,000.00
Investigators: George N. Mbata, David Shapiro-Ilan, Mark Abney

COLLABORATIONS

Active collaborations on the use of Entomopathogens in the Management of the small hive beetle and pests of vegetable crops.

NAMES AND AFFILIATIONS OF COLLABORATORS

- David I. Shapiro-Ilan, Ph.D.
Research Leader

(Editor-in-Chief, Journal of Invertebrate Pathology)
USDA-ARS, SEA
SE Fruit and Tree Nut Research Unit
21 Dunbar Road
Byron, GA 31008

- Jamie Ellis, Ph.D.
Gahan Endowed Professor
Honey Bee Research and Extension Laboratory
Entomology and Nematology Department
University of Florida
Steinmetz Hall
Gainesville, FL, USA 32611
- Lambert H. B. Kanga, Ph.D.
Professor and Chair
Director / Center for Biological Control
College of Agriculture and Food Sciences
Florida A&M University
406 Perry-Paige Bldg.
Tallahassee, FL 32307

SUMMARIES OF THE VARIOUS PROJECTS

1. Title: Sustainable conservation of pollinator
This project is aimed at reviving honeybees by targeting a pest that contributes to colony collapse disorder (CCD) in beehives. The pest addressed here is the small hive beetle (*Aethina tumida*). It is a native of south Africa but has spread from its native habitat in the mid 1990's to other continents besides Antarctica as an invasive and destructive predator of western honey bee (*Apis mellifera*) hives.
2. Title: Managing Whiteflies and Whitefly-Transmitted Viruses in Vegetable Crops in the Southeastern U.S
Summary: A study was done to survey the populations of insect pests and beneficials on different cultivars of snap bean, tomatoes and squash cultivated in Georgia, USA. It is important to conserve the beneficial insects in crops,

and to understand both the abundance and diversity of beneficials and pests in crops. The population dynamics of insect pests (particularly sweet potato whitefly), pollinators, and natural enemies were evaluated on 24 snap bean cultivars, 22 squash cultivars weekly from 25 to 60 days after the plants emerged. The number of sweet potato whitefly eggs and the number of whitefly nymphs varied on the cultivars. Some cultivars attracted very few adult whiteflies and also had few eggs laid on them implying that they may be producing kairomones that repel adult whitefly. Some cultivars that had eggs laid had few F1 adults implying that they may be killing the larvae by antibiosis. Other pests harbored by the crops include adult potato leafhoppers, tarnished plant bugs, trips and Mexican bean beetle.

3. Title: IPM Package for the Management of *Pangaeus bilineatus* (Say) Using a combination of biological and chemical insecticides. The peanut burrower bug, *Pangaeus bilineatus*, is a major crop pest of peanuts in the southern United States. Peanuts infested by *P. bilineatus* exhibit weight and quality losses and could be discounted up to 50% of the prevailing price. Control of this pest is difficult because it attacks mature peanut pods underground, thus rendering foliar pesticide applications ineffective. Integration of entomopathogenic fungi and nematodes with chemical insecticides in the management of the populations of *P. bilineatus* was investigated as a potential IPM containment tool.
4. Title: Active collaborations on the use of Entomopathogens in the Management of the small hive beetle and pests of vegetable crops

Our collaborators on all studies involving EPNs are Dr. David Shapiro-Ilan (USDA ARS) and Dr. James Ellis (UGA)

On the small hive beetle – Lambert Kanga (Florida A&M University), Dr. David Shapiro-Ilan (USDA ARS) and Dr. James Ellis (UGA).

Collaboration on whitefly - Dr. David Shapiro-Ilan (USDA ARS) and Dr. Alvin (USDA ARS, South Carolina)

Somashekhar Punnuri, Ph.D.

