Georgia (Fort Valley State University, University of Georgia Combined) Annual Report - FY2021

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Contributing Organizations

Fort Valley State University
University of Georgia

Executive Summary

Overview

This executive summary provides background information about Georgia and the state's Federal Report of Accomplishments. This summary provides data on the state and its universities, program highlights, examples of collaborative efforts between the University of Georgia (UGA) and Fort Valley State University (FVSU), and brief summaries of each of the eight planned programs.

BACKGROUND

FVSU and UGA address major agricultural issues and other problems that affect rural and urban areas, the environment, families and youth. This accomplishment report presents coordinated efforts between the state's 1862 and 1890 land-grant institutions, UGA and FVSU, respectively, and covers the joint planning that occurs between agricultural experiment stations and Cooperative Extension units at both universities.

Georgia's Extension program has 167 offices with programming in all of Georgia's 159 counties. FVSU and UGA personnel are housed jointly in county offices. Extension delivers programming in Agriculture and Natural Resources, Family and Consumer Sciences, and 4-H Youth Development as both individual county efforts and as multicounty programs. State faculty members deliver training to county agents and programming directly to clientele, when appropriate.

FVSU and UGA researchers and scientists conduct research programs through a system of agricultural experiment stations. There are several campuses throughout the state, but the four largest are located in Athens, Fort Valley, Tifton and Griffin, Georgia. In addition, 11 Georgia research and education centers and five 4-H facilities are located throughout the state.

Core programs and targeted issues are determined and guided by a structured program-development system, and they are the focus of this joint report. The program-development system is a multistep process that remains in operation throughout the year. It enables needs assessment, problem identification and program evaluation, which is used to determine impact. The Georgia program development model works in cooperation with multiple advisory systems at county and state levels.

EXTERNAL FACTORS

As the COVID-19 pandemic continued, UGA Extension provided virtual and in-person educational programming while observing safe health practices for employees and the public. We offered resources for adults and 4-H youth on health, food, finances, parenting, agriculture and more. Of our total 1,180,689 educational contacts, 422,883 were virtual. Throughout the pandemic, our Ag Services Lab continued vital diagnostic services such as soil samples and municipal water samples. A total of 111,128 samples were processed.

In responding to the ongoing COVID-19 pandemic, FVSU Extension faculty and staff continued to offer virtual programming. A survey of 400 clients indicated they were comfortable with technology and virtual programming. FVSU had over 2,700 direct and 11,000 indirect virtual programmatic contacts in addition to traditional face-to-face programming. An additional 2,700 (direct and indirect) virtual contacts were programmatic efforts related directly to mitigating COVID 19 impacts.

Critical Issue: Animal Production

This issue explores different areas of animal production and protection, focusing on the production of sheep, goats, dairy and beef cattle, swine, poultry, aquaculture, and small ruminants. Equine and bees are also included. Specific topics for this issue include, but are not limited to: Georgia Beef Challenge, Master Cattleman's Program, profitability of dairy farming, swine intake regulation, IPM and evaluation of new forages and feeds.

Examples of 2021 impact:

Heifer Evaluation and Reproductive Development Program

During the 2020-2021 Georgia HERD program, 43 Georgia beef producers consigned 241 bulls. After completing the program, a total of 135 head of bred heifers, meeting sale protocol standards, were marketed at auction through organized sales. The combined offering appraised for $296,200. Additionally, the utilization of online bidding allowed 109 individuals to view and participate in the auction online and purchase 26 heifers. The program plans on incorporating the online platform in future programs to increase the reach of the program.

Georgia Bull Evaluation

During the 2020-2021 Georgia Bull Evaluation, 54 Georgia beef producers consigned 229 bulls. These bulls were developed using best management practices for health, nutrition, and reproduction. A total of 155 head of breeding age bulls meeting sale protocol standards were marketed at auction through Tifton or Calhoun organized sales. The combined offering appraised for $447,600. Additionally, the utilization of online bidding allowed 101 producers to bid at a distance with 30 bulls being sold via the internet. The program plans on incorporating the online platform in future programs to increase the reach of the program.

Aquatic Environment Diagnostics and Management

Assistance, training, and resources were provided to county and state audiences that reached more than 900 pond owners in more than 80 counties in Georgia. Case response improved pond, property or fish population to an estimated $5,000,000 of the more than $2 billion Georgia pond property value in 2021.

Agri-Unity Beef Quality Assurance Training

In a collaborative effort, FVSU and UGA Extension organized a hands-on demonstration field day In June 2021 in addition to a Beef Quality Assurance classroom training. Live cattle were on display for handling demonstrations, chute processing best management practices, and body condition scoring. Minority producers from across middle Georgia participated. To measure program impact and engagement, a pre and post-test was completed by participants. The average mean of correct answers improved by 2.73 points. Program participants demonstrated enthusiasm over the material, and were looking forward to additional programming.

Critical Issue: Community, Home and Life Skills

This issue explores areas related to community, home and life skills. Specific topics for this issue include, but are not limited to: community development, economic development, indoor air quality, water quality, waste management, energy management, homebuyer education, consumer economics, financial literacy, and emergency preparedness.

Examples of 2021 impact:

Financial Capability Campaign

Low levels of financial capability are evident across the U.S and in Georgia. Research shows a correlation between low financial literacy and: financial choices that can impede a low-income household's pathway to the middle class; an increased vulnerability to frauds, scams, and predatory lending practices; high debt levels; lower wealth accumulation; little to no generational wealth and lack of job readiness.

Bibb County Extension began offering the VITA program in 2019. Over the past 3 years, there has been a 106% increase in filings. Residents saved $24,000 in tax preparation fees and the total amount in federal refunds totaling $108,716 secured for families.

The Bibb VITA program is simply more than tax preparation. The financial capability education was well received and, in many cases, appreciated by VITA participants. Bibb County Extension provides both a practical, immediate monetary impact for low- to moderate-income families through VITA as well as a long-term behavioral impact.

A newly widowed client was clearly nervous about handling the filing of taxes for the first time. She was unsure of herself and the process, but knew she needed assistance. The client's initial appointment revealed she was missing several important tax documents. She was also not proficient with electronic access to retrieve the needed information. The Bibb County FACS Agent was able to provide direction and handouts on securing the electronic account, and also spoke with her niece to communicate the documents needed to file. The client said, "I am a widow and this is my first time doing anything financial. I am so glad I came to you all. You were patient with me and I now know I can do it! I also know to keep all of my documents together for when I come back next year." – Macon-Bibb VITA Participant

Inmate Garden Improves Outcomes at Rockdale County Jail

The Rockdale County jail is run and administered by the Rockdale County Sheriff's Office (RCSO). It has the capacity to house up to 720 inmates. As part of the Residential Substance Abuse Treatment (RRSAT) program and Rockdale Reentry Intervention and Prevention Program (RRIPP) the concept for an inmate-run garden was conceived as a collaborative project to provide a healthy outlet as well as practical skills training for inmates as well as staff at the jail.

In total 45 participants of RRSAT and/or RRIPP (19 male, 26 female) and 5 jail staff members have participated in tending the Rockdale County jail garden since January 2021. Over this time, it has yielded over 200 pounds of produce including peppers, tomatoes, sweet potatoes, onions, collards, and various herbs. Anecdotally staff and inmates present during site visits expressed their enjoyment for the opportunity to garden. One participant stated "This is great! I've always wanted to learn to do this, [and] I can't wait to plant my own garden."

Critical Issue: Food Safety

This issue explores different areas of food safety and quality, focusing on food processing, protection, and safety; plant production; and animal production and protection. Specific topics for this issue include, but are not limited to: consumer demand for food, food industry needs, and the food processing industry.

Examples of 2021 impact:

Improving efficiencies of forced-air cooling operations

Cooling is the most important approach of reducing postharvest losses of fresh produce when the appropriate method along with the correct packaging is used. During this past year, it came to our attention that a number of packing houses around the state are not using the forced-air cooling systems to their maximum capacity or efficiency due to lack of knowledge or due to the use of inappropriate packaging supplies. This has as a result, increased cooling times or instances where the product never reaches its target temperature, resulting in increased postharvest losses which are in turn translated in lost income. Packing house owners confirmed our inferences as they face significant challenges while trying to cool during the hot summer months. progress toward, the goals and objectives described in your non-technical summary.

According to our research over the past year, a few key low-cost improvements could be implemented in the existing facilities operating in the State of Georgia which would increase the efficiency and reduce the cooling time significantly.

The significant reduction of the cooling time was shared with a group of packinghouse owners who were thrilled by the idea of improving the efficiency of their cooling system just by using an alternative packing carton which would be of no extra cost. According to them, reducing the cooling time is crucial especially in the summer months and will reduce the number of rejected loads due to poor quality that in the cases of bell peppers ofter reach the level of 20-30% of the shipments.

Egg Candling Licenses

Georgia residents needed to obtain an egg candling license from the GDA, which requires a face-to-face written exam and hands-on candling exam to complete. However, in-person classes were cancelled and online formats were either unavailable or inaccessible to many producers. During this period, the GDA amassed a waiting list of over 80 residents in need of licensing.

In August of 2021, UGA Extension–Spalding County hosted a 3-day certification training event to alleviate the bottleneck effect that was created by the pandemic. Classes were held on August 24-26, with a maximum capacity of 30 participants each day, which would allow for social distancing measures.

The event saw 58 participants attend. At the conclusion of the 3-day event, 48 residents had successfully completed both the written and hands-on exams, and were eligible to receive their egg candling license.

Critical Issue: Health & Wellness

This issue explores areas of chronic disease prevention and healthy lifestyles, focusing on weight control, physical activity, diabetes management and prevention, cardiovascular diseases prevention and cancer prevention to the public. A large focus of this issue is on the state's youth.

Examples of 2021 impact:

Combatting Senior Hunger

Good nutrition is a key factor for older adults to maintain well-being and an independent, healthy lifestyle, and in recovering from an illness or an injury. Reasonably priced, wholesome foods are not always accessible to older adults because of the lack of transportation, health problems and disabilities, and the lack of food stores within close proximity for shopping. Food insecurity is influenced by multiple factors and impacts a person’s health, wellbeing, and quality of life.

Approximately 13 of the 23 households participated on a weekly basis by coming to the Bishop Community Center to receive a pre-packed bag of produce that was placed in their trunks or back seats. In addition to the weekly produce distribution, local churches and civic clubs provide boxes of non-perishable items, laundry baskets with cleaning supplies, and/or bags of personal items for each senior. All 23 households participate in the monthly distribution. Since November 2020, approximately 3,100 pounds of produce valued at $3,780 has been provided from the Plant-A-Row garden. Produce includes tomatoes, Irish potatoes, red potatoes, Yukon gold potatoes, sweet potatoes and herbs.

Master FACS volunteers logged 175 hours between November 2020 and October 2021 through 19 distributions. According to Independent Sector, the current estimated national value of each volunteer hour is $28.54. Therefore, these volunteers’ work is valued at approximately $4,995.

Georgia 4-H Healthy Living

The Centers for Disease Control and Prevention awarded project funds to UGA for fighting obesity in Calhoun County. The coalition is comprised of Family Connection, county and city leaders, educators, local law enforcement, educators, Fire/Rescue, Faith Leaders, health professionals, farmers, business owners, and other concerned citizens. This group of citizens continue to be driven and united in tackling this issue.

Calhoun County citizens have committed to building a strong community coalition to address chronic health concerns by meeting monthly over one year. There have been over six new youth and adult prevention programs implemented.

Expanding SNAP Access of Locally Grown Produce

During the past three years, the Bartow County Extension office has formed a unique partnership with the local County Commissioner's office, Cartersville Convention and Visitor's Bureau, and City of Cartersville Mayor's office to improve health outcomes in Bartow County, by increasing access to fresh produce and local foods. This process began with revitalizing the Cartersville Farmers Market, increasing community awareness, and supporting community wellness initiatives.

The market returns money to the local economy, provides access to locally-sourced agricultural products, benefits the environment by having food travel fewer miles to the consumer, and creates a sense of community around food. There's also an increasing appreciation for food access among families in our community that previously did not have a way to connect with our local farmers.

The farmers market won 3rd place as National winner, 1st place Southern regional winner, and 1st place Georgia winner within the national association. The purpose of the award is to recognize members for their efforts in building community partnerships to meet the educational needs and/or concerns of families.

The Cartersville Farmers Market continues to exceed our expectations. This year is the strongest we've had in both sales and customer demand. Due to the success of the Cartersville Farmers Market, we have become a model for increasing food access through local farmers markets and connecting their benefits as a community health initiative.

Critical Issue: Plant Production

This issue explores plant production and protection. Specific topics for this issue include, but are not limited to: plant growth and crop production; plant diseases, weeds and pests; developing new breeding tools; soil quality; irrigation; plant pathology; genetics; entomology; IPM, harvest and post-harvest handling; conservation; cultural trends; and breeding programs that incorporate variability derived from interspecific hybrids from which new cultivars can be developed.

Examples of 2021 impact:

Pecan Disease Management

The fungal disease, pecan scab, is favored by frequent rainfall. The 2021 pecan growing season was one of the rainiest in a number of decades and crop losses due to scab was potentially devastating. Pecan growers limit this damage by applying fungicides.

The pecan Extension meetings were presented online and attended by hundreds of pecan growers. Although the season is not yet complete and data collected, reports from growers and County Agents indicate that although the frequent rains created an environment with high disease potential, most growers were able limit damage to scab with fungicide applications. With a high number of fungicide applications required, having the knowledge of how and when to rotate or mix fungicides without sacrificing disease control was critical.

Peanut Research to Educate Growers

Worth County Extension implemented two on-farm peanut trials (irrigated trial and non-irrigated trial) with UGA Peanut Agronomist and cooperating growers to collect data regarding the use of in-furrow fertilizers in peanut.

All rates of fertilizer products slowed emergence in both trials, and the two highest rates significantly reduced emergence for both locations up to 15 days after planting rating period. At the 2.0 gallon/A rate the cost of material was approximately $19/A; at the 3.0 gallon/A rate, the cost of material was approximately $28.50/A. In conclusion, the in-furrow fertilizer applications negatively affected the grower in these trials, impacting the crop stand and increasing the input cost per acre, while not increasing yield. The UGA recommendation was confirmed: Do not apply in-furrow fertilizers in peanut.

Staying Connected with Row Crop Producers

Production meetings for Row Crop Producers were affected due to in-person numbers being limited and all of the precautionary steps that came with Covid-19. ANR programming transitioned to an alternate form of communication to ensure that farmers, producers and growers received the information needed to not only protect their produce but for their production and worker safety as well. Through staggered Zoom meetings, social media feeds and online platform notifications the ANR Agent was able to provide a larger reach for different growers and commodities.

Considering most workers would not have the opportunity to all attend these trainings, the virtual option allowed producers to be able to be flexible with their workers to receive training and updates. From Row Crop Production meetings to Field days, a majority of ANR programming transitioned to a virtual platform offering better opportunities for attendance and opportunities for questions to be answered with UGA Specialists. The packet deliveries that were made in-person offered the agent the opportunity to meet with producers on more personable level allowing for more information and producer needs to be addressed.

Pest Control Handbook

Weeds can cause significant yield losses in crops since they compete for moisture, nutrients, and light.

Every year 50-70 field trials are conducted to evaluate potential new herbicides and to modify existing weed control recommendations. Over the course of 1 month in the fall, these weed control recommendations are updated using data collected in the field and by working with pesticide registrants. Approximately 900-1000 copies of the Pest Control Handbook are sold each year and it receives more than 1300+ web-page visits.

The UGA Pest Control Handbook is one of the most popular, important, and widely used UGA publications. Using field corn as an example, the judicious use of herbicides by Georgia farmers in 2021 prevented the loss of more than $126 million dollars in farm revenue.

Critical Issue: Sustainability, Conservation and the Environment

This issue explores areas related to the sustainability and profitability of agriculture. Specific topics for this issue include, but are not limited to: natural resource management, minimum tillage and cover crops; value added products or production practices that can improve sustainability and profitability; investigation of niche markets in Georgia; financial accounting and reporting strategies; and alternate cultural practices that will protect, improve and maintain soil fertility.

Examples of 2021 impact:

Increasing Water Use Efficiency and Precision Agriculture Adoption in Georgia

Agriculture is the number one industry in the state of Georgia, and the state is heavily irrigated when compared to its neighboring states with approximately 50% of its total cropland acreage irrigated. Production costs have been steadily increasing and crop prices are variable from year to year. Thus, producers need a way to better manage their inputs from year to year to aid them in increasing profitability and sustainability. One such strategy is the implementation of Precision Agriculture techniques and technologies.

The results of our research work have shown that the implementation and incorporation of irrigation scheduling tools has the potential to not only increase water use efficiency of crops, but the potential to increase yield and profitability. Climate variability is a major concern across the southeast. In some years we have ample rainfall to produce very good yields, while in other years, dryland yields are near zero. Even in seasons with ample rainfall, research has shown that the distribution of the rainfall is more critical than the total amount. Poorly timed droughts can cause significant yield reductions, especially if a valid irrigation scheduling strategy is not employed.

These numbers can be directly translated to around $200/acre savings and increased profitability by the producer which translates to a $120,000,000 impact on the state. It can be estimated that over 3,000 producers have been exposed to this information regionally and nationally during 2021.

Youth Discover National Park Service

In his 2006 book Last Child in the Woods, Richard Louv discussed the concept of children suffering from “Nature Deficiency Disorder,” which describes the disconnect students of the modern era have with the outdoors.

None of the students from the PROUD Program had been to a National Park.

After the program, 100% of students demonstrated the following knowledge gain:

- Correctly assembled a tent and prepared the campsite.
- Proficiently took down a tent and packed up camp.
- Collected Passport Cancellations at every National Park/Historic Site/Memorial on the trip.
- Prepared a meal in the great outdoors.
- Hiked in a National Park.
- Identified wildlife not found in Georgia (bison, prairie dogs, mountain goats, antelope).
- Read a map.

Well Water Testing: Building Impactful Community Partnerships

The United States Environmental Protection Agency (EPA) estimates that more than 13 million households rely on private wells for their drinking water. Private Drinking Water Wells | US EPA Since the EPA does not regulate private wells, it is up to the homeowner to assume responsibility for the safety of their water.

Between December 2020 and October 7, 2021, Golden Triangle has tested 234 wells in eighteen counties in Southwest Georgia. The most serious issues identified through this testing are levels of coliform bacteria and arsenic that are equal to or over the Maximum Contaminant Level (MCL) as defined by the EPA. To date, out of 103 wells tested for Arsenic, 20 were at or above the MCL. That is a rate of 20% positive for

arsenic. Out of the 61 wells tested for total coliform, 47 were over the MCL. Of the 61 wells tested for E.œcoli, 4 were over the MCL and of the 29 wells tested for fecal coliform, 4 were over the MCL. Altogether, 77% of the tests for total coliform bacteria have come back positive. As soon as these issues are identified, the staff of Golden Triangle contact the homeowner and begin discussing possible solutions. The staff of Terrell County Extension has provided educational information to many of the homeowners involved in this water testing program. Because these water tests are covered by grant funding from the USDA, the homeowners collectively saved over $8,800 in water testing expenses.