GRANTS

1. Title: High Throughput Phenotyping of Crops Using sUAS-borne Imagery
Funding agency: USDA ARS
Period covered: 09/01/2022 to 08/31/2025
Total Amount: \$27,777
Summary: This project enhances FVSU capacity to conduct drone studies in understanding pest problems in sorghum and other crops. It supports training FVSU personnel in conducting high throughput phenotyping using UAS-borne imagery using hyperspectral and multi-spectral drones. Student involvement and training is built into the project.
2. Title: USDA ARS Project on screening watermelon Shaker Kousik-USDA ARS Charleston and Punnuri-FVSU
Title: Screening Seeded and Seedless Watermelon Varieties for Resistance to the Whitefly-transmitted Cucurbit Leaf virus
Funding agency: USDA ARS
Period covered: 09/01/2022 to 08/31/2024
Total Amount: \$34,000
Summary: This will build capacity to conduct field trials for screening whitefly resistance in seeded and seedless watermelon varieties. This project supports collection of site-specific data for whitefly infestation on watermel-

on varieties. It provides growers and research community with information on management of whiteflies with relevant genetic and genomic information.

CONFERENCES AND MEETINGS ATTENDED AT REGIONAL, STATE, NATIONAL, AND INTERNATIONAL LEVELS

1. Graduate students presented a poster at Plant Genomics and Gene Editing conference in Raleigh, NC, October 24- 25, 2022.
2. Attended Crop Science Society of America annual meeting in Baltimore, MD, Nov-2022.
3. Attended Multi-State Climate Change project initiation meeting March 2022 in Atlanta.
4. Attended Global Sorghum Conference 2023 in Montpellier, France, June 5-9, 2023.
5. Chaired a session on sustainability in sorghum production at GSC-2023, Montpellier, France.
6. Presented an oral talk on genomic resources for improving aphid resistance in sorghum at GSC, 2023.
7. Graduate students presented a poster at National Association of Plant Breeder's conference in Greenville, SC, July 15-20, 2023.

PUBLICATIONS, PEER REVIEWED JOURNALS

1. Knoll et al. (2023) Registration of three sweet sorghum lines with resistance to sorghum aphid (*Melanaphis sorghi*)-Journal of Plant Registration-Accepted
2. Gangurde et al. (2022) Two decades of association mapping: Insights on disease resistance in major crops-Frontiers in Plant Sciences
3. Uyi et al. (2022) Impact of Planting Date and Insecticide Application Methods on *Melanaphis sorghi* (Hemiptera: Aphididae) Infestation and Forage Type Sorghum Yield. Insects 2022,13(11),

Published Works 2022 - 2023

- 1038; <https://doi.org/10.3390/insects13111038>
4. Uyi et al. (2022) Management of *Melanaphis sorghi* (Hemiptera: Aphididae) in grain sorghum with early planting and in-furrow flupyradifurone application. *Crop Protection* 164, 106148
 5. Uyi et al. (2022) Host plant resistance, foliar insecticide application and natural enemies play a role in the management of *Melanaphis sacchari* (Hemiptera: Aphididae) in grain sorghum. 2022-Frontiers in Plant Sciences
 6. Hugo et al. Genetic Mapping of Sugarcane Aphid Resistance in Sorghum Line SC112-14 (2022). *Crop Science*
 7. Punnuri* S, Ayele A, Harris-Shultz K, et al. (2022). Genome-wide association mapping of resistance to the sorghum aphid in Sorghum bicolor, *Genomics*, 110408, ISSN 0888-7543

NON PEER REVIEWED PUBLICATIONS

1. Southern Research Communicators Consortium, <https://www.morningagclips.com/southern-extension-offices-growing-crops-research/>
2. SorghumBase Website, <https://www.sorghumbase.org/post/identification-of-marker-trait-associations-for-sorghum-aphid-resistance>

ABSTRACTS SUBMITTED.

1. Punnuri S, Boatwright L, Coffin A, Tadesse H, Knoll J, Harris-Shultz K, Wallace J. (2023)- Identification of sorghum aphid resistance loci and other related traits using cornerstone genomic resources. Global Sorghum Conference, 2023, Montpellier, France, June 5-9

2. Cheruku VKR, Sangireddy MKR, Punnur S. 2022. Understanding the role of microbiome dynamics in monocot-dicot systems. *Plant Genomics and Gene editing Congress 2022*, October 24- 25, in Raleigh, NC

COMMUNITY SERVICE

- Attended VCVD-Virtual Congressional Visits Day with other SEED ambassador for Crop Science society meeting March 2023.
- I have served as the academic editor for PLoS One journal since January 2023.