Master Agri-manager Program

A team of faculty from the Department of Agricultural & Applied Economics and Cooperative Extension worked together to create the Master Agri-manager program. This program was done in collaboration with the UGA Small Business Development Center, AgSouth Farm Credit, United States Department of Agriculture (USDA) Farm Service Agency, and a Private Practice Attorney. The Master Agri-manager program was designed to help educate farmers about the business management side of their farming operation.

After participating in the program, participants self-reported that they were/will:

- Re-evaluate the goals of a multi-generational farm.
- Better prepared to come up with a realistic business plan.
- Further develop and complete a business plan.
- Consider converting the farm business into a Limited Liability Corporation (LLC).
- Utilize insurance to manage risk.
- Participate in programs from USDA, Farm Service Agency.
- Improved understanding of accounting documents (balance sheet and income statement)
- Apply principles of good record keeping and keep up-to-date financial records.
- Use spreadsheets to create a working capital budget and do accrual accounting to get an accurate assessment of profit/loss.
- Convert the farm into a corporation or partnership for longevity and to limit personal liability (25% of participants self-reported that they intend to consider becoming an LLC)
- Develop a farm business management plan (25% of participants self-reported that they intend to create a formal farm business plan)

Bridging the public's understanding of science and water within agriculture production practices

Effective environmental science communication is an increasingly important area of research to connect the public with the importance of preserving and protecting natural resources in the world. Water is a finite resource necessary for all forms of life. Agricultural production has often been portrayed as one of the greatest offenders of mismanaging the use of the natural resource.

This study further explored the concept of information visualization around science. The findings suggest animation of complex information can increase the public’s ability to remember and recall key information elements. More importantly, this research highlighted the importance of providing the public any type of information about water conservation. This study used a control group who did not receive any type of infographic about water conservation. The control group was the least likely to be able to answer key questions about connecting water conservation and agricultural production’s utilization of water; therefore, providing a static or animated form of information is more effective than no messaging about water conservation.

Critical Issue: Urban Agriculture

This issue explores areas related to urban agriculture. Specific topics for this issue include, but are not limited to: water conservation technology and training; turf disease identification and management; IPM; development of new cost estimating and job bidding software for landscape installation; and Master Gardener programs.

Examples of 2021 impact:

Culturally Responsive Agricultural Literacy

The goal of this project is to establish an academy to train educators who work in or desire to work in urban areas to identify and develop future leaders who will address the grand challenges related to our nation's food supply, nutrition and health, the economy, and the environment as 80% of Americans currently live in urban areas. Our project will result in a grassroots initiative that will not only serve as a model and support for urban secondary agricultural education, but also encourage HEIs to invest resources into offering degrees programs in urban agriculture and/or courses that linked urban agriculture, nutritional sciences, environmental sciences, and telehealth due to increased student demand.

As a result of the training and summer institute:

1) A curriculum Map outlining learning outcomes for the six academic areas identified for the project has been developed to guide all future lesson development for the project.

2) Participants expressed that the summer institute was reinvigorating and must become accessible to other teachers.

3) Participants are developing lessons that align with the curriculum map

4) Three universities have expressed an interest in collaborating with the UALSA.

5) Saul Agricultural High School in Philadelphia has expressed an interest in participating in the summer institute next year.

6) Plans are underway to recruit teachers for the 2022 summer institute.

UGArden Supports Sustainable Food Systems Education

There is growing demand for trained professionals in the area of sustainable and local food systems. Employers are looking for graduates who have an understanding of how food is grown and the issues related to organics as well as issues of food insecurity. At the same time, the Athens community ranks among the poorest and most food insecure of any in Georgia and the US, with many neighborhoods in USDA designated food deserts. UGA has established a new Experiential Learning requirement of all undergraduate students, and UGArden offers both formal and informal opportunities to fulfill this requirement.

In addition to serving students, UGArden has also increased opportunities for county agents (in-service training), growers (workshops and tours). teacher training (in-service training dsays), individual tours and consultations and collaborations with local growers and makers of herbal products.

As a result of efforts at UGARden...

- 12,000+ lbs. produce shared with families in need through Campus Kitchen

- over 100 county agents nd growers have tured or attended workshops at UGARden

- Due to COVID restrictions, school visits have been curtailed, however, in previous years, over 1000 K-12 school children visist UGArden for instructiojnal activites and tours.

- Three county agent trainings were held covering mushroom production, school and community gardens, and small scale farm operations

- A small consortium of 6 herb growers and makers of herbal products has been establisehd, providing business support, networking, and sharing of resources

Virtual MGEV Training

Annually, 300 individuals are trained as Master Gardener Extension Volunteers (MGEV) to support Extension programming addressing consumer horticulture issues at the county level. The introductory training course includes 42 hours of instruction covering a wide range of topics, such as botany, plant physiology, soils, entomology, pathology, edible plants, ornamental plants, and turf.

The COVID-19 pandemic disrupted the traditional classroom approach, yet demand for prepared volunteers increased. A virtual training course was constructed in UGA's eLearning Commons.

Five virtual MGEV training programs used the pilot virtual course to train 95 volunteers in nine counties. The course was effective at increasing knowledge among trainees. The seven cluster test scores were favorable with averages of 83.4% and higher

The virtual course format attracted higher levels of interest than in-person training (higher class counts) than agents and program assistants have experienced in recent years. Participant comments, such as "This course was very good because it allowed flexibility in my schedule to be able to complete the assignments with my other commitments," spotlighted the appeal of and value for the flexibility of the virtual course. Training coordinators reported younger trainees and a larger proportion of working people involved in the program, addressing accessibility goals for the MGEV program. One trainee shared, "First, this hybrid of in-person and virtual learning worked well for me as a high school teacher. This was the first year I was able to enter and complete the program, although I've wanted to do so for decades. Great job in improving accessibility!"

Agriculture Literacy in an Urban Community

Due to urbanization, some communities in Chatham County have significant problems with food insecurity. Families have limited access to stores that offer a wide variety of healthy food items. Many neighborhoods are considered food deserts, an area that lacks fresh fruits, vegetables, and meats, but has a high number of convenience stores. Additional challenges like low income and vehicle availability may make it even harder for them to have a healthy diet and lifestyle.

As a way to educate youth about agriculture and careers in agriculture Chatham County 4-H collaborated with FVSU Extension and Coastal Georgia Botanical Gardens.

This was the second time we hosted a weeklong Agro S.T.E.A.M. camp for youth in Chatham County. Because of COVID, we hosted the camp at Georgia Coastal Botanical Gardens, the pavilion was used for outdoor classrooms, greenhouse and field. Chatham 4-H staff, 4-H teen & adult volunteers and FVSU Extension faculty implemented multiple lessons to 31 participants.

Participants showed knowledge gained through their comments:

"I learned how to extract DNA from a strawberry."

“Learned how they made soap and ice cream from goat milk, the ice cream was GOOD.”

“I learn about agriculture and what its meaning.”

“How important farms are and how we need to help them.”

“Learn about different careers in Agriculture.”

Former Chatham County Commissioner Jay Jones social media comment:

“Great day at “Da Valley!ⷸ As usual it’s about the kids… Chatham County Kids! Thanks to the 4H Club and UGA Extension for building with me in 2019! Now 2021!!! We are back on the map and AG STEAM Camp will be bigger and better next year… close out tomorrow! All credit belongs to the ladies that put it together…”

Critical Issue: Youth & Family Development

This issue explores positive youth and family development. Specific topics for this issue include, but are not limited to: parenting; relationships, child and elderly care; 4-H and youth programming.

Examples of 2021 impact:

Continuing Education for Early Childhood Professionals

Early childhood settings are educational experiences for young children. Children in high-quality child care programs learn valuable motor, language, cognitive, and social-emotional skills in child care that contribute to their school readiness, social skills, and emotional well-being in elementary school and beyond. Ongoing education of child care providers is one important way to increase child care quality in Georgia. Child care providers with more education and training provide better-quality learning experiences and are more responsive to children’s needs, which enables children to build skills they need to succeed in school and later in life.

A total of 282.5 clock hours were obtained by early childhood professionals through the classes. 115 contacts were made through the ten sessions. Participants completed retrospective evaluations at the conclusion of each session and report the following results:

- 53% indicate being extremely knowledgeable after the program compared to 5% before the program

- 99% report they will definitely use the information they gained in the sessions

- 83% state they feel better, 68% feel healthier, 71% feel more stable, 66% feel less stress, and 71% feel more in control as a result of the programs

- Participants indicate on average saving approximately $70 as a result of attending the sessions which equates to approximately $2,126 per month and $25,515

Better Brains for Babies

The connections made in the brain during the first few years of life form a crucial foundation for later learning and development.. Georgia’s poverty rate is higher than the national average. Children who grow up in such deprived environments are less likely to have the enriching experiences that lead to optimal brain development. Children who grow up in poverty tend to enter school less ready to learn, have more learning problems in school, are less likely to finish school, and tend have more adjustment problems later in life.

Follow-up surveys were distribute six weeks after the class. The surveys were made available in both English and Spanish for participants to complete. 221 child care providers participated in the pilot. Of these 221, 73 people (33%) completed the survey. The majority of participants report integrating skills into the classroom at least weekly, with several report using lessons learned multiple times a week. For stress in youth, providers report they were more aware of symptoms and more likely to provide strategies and activities to alleviate its impact. Finally, providers also report sharing the information with parents and guardians to help them enhance home environments for brain development.

Mental Health First Aid

One in five youth will experience a mental health challenge at some point during their life.e17.1 million youth under the age of 18 have or have had a psychiatric disorder – more than the number of children with cancer, diabetes, and AIDS combined. 5.14% of youth report having a substance use or alcohol problem. Despite this, only 7.4% of children in the United States have a mental health visit in a given year. 64.1% of youth with major depression do not receive any mental health treatment. Youth need caring adults who are able to talk with them and support them and their families in accessing appropriate resources.

133 Participants have been certified as Youth Mental Health First Aiders, including 33 Extension Employees. Of those participants who participated in virtual trainings:

- 94% feel able to have a supportive conversation about mental health and/or substance abuse with a young person.
- 90% feel able to ask a young person directly about suicide.
- 86% feel able to respond to a young person experiencing a substance use crisis.

Georgia 4-H Environmental Education

The Georgia 4-H Environmental Education Program offers day and residential field studies at sites from the mountains to the sea. The programs use the outdoors as a classroom without walls, are aligned with the current state education standards, keep students active and engaged in classes for up to eight hours a day, are taught by well-trained and college-educated instructors, use hands-on approaches to put learning in the context of the real world environment, and help to create and sustain bonds between teachers and students.

During the 2020-21 school year, the program reached 3,956 participants, which is only a fraction of the typical 40,000+ served in a school year due to the COVID-19 pandemic. The program supplemented this limited in-person audience with a continuation of the very successful virtual series, "From the Mountains to the Sea."

4-H Partnership Supports Meal Delivery to At-Risk Citizens

The Lamar County Senior Center, the hub for the “Meals on Wheels” program, was faced with the dilemma of delivering shelf-stable meals to at-risk citizens with limited staff and transportation when the need for meals increased and routes grew.

Over a period of four months, Lamar County 4-H’ers and one adult volunteer dedicated approximately 24 hours to deliver food to approximately 11 program participants. The deliveries equated to over 400 lbs. of prepared frozen meals. Mrs. Antionette Watts, Lamar County Senior Center Director stated, “The 4-H members jumped into action to help out. With the help of the 4-H team, we have been able to continuously provide meals to our homebound seniors without interruption. The Lamar County Senior Center and its meal participants greatly appreciate the Lamar County 4-H team for their willingness to work with us as a team to ensure continued service.”

Getting Smarter about Relationships

Relationship Smarts Plus (RS+) is an evidence-based relationship education curriculum that helps youth (a) understand how relationships connect to their personal development, (b) distinguish between healthy versus unhealthy relationship behaviors, (c) develop skills to effectively communication and manage conflict, and (d) make safe and mature relationship decisions.

In 2021, 1,038 youth across 7 counties were reached. At the conclusion of the program, youth report positive changes that will lead to future healthy relationships. At least 70% reported that they were more confident forming healthy relationships and applying the interpersonal skills learned. According to one of the youth, “This program helped me to better understand the components of a healthy relationship between family, friends, etc. and figure out methods to productively handle conflicts” Importantly, 77% have reported that they will use the skills learned.

Merit and Scientific Peer Review Processes

Updates

None

Stakeholder Input

Actions to seek stakeholder input that encouraged their participation with a brief explanation

None

Methods to identify individuals and groups and brief explanation

None

Methods for collecting stakeholder input and brief explanation

None

A statement of how the input will be considered and brief explanation of what you learned from your stakeholders

All input is channeled to college administration so they have the knowledge to make budgetary and program planning decisions. All vacant positions in all departments are brought to college-level administration for evaluation based on these criteria before a decision is made to refill. The dean solicits input from all faculty, staff and stakeholders prior to making hiring decisions on major administration positions. County agent and staff positions are reallocated to counties of higher need and those willing to contribute more county funding. Finally, legislative allocations greatly influence the type and amount of new positions added.

Highlighted Results by Project or Program

Critical Issue

Animal Production

Effect of melatonin on fetal development, neonate survival and growth performance in goats

Project Director

Mahipal Singh

Organization

Fort Valley State University

Accession Number

1026328

2021 Results – Small Ruminant Research

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Goat meat and milk is a major source of livelihood for small farmers around the world and is rapidly expanding in southern United States due to nutritional benefits, manageable operations, and influx of African, Hispanic, and Asian populations. However, this industry suffers in production efficiency due to fetal and neonatal losses as well as the seasonality of the reproductive cycles. Low birth weight of offspring is associated with an increased rate of mortality. The main cause of low birth weight is placental insufficiency caused by low vascular circulation in the placenta-fetus complex resulting in insufficient delivery of nutrition and oxygen to the growing embryo/fetus. 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.

Although goats and sheep have similar physiological systems, it is not clearly established if melatonin has a similar effect in goats. The overall goal of this project is to understand the effect of melatonin supplementation during gestation on fetal development and growth, neonate survival and post-natal growth performance in goats. In addition, base line data will be collected to develop methods to study melatonin receptors and in vitro embryo production in goats.

These studies can provide a mechanism for goat farmers to use melatonin supplements to enhance neonate and infant survival, growth performance, reproductive performance and ultimately profitability. Additionally, the project will provide an opportunity for training of the next generation of scientists in animal biotechnology, reproductive technology, as well as increasing their competence for undertaking other challenging projects in the future.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

- During this period a cohort of 21 meat goats (20 does and 1 fertile buck, 2–3 year old) were purchased and quarantined for a month in one of our pastures established for this purpose.
- The animals were fed on 18% medicated goat feed and allowed to graze in the pasture with access to water all the time. After a month they were transferred to regular pasture and maintained until used for experiments.
- Goat feed, appropriate attire, and other necessary field and lab equipment and supplies were purchased.
- Three graduate students and one research assistant were trained in animal husbandry practices, blood drawing, ear tagging, weighting, and FAMACHA scoring.

Briefly describe how your target audience benefited from your project's activities.

- Three graduate students and one research assistant were benefited by receiving training in livestock handling practices, blood drawing, ear tagging, weighting, and FAMACHA scoring.
- One graduate student received financial support in the form of a research assistantship

Briefly describe how the broader public benefited from your project's activities.

Increased sustainability of small goat farms

Closing Out (end date 09/07/2023)

Advanced Technologies for the Genetic Improvement of Poultry

Project Director
Samuel Aggrey
Organization
University of Georgia
Accession Number
1025875

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Selection for residual feed intake will lead to reduced feed intake and no changes in weight gain. High feed efficiency birds are characterized by rapid conversion of carbohydrates to ATP, high fat oxidation, increased in de novo amino acid synthesis, cell division and proliferation, and efficient nitrogen recycling. Low feed efficiency birds are characterized by low ATP production, increased apoptosis, increased lipogenesis and increased ammonium production and excretion.

Using nutritional approaches to mediate the effects of heat stress. Nutriceuticals can modulate oxidative stress and also mitigate reduced body weight in chickens under heat stress.

We have shown that heat stress curtails the life cycle of Eimeria species. We will use molecular and metabolomics tools to elucidate the molecular mechanisms that underlie such mitigation.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

1. Bacterial community present in litter during down-time was stable for a duration of 19 d.

2. Topdressing and addition of an acidifier perturbed the bacterial community in reused litter

3. E. coli population decreased by 1.5 logs during downtime

4. E. coli population increased after topdressing and acidifier application

Briefly describe how your target audience benefited from your project's activities.

Poultry breeding industry; Scientists in poultry genomics; Scientists in microbiome; Genomics community at large.

Briefly describe how the broader public benefited from your project's activities.

Journal Articles Published in 2021

6.Johnson, J., Zwirzitz, B., Oladeinde, A., Milfort, M., Looft, T., Chai, L., Zock, G., Sommers, M., Tunim, S., & Aggrey, S. E. (2021). Succession patterns of the bacterial community in poultry litter after bird removal and sodium bisulfate application. Journal of environmental quality, 50(4), 923-933

8,Oladeinde, A., Abdo, Z., Press, M. O., Cook, K., Cox, N. A., Zwirzitz, B., Woyda, R., Lakin, S. M., Thomas, J. C., 4th, Looft, T., Cosby, D. E., Hinton, A., Jr, Guard, J., Line, E., Rothrock, M. J., Berrang, M. E., Herrington, K., Zock, G., Plumblee Lawrence, J., Cudnik, D., House, S., Ingram, K., Lariscy, L., Wagner, M., Aggrey, S. E., Chai, L. & Ritz, C. (2021). Horizontal Gene Transfer Is the Main Driver of Antimicrobial Resistance in Broiler Chicks Infected with Salmonella enterica Serovar Heidelberg. mSystems, 6(4), e0072921. https://doi.org/10.1128/mSystems.00729-21

9.Wu, Y., Lei, Z., Wang, Y., Yin, D., Aggrey, S. E., Guo, Y., & Yuan, J. (2021). Metabolome and Microbiota Analysis Reveals the Conducive Effect of Pediococcus acidilactici BCC-1 and Xylan Oligosaccharides on Broiler Chickens. Frontiers in microbiology, 12, 683905. https://doi.org/10.3389/fmicb.2021.683905 Type Journal Articles Status Published Year Published 2021 NIFA Support Acknowledged NO Citation

5.Ling, A. S., Hay, E. H., Aggrey, S. E., & Rekaya, R. (2021). Dissection of the impact of prioritized QTL-linked and - unlinked SNP markers on the accuracy of genomic selection!BMC genomic data, 22(1), 26. https://doi.Org/10.1186/s12863-021-00979-y

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Results have been disseminated through publication.

Investigation of Potential for Zoonotic and Interspecies Disease Transmission to Livestock via White Tail Deer in Georgia

Project Director

Oreta Samples

Organization

Fort Valley State University
Accession Number
1024532

2021 Results – Research on zoonotic diseases in Georgia wildlife species

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The project is aimed at identifying the prevalence of zoonotic diseases in Georgia wildlife species, namely White-tailed Deer and the possibility of transmission to both humans as well as intra-species transmission to domestic cattle herds through shared grazing and possible internal and external parasite transmission. The issue that drives this study is the hypothesis that white-tailed deer may harbor both disease and parasites that are zoonotic in nature. This can be problematic to the health of certain human populations namely hunters, taxidermists, wild game processors, DNR technicians and even farmers of cattle causing illness and loss of productivity to those affected.

The significance of the project is to first identify the possible diseases and/or parasites that are present in white-tailed deer, then to act upon this presence by educating those who come in contact with these animals (hunters, taxidermists, wild game processors, DNR technicians, etc.) on how to handle carcasses safely to avoid potential infection of themselves. Secondly, to ascertain if there is a potential for spread of disease and parasites (both external and internal) to Georgia cattle that may affect food animal production.

The diseases/parasites that are targeted specifically are: gastrointestinal nematodes (Haemonchus contortus, Ostratagia ostratagi), tick species that may harbor zoonotic diseases such as Ixodes scapularis, Ixodes pacificus, etc., and diseases such as Anaplasmosis, Salmonella, Bovine Diarrhea Disease and COVID-19. These diseases and parasites have a negative impact on the health of humans that contract them; therefore it is hoped by educating at-risk population on the dangers and need for safe handling practices, they will be able to avoid illness while still enjoying such outdoors activities as hunting and processing of their wild game.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Four graduate students have worked on this project as their Thesis driven research and have collected blood and feces from White-tailed Deer during 20-21 and 21-22 Georgia hunting season from 13 counties in Georgia representing the south, north, east and western parts of the state. They are now processing data from testing. Approximately 300 samples were collected in 20-21 season and 250 samples collected in 21-22 season of blood and/or fecal matter for testing for gastrointestinal parasites as well as presence of Anaplasmosis and in 21-22 season approximately 20 nasal swabs were taken for testing for COVID-19 from carcasses.

Briefly describe how your target audience benefited from your project's activities.

This project has impacted the technicians of the Ga. Dept. of Natural Resources who have worked with us to provide access to wild game processing facilities as well as DNR-sanctioned quota hunts for collection and hunter education access by our team. This project has impacted hunters and game-processing employees who have embraced our presence and received our public health messages of the need for safe handling of carcasses to avoid zoonotic disease transmission or encounters with disease-spreading parasites, namely ticks and gastrointestinal parasites. Beginning in Sept. 2021 we began to survey hunters, DNR technicians and processor employees on their existing knowledge about the potential for zoonotic disease spread via white-tailed deer. This process will be on-going in the coming seasons.

Short-term

A survey was given to hunters, DNR technicians and wild game processors on a strictly voluntary basis regarding their current knowledge of the potential for zoonotic spread of disease in handling white-tailed deer carcasses.

Results are pending as graduate students are currently analyzing data. However, preliminarily, it appears that roughly 80 of DNR technicians are familiar with and understand the potential for disease transmission in handling carcasses of wildlife of Georgia, including White-Tailed deer. Approximately 50% of hunters are as knowledgeable.

Briefly describe how the broader public benefited from your project's activities.

Reduction in wildlife diseases

Animal Production

Project Director
Mark Latimore
Organization
Fort Valley State University
Accession Number
7000377

Small ruminant production support

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Small ruminant production continues to grow in popularity, resulting in new and beginning producers, hobby farmers and even pet owners searching out reliable information to help them care for their animals.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

FVSU specialists provide advice on most livestock enterprises, and are known for successes in guiding landowners to managing successful sheep and goat enterprises. Aspects of health, marketing, breeding systems, facilities and natural resource use are given consideration. Our associates at the FVSU Georgia Small Ruminant Research and Extension Center provide new research information used to train and educate clientele.

Key training components include FAMACHA© and Smart Drenching.

Briefly describe how your target audience benefited from your project's activities.

Trainings improve sustainability of small ruminant farms

Briefly describe how the broader public benefited from your project's activities.

General agricultural sustainability, especially for limited-resource farmers

Enhancing broiler metabolic efficiency and intestinal health in the absence of antibiotics

Project Director
Laura Ellestad
Organization
University of Georgia
Accession Number
1022321

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Recent regulatory changes and consumer preference have led to an increase in antibiotic-free production of agricultural products, including that of meat-type (broiler) chickens. The absence of antibiotics can negatively impact bird growth performance, ultimately leading to reduced profit margins for poultry producers and increased cost of poultry products for consumers. Understanding mechanisms by which antibiotics enhance bird growth performance and identification of alternative products that work in a similar manner are necessary to maintain efficiency in current broiler production systems.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Multiple experimental trials were conducted within the past year to begin making progress towards the goals of this project. These trials have identified metabolic markers of birds that exhibit high or low metabolic efficiency phenotypes. Specific hormones that are elevated in birds with a low metabolic efficiency include those associated with mediating the stress response (corticosterone) and basal metabolism (thyroxine). Expression of hormone receptors linked to increased growth and muscle accretion were observed in birds with a high metabolic efficiency phenotype. An additional trial investigating metabolic impacts of subclinical enteric disease was conducted. It was observed that expression of factors necessary for improving intestinal barrier function were reduced in the face of disease, and this was reversed when birds received a diet supplemented with antibiotics. Levels of genes for proteins that mediate nutrient digestion and uptake were also impacted by enteric disease, and some of these effects were mitigated by dietary antibiotics.

Briefly describe how your target audience benefited from your project's activities.

These initial findings provide critical information to researchers, poultry producers, and poultry veterinarians related to the metabolic impacts of removing dietary antibiotics under non-diseased or diseased states. This will facilitate further investigation that addresses this issue as well as development of strategies to effectively maintain broiler production efficiency in the absence of antibiotics.

Briefly describe how the broader public benefited from your project's activities.

These results will allow development of strategies that improve broiler production efficiency and ultimately contribute to reduced costs of broiler meat as well as improved well-being of birds raised under antibiotic-free conditions.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

No problems have been encountered that require changes to the proposed work.

Opportunities

During this reporting period, two undergraduate students, one PhD student, and one post-doctoral researcher were substantially involved in the project. Training in scientific techniques, experimental design and statistical analysis, interpretation and presentation of results, scientific oral and written communication, and animal husbandry have been provided. All students and the post-doctoral researcher have presented their findings at University symposia and/or national scientific meetings.

Dissemination

Results generated during year one have been presented at the Poultry Science Association’s annual meeting, the International Poultry Scientific Forum, and at formal and informal UGA research symposia, seminars, and departmental meetings.

Plans

Additional trials related to the impact of dietary antibiotics on broiler growth and metabolism and how they influence response to enteric disease will be conducted. Analysis of samples collected during this reporting period will continue.

Associative effects of ensiling mixtures of alfalfa and tropical forages with antimicrobial and antiparasitic activity on the performance, microbial communities and metabolome of ruminants.

Project Director
Andres Pech Cervantes
Organization
Fort Valley State University
Accession Number
1022336

2021 Results – Sustainable Livestock Feed Alternatives

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

My research program focuses on nutritional interventions, including the sustainable use of feed additives, which impact the gastrointestinal microbiome and metabolome of dairy and meat ruminants to improve the efficiency of ruminant production systems. The latest two research projects investigated the effects of peanut skins as a source of antioxidants for ruminants and, their subsequent effects on meat quality. Likewise, we evaluated the use of silage mixtures as a strategy to increase the meat and milk production of ruminants during the summer season.

1.- Peanut skins and Florida-Native Sheep are abundant and economic resources available in the Southeast of the United States, however, less is known about their benefits to increase animal production systems. Thus, Small ruminant producers in the southern region of the United States like Florida, Georgia, Alabama, and South Carolina could benefit from this research.

2.- Warm-season grasses like bermudagrass are considered low-quality forages compared to cool-season forages like alfalfa. However, establishing and evaluating mixtures of heat-tolerant alfalfa and bermudagrass could help to increase dairy and beef production systems in the southern region of the United States.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

1.- Preliminary results demonstrated that dietary supplementation of peanut skins increased the incorporation of antioxidants (vitamin E) in the lean meat of sheep.

2.-Preliminary results demonstrated that ensiling alfalfa-bermudagrass mixtures with homolactic inoculants during the summer increased the quality and fermentation of silages. Likewise, homolactic inoculants increased the digestibility of silages and improved silage preservation during the summer.

Briefly describe how your target audience benefited from your project's activities.

1.- Our research demonstrated that peanut skin supplementation increased the concentration of vitamin E in lean mean. These results suggest that peanut skins increased meat quality and the nutritional value of meat.

2.- Our results showed that alfalfa-bermudagrass silage mixtures with homolactic inoculants increased the digestibility and quality of silages. These results suggest that silage mixtures could increase animal performance during the summer in subtropical regions of the United States

Medium-term Outcome

1.- Our research demonstrated that feeding 20% of peanut skins in the diet of meat lambs increased the concentration of vitamin E in lean meat by more than 100% compared to the untreated animals. These results suggest that meat from animals fed with peanut skins had a higher concentration of antioxidants compared to the untreated animals.

2.- The results showed that homolactic inoculants (lactic acid bacteria) increased the concentration of organic acids in the silage mixtures compared to heterotactic inoculants (Lactic acid and acetic acid bacteria) and the control. Likewise, homolactic inoculants increased the digestibility of the silage compared to the other treatments by 20%

1.- We estimate the concentrations of alpha-tocopherol (Vitamin E) in lean meat of lambs fed with and without peanut skins. We also evaluated the effects on meat color and cooking losses. The results showed that meat quality was similar between animals fed with and without peanut skins but, the alpha-tocopherol concentrations were ten times higher in animals fed with peanut skins compared to the control animals.

2.- We estimated the concentration of organic acids in the silage mixtures with and without inoculants. We also measured the in vitro digestibility of the samples after 100 days of ensiling.

Briefly describe how the broader public benefited from your project's activities.

Increased sustainability in livestock production

Closing Out (end date 09/07/2023)

Future Challenges in Animal Production Systems: Seeking Solutions through Focused Facilitation

Project Director
Lilong Chai
Organization
University of Georgia
Accession Number
1021519

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

1) Developed an imaging system for collecting broiler chicken information; 2) Innovated deep learning models to assess broilers' behaviours of drinking, feeding, and resting; 3) Figured out a solution for interpreting animal behaviours and activities into welfare indicators.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

United States is currently the world's largest broiler producer and the second largest egg producer (e.g., poultry and eggs had a sale value of $40 billion in 2021), but poultry and egg productions are facing grand challenges of animal welfare concerns, food safety issues, and environmental impacts. The rapid growth rate of broilers is associated with welfare concerns such as leg issues and lameness. Broilers with lameness suffer behavior restrictions, physical discomforts, and impingement of fundamental freedoms. Those welfare concerns have triggered the attention of the general public and the food industry to improve broiler well-being, and well-being evaluation. Animal welfare evaluation is currently performed manually by farm workers daily or occasionally in the poultry houses, which is time consuming, labor intensive, and subject to human errors. This task calls for the design of an automated system that can monitor poultry welfare automatically. Sensing technologies, such as ultra-wideband, radio frequency identification, accelerometer, and computer vision-based monitoring, have been and are being adapted and tested for livestock and poultry farming systems to aide well-being evaluation. Computer vision-based phenotyping technologies have been tested efficient in monitoring large animals such as cattle and pigs. However, it is technically challenging to monitor smaller animals such as broiler and layer chickens. Dr. Lilong Chai's team at the University of Georgia has developed specific imaging and phenotyping technologies (e.g., deep learning models) for monitoring/tracking floor distribution patterns of broiler chickens and individual birds' moving in different zones of feeding, drinking, and resting.

Briefly describe how your target audience benefited from your project's activities.

Poultry producers, farmers, researchers, and service companies.

Briefly describe how the broader public benefited from your project's activities.

Those imaging and phenotyping technologies developed by PI Chai's team provide basis for developing integrative sensing systems to evaluate poultry welfare indicators in commercial broiler houses.The new method will facilitate the precision animal farming and benefit poultry producers, farmers, researchers, and service companies in addressing the concerns from the general public on animal welfare.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to

communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

This study provide materials for developing Extension training materials. PI Chai has been invited to give trainings/talks for several times: [1]Chai, L. (2022). Phenotyping Technologies for Poultry Welfare Evaluation. 2022 American Society of Animal Science - Midwest Symposium. March 15, 2022 (Invited Talk by American Society of Animal Science). [2] Chai, L. (2022).Precision Poultry Farming with Machine Vision Systems. GA AgTech Summit. March 2, 2022 (Invited by Director of Agricultural Technology, Georgia Center of Innovation). [3] Chai, L. (2022). Data Science in Precision Poultry Farming. UGA College of Agricultural and Environmental Science Data Science Seminar (February 18, 2022). (Invited Talk by Dr. Harald Scherm at UGA). [4] Chai, L. (2021).Using machine vision to monitor poultry floor distribution. Poultry Tech Summit. November 10, 2021 (Invited by Watt Poultry). [5] Chai, L (2021). Poultry House Environmental Management. 7th International Gut Health Congress. November 14, 2021 (Invited Talk by Dr. Chengbo Yang at the University of Manitoba). [6] Chai, L (2021). Precision Poultry Farming Technologies. UGA PPRC Annual Symposium. September 17, 2021.

Dissemination

Initiated the 1st Georgia Precision Poultry Conference-Virtual. May 4, 2021 (the conference had 322 participants globally from over 30 different countries).

Products

1] Guo, Y., S. Aggrey, A. Oladeinde, J. Johnson, G. Zock. L. Chai (2021). A Machine Vision-Based Method Optimized for Restoring Broiler Chicken Images Occluded by Feeding and Drinking Equipment. Animals.11 (1), 123. [2] Guo, Y., L. Chai, S. Aggrey, A. Oladeinde, J. Johnson, G. Zock. (2020). A Machine Vision-Based Method for Monitoring Broiler Chicken Floor Distribution. Sensors. 20(11), 3179. [3] Guo, Y., J. Guo, C. Liu, H. Xiong, L. Chai., D. He. (2020). A Precision Method for Landing Control of Agricultural UAV on Apron. Sensors 20 (12), 3369. [4] Guo, Y., D. He, L. Chai. (2020). A Machine Vision-based Method for Monitoring Scene-interactive Behaviors of the Dairy Calf. Animals, 10, 190. [5] Guo, Y, L. Chai. (2021). Monitoring animal group distribution index with the machine vision-based technology in the poultry house. 2021. ASABE Annual International Meeting # 2100856 (doi:10.13031/aim.202100856). [6] Guo, Y., L. Chai, D. He. 2020. Interferences for Detection of Poultry Behaviors with Machine-vision Based Methods. 2020 ASABE Annual International Virtual Meeting-2000189 (doi:10.13031/aim.202000198).

Plans

1) Conduct tests in a broiler houses with more chickens to verify the research findings; 2) Innovate the deep learning models further for enhancing computing speed; 3) Initiate the cloud computing of animal data collection and analysis.

Effects of bioactive molecules on embryogenesis, bone development, fat reduction, feed efficiency and growth performance in broilers

Project Director
Woo Kyun Kim
Organization
University of Georgia
Accession Number
1018584

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Skeletal problems in broilers are important economic issues for the broiler industry. Rapid muscle growth in broiler chicks (meat-type chicks) through genetic selection causes imbalance between meat production and skeletal growth. These skeletal problems in broilers cost the broiler industry over $300 million annually (Cook, 2000; Bell and Weaver, Jr., 2002).

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We evaluated the effects of oxysterols on embryonic and post-embryonic growth using in ovo injection technique.We found that oxysterols increased bone mineral contents in broilers at 42 days.

Briefly describe how your target audience benefited from your project's activities.

Researchers and industry personnel

Briefly describe how the broader public benefited from your project's activities.

Oxysterols have pontential to improve bone quality in broilers, reducing economic loss related to bone disorders in poultry.

Closing Out (end date 09/07/2023)

Enhancing Health Promoting Properties and Shelf-life of Small Ruminant Meat and Dairy Products by Incorporating Functional Ingredients and Packaging Technologies

Project Director
Jung Lee
Organization
Fort Valley State University
Accession Number
1014900

Enhancing Health Promoting Properties and Shelf-life of Small Ruminant Meat and Dairy Products by Incorporating Functional Ingredients and Packaging Technologies

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

First, a feeding trial was conducted to determine the effect of tannin-rich peanut skin (PS) on carcass traits and meat quality characteristics of goat meats. Twenty-one Kiko crossbred male goats (9 mo of age; BW = 38.6 ± 2.7 kg) were blocked by body weight and randomly assigned to one of three diets: 30% alfalfa pellet (AP, control); 15% AP plus 15% PS; and 30% PS, with the remainder of each diet made up of 70% corn-based sweet feed. After 45 d feeding trial, goats were slaughtered, and their carcasses were evaluated. After 24 h cooler storage (2°C), longissimus muscle (LM) pH was measured from individual carcasses and 2.5-cm thick loin chops were collected from individual carcasses to assess meat quality parameters. Carcass traits and ultimate muscle pH (5.71 to 5.93 ± 0.061) were not significantly affected by PS supplementation. Chops from goats fed 15%-PS diet had lower ($P < 0.05$) CIE a* (redness) values than those from goats fed either control or 30%-PS diet. Compared with goats fed 30%-PS diet, goats fed either control or 15%-PS diet had higher ($P < 0.05$) cooking losses (13.0 vs 20.2 or 19.8 ± 1.87 %, respectively) in cooked loin chops; however, no significant differences were found in the shear force values of cooked chops (4.55 to 5.45 ± 0.296 kg) from experimental goats. The proximate composition of LM from goats fed three experimental diets was not significantly different. Furthermore, the thiobarbituric acid reactive substances of LM from goats (0.45 to 0.57 ± 0.047 mg malondialdehyde/kg) were not significantly affected by PS supplementation. Compared with goats fed the control, goats supplemented with 30% PS had a higher concentration of a-linolenic (C18:3n3; 0.13 vs. 0.17 ± 0.011%) acid in the LM. Our findings indicated that supplementing tannin-rich peanut skin might not negatively affect the carcass traits and meat quality parameters of goat meats. Secondly, raisin paste influences on quality parameters of restructured chevon jerky and its stability were assessed. Eight batches of restructured chevon jerky were prepared by ground chevon from Spanish goats, mixed with a jerky seasoning either with or without sodium nitrite (NaNO2), or raisin paste. Restructured jerky strips were extruded through a stuffing horn, placed in a smokehouse at 93.3 °C for 3.5 h, vacuum packaged, and stored at ambient temperature under

fluorescent light for quality analysis at 0, 2, 4, 6, 8, 10 wk. Compared to cured-jerky, jerky prepared with raisin had significantly lower CIE L* (lightness) and a* (redness) values, moisture contents (33.8 vs 37.9%), water activities (0.79 vs 0.88) pH (5.2 vs 6.2) values, but higher ($P < 0.05$) shear values (2.8 vs 2.6 kg). Furthermore, these quality parameters were also significantly influenced by the storage time whether or not jerky was cured. Inclusion of raisin significantly affected the total microbial counts of jerky. Compared to jerky prepared with or without $NaNO_2$, raisin-jerky had significantly lower aerobic plate counts during storage. Jerky prepared with raisin or $NaNO_2$ significantly decreased TBARS values, which did not change during storage. Cured jerky had higher ($P < 0.05$) sensory color, flavor, texture and overall acceptability scores compared to uncured jerky. However, no significant differences were found in the flavor scores of cured- and raisin-jerky. Jerky prepared with raisin that might be similar to the conventional cured jerky based on its antioxidant and antimicrobial properties. However, unique nitrite-cured sensory properties might not be generated by raisin paste.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The major goal of this project is to enhance health promoting properties and shelf-life of small ruminant meat and dairy products by incorporating functional ingredients and packaging technologies. First, a feeding trial was conducted to enhance the nutritional value of small ruminant meat (goat meat) by feeding dietary supplements (phytochemical tannin containing peanut skin) containing health promoting compounds (polyphenolic compounds) to small ruminants (meat goats). Although supplemented with phytochemical tannin containing peanut skins did not altered meat quality parameters of fresh goat meat in this feeding trial, fresh goat meat from peanut skin supplemented meat goats might have a healthier fatty acid profile compared to that from goats supplemented only alfalfa. Secondly, a meat product was conducted to modify small ruminant meat products (goat meat jerky) by adding ingredients considered beneficial for health or eliminating/reducing harmful components (curing ingredient: sodium nitrite) during processing. Because of the potential to generate carcinogenic nitrosamines from nitrite-cured meats, there is considerable interest in producing no nitrate/nitrite-added meat products that simulate conventional cured meats. Raisin has been recognized as sensorially compatible with meat products. Furthermore, it contains antimicrobial and antioxidant components as natural preservatives. Goat meat jerky prepared with raisin that might be similar to the conventional cured jerky based on its antioxidant and antimicrobial properties. However, unique nitrite-cured sensory properties might not be generated by raisin.