NEW STRATEGIC PARTNERS

- Dr. Alisa Coffin from USDA ARS is supporting our research team in conducting drone-based imaging and collecting data on plant health.
- Dr. Shaker Kousik, Research leader, USDA ARS Charleston is supporting us through ARS project to conduct field screening of watermelon varieties at FVSU location.
- Dr. Raghupathy Karthikeyan, Clemson University is supporting our phenome analysis in CBG project.

Hari Pratap Singh Ph.D.

RECENTLY FUNDED PROPOSALS

1. NEXTGENERATION Inclusion Consortium for Building the Food, Agriculture, Natural Resources, and Human Sciences Pipeline (FANHP), USDA-NIFA, \$1,316,596.00 (year 2023-2028).
2. Title III, Part F project entitled, "Creating Awareness and Training Opportunities in Nanotechnology (CATON), Department of Education, \$158,129.65 (year 2022-2023).

3. 1890 Multistate Integrated Project "Climate Change: Impacts for Socially Disadvantaged Farmers, Landowners & Communities of Color", USDA-NIFA, \$3,922,010.00 (year 2022-2028).

RESEARCH JOURNAL PUBLICATIONS

1. Habib, A, et. al., and H.P. Singh (2022). Water Deficit Stress Tolerance Assessment in Barley Cultivars Using Drought Tolerance Indices. *Journal of Agriculture and Crops*, 8(4):228-235.

PRESENTATIONS/ABSTRACTS INVOLVING STUDENTS

1. Voruganti, S.R. and H.P. Singh (2023). Nanofertilizer: A Paradigm Shift in Era of Advancing Nanotechnology. FVSU Annual Research and Creative Works Symposium, April 19-20, Fort Valley State University, Fort Valley Ga.
2. Shrestha, D. and H.P. Singh (2023). Emerging Nanotechniques for Aflatoxin Detection in Peanuts. FVSU Annual Research and Creative Works Symposium, April 19-20, Fort Valley State University, Fort Valley Ga.
3. Cloud, S. and H.P. Singh (2023). Biomass Waste Derived Cellulose-Chitosan Cross Linked Super Absorbent Hydrogels. FVSU Annual Research and Creative Works Symposium, April 19-20, Fort Valley State University, Fort Valley Ga.
4. Singh, H. P., Voruganti, S. R., & Degala, V. N. (2022) Nanotechnology and its Application in Agriculture. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD. November 6-9, 2022. <https://scisoc.confex.com/scisoc/2022am/meetingapp.cgi/Paper/145836>
5. Smith, J., and H.P. Singh (2022). Application of Cellulose Based Superabsorbent Hydrogels for Water Conservation and En-

- hanced Plant Growth. 80th Professional Agricultural Workers Conference, Montgomery, AL, November 13-15, 2022.
6. Davenport, A., and H.P. Singh (2022). Sem Size Analysis of Gold Nanoparticles Used in The Detection of Aflatoxin B1. 80th Professional Agricultural Workers Conference, Montgomery, AL, November 13-15, 2022.
 7. Eneh, N, and H.P. Singh (2022). Rapid Detection of Aflatoxin B1 in Peanuts Using an Aptamer Based Dipstick. 80th Professional Agricultural Workers Conference, Montgomery, AL, November 13-15, 2022.
 8. Degala, V. N., Singh, H. P. (2022) Application of Cellulose Based Nanocomposite Hydrogel Patches for Wound Healing. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD. November 6-9, 2022.
 9. Davenport, A and H.P. Singh (2022). Using Gold Nanoparticles for the Sensitive Detection of Aflatoxin B1 in Peanuts. ACMAP 2022 Conference, Interamerican University of Puerto Rico, Barranquintas, Puerto Rico, June 28-July 2, 2022.