Briefly describe how your target audience benefited from your project's activities.

This project is expected to increase the awareness and consumption of small ruminant products that is a driving force to increase the income of small ruminant farmers in the United States. Furthermore, this project provides students at FVSU with a great opportunity to become professionals through their laboratory skills and research experiences which can be applied to real-world industrial applications that directly impact local economy.

Briefly describe how the broader public benefited from your project's activities.

The ultimate goal of this project is to provide consumers alternative meat and dairy products using small ruminants that are healthier, safe, and superior in palatability. Small ruminant farmers are expected to adopt the suggested feeding strategies that produce nutritionally enhance fresh meat and milk. Subsequently, attractive small ruminant meat and dairy products are developed.

Animal Production

Project Director
Laura Perry Johnson
Organization
University of Georgia
Accession Number
7000203

County-based Poultry Ordinances

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The poultry industry in the state of Georgia is the largest in the U.S., with an annual economic impact to the state in excess of $28 billion dollars. The need for expansion of new production housing to meet the growing demand for poultry meat has led farmers and poultry companies to build new housing in areas of the state unaccustomed to the poultry industry and the size of facilities needed to accommodate the production practices. Concerned citizens and county commission members who are often uniformed or misguided regarding poultry production, have voiced misgivings concerning the approval of large scale production housing and often attempt to craft ordinances that will prohibit poultry housing within county boundaries.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Extension specialists within the Department of Poultry Science assisted county agricultural agents in delivering sound scientific information to county commission members regarding modern poultry production housing, estimations of water usage, management of production by-products, air emissions, and neighbor relations. During 2021, four county commissions were assisted with the formation or amending of poultry-related ordinances. The county commissions received face-to-face interactions with extension specialists and county-based agricultural agents in an effort to deliver factual information in order that the commissions could appropriately deliberate regarding the formation of poultry-specific ordinances that target poultry production siting and management practices. The Northwest Georgia Regional County Commission Association sponsored a face-to-face educational event on September 13, 2021, to provide commissions, planning board members, city planners, poultry companies, and concerned citizens an opportunity to hear from university specialists and Georgia Poultry Federation representatives regarding the importance of proper poultry barn siting, management and environmental stewardship. The presentations, publications and ordinance summaries generated by UGA Poultry Specialists can assist county Extension agriculture agents with county commission interactions in order to determine the best course of action to take when county commissions request assistance from the Extension Service when deliberating the need for or alteration to county-based ordinances. A series of informational publications continue to be prepared by UGA Poultry Extension Specialists to simplify the delivery process and provide county agents with more concise and timely assistance.

Briefly describe how your target audience benefited from your project's activities.

Through the efforts of the College of Agriculture and Environmental Sciences at the University of Georgia, county administrators continue to be educated on the practices of modern poultry production and the interactions that it creates within Georgia counties. Careful consideration of the needs of the whole county, including zoning/ordinance development, tax revenue, and infra-structure improvements will provide measured opportunities for growth of the poultry industry while addressing concerns of citizen within rural communities.

Briefly describe how the broader public benefited from your project's activities.

Increased opportunities for the poultry industry and public awareness

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Extension Trainings for Precision Poultry Farming

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Different precision poultry farming technologies such as wearable sensors, robots, computer vision methods of machine learning or deep learning, Internet of Things (IoT), and environmental sensing have been tested or developed to enhance and optimize the production, animal health, and welfare management of poultry farming. However, it's still not clear which kind of technologies have been commercialized and how poultry producers can use those technologies to address on-farm animal production and welfare issues. Therefore, a systematic training platform is critical for building the connection between technology researchers/developers and potential users.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Dr. Lilong Chai (a poultry engineering specialist in UGA poultry science department) initiated a Georgia Precision Poultry Conference in May 2021, along with support from department administration and fellow faculty members. At the training, speakers and panelists (i.e., poultry producers, researchers, and technology developers) shared their knowledge and experience in poultry well-being evaluation, new technological applications of precision poultry farming, and experience with implementation and refinement of precision management practices applicable to the poultry sector. The inaugural 2021 Georgia Precision Poultry Farming Conference (virtually via Zoom) attracted 322 registrations from poultry and egg farms, poultry service companies, academia and government agencies from more than 30 countries.

Briefly describe how your target audience benefited from your project's activities.

The Georgia Precision Poultry Farming Conference provided a training and information exchange opportunity for stakeholders on the challenges and opportunities related to future of poultry farming. The Department of Poultry Science plans to host this Extension conference annually.

Briefly describe how the broader public benefited from your project's activities.

Currently, the U.S. is the world's largest poultry producer, with annual sales value of $40 billion, making research, development and training of precision poultry farming critical in the U.S. poultry sector. As the top poultry producing state in the U.S., Georgia is home to many nationally ranked poultry production and processing companies, as well as a multitude of companies supplying poultry technologies to the world.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Georgia Beef Challenge

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The average beef herd in Georgia is less than 30 cows and markets their calf crop at weaning, or soon thereafter. Most producers do not receive any information on how efficiently their cattle perform in the feedlot, or the value or quality of the carcasses from these cattle. With this information, Georgia producers can make informed decisions on breeding and genetics for their herd each year. These decisions can improve the value of their cattle, and ultimately make their operations more profitable.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Georgia Beef Challenge allows producers to retain ownership of cattle through the finishing period and market these cattle by the quality of carcass they produce. Georgia producers can consign as few as two head, up to a full truckload (48,000 lb). The program collaborates with Tri County Steer Carcass Futurity (TCSCF) in Southwest Iowa to feed and market cattle. Cattle are shipped from August to November of each year, fed April to June of the following year, and harvested at nearby facilities. Producers then receive payment based on the quality-grade of the cattle. Additionally, producers learn about risk management practices utilized to purchase feed and marketing of the cattle.

Briefly describe how your target audience benefited from your project's activities.

In 2020, 252 calves (190 steers and 62 heifers) were consigned to the program from 13 different Georgia Consignors. Of the Georgia Beef Challenge carcasses, 85.2% had a Quality Grade of Low Choice or better. The industry goal is 70% Low Choice or better. The national average for black hided calves to grade Certified Angus Beef (CAB) is 24%. GBC Cattle averaged 55%. CAB. In 2020, the program resulted in an average net loss of $77.44 per head based on the value that was placed on each animal in Georgia by USDA Livestock Market Reporters. However, the marketing of the cattle was impacted by the COVID pandemic.

Briefly describe how the broader public benefited from your project's activities.

Improved sustainability in cattle production

POULTRY411 App for Smartphones

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Environmental control within poultry houses is an important factor in poultry production. Ventilation is a key component of poultry house environmental control in maintaining conditions conducive to achieve optimum bird health and performance. Grower income is reduced as energy costs continue to rise. Understanding how to ventilate and operate poultry houses to achieve and maintain productive environments during cold weather is crucial for both the grower and the integrator. Broiler house design has improved greatly over the last 30 years to meet the requirements of modern broilers. As a result, environmental conditions can be controlled much more closely with outside weather conditions having less of an effect. Management of these houses is complex and a lack of understanding of basic principles invariably has a negative influence on poultry performance and results in higher operation costs. Poultry growers, flock supervisors, veterinarians and others that support the poultry industry could use a way to conveniently access information when away from their computers. Minimum ventilation rates are important in maintaining the optimum environmental conditions for poultry performance and welfare, but people may not fully understand the factors that affect the fan operation time. Minimizing air leakage in a poultry house improves poultry house ventilation by getting more air to enter through the air inlets. A convenient and mobile method was needed for people to calculate both minimum ventilation rates and poultry house air leakage.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A smartphone app was created for the iOS and Android operating systems that provides access to a moisture balance calculator that uses current house conditions to determine the proper minimum ventilation rate. The second calculator in the app provides information on the amount of house leakage, how much air inlet area is required, how much air enters through the air inlets, and how much the air inlets will open. Using this information people can determine how well their house is performing and how much more air would enter through the inlets due to efforts to reduce the air leakage. The app also provides a means to access the Poultry Housing Tips Newsletters that cover many topics on poultry house environmental control and find out when workshops, seminars and other educational opportunities on poultry house environmental control are available.

Briefly describe how your target audience benefited from your project's activities.

Since it’s launch in October, the app has a total of 2,975 downloads.

Briefly describe how the broader public benefited from your project's activities.

Poultry App available to the public.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Critical Issue

Community, Home and Life Skills

Community, Home and Life Skills

Project Director

Mark Latimore

Organization

Fort Valley State University
Accession Number
7000387

2021 Results - Virtual FVSU Family and Consumer Sciences Educational Opportunities

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Georgia citizen have an increased unemployment, poverty and chronic disease rate compared to national levels. Fort Valley State University Cooperative Extension Program Family and Consumer Sciences Area (FVSU CEP FCS) has been able to enhance lives by providing virtual educational opportunities to families and individuals within the 35 counties in middle, east and south Georgia. Educational opportunities were redeveloped to meet the new normal of technology and learning.

Our educational opportunities were updated to virtual platforms to meet our client's needs. Providing safe and consist messaging on various topics we were able to educate clients on increased health wellness management (food label reading, meal consideration, COVID-19 information and physical activity), essential knowledge and skills to increase positive family dynamics and financial resource management by saving money on home cost and utilization of recipes developed using items provided by federal/state food bank opportunities.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Key activities provided through FVSU CEP Family and Consumer Science Area were varied; we collaborated with 4-H for youth programs that focused on nutrition, decision making techniques on behavior, soft skills development and physical activity programs. Programs offered to parents consisted of nutrition education, chronic disease, parenting workshops that focused on teaching at home during the pandemic, dealing with stress and technology workshops (email, virtual doctor appointments, and Zoom). With the other adults, caregivers and senior communities we provided programs on fruit/vegetable home gardening, facts on COVID-19 pandemic, energy efficiency, developed recipes using items received in USDA food giveaways, health & wellness and technology workshops.

Briefly describe how your target audience benefited from your project's activities.

During the period October 1, 2020 - September 30, 2021, the Expanded Food and Nutrition Education Program (EFNEP) serviced 156 homemakers and 443 family members with a 100% graduation rate. Homemakers reported a 92% increase of fruit/vegetable/whole grain consumption. Seventy six percent of the homemakers reported improved usage of their food dollars.

Briefly describe how the broader public benefited from your project's activities.

By providing practical, solution-oriented learning opportunities for Georgians outside the formal classroom citizens were able to lead enhanced lives in health and wellness, family dynamics and utilization of finances. FVSU CEP FCS serves a key role in providing programs and instruction aimed in educating our next generation of resilient families and citizens.

Closing Out (end date 09/07/2023)

The Antecedents and Effects of Financial Self-Efficacy on Financial Behaviors and Outcomes

Project Director
Lance Palmer
Organization
University of Georgia
Accession Number
1023652

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

A variety of studies have pointed to self-regulation and financial self-efficacy as determinants of household variability in financial outcomes. Self‐regulatory skills and self-regulatory strength effect daily financial management and long-term financial outcomes (Chatterjee, Palmer, & Goetz, 2012; Howlett, Kees, & Kemp, 2008; Liu, Yilmazer, Loibl, & Montalto, 2019; Strömbäck, Lind, Skagerlund, Västfjäll, & Tinghög, 2017). Financial management practices are also influenced by one's financial self-efficacy, or one's belief in their ability to manage their finances (Lown, 2011; Farrell, Fry, & Risse, 2016; Qamar, Khemta, & Jamil, 2016). Warmath and Zimmerman (2019) argue that financial self-efficacy is a core component of financial literacy and influences many facets of financial outcomes. However, there is a paucity of published research addressing the structure of the association between self‐regulation and financial self-efficacy and how that relationship influences financial management behaviors. Theoretical constructs of self-regulation and self-efficacy note that self-regulation is a precursor to self-efficacy, both general and specific, but empirical studies in the area of household finances are absent. Furthermore, for practitioners and policy makers, the literature is silent as to how that relationship can be manipulated over time and what interventions, if any, positively influence household financial outcomes and well-being. In addition to a limited empirical understanding of the structure of the relationship between self-efficacy and financial outcomes, there is also inconsistent use of measures used to identify self-regulation and financial self-efficacy across studies. The inconsistent use of such measures inhibits comparison and interpretation of such results. Finally, the key question of whether and how financial self-efficacy contributes to household's financial resiliency after experiencing a financial shock is not currently discussed in the literature. Yet, financially resilient individuals and families will help create financially resilient communities, states and countries. OBJECTIVES 1. Empirically identify the relationship between self-regulation, self-efficacy, and financial management practices and well-being. 2. Empirically investigate the theoretical antecedents of financial self-efficacy to determine how changes in the antecedents, such as self-regulation, effect financial self-efficacy, and financial outcomes. 3. Compare currently used measures of financial self-efficacy and self-regulation to determine reliability and validity across measures. 4. Examine the long-term association between financial self-efficacy and household resiliency following financial shocks.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We have continued to analyze data in ways that allow us to address our objectives. Our initial data analysis focused on cross-sectional data that examined the relationship between general self-regulation, financial self-efficacy, and financial management behaviors. One paper has been published and a second paper will be sent out for review this year. We have also presented these findings at conferences.

Products

Palmer, L., Richardson, E. W., Goetz, J., Futris, T. G., Gale, J., & DeMeester, K. (2021). Financial Self-Efficacy: Mediating the Association Between Self‐Regulation and Financial Management Behaviors. Journal of Financial Counseling and Planning, 32(3), 535-54

Briefly describe how your target audience benefited from your project's activities.

Our target audience is financial professionals working with clients. In presentations with financial counselors, we have received feedback regarding ways that they can work with clients, such as mindfulness exercises.

Briefly describe how the broader public benefited from your project's activities.

As additional papers come out, there will be an ongoing discussion of how general self-care practices, such as mental and emotional self-care (mindfulness exercises) and physical self-care (diet, physical activity, and sleep) affect individuals' abilities to manage their finances and they are part of a larger system of self-regulation practices. Improvements in one area can help support improvements in other areas, even though they appear unrelated.

The road to substandard housing: Pathways, poverty, and life circumstances in rural Georgia

Project Director

Kimberly Skobba

Organization

University of Georgia

Accession Number

1019081

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Small towns in the rural South struggle with a range of adverse housing issues that are associated with a health and psychosocial problems and other quality of life issues, yet these communities and the voices of their residents are rarely the focus of research. This project seeks to explore the experiences of low-income individuals living in substandard housing in rural Georgia to better understand the intersection between housing and life circumstances.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The goal of this research is to bring visibility to rural housing issues and explore potential policy solutions. To explore the housing challenges of rural Georgians, I conducted interviews with 37 low-income adults living in rural Georgia. These interviews provided an exploratory analysis of housing pathways data to better understand how rural housing conditions intersect with the well-being and housing stability of rural renters (including people staying in efficiency units in extended-stay hotels) and homeowners.

Briefly describe how your target audience benefited from your project's activities.

The data analysis is still in progress so the target audience has not yet benefitted. Ultimately, low-income households living in substandard housing conditions will hopefully benefit through policy efforts to address their housing needs. Local governments and housing policymakers will benefit from the in-depth data obtained from this study.

Briefly describe how the broader public benefited from your project's activities.

Similar to the benefits to the target audience, the broader public will benefit through greater awareness of housing conditions in rural Georgia and hopefully through better policies and resources to address substandard housing conditions.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

Conducting remote research was challenging and required testing different outreach strategies. Also, i did not factor in adequate time and resources for transcription. I used an AI auto-transcription service but it still requires a considerable manual transcription effort to obtain quality, accurate transcripts. I recently received some additional funds to hire a grad student to help with this.

Dissemination

Analysis is still in progress.

Plans

Finish transcripts, analyze data and write several publications using the data.

Laura Perry Johnson
Organization
University of Georgia
Accession Number
7000205

Military readiness training benefits county

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Rural Warren County has many citizens that have no medical insurance or are underinsured. The Warren County Board of Commissioners applied to host an Innovative Readiness Training. This program is sponsored by the Secretary of Defense for Reserve Affairs with the mission of providing Military Reserve Service members with hands-on readiness training opportunities while providing direct and lasting benefits to communities in need of free medical, dental, optometric and veterinary services.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The grant required many partners and all types of local support. The Warren County Extension Coordinator served on the committee to organize and carry out all of the required efforts. This included meals, extra labor and communication with the county residents as well as all other necessities for the eleven-day program for 180 Reserve members. The Warren County Group was chosen in 2018 and 2019 to host this training event.

Briefly describe how your target audience benefited from your project's activities.

When the grant was announced again, Warren County leaders applied again and were successful. The Innovative Readiness Training Program was a great success. Veterinary services were added from the 2021 grant. The military reserve personnel served 721 Warren County residents and performed 5,811 medical services. This saved $327,877 for dental, optometry and medical services for underinsured and non-insured citizens. In addition, they performed 487 veterinary procedures saving $11,200.