PROFESSIONAL SOCIETY TRAINING AND MEETING(S) ATTENDED

1. National Academies' Committee (Sciences, Engineering, Medicine) on Exploring Linkages Between Soil Health and Human Health on June 13, 2023.
2. 2023 Georgia AgTech Summit, Middle Georgia State University, 100 University Parkway, Macon, GA 31206, Wednesday, June 7, 2023.
3. 2023 Model Farm Filed Day, Byromville, GA, June 2, 2023.
4. AI Basics: Skills for Extension Professionals, Thursday, June 1, 2023.

5. 13th Annual FVSU Research and Creative Works Symposium "Innovation and Empowerment: Explorations in Research and Creativity at FVSU", Fort Valley, GA, April 19-20, 2023.
6. Industrial Hemp Production and Industry Basics Unearthed - Webinar Five, February 13, 2023.
7. Professional Agricultural Workers Conference (80th), Montgomery, AL, November 13-15, 2022.
8. ASA, CSSA, SSSA International Annual Meeting, November 6-11, 2022, Baltimore, MD
9. 16th Annual Grantsmanship Training & Recognition Institute, September 22, 2022.
10. ACMAP 2022 Conference, Interamerican University of Puerto Rico, Barranquintas, Puerto Rico, June 28-July 2, 2022.
11. Course Based Undergraduate Research Experience (CURE) Workshop, Final session, July 27, 2022.

Mahipal Singh Ph.D.

SUMMARY OF CURRENT PROJECTS:

Title: Evaluation of reproductive performance of goats upon melatonin supplementation.

Summary: Low birth weight of the offspring is associated with increased rate of mortality. Even if the low-birth-weight offspring survive, they have low growth performance. The overall goal of this project is to understand effect of melatonin supplementation during gestation on fetal development/growth, neonate survival and growth performance as well as to collect some base level data and develop methods to study melatonin receptors and in vitro embryo production in goats.

PUBLICATIONS:

1. Singh, M; T Stephens, X Ma, A Abosedo & A Irving. In vitro

culture of an accidentally deceased one month old goat kid skin up to 14 days of postmortem storage at 4°C. Journal of Biotech Research (2022) 13: 220-24. (<http://www.btsjournals.com/assets/2022v13p220-224.pdf>).

2. M. Singh, C. Henry, X. Ma, A. Abolude, A. Moawad, and T. Stephens (2023). Effect of Different Cryopreservation Temperatures on Recovery of Postmortem Goat Skin Derived Fibroblast Cell Populations. ISBER annual conference Seattle, May3-6, 2023. Poster PE26, PAGE A40
3. A. Abolude*, A. Irving, T. Stephens, X. Ma, A. R. Moawad, B. Kouakou and M. Singh. (2023). Detecting Genetic Variability in Arylalkylamine N-acetyltransferase Gene of *Capra hircus*. RESEARCH DAY April 20, 2023
4. Singh, M; T Stephens, X Ma, A Abosedo (2022). In-Vitro Culture of Skin Samples Excised from an Accidentally Deceased One Month Old Goat Kid up to 14 Days of Postmortem Interval Upon Storage at 4°C. Mol. Biol. Cell (2022) 34 (2): Abstr # P2325 (<https://www.molbiolcell.org/doi/10.1091/mbc.E22-12-0555>)
5. Moawad, AR; M Osbie, X Ma, M Singh, B Kouakou, TH Terrill & AA Pech-Cervantes (2022). Effects of dietary supplementation of peanut skins on sperm quality and fertility parameters of growing male sheep. Reproduction, Fertility and Development (2022) 35(2): 214.
6. Moawad, AR; T Reese; S Miller, M Singh, B Kouakou. PSXIV-10 Influence of Breeds on the Quality of Chilled Goat Semen Collected by Artificial Vagina. Journal of Animal Science, Volume 100, Issue Supplement_3, October 2022, Page 230