While providing these services to the community, these Reserve and National Guard members get invaluable practice which results in a combat-ready force equipped to the same standards of operational readiness as their Active Duty Counterparts.

Briefly describe how the broader public benefited from your project's activities.

Military preparedness

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Radon Action Month

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Radon is a naturally occurring radioactive gas that is the second leading cause of lung cancer in Georgia. While nationally one in 15 homes has an elevated level of radon, in parts of Georgia as many as one in three homes has an elevated radon level. Georgia has no laws on radon, so it is up to residents to test their homes. The UGA Radon Program works to educate the public on radon, distribute radon test kits, and encourage radon testing and mitigation.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

During the month of January, we promote radon action month. The UGA Radon Program puts out press releases on radon, gets proclamations in many Georgia counties, and hosts programs on how to test for radon and what to do to fix your home if radon levels are elevated.

Briefly describe how your target audience benefited from your project's activities.

During January 2021 the UGA Radon Program distributed 517 radon test kits. Of those distributed, 319 were used. Sixty-four of those homes tested high, and according to our survey results about 75% of those individuals mitigated the radon in their home. This resulted in about 128 individuals with a reduced risk of developing lung cancer from our outreach activities in January.

Briefly describe how the broader public benefited from your project's activities.

Safer homes

Critical Issue

Food Safety

Food Safety and Quality

Project Director

Laura Perry Johnson

Organization

University of Georgia

Accession Number

7000204

Food Safety Education for Foodservice Personnel

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

More than 250 foodborne diseases present a significant public health challenge. In the U.S., per year, foodborne disease results in an estimated 48 million persons with gastrointestinal foodborne illnesses, 128,000 hospitalizations, and 3,000 deaths (2010). Estimates for Georgia are 2.5 million cases per year at a cost of $4.7 billion (2010). Transfer of viral and bacterial infections through foodservice operations is of high concern.

FDA's periodic retail food safety risk factor studies document the need for improved food safety practices by workers; compliance with personal hygiene controls, temperature control and practices to prevent contamination and cross-contamination should be higher in most foodservice settings (FDA 2014). The American public continues to eat away from home in large numbers. In Georgia, there are more than 18,500 food service establishments (2016) having sales of $19.6 billion and employing more 476,500 people (NRA, 2018). In Georgia, 65% of children under the age of six are in the care of someone other than their parents while the parents work (2014). The staff in these facilities could benefit from food safety training. Georgia DCH regulates 2,024 personal care homes, 815 Community Living Arrangements, and 368 nursing home facilities (2016); the staff in these need food safety education. In Athens-Clarke, Morgan and Oconee Counties, there are 620 inspected food establishments, 112 personal care facilities, and 67 childcare facilities.

The FDA Food Code requires that the person in charge of a foodservice operation become a Certified Food Protection Manager (CFPM). That person must be on site at all times during operating hours. A CFPM must show that he or she has the required knowledge by passing a test from an accredited program. Both the Georgia Departments of Health and Agriculture require food safety-certified managers for foodservice and retail food stores.

A Center for Disease Control and Prevention study suggests that the presence of a CFPM reduces the risk of a foodborne illness outbreak for an establishment. The study also suggests it was a distinguishing factor between restaurants that experienced a foodborne illness outbreak and those that had not. In addition, the FDA's Retail Food Risk Factor Studies suggest that the presence of a certified manager has a positive correlation with more effective control of certain risk factors, such as poor personal hygiene, in different facility types.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The ServSafe® Food Safety Program is developed by the National Restaurant Association (NRA) to address the growing food safety concerns of consumers for the food service staff that serve them. This program provides foodservice managers and employees of schools, nursing homes, senior centers, deli's, private clubs, and restaurants information on food microbiology, sanitary food handling and storage, HACCP food safety program, pest control, and safety procedures. The NRA's ServSafe program leads the way in providing comprehensive educational materials to the restaurant industry. The training and certification program is recognized by more federal, state and local jurisdictions than any other food safety certification.

Family and Consumer Sciences Extension Agents offered ServSafe® Manager and Food Handler training opportunities across the state.

Briefly describe how your target audience benefited from your project's activities.

Food industry professionals received critical educational trainings. After the training, participants completed either the ServSafe® Manager certification exam or the Food Handler test to assess their knowledge of food safety and recommended food handling practices. As a result of the trainings, participants indicated they are very likely to improve these food safety practices:

•train employees on personal hygiene and safe food handling

•monitor cleaning and sanitizing practices for food-contact surfaces

•perform continuous self-inspections

•monitor employee use of food thermometers and temperature logs

•monitor employee handwashing

•use written standards for receiving foods from suppliers

On average, these foodservice workers serve approximately 1,500 people a day and manage approximately 20 employees.

Foodservice personnel indicated in the post evaluations that "Instructors made the class interesting" and "Great new information". As a result of these classes, participants can put into practice the new knowledge and keep food safe for Georgia.

Briefly describe how the broader public benefited from your project's activities.

Reduce foodborne illness

Food Safety and Quality
Project Director
Mark Latimore
Organization
Fort Valley State University
Accession Number
7000378

FVSU CEP Family and Consumer Science – Food Safety Initiatives

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

More than 250 foodborne diseases present a significant public health challenge. In the U.S., per year, foodborne disease results in an estimated 48 million persons with gastrointestinal foodborne illnesses, 128,000 hospitalizations, and 3,000 deaths (2010). Estimates for Georgia are 2.5 million cases per year at a cost of $4.7 billion (2010). Transfer of viral and bacterial infections through foodservice operations is of high concern.

Research-based food handling practices minimize the risks of food-borne illnesses.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Trainings are offered as needed in the areas of:

• Food Safety and Food Preservation

• ServSafe® Training

Briefly describe how your target audience benefited from your project's activities.

Food industry professionals and individuals receive critical educational trainings.

Briefly describe how the broader public benefited from your project's activities.

Reduce foodborne illness

Improving the current understanding of the spray during process of liquid foods through modeling and experimentation

Project Director
Kevin Mis Solval
Organization
University of Georgia
Accession Number
1021399

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Currently, there is a limited understanding regarding the effect of particle size and particle surface area on the stability of spray-dried food ingredients. Hence, this project is aimed to improve the current knowledge of the spray drying of liquid foods using computer-assisted simulations and experimental tools. If successful, this project may allow the production of high-quality spray-dried powders more efficiently.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Our team studied the effect of spray drying conditions on the survival of probiotic bacteria during microencapsulation (Objective 2). In addition, we developed spray-dried powders of different particle sizes to understand the relationship between bacteria survival and the size of particles during spray drying (Objective 3). Finally, we presented findings of this research at International Conferences, including the 2021 Annual Meeting of the Institute of Food Technologists (Objective 5).

Products

Cavender, George, Nan Jiang, Rakesh K. Singh, Jinru Chen, and Kevin Mis Solval. "Improving the survival of Lactobacillus plantarum NRRL B-1927 during microencapsulation with ultra-high-pressure-homogenized soymilk as a wall material." Food Research International 139 (2021): 109831. https://doi.org/10.1016/j.foodres.2020.109831

Briefly describe how your target audience benefited from your project's activities.

The global food industry and researchers from the academic and federal government gained more knowledge regarding the microencapsulation of probiotic bacteria via spray drying. It is expected that better spray-dried foods can be produced using the findings reported.

Briefly describe how the broader public benefited from your project's activities.

First, the results generated from this research will allow the production of high-quality food powders and ingredients at a reduced cost. Furthermore, graduate students are currently being trained in producing high-quality spray-dried products. After graduation, the highly trained new professional will join the workforce as food scientists.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes/Problems

No major changes /problems were encountered. The current COVID-19 pandemic delayed the delivery of several supplies needed for the project. However, our team was able to conduct the research activities and present results on time. Therefore, there was no need to modify the primary approach during this timeframe.

Opportunities

Partial results of this project were published in a peer-reviewed article which was published in Food Research International (IF=6.475). Also, Mr. Boran Yang presented an abstract at the virtual 2021 AMIFT where he was awarded third place winner of the graduate student poster competition. PI delivered a seminar entitled "Advances in the development of food ingredients using spray-drying technology" at the virtual 1st. Congreso Euroamericano de Procesos y Productos Alimentarios (CEAPA).

Dissemination

Partial results of this project were published in a peer-reviewed article which was published in Food Research International (IF=6.475). Also, Mr. Boran Yang presented an abstract at the virtual 2021 AMIFT where he was awarded third place winner of the graduate student poster competition. PI delivered a seminar entitled "Advances in the development of food ingredients using spray-drying technology" at the virtual 1st. Congreso Euroamericano de Procesos y Productos Alimentarios (CEAPA).

Plans

We will continue studying the effect of spray drying conditions on the quality and nutritional properties of the resultant spray-dried food ingredients.

Development of advanced technologies to ensure food safety

Project Director

Yen-con Hung

Organization

University of Georgia

Accession Number

1015350

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

To develop technologies to help ensure safety of food and food contact surfaces. In addition, this study will also ensure the technology developed will not induce different foodborne pathogens into the viable but-non culturable (VBNC) state.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This project is working on a new type of sanitizer, activated persulfate solution in inactivation and removal of pathogenic bacteria from fresh fruit and vegetable surface. We will evaluate the efficacy of ferrous sulfate and sodium hydroxide activated persulfate in inactivating Escherichia coli O157:H7, Salmonella Typhimurium DT104, and Listeria monocytogenes and quantify the concentrations of sulfate and hydroxyl radical in activated persulfate solution and evaluate their contributions in inactivation of the above pathogens. Effect of activated persulfate to inactivate foodborne pathogens on fresh produce surface will also be determined. Photocatalytically active nanoparticle embedded coatings shown great promise as effective disinfectants over a range of microorganisms. This proposed study is to develop light activated antimicrobial coating on food packaging films to minimize or eliminate bacteria growth for fresh produce during storage and distribution. We will also determine the surface characteristics, photocatalytic activity, and bactericidal activity of the coated packaging films. Bactericidal efficacy of the nano-coatings will be determined by simulating real use scenarios of fresh and processed foods during distribution and storage. An emerging/under-researched contaminants is the present of viable but non-culturable (VBNC) bacteria after disinfection/pasteurization. This challenge will be addressed by first investigate the sanitizing conditions of acidic electrolyzed oxidizing (AEO) water, a chlorine-based sanitizer that can induce different foodborne pathogens into the VBNC state and determine the parameters under which these cells can be resuscitated and determine the effect of different sanitizers and non-thermal physical treatments on the induction of the VBNC state foodborne pathogens and an evaluation of the risks of cross contamination during fresh-produce wash.

Products

1. Tang, J., H. Chen, H. Lin, Y.-C. Hung, H. Xie, Y. Chen. 2021. Acidic electrolyzed water treatment delayed fruit disease development of harvested longans through inducing the disease resistance and maintaining the ROS metabolism systems. Postharvest Biology and Technology 171:111349. 2. Xie, J. and Y.-C. Hung. 2021. Effect of TiO2 loading, water depth and light intensity on photo-disinfection efficacy of Escherichia coli O157:H7 using TiO2 NP-embedded cellulose acetate film in water. Applied Eng. In Agri. 37:1-9. 3. Xie, J. and Y.-C. Hung. 2021. Effect of water compounds on photo-disinfection efficacy of TiO2 NP-embedded cellulose acetate film in natural water. Water Supply doi: 10.2166/ws.2020.271. 4. Hung, Y.-C., H. Lin, Y. Chen. 2021. Ensuring the safety of fresh-cut produce using electrolyzed oxidizing water. Acta Hortic. 1319. doi 10.17660/ActaHortic.2021.1319.20

Briefly describe how your target audience benefited from your project's activities.

The target audiences for the information generated by this project are the small, medium, and large-sized produce processors, their VP's of food safety and/or their QA/QC staffs. The information on new developments for produce safety and quality have been presented and delivered to professional produce science community in industry, academic, and government through technical presentations at scientific meetings, short courses, and extension publications.

Briefly describe how the broader public benefited from your project's activities.

1. We found AEW treatment could significantly elevate the activities of PAL, CHI, GLU, C4H, and 4-CL, and the amount of H2O2, and hence enhanced disease resistance of longan fruit. Next, the application of AEW could prevent the overproduction of ROS and MDA via increasing the activities of antioxidant enzymes including SOD, CAT and APX, and maintaining higher levels of AsA, GSH, DPPH radical scavenging ability, and reducing power. In addition, AEW treatment could prevent the cell membrane lipid peroxidation and hence maintain the integrity of cellular membrane structure and inhibit the disease development. The possible mechanism of AEW delayed the occurrence of disease development of harvested longan fruit through inducing the disease resistance and maintaining the ROS metabolism systems.

2. We found the optimum TiO2 CA film with the highest antimicrobial activity was at 0.82 mg/cm2. Response Surface Methodology (RSM) showed that bacterial inactivation increased with a decrease in water depth and increased with increasing light intensity. Results showed that greater than 5 log of bacterial reductions were achieved when light intensity was at 1 mW/cm2, and the water depth was equal or below 1.6 cm. The antimicrobial activity of the film at a fixed water depth can be maintained even when the film area expanded, indicating the size of TiO2 NP-embedded CA film can be further scale-up for practical water disinfection applications. Repeated test of the CA film showed that the antimicrobial activity of TiO2 NP-embedded CA film did not change significantly after four repeated usages, further demonstrated the durability of the CA film for practical application.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Dissemination

The target audiences for the information generated by this project are the small, medium, and large-sized produce processors, their VP's of food safety and/or their QA/QC staffs. The information on new developments for produce safety and quality have been presented and delivered to professional produce science community in industry, academic, and government through technical presentations at scientific meetings, short courses, and extension publications.

Rapid Methods and Biosensors for Food Quality, Food Safety and other Agricultural Applications

Project Director

Jose Reyes De Corcuera

Organization

University of Georgia

Accession Number

1014994

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Enzymes are used as sensing elements in the fabrication of enzyme biosensors de measure glucose, ethanol, lactate, pesticides, and other analytes of interest to agriculture and food. Enzymes are also used catalysts in the food industry in the development of flavors, clarification of fruit juice, manufacture of high fructose corn syrup etc. Enzymes are proteins that lose their catalytic activity over time. Objective 2 of this project aims at stabilizing enzymes reduce their industrial cost and also to enable the use of some enzymes that are currently too labile to find a practical application.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This year as well, we focused on the stabilization and activation of enzymes at high hydrostatic pressure. In particular, we characterized the effect of HHP on the activity of alcohol oxidase. HHP increased the activity of the labile fraction of alcohol oxidase but not of the resistant fraction suggesting that a labile isozyme, despite being highly homologous has regions that unfold differently due to high pressure.

We also validated the study on the effect of HHP on the stability of galactose oxidase and started writing the manuscript for publication in a peer-reviewed journal.

Also, we started studying the denaturation of glucose oxidase at high pressure using fluorescence measurements. However, the sensitivity of our analytical setup was to low and not reproducible enough to make quantitative determinations.

Finally, we participated in a high pressure-small-angle X-ray scattering (HP-SAXS) workshop at Cornell synchrotron and then we were able to get some beam time to run preliminary HP-SAXS on galactose oxidase and glucose oxidase. Preliminary results indicate that the protein unfolding under HHP follows a different mechanism than at atmospheric presssure.

Products

Yang, D. and Reyes-De-Corcuera, J.I.* (2021) Increased Activity of Alcohol Oxidase at High Hydrostatic Pressure. Enzyme Microb. Technol. 145: 109751.

Briefly describe how your target audience benefited from your project's activities.

Because of the fundamental nature of this project, the target audience for this project is mainly the academic community, in particular researchers studying enzyme stabilization, biophysicists, and other scientists studying enzymes in extreme conditions. We are characterizing the effect of HHP on enzymes that catalyze similar reactions but that they are structurally very different. We have proposed a correlation between the size of the cavities that exist in these enzymes. This will allow the scientific community to focus on stabilizing these cavities to increase the operational life of these enzymes.

Eventually, the food processing industry, in particular, those that use enzymes in their processes will benefit from this research.

Briefly describe how the broader public benefited from your project's activities.

Because of the fundamental nature of this project, the broader public has not benefited from this research yet.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

During this period of time one M.S. and one Ph.D. student, both in Food Science were trained and carried out most of the research done for this project.

Dissemination

Research results were disseminated at two professional meetings and one foreign university symposium:

Reyes De Corcuera, J. (2021). Application of High Hydrostatic Pressure and Nanofilms to the Fabrication of Enzyme Biosensors. In *2021 Annual Conference of the Institute of Biological Engineering*

Reyes De Corcuera, J. (2021). Procesos Enzimáticos a Altas Presiones (Enzyme Processes at High Pressure. In *IV congreso de Ingeniería de Alimentos Universidad Iberoamericana - (4th Congress of Food Engineering, Universidad Iberoamericana)*

Reyes De Corcuera, J. (2021). Catalisis Enzimatica a Altas Presiones. In *1st Congreso Euroamericano de Proceso y Productos Alimentarios (1st Euroamerican Congress on Food Processes and Products)*

Plans

During the next period, we will continue to focus on Objective 2. We will determine the optimal pressure for three enzymes. We will re-run HP-SAXS on glucose oxidase and galactose oxidase to better understand the mechanisms of protein unfolding at selected temperatures and pressures.

Microbial quality of blueberries and hygiene conditions of fresh blueberry packing lines

Project Director
Jinru Chen
Organization
University of Georgia
Accession Number
1014538

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The Produce Safety Rule provides a framework for best practices to minimize the risk of pathogen contamination throughout the production process, however, knowledge gaps remain. To date, limited studies have been conducted to identify the risks among various components along fresh produce production and supply chain.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Blueberry demand has increased significantly in the past decade mainly because of the health benefits associated with blueberry consumption. Despite the healthy outcomes of regular blueberry consumption, foodborne illnesses have been linked to fresh blueberries contaminated with pathogenic bacteria. Since fresh blueberries are not subjected to any antimicrobial treatment before being shipped to the market, the hygiene conditions in berry packing environment is extremely important for the production of microbiologically safe and wholesome products. In this project, we will evaluate the hygiene conditions of selected fresh blueberry packing lines and assess the microbial loads on blueberries collected from fresh fruit packing lines. We will also evaluate the efficacy of chemical sanitizers commonly used by blueberry packers in cleaning and decontaminating blueberry packing lines. The research will provide useful information to the blueberry industry.

Products

Gazula, H., J. Quansah, H. Scherm, C. Li, F. Takeda, P. Wang, and J. Chen. 2019. Ease of biofilm accumulation, and efficacy of sanitizing treatments in removing the biofilms formed, on selected surface coupons. Food Control. 104:167-173.

Briefly describe how your target audience benefited from your project's activities.

Blueberry producers and packers, researchers in the food industry, government and academia, policy makers.

Briefly describe how the broader public benefited from your project's activities.