Published Works 2022 - 2023

7. Singh, M; ASKR Kutagulla. PSVI-7 Postmortem in Vitro Culture of Cells from Visceral Organs Stored at 4°C in Small Ruminants. Journal of Animal Science, Volume 100, Issue Supplement_3, October 2022, Page 403
8. # Reese, TB; B Kouakou, M Singh, S Miller & AR Moawad. Impact of Breed and Method of Semen Collection on Viability and Membrane Integrity of Goat Spermatozoa. Journal of Animal Science, Volume 100, Issue Supplement_1, April 2022, Pages 15-16,
9. Singh, M & X Ma. Recovering Life after Death: A Livestock Experience. Orally presented in 20th Biennial ARD Research symposium, Atlanta, GA, April 3-5, 2022. Abs. 257, page 162.
10. # Abolude, A; A Irving, T Stephens, X Ma, AR Moawad, B Kouakou & M Singh. Restriction Fragment Length Polymorphism Based Procedure to Detect Genetic Variability in Arylalkylamine N-acetyltransferase Gene of *Capra hircus*. Presented in 20th Biennial ARD Research symposium, Atlanta, GA, April 3-5, 2022. Abs. 453, page 244-245.
11. # Reese, T; S Miller, B Kouakou, M Singh & AR Moawad. Effect of breed and semen collection method on viability and membrane integrity of goat spermatozoa. Presented in 20th Biennial ARD Research symposium, Atlanta, GA, April 3-5, 2022.
12. Stephens, T; X Ma & M Singh. Effect of Melatonin on Proliferation of Fibroblast Cells Established from Livestock. Presented in 20th Biennial ARD Research symposium, Atlanta, GA, April 3-5, 2022. Abs. # 11, page 60.

Number of graduate students (under and graduate) supported by each grant: Supervising Three students (2 graduate and one undergraduate but one graduate is paid by Education grant)

PROFESSIONAL SOCIETY TRAINING AND MEETING(S) ATTENDED:

Four conferences attended including ARD and presented papers in all: ARD, ASAS, ASCB, SIBER

Thomas Terrill, Ph.D. GRANTS SECURED

1. Title: Geo-Information Technology and Artificial Intelligence Application Based Animal Health Management Decision Support System Development to Support Small-Holding Farmers
Funding Agency: USDA/NIFA 1890 Institution Capacity Building Program
Number of students supported: 2 graduate, 3 undergraduate
Period covered: 5/15/2022-5/14/2025
Amount: \$749,873.00
2. Title: Système d'Innovation en Production Animale (SIPA)
Funding Agency: USAID
Number of students supported: Project just funded
Period covered: 5/23/2023-5/22/2028
Amount: \$3,999,074.00

PUBLICATIONS, REFEREED JOURNAL ARTICLES

1. Kannan, G., Batchu, P., Naldurtiker, A., Dykes, G.S., Gurrappu, P., Kouakou, B., Terrill, T.H. and McCommon, G.W., 2023. Habituation to Livestock Trailer and Its Influence on Stress Responses during Transportation in Goats. *Animals*, 13(7), p.1191.
2. Chelkapally, S.C., T.H. Terrill, Z. Estrada-Reyes, I.M. Ogunade,

and A.A. Pech-Cervantes. 2023. Effects of dietary inclusion of dry distiller grains with soluble (DDGS) on performance, carcass characteristics, and nitrogen metabolism in meat sheep: A Meta-analysis. *Frontiers in Veterinary Science* 10:740.

3. Burke, J.M., J.E. Miller, T.H. Terrill, S.T. Orlik, J.J. Garza, M. Acharya, and E.L. Wood. 2023. Sericea lespedeza leaf meal fed to sheep and goats reduces serum concentrations of trace minerals. *Sheep and Goat Journal* 38:1-10.
4. Naldurtiker, A., P. Batchu, B. Kouakou, T.H. Terrill, G.W. McCommon, and G. Kannan. 2023. Differential gene expression analysis using RNA-seq in the blood of goats exposed to transportation stress." *Scientific Reports* 13:1984.
5. Naldurtiker, A., P. Batchu, B. Kouakou, T.H. Terrill, A. Shaik, and G. Kannan. 2022. RNA-Seq exploration of the influence of stress on meat quality in Spanish goats. *Scientific Reports* 12:20573.
6. Kannan, G., P. Batchu, A. Naldurtiker, G.S. Dykes, B. Kouakou, T.H. Terrill, and P. Gurrappu, 2022. Influence of excitability rate on physiological responses to stress in goats. *Animals* 12:1023.
7. Estrada-Reyes, Z.M., I.M. Ogunade, A.A. Pech-Cervantes, and T.H. Terrill. 2022. Copy number variant-based genome wide association study reveals immune-related genes associated with parasite resistance in a heritage sheep breed from the United States. *Parasite Immunology* e12943.
8. Pannell, D., B. Kouakou, T.H. Terrill, I.M. Ogunade., Z.M. Estrada Reyes, V. Bryant, M. Idowu and, A.A. Pech-Cervantes. 2022. Adding dried distiller

grains with soluble influences the rumen microbiome of meat goats fed lespedeza or alfalfa-based diets. *Small Rum. Res.* <https://doi.org/10.1016/j.smallrumres.2022.106747>

- Whitley, N.C., J.M. Burke, E. Smith, K. Lyte, and T.H. Terrill. 2022. Determining the efficacy of Red Cell® in combination with anthelmintics against gastrointestinal nematode parasitism in sheep and goats. *Small Ruminant Research* 209:106656.

CONFERENCE PROCEEDINGS

- Terrill, T.H., V. Smith, B. Morning, E.M. Courson, J.P. Muir, N.M. Cherry, and J.B. Morris. 2023. Concentration and bioactivity of condensed tannins and total phenolics of Lespedeza species from a germplasm collection. *Proceedings of the XXV International Grassland Congress*, May 14-19, 2023, Covington, KY.

ABSTRACTS

- Randall, R., A. Siddique, A.A. Pech-Cervantes, J.A. van Wyk, S.S. Panda, A. Mahapatra, E.R. Morgan, K.K. Stegall, and T.H. Terrill. 2023. Smartphone Integration in Anemia Detection for Small Ruminants with Convolutional Neural Networks. *ASAS Annual Meeting*, July 16-20, 2023, Albuquerque, NM. (Abstract).
- Smith, Y., G. Taiwo, M.D. Idowu, I.M. Ogunade, Z.M. Estrada-Reyes, T.H. Terrill, and A.A. Pech-Cervantes. 2023. Nutritional effects of fertilized and unfertilized sericea lespedeza hay on gastrointestinal parasitism and whole-plasma metabolome of naturally infected goats. *ASAS Annual Meeting*, July 16-20, 2023, Albuquerque, NM. (Abstract).
- Odom, T., D. Brown, C. Pulsifer, N.C. Whitley, T.H. Terrill, Z.M. Estrada-Reyes, I.M. Ogunade, G. Taiwo, M.D. Idowu, and A.A. Pech-Cervantes. 2023. Effect of dietary inclusion of fertilized and unfertilized sericea lespedeza hay on performance and plasma metabolome of naturally infected goats. *ASAS Annual Meeting*, July 16-20, 2023, Albuquerque, NM. (Abstract).
- Chelkapally, S.C., T.H. Terrill, I.M. Ogunade, Z.M. Estrada-Reyes, and A.A. Pech-Cervantes. 2023. Meta-analysis of the effects of the dietary inclusion of brewer's grain on feed intake, milk production, and feed efficiency of lactating dairy cows. *ADSA Annual Meeting*, June 15-28, Ottawa, Canada.
- Heikal, R., J. Hicks, B. Holmes, J. Brown, G. Dykes, L. Wartley, N. Mendez, A. Neha, A. Shaik; S.C. Chelkapally, D. Brown, J. Crumpler, N.C. Whitley, A. A. Pech-Cervantes, T. Reese, M. Woldemeskel, T.H. Terrill, and A.R. Moawad. 2022. Effects of dietary supplementation with lespedeza on the semen quality and fertility of male goats. *Journal of Animal Science* 100, Supplement 3:19-20.
- P. Batchu, A. Naldurtiker, G. Dykes, B. Kouakou, T.H. Terrill, G. McCommon, and G. Kannan, 2022. Conditioning of goats to livestock trailer: Effects on physiological stress responses during long-distance transportation. *Journal of Animal Science* 100, Supplement 3:301-302.