The research will evaluate the hygiene conditions of selected fresh blueberry packing lines and assess the microbial loads on blueberries collected from fresh fruit packing lines; evaluate the efficacy of chemical sanitizers commonly used by blueberry packers in cleaning and decontaminating blueberry packing lines; and provide useful information to the blueberry industry.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

NA

Opportunities

The project has trained 3 Ph.D. students and1 laboratory helper. The project provides an excellent opportunity for the students to gain research training and laboratory experience. Meanwhile, they are given the responsibility to supervise the laboratory helper, which is an opportunity for them to learn management and supervisory skills. In addition to laboratory research, the graduate students are encouraged to get involved in food safety professional societies. The involvement will allow them to develop professional networks and get connected with their peers.

Dissemination

Gazula, H., and J. Chen. 2018. Ease of biofilm accumulation, and efficacy of sanitizing treatments in removing the biofilms formed, on selected abiotic surfaces. Int. Assn. Food Prot. Annu. Mtg. Prog. Abstr. Book. 8-11 July. Salt Lake City UT p.68.

Gazula, H., and J. Chen. 2018. Ease of biofilm accumulation, and efficacy of sanitizing treatments in removing the biofilms formed, on selected abiotic surfaces. ASM Microbes. 7-11 June. Atlanta GA poster no: 7387.

Plans

Investigate whether pre-adaptation with sub-lethal concentrations of sanitizers will elevate the tolerance of fecal coliforms to antibiotics used in human medicine

Critical Issue

Health & Wellness

Transit and Release of Microencapsulated Bioactive Compounds in Dynamic Gastrointestinal Conditions and the Effect of Differing Food Matrices

Project Director
Fanbin Kong
Organization
University of Georgia
Accession Number
1026466

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Bioactive compounds, such as polyphenols, carotenoids, and probiotic bacteria, have attracted strong interest from consumers and food companies due to their high potential for improving health and use in disease interventions. Microencapsulation is used as a strategy to protect nutrients and phytochemicals from harsh stomach conditions and allow controlled release at desired site in the gastrointestinal (GI) tract. Dynamic physiological conditions (pH, peristalsis, acid and enzyme secretion, GI transit and emptying) could significantly impact the transit of bioactive-embeded-microcapsules (BEM) in the GI tract and their release properties. In addition, food matrix could strongly affect the movement, transformation, and release properties of BEMs. These information, however, are very limited.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In this proposed project, we plan to study the transit of BEMs and their release properties as affected by dynamic GI conditions and the food matrix using dynamic GI models. β-carotene (BCT) and anthocyanin (ACN) are used as the example of core materials, representing oil- soluble and water-soluble bioactive compounds, respectively. Specific objectives include 1) Investigate the effect of pH, viscosity, and contraction forces on release mechanisms and kinetics of BEMs, 2) Determine how food matrix and composition cause dynamic changes in the physical chemical properties of GI media (pH, viscosity, water diffusivity) and the effect on transformation and release of BEMs, and 3) Explore how food ingestion modulates gastric emptying and intestinal transit of BEMs.

Briefly describe how your target audience benefited from your project's activities.

Target audience include researchers from companies and research institutes working in the area of microencapsulation technology.

Briefly describe how the broader public benefited from your project's activities.

The expected results will contribute to design of effective microencapsulation systems for controlled release of food bioactives in the human GI tract, and will enhance understanding of bioaccessbility and bioavailability of nutrients embedded in microcapsules and food matrix.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

One graduate students is working on this project conducting experiments and data analysis, as well as preparing manuscripts for publication.

Dissemination

The results were presented at annual IFT conferences. A manuscript is in preparation.

Health and Wellness

Project Director
Mark Latimore
Organization
Fort Valley State University
Accession Number
7000386

FVSU CEP Family and Consumer Science – Health and Wellness Initiatives

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Through grassroots connections, researched based education and personable staff Fort Valley State University Cooperative Extension Program Family and Consumer Sciences Area (FVSU CEP FCS) has been able to empower participants to develop the essential knowledge and skills to increase positive family dynamics, save money and to enhance longevity of life through improved health and nutrition behavioral changes.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Key activities provided through FVSU CEP Family and Consumer Science Area were varied; we collaborated with 4-H for youth programs that focused on nutrition, decision making techniques on behavior, soft skills development and physical activity programs. Programs offered to parents consisted of nutrition education, chronic disease, parenting workshops that focused on teaching at home during the pandemic, dealing with stress and technology workshops. With the other adults, caregivers and senior communities we provided programs on fruit/vegetable home gardening, facts on COVID-19 pandemic, energy efficiency, health & wellness and technology workshops.

Briefly describe how your target audience benefited from your project's activities.

FVSU CEP FCS staff works personally with residents in nearly 35 counties throughout middle, east and south Georgia. Georgia citizens are faced with an above average poverty rate, high unemployment, increased chronic diseases, increased local food deserts and daily challenges compounded with the COVID-19 pandemic. To aid in a healthy future for Georgia families, community-based programs are essential. FVSU CEP FCS provided programs focused on parenting skills, caregiver trainings, youth life-skills, energy efficiency/healthy home workshops and nutrition education programs. These types of programs must

be a staple in Georgia.
By providing practical, solution-oriented learning opportunities for Georgians outside the formal classroom citizens were able to save money, lower health concerns, cope with stress and increase family resiliency.

Briefly describe how the broader public benefited from your project's activities.

Research-based educational programs improve the quality of life for individuals, families and communities.

Enzymatic Modification of Lipids

Project Director
Casimir Akoh
Organization
University of Georgia
Accession Number
1024219

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The food industry, academia, and government researchers are continuously looking for ways to provide the consumer with healthier, functional, oxidatively stable fats and oils. Attention is focused on the enzymatic synthesis of structured lipids (SLs) and their application in food products. There is also added interest in finding suitable natural or enzymatically produced antioxidants that can replace potentially harmful synthetic antioxidants in foods containing n-3, n-6, and n-9 fatty acids (FAs).

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We set out to explore for the first time the use of enzyme/lipases to synthesize novel antioxidants with improved solubility in hydrophilic and lipophilic environments for possible use in food products. Our efforts resulted in successful synthesis and characterization of such antioxidants and their ability to stabilize emulsions and act as antioxidants were studied.

Products

Zhang, S. and Akoh, C.C. 2020. Enzymatic synthesis of 1-o-galloylglycerol: Characterization and determination of its antioxidant properties. Food Chem. 305:1-9 (125479). Doi: 10.1016/j.foodchem.2019.125479.

Zhang, S. and Akoh, C.C. 2020. Antioxidant property and characterization data of 1-o-galloylglycerol synthesized via enzymatic glycerolysis. Data Brief Doi: 10.1016/j.dib.2020.105110. eCollection 2020 Apr.

Zhang, S., Willett, S.A., Hyatt, J.R., Martini, S., and Akoh, C.C. 2021. Phenolic compounds as antioxidants to improve oxidative stability of menhaden oil-based structured lipid as butterfat analog. Food Chem. 334. Doi:10.10.1016/j.foodchem.2020.127584.

Zhang, S., Hyatt, J.R., and Akoh, C.C. 2021. Solvent-free enzymatic synthesis of 1,2-dipalmitoylgalloylglycerol: characterization and optimization of reaction condition. Food Chem. 344 Doi:10.1016/j.foodchem.2020.128604.

Zhang, Z., Ye, J., Lee, W.J., Akoh, C.C., Li, A., and Wang, Y. 2021. Modification of palm-based oil blend via interesterification: physicochemical properties, crystallization behaviors and oxidation stabilities. Food Chem. 347 Doi:10.1016/j.foodchem.2021.129070.

Hyatt, J.R., Zhang, S., and Akoh, C.C. 2021. Comparison of antioxidant activities of selected phenolic compounds in o/w emulsions and bulk oil. Food Chem. 349 Doi:10.1016/j.foodchem.2021.129037.

Zhang, Siyu. PhD 2020. Dissertation: “Enzymatic synthesis of glycerol-based galloyl structured lipids: characterization and application as antioxidants.”

Briefly describe how your target audience benefited from your project's activities.

We successfully used our antioxidant, 1-o-galloylglycerol, GG (hydrophilic), to improve the oxidative stability of a menhaden oil-based structured lipid intended for use a butterfat analog. We also tested this as an antioxidant in oil-in-water, o/w emulsions and bulk oil. We were able to synthesize a novel diacylglycerol-based structured lipid (lipophilic), 1,2-dipalmitoylgalloylglycerol (DPGG) and characterize the structure. These novel natural antioxidants were better than other synthetic antioxidants currently used in foods. This means that in the future such antioxidants may lead to less use of synthetic (chemical) antioxidants in foods.

Briefly describe how the broader public benefited from your project's activities.

One inter-university collaboration study was published using the product of this project. Overall, human health will be improved if these natural antioxidants are applied to food products.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

The project director and the students participated in professional meetings such as IFT and AOCS, to present results of their findings and to enrich their knowledge by listening to other presentations. One PhD student dissertation resulted from this project.

Dissemination

We disseminated the results through publications and presentations at professional meetings.

Plans

We will continue to work on our remaining objectives.

Nutrition Assistance Programs and Dietary Outcomes

Project Director
Travis Smith
Organization
University of Georgia
Accession Number
1018587

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

This project uses state of the art econometric methods to (1) identify the impacts of federal nutrition assistance programs on dietary outcomes such as diet quality and food security, and (2) uncover heterogeneous impact across targeted subpopulations. For example, the project will answer questions such as: (1) Does the WIC program impact children who are prone to lower-quality diets differently than those who are prone to higher-quality diets? (2) Does the monthly nature of SNAP benefit redemption impact the quality of diets over the SNAP benefit month? (3) What are the econometric implications of cyclical responses to food insecurity reporting when investigating the impact of SNAP on food insecurity?

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Federal food assistance programs, such as SNAP, WIC and school food, make up roughly two-thirds of USDA's budget. The project explores both the intended and unintended consequences of these programs on individuals' health and well-being.

Briefly describe how your target audience benefited from your project's activities.

This project will target industry stakeholders, policymakers, academics, and generally informing the population at large.

Briefly describe how the broader public benefited from your project's activities.

Results from this project will inform on-going policy discussions pertaining to reforming nutrition assistance programs. For example, child nutrition programs (e.g., WIC and school food) the programs can change.

Folate Status Assessment for Evaluating Global Risk for Neural Tube Defects (NTD) and Monitoring Effectiveness of Folic Acid Fortification Programs

Project Director
Lynn Bailey
Organization
University of Georgia
Accession Number
1015935

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Folic acid fortification programs have been implemented in numerous countries globally. To assess the effectiveness of these programs, public health programs have been implemented to assess folate status as an indirect measure of potential risk reduction.This project is designed to address enhancing the consumption of foods to which folic acid has been

added (i.e. fortified foods) in the world's most vulnerable groups of women of reproductive age in LMI countries. The identification of specific countries with the greatest need for folic acid fortified products will be based on the assessment of folate status by establishing regional laboratories where blood folate levels can be measured by standardized methodology. The expected outcome of this study is to prevent NTDs globally through new folic acid fortification programs based on folate status assessments of women of reproductive age.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This project is designed to address enhancing the consumption of foods to which folic acid has been added (i.e. fortified foods) in the world's most vulnerable groups of women of reproductive age in LMI countries. The identification of specific countries with the greatest need for folic acid fortified products will be based on the assessment of folate status by establishing regional laboratories where blood folate levels can be measured by standardized methodology. The expected outcome of this study is to prevent NTDs globally through new folic acid fortification programs based on folate status assessments of women of reproductive age.At present, the most effective folic acid

fortification programs in terms of coverage and low cost utilize wheat flour or maize meal as the fortification vehicle (Garrett and Bailey, 2017). Reliance on these fortification vehicles alone may limit coverage in populations reliant on other food staples such as rice or in indigenous subpopulations which mill grain at home (Garrett and Bailey, 2017). Thus, in collaboration with an

international team of experts, we will lead efforts to identify additional food stuffs consumed regularly by a majority of women of reproductive age in specific regions, populations and sub-populations. Potential fortification vehicles will be tested for bioavailability, stability and effectiveness in improving folate status prior to approval for use in large-scale fortification programs.

Briefly describe how your target audience benefited from your project's activities.

Together with collaborators from the CDC, we will establish a network of resource laboratories in each WHO region globally.One or more laboratories in each of the six WHO regions (Africa, Americas, South-East Asia, Europe, Eastern Mediterranean and Western Pacific) currently conducting folate analysis using the MBA assay or laboratories which can be equipped and personnel trained to conduct the analysis will be identified. The analytical capacity of existing laboratories to measure blood folate using the standardized assay will be evaluated as a first step in selecting the regional resource laboratories. Folate assay kits including all common critical reagents, such as microorganism, standards and quality control pools will be produced by the CDC and provided to each regional resource laboratory.

Briefly describe how the broader public benefited from your project's activities.

Successful completion of these objectives will greatly enhance efforts toward improving folate status in women of reproductive age and in reducing NTD risk throughout the world. Development of a standardized assay for folate assessment will allow for greater precision in determining the prevalence of folate insufficiency in LMI countries and aid in identifying populations or

population subgroups most at risk. This information, together with the development of additional and more appropriate fortification vehicles, should assist policy makers at the national and international level in developing additional mandatory fortification programs to provide greater coverage towards improving nutritional status and eradication of folate-sensitive NTDs.

The Relationship among Food Insecurity, Public Assistance Program Participation, Health, and Health Care Utilization in Older Adults

Project Director
Jung Sun Lee
Organization
University of Georgia
Accession Number
1015380

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Food insecurity is a critical public health issue facing millions of older adults in the US. Despite a high prevalence of food insecurity among older adults and well-documented adverse health effects of food insecurity, little is known about the impact of food insecurity on health and health care utilization among low-income older adults with a high prevalence of chronic conditions and low level of financial resources to meet their basic food and health care needs as well as about the effectiveness of existing public assistance programs designed to address food insecurity among low-income older adults. Using best available national and state-level data, this project investigates the relationships among food insecurity, public assistance program participation, health status, and health care utilization and expenditures among low-income older adults.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We made significant progress toward our project goals between October 1, 2020, and September 30, 2021. During this period, we received approval from the Georgia Division of Aging Services (GA DAS) and the Georgia Division of Family and Children Services (GA DFCS) for acquiring Older Americans Act (OAA) Nutrition Programs and other aging services data from GA DAS linked with Supplemental Nutrition Assistance Program (SNAP) administrative data from GA DFCS. We established a Data Use Agreement (DUA) with the Georgia Department of Human Services (GA DHS) on April 15, 2021, which was critical to acquiring GA

aging services and SNAP administrative data for the project. We received the data from GA DAS and DFCS in May 2021. We have since analyzed these data to examine the trends and prevalence of food insecurity, aging services and SNAP usage patterns, and the impact of SNAP and aging services on food insecurity among aging services participants between January 2018 and August 2020.

Briefly describe how your target audience benefited from your project's activities.

The statewide longitudinal food insecurity and OAANP services use data provide unprecedented documentation and evidence on the prevalence and trends in food insecurity in a state with higher-than-average prevalence of food insecurity, poverty and adverse health outcomes. The findings from this study also provide evidence on the causal relationship of nutrition assistance programs with food insecurity in low-income older adults. These findings will inform evidence-based practices, programs, and guidelines to address food insecurity and related burden of vulnerable low-income older population.

Briefly describe how the broader public benefited from your project's activities.

The findings, experiences, and lessons learned from establishing the data utilized in this project hold great potential for research and nutrition assistance program and policy innovations for older Americans. The innovative approaches tested in the proposed study will provide methodological guidance on linking and utilizing data from distinct yet complementary data sources and suggest best-practice approaches to leverage existing administrative data sources for nutrition assistance and aging programs in establishing timely and reliable researchable databases. The innovative methodology used in this project can be replicated in other states and/or at the national level to provide opportunities for researchers to better understand food insecurity, underlying risk factors, and resulting nutrition and health outcomes. The findings of this project will also be of importance to the policymakers at the federal, state and local levels intending to enhance the delivery of public assistance programs and other services targeted to meet the unique needs and demands of older adults.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

As reported previously, due to several stricter requirements in acquiring aging services data, we have faced unforeseen challenges in accessing and linking administrative datasets. The COVID-19 pandemic also caused delays in obtaining the required waivers to access the data. Due to these issues, we could not proceed with merging the linked aging services and SNAP administrative data with Medicare data and could not examine health outcomes. We will continue to work with GA DAS, GA DFCS, and CMS to establish the needed DUAs and acquire Medicare data for the aging services participants in Georgia.

Plans

During the next reporting period, we will continue to work with GA DAS, GA DFCS, and Centers for Medicare and Medicaid Services (CMS) to finalize and establish the required protocol to merge linked aging services and SNAP data with the Medicare data. We will also disseminate our findings to researchers and policymakers through presentations and peer-reviewed publications.

Health and Wellness

Project Director

Laura Perry Johnson

Organization

University of Georgia

Accession Number

7000206

Diabetes Prevention

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

One in three American adults (88 million) has prediabetes and more than 8 in 10 adults with prediabetes don't know they have it.(1) Prediabetes increases the risk for heart disease and stroke and for developing type 2 diabetes (T2DM), a costly and life-altering disease that increases the risk for morbidity and mortality from COVID-19. Together, prediabetes and diabetes cost Georgia $11 billion annually in direct medical expenses and lost productivity,(2) and those costs are likely higher in the wake of COVID-19. The evidence-based, CDC National Diabetes Prevention Program (DPP) lifestyle change program has been shown to decrease the risk of developing T2DM by up to 58% among those with prediabetes who lose at least 5% of their body weight by eating healthy and exercising 150 minutes per week.(3) Moreover, the program has been shown to have a return on investment of up to 42%, and save participants $2,671 per person in medical costs per year.(4)

1. Centers for Disease Control and Prevention. About Prediabetes & Type 2 Diabetes. https://www.cdc.gov/diabetes/prevention/about-prediabetes.html. Accessed on Jul 27, 2020.

2. American Diabetes Association. The Burden of Diabetes in Georgia. http://main.diabetes.org/dorg/docs/state-fact-sheets/ADV_2020_State_Fact_sheets_GA.pdf. Accessed on Oct 20, 2021

3. Centers for Disease Control and Prevention. Research Behind the National DPP. https://www.cdc.gov/diabetes/prevention/research-behind-ndpp.htm. Accessed on Jul 27, 2020.

4. Khan, T., Tsipas, S., & Wozniak, G. (2017). Medical Care Expenditures for Individuals with Prediabetes: The Potential Cost Savings in Reducing the Risk of Developing Diabetes. Population health management, 20(5), 389–396. https://doi.org/10.1089/pop.2016.0134

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In the fall of 2019, UGA Extension began delivering the yearlong Diabetes Prevention Program in-person in two counties and expanded to in-person delivery to 13 counties in winter of 2020. All in-person programs were switched to virtual delivery in March of 2020 in response to the COVID-19 pandemic. As of fall 2020, UGA Extension has been providing both in-person and virtual Diabetes Prevention Programs across the state inclusive of 13 counties and three University System of Georgia faculty and staff groups (University of Georgia, University of North Georgia, and Georgia Tech). FACS Extension agents teach participants to prevent diabetes through eating healthy, managing stress, being more active, and problem solving. Participants and agents work together to find solutions to the common barriers to a healthy lifestyle, many of which were amplified during the pandemic lockdowns. In the reporting year, FACS Agents delivered over 2,700 educational contact hours to the 194 active participants.