PROFESSIONAL SOCIETY MEETINGS

ATTENDED

- AI in Agriculture Conference, April 17-19, 2023, Orlando, FL
- XXV International Grassland Congress, May 14-19, 2023, Covington, KY.

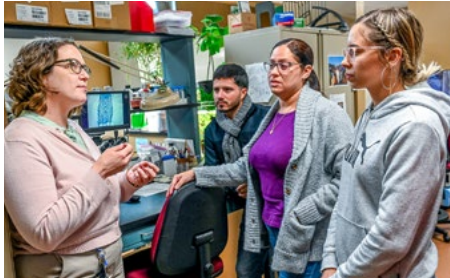
- American Dairy Science Society (ADSA) Annual Meeting, June 15-28, 2023, Ottawa, Canada.

GRADUATE STUDENT MENTORSHIP

- Reginald Randall, animal science master's student, currently enrolled
- Ebonie Appleberry, animal science master's student, currently enrolled
- Ayesha Neha, animal science master's student, currently enrolled
- Rania Heikal, animal science master's student, awarded December, 2022
- Jayla Hicks, animal science master's student, awarded December, 2022
- Brianna Carter, animal science master's student, awarded December, 2022

News & Notes

Students from Puerto Rico learn research techniques at Fort Valley State



By LATASHA FORD

Student scientists from the Inter American University of Puerto Rico, Barranquitas visited Fort Valley State University's (FVSU) campus for a week in spring 2023 to engage in advanced research.

This visit stemmed from the 2022 annual American Council for Medicinally Active Plants (ACMAP) meeting in Puerto Rico, where FVSU students and faculty presented their research in various fields. ACPMAP promotes and fosters research, development, production and conservation of medicinal, aromatic and other bioactive plants useful to human health. Dr. Nirmal Joshee, an FVSU professor of plant science, serves as the current ACPMAP president.

FVSU has collaborated with the Inter American University of Puerto Rico, Barranquitas for more than 15 years, which offers a master's degree and doctorate in biotechnology.

"It has been a wonderful relationship, and we want to take it further," Joshee said.

Rosalinda Aybar, who is a research technician at the Institute of Sustainable Biotechnology at the Inter American University of Puerto Rico, Barranquitas, joined fellow graduate student Kamila Rivera and doctoral student Christopher Sameolin on

the visit. The group aimed to gain research insights and hands-on experience in microscopy and histology in Joshee's plant science/plant biotechnology laboratory at FVSU's Agricultural Research Station.

Samantha Sherman, an FVSU research assistant and Master of Biotechnology alumna, led the experiments that involved preparing samples for paraffin sectioning and fluorescent staining.

"They have been good students and super eager to learn," Sherman said. The guests also interacted with FVSU graduate students.

Aybar said this was an awesome experience because of FVSU's extensive knowledge in plant histology.

"It is fascinating research because you can see the different types of cells," she said. "It has been very knowledgeable for me, and one of the things that I have always wanted to work with."

Rivera added that she learned new techniques and equipment, which will advance her skills while studying biotechnology and in her future career.

Sameolin said he is grateful for the opportunity.

"Being here gave me a wider perspective of new ideas, technology and methods to analyze data," he said. "It has been vital for my project."

Sameolin is researching bananas and plantains for food security in Puerto Rico.

"We are an island that has sensitive environmental conditions like hurricanes. We want to develop strong bananas, which is the most con-

sumed fruit," he noted. His research will benefit farmers and growers.

Joshee said FVSU's partnership with the Inter American University of Puerto Rico is important because both institutions have different strengths that can benefit students. As a result of this positive experience, he looks forward to exploring other opportunities.

Fulbright fellow presents research at Fort Valley State University



By LATASHA FORD

Fulbright fellow Dr. Basavaprabhu Patil recently shared his research on viral diseases with Fort Valley State University (FVSU) students and faculty.

Dr. Somashekhar Punnuri, FVSU research assistant professor, invited the principal scientist from the ICAR-Indian Institute of Horticultural Research in Bengaluru, India. Patil is visiting the University of California, Davis for nine months as a Fulbright-Nehru academic and professional excellence fellow.

Viral diseases of crop plants cause significant yield and economic losses, and this poses a major threat to global food security. There are no effective antiviral chemicals available. The most effective option to combat phytopathogenic viruses is through biotechnological interventions, such as the use of RNA silencing and genome editing technologies.

For that reason, Patil's research focuses on viral diseases of orphan crops and biotechnological remedies for their control.

"Most cultivated crops are affected by viruses," he told the FVSU group during his presentation in the Stallworth Biotechnology auditorium. His discussion included the diversity of plant viruses, the structure of virus particles, their life cycle and resistant genes. He further presented information on cross-protection against plant viruses and the cultivation of transgenic plants in Hawaii and Brazil, as well as virus-resistant cassava in Africa.

According to Patil, at least 136 different viruses are known to infect tomatoes, whereas this is significantly lower for other vegetable crops. In addition, 49 viruses are reported to infect peppers, 46 infect melons, 53 infect lettuce, 54 infect potatoes and 44 infect eggplants. Only cucurbits are infected by more viruses than tomatoes (153).

Conventional virus control strategies involve quarantine, improved agronomic practices, changing cropping practices, breeding for host-plant resistance and chemical control of viral insect vectors. Patil developed a double-stranded RNA-based foliar application technology that worked best against several viruses. The research team at Danforth Plant Science Center in St. Louis, Missouri, where Patil worked, collected cassava samples from East Africa for diverse studies and conducted field trials of transgenic plants in East Africa. He also developed MiRNA-induced gene silencing (MIGS) technology for the control of multiple pests and pathogens in cotton.

The next step in his research is taking this information to the farmers to help in the field. He noted this study is safe, and there is no cross-transmission of genes. The Fulbright

Outreach Lecturing Fund program sponsored this visit.

Workshop exposes students to CRISPR-based gene editing, other molecular biology tools



By **LATASHA FORD**

A three-day workshop introduced five plant science-biotechnology students and a biology student to clustered regularly interspaced short palindromic repeats (CRISPR). This latest technology allows scientists to enable gene editing and refine gene expression in living organisms, including plants, animals and humans. Dr. Sarwan Dhir, an FVSU professor of plant biotechnology, collaborated with Drs. Sairam Rudrabhatla and Shobha Potlakayala with the Department of Biology and Sciences at Pennsylvania State University – Harrisburg to organize the educational experience.

Students engaged in preparatory steps such as nutrient media preparation, bacterial transformation, plasmid DNA isolation (CRISPR-derived constructs for plant genetic transformation) and genomic DNA extraction. Other activities included polymerase chain reactions (PCR), bioinformatics to analyze gene editing laboratory results, and DNA staining and visualization. All students received a certificate for completing the workshop.

Dhir believes early hands-on exposure to advanced laboratory experiments benefits FVSU's first plant science-biotechnology majors.

"Witnessing their confidence grow in conducting hands-on lab activities

using advanced gene editing techniques is rewarding," he said. "As an underrepresented group in STEM, it is imperative that minority students receive opportunities to learn from the expertise of leading scientists. Research such as CRISPR/Cas9 will positively impact the medical field to agricultural biotechnology."

In addition to the three-day workshop, the six students participated in a two-week boot camp beforehand to prepare. Biology faculty members professor Seema Dhir, Dr. Kaneatra J. Simmons and Dr. Celia Dodd conducted the boot camp.

The workshop was funded by the National Science Foundation (NSF) HBCU-UP (HRD-2011903), S-STEM (DUE-1834046), HBCU-UP TIP (2011847) and the Department of Education MSEIP (P120A2000016) at FVSU.

NIFA visits FVSU



The U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) Communications team visited Fort Valley State University in January. The group learned about the various research developments taking place in the College of Agriculture, Family Sciences and Technology, with many of those projects being NIFA-funded. They toured the agricultural labs focused on medicinal plants and small ruminant (goats and sheep) research and the state-of-the-art Meat Technology Center.

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