Briefly describe how your target audience benefited from your project's activities.

Since the start of the program in 2019, agents delivered 25 programs (16 complete and 8 ongoing) to 277 Georgia citizens, (102 in-person and 92 virtual since November 2020). Participants lost a total of 1,924 pounds (1,618 since November 1, 2020). Sixty participants have met or exceeded the 5% weight loss goal shown to reduce the risk of diabetes, and many of these participants are only partway through the year-long program. Moreover, participants are averaging 175 minutes of physical activity per week which exceeds the program goal. Notably, these positive outcomes have been achieved during a time when much of America has gained weight and experienced declines in physical and mental health.

The estimated savings of an individual who does not progress from prediabetes to diabetes is $2,671 annually.(4) Thus, one could estimate that these 60 people who have met the program goals will save $160,260 next year if this weight loss keeps them from progressing to diabetes. Yet diabetes costs are not the only costs associated with excess weight, and researchers have compared societal costs savings across BMI categories.(5) Eight people moved from overweight to normal weight and 11 people from obese overweight resulting in an estimated societal cost savings of $329,287.5

Participants have also reported decreasing medications and insulin, less knee pain, and improvements in cholesterol, blood pressure, and mental health. Comments from participants include, "This program was the best thing that I've done in a long time…and I no longer have to take the pre-diabetes medication my doctor had prescribed," "Since COVID, [the DPP] has helped me to get back on track," and "My joint pain and inflammation is virtually gone."

In February 2021, UGA achieved full recognition, the highest honor, in the CDC through the National Diabetes Prevention Recognition Program for its excellence in implementation and program outcomes. Thus, UGA Extension is persevering through the pandemic to improve health and wellbeing of citizens and save Georgia money.

1. Centers for Disease Control and Prevention. About Prediabetes & Type 2 Diabetes. https://www.cdc.gov/diabetes/prevention/about-prediabetes.html. Accessed on Jul 27, 2020.

2. American Diabetes Association. The Burden of Diabetes in Georgia. http://main.diabetes.org/dorg/docs/state-fact-sheets/ADV_2020_State_Fact_sheets_GA.pdf. Accessed on Oct 20, 2021

3. Centers for Disease Control and Prevention. Research Behind the National DPP. https://www.cdc.gov/diabetes/prevention/research-behind-ndpp.htm. Accessed on Jul 27, 2020.

4. Khan, T., Tsipas, S., & Wozniak, G. (2017). Medical Care Expenditures for Individuals with Prediabetes: The Potential Cost Savings in Reducing the Risk of Developing Diabetes. Population health management, 20(5), 389–396. https://doi.org/10.1089/pop.2016.0134

5. Fallah?Fini, S., Adam, A., Cheskin, L. J., Bartsch, S. M., & Lee, B. Y. (2017). The additional costs and health effects of a patient having overweight or obesity: a computational model. Obesity, 25(10), 1809-1815.

Briefly describe how the broader public benefited from your project's activities.

Improved health of citizens

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Fresh on DeK Mobile Farmers Market

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

DeKalb County has the 4th highest case count of novel coronavirus (COVID-19) in the state of Georgia, compared to 2020. Feeding America projects that in 2021, 21.3%, of black individuals may experience food insecurity, due to lack of access to sufficient foods because of limited financial resources.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Fresh on DeK Mobile Farmer's Market visits 16 different food desert locations around DeKalb County over the course of 16 weeks providing education and fresh produce to DeKalb residents. Due to social distancing and food-handling guidelines, Fresh on Dek continues to provide fresh produce at no cost at various strategic drive-thru locations, including recreation centers, senior communities, public libraries, churches, and community centers. Residents receive a range of pre- bagged produce including sweet potatoes, apples, oranges, corn, okra, plums and more. Fresh on DeK, continues offering weekly live classes, online food demonstrations and digital healthy-living handouts. This is made possible with funding from the Centers of Disease Control and Prevention, DeKalb County Government DeKalb County Board of Health and UGA Cooperative Extension.

Briefly describe how your target audience benefited from your project's activities.

Throughout the 16-week 2021 farmers market season, Fresh on DeK Mobile Farmer's Market provides fresh produce to about 8,410 residents. The number of participants nearly doubled from last year's farmers market season. This equates to the distribution of approximately 54,665 pounds of fresh fruits and vegetables at 16 community sites around DeKalb County. Fresh on DeK continues the educational outreach through weekly 1-hour healthy living classes on Zoom and Facebook Live online platforms for 16 weeks. Reaching over 500 online participants through various topics such as physical activity with limited

mobility, to reducing sodium intake in their diets. Fresh on DeK estimates $95,665 of money saved for families, based on average produce prices. A participant of the classes said, “The Health, Nutrition, and Wellness discussion and demonstrations were most/very beneficial part of the program.” Another participant commented, “Thank you for providing this program, it has been a blessing to myself and my family.”

Briefly describe how the broader public benefited from your project's activities.

Improved access to fresh produce.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Gleaning Program Provides Fresh Produce

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

In Georgia, 32% of adults are obese, while in Appling County 39% of adults are obese (CHR, 2020). Obesity and overweight contribute to the development of chronic conditions such as cardiovascular disease (CVD), hypertension, diabetes, cancer and osteoarthritis. CVD is the number one killer in Georgia. For every 100,000 people in Georgia, 341.1 people die from heart disease annually compared to 320 per 100,000 nationally (CDC, DHDSP 2016-2018). For every 100,000 people in Appling County, 475.9 adults die from all heart related disease each year. Hypertension contributes to heart disease, kidney disease, diabetic complications and stroke. For every 100,000 people in Appling County, 110.2 people die each year from stroke compared to the Georgia average of 85. While 10.5% of the US population has been diagnosed with diabetes, 11.4% of Georgians have been diagnosed with diabetes(CDC, 2020). Appling County is higher than the state average at 15% of adults diagnosed with diabetes (CDC, 2017). Cancer is the second leading cause of death in Georgia and the US (CDC, 2017). While Georgia has similar incidence and mortality rates to the U.S. for breast, cervical and colorectal cancer, several counties, particularly rural counties, have rates that far exceed national and state averages (SEER, 2013). For every 100,000 people in Appling County, 416.8 people are diagnosed with cancer; cancer mortality rates are 173.3 people (CDC, 2017). Risk for 1/3 of cancers could be reduced by achieving a healthy weight, eating a healthier diet, not smoking and being more physically active (AICR 2018. Out of the six statistics mentioned above, Appling County ranks higher than Georgia does five times. In addition, only 20% of the population of Appling County has access to exercise opportunities, which is below state norms at 75%. Appling County also ranks higher, at 38% in physical inactivity, than the state at 28%, according to County Health Rankings (2020).

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

As one of the eleven counties chosen to receive funding from Healthcare Georgia Foundation Two Georgias Initiative, Appling County formed the Coalition for a Healthy Appling County in 2017. Two of the goals of the Strategic Plan are to: Empower all Appling County residents to eat a healthy diet and to Empower all Appling County residents to be physically active. As chair of the Healthy Eating Committee, agent helped choose strategies to meet the goal of this committee. One of the strategies chosen was to support the establishment of a Gleaning Program, which gives volunteers the opportunity to gather leftover produce after a harvest to donate to those in need. This project addresses both goals mentioned above by providing fresh produce to limited income individuals and families, and promotes physical activity to those who glean. In addition, it has helped foster community and a sense of belonging among the volunteers who enjoy working together for a good cause.

Briefly describe how your target audience benefited from your project's activities.

Extension partnered with the Coalition for a Healthy Appling County to form the Appling County Glean Team in October 2018, under the direction of Society of St. Andrew. Thirteen growers from Appling and surrounding counties have been involved by donating produce that was left after the harvest. One farmer has donated an acre of his land to plant a garden just for this project. Nine volunteers have been

trained to be Field Supervisors. Seventy-one volunteers have gleaned, with a total of 713 volunteer hours, with a value of $20,349.00, based on Independent Sector–Dollar Value of a Volunteer. Some of the volunteers included 4-H'ers, clients from the Appling County Senior Center and Pineland Adult Mental Health Service Center.

The gleaning program has provided adults and youth opportunities to give back. Since the project's inception, volunteers of all ages have gleaned 40 times, and one farm donated pallets of blueberries fifteen times. Last year, four 4-H'ers donated one of their show pigs for slaughter to the food bank. In total, 55,550 pounds of produce and 650 pounds of pork, equaling 56,200 pounds of fresh food, have been donated to feed limited income citizens of Appling and surrounding counties. According to America's Second Harvest, the dollar value of these donations equal $56,200.

In order to educate those receiving food, FACS agent also provided Farm, Fresh and Fast brochures for the food bank to disperse with produce that was gleaned. Therefore, 225 citizens of Appling County have received educational materials, which included nutrition facts, food safety advice and recipes.

This project has impacted Appling County citizens in many ways, whether they received food or volunteered their time to give back to their community. Food was donated to several organizations: the Appling County Food Bank; the Appling County Senior Center; Pineland Behavioral Health Center; Called to Love; Elderwood Apartments; and the Georgia Baptist Children's Home.

Through the gleaning program, the original goals – to empower all Appling County residents to eat a healthy diet and to empower all Appling County residents to be physically active – are being met with the help of volunteer adults and youth. The main objective of this project is to strengthen the overall health

of Appling County, raising it above the state and national levels.

The following testimonies represent those who have been involved in this project:

A volunteer from the Appling County Senior Center, said "This is a wonderful program. It allows people who wouldn't normally go to the store to buy fresh fruits and vegetables to eat healthy. It's such a blessing. I feel that the farmers enjoy not having to waste their crop and be able to bless people too. I've so enjoyed helping with this worthy cause. It's been a blessing to me and to others."

The overseer of the Appling County Food Bank, said "For the people we serve and the food bank volunteers, receiving fresh fruits and vegetables makes their day! Not only for the people we serve, but those people who are serving especially enjoy being able to serve fresh produce to the clients. You know, most people just don't get fresh produce anymore. It is very rewarding. People get excited about fresh produce!"

Briefly describe how the broader public benefited from your project's activities.

Fresh produce available to the public

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Increasing Community Engagement on Health

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Extension's WCC initiative helps build diverse, multigenerational, cross-sector coalitions that can recognize and address systemic health inequities. This initiative supports youth voice and action through equal partnerships with adults, addresses determinants of health through policy, systems and environmental changes at local and system level and focuses on diversity, equity and inclusion. Washington County has been part of this grant for the past four years and plans to continue to work toward these projects. Located in the Southeast Extension District, Washington County has a long history of being engaged in health interventions with many community collaborators including county government. Washington County is rural and ranks 59 of 159 counties in overall ranking in health outcomes with a population of 20,676 and a 30.2 % poverty rate. Out of 159 Counties Washington County ranks 34 in County Life Expectancy (Premature Death) out of those 159 Counties.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Washington County established and formed a community Health Coalition. With the expertise in rural programs the Archway Partnership and Cooperative Extension were natural partners for developing new options and resources for the community. Extension and UGA Archway partnered their Health Issue Work Group model to bring together stake holders, including healthcare providers and other community members, to learn about the needs and goals for rural areas on health and the Washington County Health Coalition was formed. Youth voice has become valued and an active part of the Coalition. Washington County 4-H Agent recruited youth to the Health Coalition team. WCC team members we offered an opportunity to participate in the new developed master Volunteer Academy. Four youth and two adults agreed to complete the 40-hour volunteer training and successful graduated the program. The Master Volunteers now participate in the Washington County Health Coalition. This will provide over 480 volunteer hours back into the community.

Briefly describe how your target audience benefited from your project's activities.

Efforts in recruiting adult and youth volunteers produced a total of 104 volunteers actively participating in the WCC Master Volunteer Academy. 15 adult volunteers and 7 youth volunteers are actively participating in monthly Health Coalition Meetings. Current estimated national value of each volunteer hour is $28.54. The 6 master volunteer graduates have given 240 hours of volunteer time at an estimated amount of $12,329.28. There are additional 98 participants in the Master Volunteer Program giving their time of 18 hours totaling 1,764 hours for an estimated value of $50,344.56. Since graduation, the master volunteer graduates have given an additional 192 hours totaling $5,479.68. Additional WCC volunteers have give 96 hours totaling $2739.84. WCC has acquired $53,344.56 of estimated value to Washington County Culture of Health. Participant Comments: "I never thought about improving health equity means changing policies, systems and environments so that everyone has what they need." – Youth Participant. "I have been so impressed how our youth have grown becoming a strong voice and integral part of the decisions about health in our community." – Adult Participant.

Briefly describe how the broader public benefited from your project's activities.

Increased community engagement

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Critical Issue

Plant Production

Improvement of Ornamental Traits through Genome Editing

Project Director

H Wilde

Organization

University of Georgia

Accession Number

1024848

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Genome editing provides the opportunity to develop new traits in ornamental plants in a shorter timeframe than breeding. An emphasis is placed on gene editing approaches that will result in nontransgenic ornamental plants.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Progress was made on the development of a gene transfer system for two Gerbera daisy cultivars. Tissue culture-based regeneration through organogenesis and somatic embryogenesis was examined. Agrobacterium-mediated transformation experiments were carried out with visual markers (GUS, GFP) and antibiotic-resistance markers (nptII, hpt). Molecular analysis was conducted with the CRISPR target genes, phytone desaturase and MLO.

Briefly describe how your target audience benefited from your project's activities.

The floral industry will benefit from methods that can develop new traits for the ornamental market.

Briefly describe how the broader public benefited from your project's activities.

Gene editing can produce gerbera plants with genetic resistance to powdery mildew. This can reduce the reliance on fungicides to control the disease, protecting workers and consumers.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

Gerbera has been found to respond slowly in tissue culture, extending the time needed to optimize gene transfer.

Opportunities

This project provides training for a postdoctoral associate and two PhD students.

Plans

CRISPR constructs for PDS and MLO genes will de developed and introduced into gerbera. Somatic embryogenesis will be explored as a platform to conduct gene editing without the stable introduction of transgenes.

Plant Production

Project Director

Laura Perry Johnson

Organization

University of Georgia

Accession Number

7000207

Agronomic Crops Scout School

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Insect pests pose a serious economic threat to Georgia's cotton, peanut and soybean producers. The foundation of effective IPM strategies is pest population monitoring and the use of economic thresholds for management decision making. Time constraints and lack of training often limit a grower's ability to monitor insect activity accurately and efficiently in his or her own fields. Well-trained professional scouts reduce the risk of insect injury to crops and ensure that control tactics (e.g. insecticide applications) are implemented only when necessary.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The University of Georgia Agronomic Crops Scout School is held annually in South-central and Southeast Georgia. The major components of the curriculum are crop physiology and development, insect identification and biology, proper scouting procedures, and safety. The half-day course provides attendees a comprehensive introduction to scouting cotton, peanut, and soybean with classroom and field instruction.

Briefly describe how your target audience benefited from your project's activities.

Using accurate, real-time pest population information for making pest control decisions is the single most effective way to reduce management mistakes. The Agronomic Crops Scout School ensures a ready supply of well-trained scouts to meet the pest monitoring needs of Georgia growers. Scout School attendance averages over 100 annually. The economic and environmental impact of implementing IPM practices in Georgia's major row crops is not easily quantified, but the benefits are significant. A survey of Georgia peanut growers conducted in the fall of 2021 showed that approximately half of the surveyed acres (108,277) were scouted regularly for insect pests. Growers who reported that their peanuts were scouted treated 24% fewer acres for foliage feeding caterpillars than growers whose peanut fields were not scouted. Likewise, the use of a trapping program to monitor peanut burrower bug populations in East Georgia in 2021 resulted in knowledge-based insecticide applications that reduced crop injury and ensured judicial pesticide use.

Briefly describe how the broader public benefited from your project's activities.

Reduction of pest damage to crops

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Plant Production

Project Director

Mark Latimore

Organization

Fort Valley State University

Accession Number
7000388

Horticulture/Fruits and Vegetables/Organic and Traditional Garden

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Educational opportunities are always a need for homeowners and small farmers.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Support is provided to assist homeowners and small farmers in their quests to meet household needs for home-grown fruits or vegetables. Guidance is also provided for those seeking profitable enterprises through off-farm sales. There are two demonstration sites at the FVSU agriculture research station farm dedicated to showing landowners the methods we use and share.

Briefly describe how your target audience benefited from your project's activities.

Research-based educational trainings were provided to homeowners and small farmers in the areas of plant production, horticulture, and gardening.

Briefly describe how the broader public benefited from your project's activities.

Improving growing food and fiber, producing crops for renewable energy and encouraging resource conservation

Closing Out (end date 09/07/2023)

Improving Quality and Reducing Losses in Specialty Fruit Crops through Storage Technologies

Project Director
Angelos Deltsidis
Organization
University of Georgia
Accession Number
1024138

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The postharvest quality of specialty fruit crops is a major issue for the production of Southeastern States such as Georgia as often the adverse conditions of the growing season (heat, high humidity) affect negatively the shelf-life of such crops. The improvements in harvesting techniques, packing, packaging, refrigeration and overall mechanization have significantly alleviated many of these issues. There exist novel techniques that need to be adapted into the local conditions and to be validated before the their importance is disseminated to the industry.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The UGA Postharvest lab, made significant progress over the past year despite working under pandemic restrictions. A new Master's student joined the lab in Spring of 2021 studying postharvest quality of fresh peaches. A number of projects were undertaken by lab members during this year including trials with strawberries, muscadine grapes, peaches among others. The findings were presented in local, regional and national meetings. The PI contributed in extension and scientific publications and delivered extension trainings to communicate the findings.

Products

Extension publication: Deltsidis, A., A.L.B.R. da Silva. 2020. Quick storage guide for vegetable crops. University of Georgia Extension Publications Circular 1205.

Briefly describe how your target audience benefited from your project's activities.

The agriculture industry of Georgia was offered a number of extension presentations that were both for extension agents and farmers. The PI presented virtually at the Southeast Regional Fruit & Vegetable Conference, as well in other trainings that were organized by UGA. The PI was also invited to present in workshops/short courses held by other institutions that have a more national/international audience.

Briefly describe how the broader public benefited from your project's activities.

Our research is aiming to improve the quality of fresh produce that is available to all consumers. We are working towards providing safer, more fresh and more flavorful produce items. Our advances in new water sanitation systems, variety trials, new storage methods have all been shared with the industry who will be evaluating them by their standpoint and needs.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

Our team lost 2 members during this period. The lab technician/manager left the job in August of 2021 while the building superintendent retired in December of 2020.

Opportunities

The new grad student that joined the lab along with the replacement lab manager are assisting with new and ongoing projects as well as with publications.

Dissemination

New extension activities, both in person (local) as well as remote (either online or in other institutions) were organized and the participation was better due to less covid-related restrictions.

Plans

A set of projects is already underway involving a wide array of horticultural crops. The team has grown significantly with 3 undergraduate students, 2 graduate students, 1 lab manager and 1 part time engineer. The team is well prepared to undertake all the studies that have been planned for this season and to disseminate the information in regional, national and international meetings.

Cultural Management Strategies to Enhance Pecan Production

Project Director

M Wells

Organization

University of Georgia

Accession Number

1024094

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

As pecan trees grow in an orchard, their tree canopies encroach on one another, causing excessive shading, which has been shown to increase alternate bearing intensity and reduce tree health and orchard profitability. Historically, limb pruning and tree removal have been the solution to this problem, particularly in the low-light environment of the southeastern United States. Mechanical hedge pruning has been used successfully in in the Western U.S. to mitigate the effects of orchard shading. However, no studies have addressed this in the humid, Southeastern U.S.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Our research has demonstrated that hedge pruning pecans improves nut size, percent kernel, water use efficiency, improves sprayer coverage, and reduces wind damage. Dormant hedging, however, does not improve raw yields over that of non-hedged trees when sunlight is not limiting. In 2021, the non-hedged plots were thinned, which will allow us over time to evaluate tree removal vs. hedge pruning of pecan trees as a method of managing sunlight and maintaining pecan yield. Thus far through the third year of study (2021), while there is a slight numerical difference in yield between summer and dormant hedge pruning, we see no statistically significant difference in yield for summer vs winter pruning. We see no difference in quality between the two pruning periods so far. However, we do see a significant reduction in shoot growth for summer hedged trees compared with dormant hedged. We expect that this will allow growers to prolong the period between pruning cuts on a given face of the tree, which should reduce pruning costs and may improve yields over the long-term compared to dormant hedged trees. Further studies are required to determine the best timing of hedge pruning for Georgia producers.

Briefly describe how your target audience benefited from your project's activities.

Commercial pecan producers

Briefly describe how the broader public benefited from your project's activities.

Hedge pruning has gained in popularity as a regular practice among pecan producers and there are now a number of commercial contractors offering this service throughout the Georgia pecan industry. Hedge pruning has imporved nut quality, minimized alternate bearing, improved spray coverage, improved the efficeicny of pecan water use, and minimized tree damage from wind storms.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

We will beholding field days to instruct county agent son hedge pruning techniques

Dissemination

Presentations have been given to growers at the Southeastern Pecan GRowers Assoc COnference, the Georgia Pecan Conference, and at various county pecan production meetings throughout Georgia Articles published in pecan industry trade magazines---Pecan South and The Pecan Grower

Plans

Field work will continue to gather more data Additional articles and presentations

Advancing plant epidemiology for the growers of Georgia and beyond

Project Director

Paul Severns

Organization

University of Georgia

Accession Number

1023738

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Identification of plant diseases early in the disease cycle enable more efficient and effective management interventions to control economically important plant diseases. In one project, a thermal imaging approach is being used to identify Xylella fastidiosa (a plant pathogenic bacterium) infected blueberry plants months to years before the diagnostic disease symptoms are expressed. Another project focuses on advancing and introducing different types of multi-variate statistical analyses to understand the impacts and patterns of plant parasitic nematodes for crop management.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Recent statistical modeling has indicated how early disease outbreak treatments are a far more efficient and effective strategy for controlling plant disease outbreaks than delaying and increasing the area of plants treated (the most common scenario). Controlled environment and limited outdoor study supports the use of thermal imagery to identify Xylella fastiodosa diseased blueberry plants much earlier in the disease cycle than with traditional approaches to disease detection. Last, uncommonly used statistical analyses have revealed important geographic and management specific patterns to plant parasitic nematodes that helps refine and direct nematode control strategies.

Products

Jagdale, G.B., Brenneman, T.B., Severns, P.M., & D. Shapiro-Ilan. 2021. Differences in distribution and community structure of pecan plant-parasitic nematodes between two ecoregions of Georgia. Journal of Nematology 53:1-14. Mijatovi?, J., Severns, P.M., Kemerait, R.C., Walcott, R.R., & B.H. Kvitko. 2021. Patterns of seed-to-seedling transmission of Xanthomonas citri pv. malvacearum, the causal agent of cotton bacterial blight. Phytopathology doi.org/10.1094/PHYTO-02-21-0057-R Harrelson, B., Ghimire, B., Kemerait, B., Culbreath, A., Li, Z., Severns, P.M. & J. Buck. 2021. Assessment of quinone outside inhibitor sensitivity and frogeye leaf spot race of Cercospora sojina in Georgia soybean. Plant Disease doi.org/10.1094/PDIS-02-21-0236-RE Stice, S.P., Shin, G.Y., De Armas, S., Koirala, S., Galvan, G.A., Siri, M.I., Severns, P.M., Coutinho, T.A., Dutta, B. & B.H. Kivitko. 2021. The distribution of onion virulence gene clusters among Pantoea sp. Frontiers in Plant Science 12:384. Marquez, J, Severns, P.M. & A. Hajihassani. 2021. The influence of the environment and vegetable cropping systems on plant-parasitic nematode communities in southern Georgia, USA. Plant Disease doi.org/10.1094/PDIS-09-20-2019-RE

Briefly describe how your target audience benefited from your project's activities.

In all three projects, the scientific community, extension agents, and producers have and will benefit from the both the methods of study and that the information can be used to design more efficient and effective disease control strategies.

Briefly describe how the broader public benefited from your project's activities.

Producers have already integrated some disease control recommendations into their crop management plans, helping them to save money, reduce the use of chemicals for pest control, and provide alternative means of diagnosing/evaluating important plant diseases.

Postharvest technologies and techniques to improve the quality of fresh fruits and vegetables

Project Director
Angelos Deltsidis
Organization
University of Georgia
Accession Number
1022102

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Postharvest losses affect all the sectors of our local agriculture production and trade in the State of Georgia while they have detrimental effects to the local economy. While harvesting techniques, packing, packaging, refrigeration and overall mechanization have significantly improved, the implementation of those improvements by the industry has been lagging throughout the US. The implementation of such techniques needs to be augmented by local research projects in order to validate the results on and disseminate them to the industry in appropriate. There seems to be interest by the local industry as there has been a lack of postharvest research in South Georgia in the recent years.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The UGA Postharvest lab, made significant progress over the past year despite working under pandemic restrictions. A new Master's student joined the lab in Spring of 2021 studying postharvest quality of fresh peaches. A number of projects were undertaken by lab members during this year including trials with bell peppers, broccoli, muscadine grapes, peaches among others. The findings were presented in local, regional and national meetings. The PI contributed in extension and scientific publications and delivered extension trainings to communicate the findings.

Briefly describe how your target audience benefited from your project's activities.

The agriculture industry of Georgia was offered a number of extension presentations that were both for extension agents and farmers. The PI presented virtually at the Southeast Regional Fruit & Vegetable Conference, as well in other trainings that were organized by UGA. The PI was also invited to present in workshops/short courses held by other institutions that have a more national/international audience.

Briefly describe how the broader public benefited from your project's activities.

Our research is aiming to improve the quality of fresh produce that is available to all consumers. We are working towards providing safer, more fresh and more flavorful produce items. Our advances in new water sanitation systems, variety trials, new storage methods have all been shared with the industry who will be evaluating them by their standpoint and needs.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

The team lost 2 members. The lab professional/manager departed in August of 2021 and the building superintendent in December of 2020.

Opportunities

The PI has been recruiting new members to join the team and fill the voids. A new lab managers has been hired and a new graduate student will be joining during the Spring of 2022.

Dissemination

More in person extension events have been planned thanks to the relaxation of covid restrictions.

Plans

A second master's student will aid the completion of more projects and will support with production of extension and scientific publications.

Closing Out (end date 09/07/2023)

Epidemiology and management of economically important insect-transmitted virus diseases in Georgia

Project Director

Sudeep Bag

Organization

University of Georgia

Accession Number

1020319

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Insect-vectored viruses are a major constraint to the agricultural production system and cause significant yield loss. The plant virology program at UGA Tifton campus focuses on disease epidemiology and management of virus diseases on row and horticultural crops of economic importance.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The biological and molecular characteristics of the important viruses will be ascertained. Vectors, modes of transmission, and alternate hosts have been identified. managing these alternate hosts will reduce the primary inoculum and reduce the disease spread in the growing season. Based on the genomic data generated, tools for accurate and quick diagnosis were being developed. The effects of mixed infection of viruses especially in vegetables are being investigated. This study will provide crucial information on the diversity of viruses present in the major crops including cotton, vegetables, and peanuts in Georgia. The vectors responsible for the transmission of the viruses from infected to healthy host, and their interaction with host and vector will be evaluated. Based on the preliminary data, advanced genomic and biotechnological tools such as the yeast-two-hybrid system and bimolecular fluorescence complementation (BiFC) assay will be applied to understand the genes involved in the interaction among the host-virus-vector. This data will be used to modify cultural and management practices for increased yield and maintaining sustainability. The research will be conducted in collaboration with the faculty of entomology, crops and soil sciences, and UGA extension.

Products

1. Lai, P-C., Abney, M.R., Bag, S., Srinivasan., R. (2021) Impact of host resistance to tomato spotted wilt orthotospovirus in peanut cultivars on virus population genetics and thrips fitness. Pathogens, 10(11), 1418. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.3390%2Fpathogens10111418&token=Ll5vopZcxOGnU%2B%2FIf5B3cOXDk0Q5Y1hqKwNMoru7anQ%3D

2. Lai, P-C., Abney, M.R., Chen, Yi-Ju., Bag, S., Srinivasan., R. (2021) Discrepancies in serology-based and nucleic acid-based detection and quantitation of tomato spotted wilt orthotospovirus in leaf and root tissues from symptomatic and asymptomatic peanut plants. Pathogens 2021, 10(11), 1476. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.3390%2Fpathogens10111476&token=xFqTmXMgDTBVfuiwpSBq%2FTK%2B5nSHkN9z869WpCHJXdQ%3D

3. Parkash, V., Sharma, D.B., Snider, J.L., Bag, S., Roberts, P.M., Tabassum, A., West, D., Khanal, S., Suassuna, N., and Chee. P (2021). Effect of cotton leafroll dwarf virus on physiological processes and yield of individual cotton plants. Frontiers in Plant Science. 12:734386. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.3389%2Ffpls.2021.734386&token=hztyIqgS39ZjyZkKTLbpPcy6HTzzL%2BLx1b%2BYSpF2m20%3D

4. Kavalappara, S.R., Milner, H., Sparks, A., Mcgregor, C., Wintermantel, W. M., and Bag, S. (2021) First report of cucurbit chlorotic yellows virus in association with other whitefly-transmitted viruses in squash (Cucurbita pepo) in Georgia. Plant Disease 105 (6):1862 https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.1094%2FPDIS-11-20-2429-PDN&token=yIJeP2Gg8QbgEo7vxchuHF8zXCMWp%2B6whSx4hDZ3pTE%3D

5. Tabassum, A., Bag S., Suassuna, N. D., Conner, K. N., Chee, P., Kemerait, R.C., and Roberts, P. (2021). Genome analysis of cotton leafroll dwarf virus reveals variability in the silencing suppressor protein, genotypes, and genomic recombinants in the USA. PLoS ONE. 16(7): e0252523. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.1371%2Fjournal.pone.0252523&token=r3b5XS8LIECLQJoSIfFr61Xp959ov%2FoPg634bDkXl4c%3D

6. Kavalappara, S.R., Milner, H., Morgan, K., Konakalla N. C., Sparks, A., Mcgregor, C., Wintermantel, W. M., and Bag, S. (2021). High throughput sequencing-aided survey reveals widespread mixed infections of whitefly-transmitted viruses in cucurbits in Georgia USA. Viruses. 13(6):988. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.3390%2FV13060988&token=7JJl7o3gsZzCCSPJ1XEZE0UKfYCp5Fe4Ob%2FJSnEXECk%3D

7. Konakalla, N.C., Bag, S., Deraniyagala, A.S., Culbreath, A.K., and Pappu, H.R. (2021) Induction of plant resistance in tobacco (Nicotiana tabacum) against tomato spotted wilt orthotospovirus through foliar application of dsRNA.Viruses. 13 (4): 662. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.3390%2Fv13040662&token=9N%2BI6iCzD6CCvqNXXHeiwviG9844zSDyemi3qVRAx8E%3D

8. Sedhain, N. P., Bag, S., Carter, R., Morgan, K., Triana, P., Kemerait, R. C., Roberts, P. M. (2021). Natural host range, incidence on overwintering cotton and diversity of cotton leafroll dwarf virus in Georgia USA. Crop Protection. 144:105604. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.1016%2Fj.cropro.2021.105604&token=0YdTZFGLbET0vNHNoilfw%2FLtxXyne%2BmD0IXYQjr%2BRN8%3D

9. Bag, S., Roberts P. M., and Kemerait R.C. (2021). Cotton leafroll dwarf virus: an emerging virus disease on cotton in the US. Crops and Soils. 54:2,18-22. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.1002%2Fcrso.20105&token=thgoSm4G2pV89oUsfPZirgb8aBqzQ4PkpWbmAEoJd4E%3D

10. Tabassum, A., Roberts, P. M., and Bag, S. (2020). Genome Sequence of cotton leafroll dwarf virus infecting cotton in Georgia, USA. Microbiol Resource Announcement. 9(34). https://doi:10.1128/MRA.00812-20

Briefly describe how your target audience benefited from your project's activities.

The targeted audiences were informed about the research outcomes through growers meeting at county and regional levels.

1: The emerging and re-emerging viruses in the row and horticultural crops.

2: The potential alternate hosts for the virus and vector were identified.

3: Removing volunteers, weeds, and non-host crops would reduce the virus inoculum during the non-crop season.

4: The results were published in peer-reviewed journals for broader outreach to the scientific community.

Briefly describe how the broader public benefited from your project's activities.

Field sanitation and management practices will de be developed to reduce the virus disease incidence, further improving the crop profitability and sustainability by reducing yield loss.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

Currently, the team consists of one master's and one Ph.D. student, two post-doctoral scholars, and a research professional who are being trained on different aspects of the project. The project also provides an opportunity for undergraduate student internships. This will assist in training next generation of plant scientists.

Dissemination

The results were disseminated to growers and other stakeholders during growers and scientific meetings at the county, regional and national levels. The outcomes were published in peer-reviewed research journals.

Closing Out (end date 09/07/2023)

Biological Control of Arthropod Pests and Weeds

Project Director

Jason Schmidt

Organization

University of Georgia

Accession Number

1018598

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The biological control challenges we address in this multistate project are broad reaching from natural systems and invasive plants to urban landscapes. To address these problems, we study compatibility of insecticides with biological control, plant diversity, and building efficiency in rearing and deployment of biological control agents. Our work benefits municipalities, landscape professionals, landscape designers, urban planners, and the millions of residents of the US who interact with ornamental landscapes each day.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

By working with closely with agricultural producers, federal entities (NRCS, USDA), and extension and research personnel (entomology, pathology, forestry), we are continuing to build realism of implementing conservation biological on broad scales. Our work combines testing new native plant materials for promoting biodiversity, and pest management services at ecologically relevant scales with focused greenhouse studies of biocontrol. We currently work with cotton, peanut, and blueberry producers, and look forward to building further partnerships in the future.

Products

Peer reviewed: 2021 Kheirodin A, Schmidt JM. Rapid PCR-based method for polyphagous pest dietary evaluation using plant-specific primers. PlosOne. In review. 2021 Grabarczyk, EE, Gill, SA, Vonhof, MJ, Alabady, MS, *Wang Z, Schmidt, JM. Diet composition and diversity does not explain fewer, smaller urban nestlings. PloSOne. In press. 2021 *Martins, EF, Franzin, ML, Perez, AL, Schmidt, JM, Venzon, M. Is Ceraeochrysa cubana a coffee leaf miner predator? Biological Control 160:104691. 2021 *Bowers, C, Toews, MD, Schmidt, JM. Winter cover crops shape predator communities and trophic interactions. Ecosphere 12:7

e033635. 2021 Schmidt, J.M. et al. Parasitoid communities in the variable agricultural environments of Southeastern blueberry production. Journal of Economic Entomology. 114:4 1480-1488. 2021 Schmidt, JM, Acebes-Doria, A, Blaauw, B, Kheirodin, A., *Pandey, S, *Lennon, K, *Kaldor, AS, *Toledo, PFS, Grabarczyk, EE. Identifying Molecular-Based Trophic Interactions as a Resource for Advanced Integrated Pest Management. Insects, 12, 358. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.3390%2Finsects12040358&token=ZgO44OBucfFmer6S%2BTIFlqLXPeZqtEwMiA9fiKb2%2BAM%3D 2021 Coffin AW, Olson DM, Seymour L, Bosch DD, Schmidt JM, Strickland TC. Responses to environmental variability by herbivorous insects and their natural enemies within a bioenergy crop, Miscanthus x giganteus. PLoS ONE 16(2): e0246855. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.1371%2Fjournal.pone.0246855&token=Wm%2FC24sUfosvE8pgVyCT070ABgVfFvauHqbyfu%2BNnmU%3D 2020 Kheirodin, A., A. M. Simmons, J. C. Legaspi, E. E. Grabarczyk, M. D. Toews, P. M. Roberts, J.-H. Chong, W. E. Snyder, and J.eM. Schmidt. Can Generalist Predators Control Bemisia tabaci? Insects 11: 823. 2020 Krupa J, Hopper K, Harwood J, **Gruber S, Schmidt JM. Potential plant-animal interactions between carnivorous plants, sheet-web spiders, and ground-running spiders as guild predators in a wet meadow community. Ecology and Evolution. https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fdoi.org%2F10.1002%2Fece3.62302020&token=TJ0L%2Bu5SM03q2NnMgClaslKaj0YvI47co2Rg2n%2BgnVk%3D 2020 *Bowers, C., M. D. Toews, and J.eM. Schmidt. 2020. Beyond soil health: the trophic effects of cover crops shape predator communities. bioRxiv: 2020.2003.2028.013409. Pop press: 2021 Schmidt JM, Blubaugh C, Snyder W. Getting bugs to work for you: biodiversity in action. VSCNews.

Briefly describe how your target audience benefited from your project's activities.

Currently, I feel we are beginning to reach a broader audience of producers and extension personnel that will help educate on research findings of beneficial arthropods in southeast landscapes.

Briefly describe how the broader public benefited from your project's activities.

Adoption of habitat enhancement is increasing, and interest in building cropping systems with more diversity for wildlife and for biocontrol. I can't take all the credit for this impact, because many are working to study and communicate the benefits of habitat, but my lab and collaborations are certainly contributing to the impact.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

One aspect of our program is using molecular tools to identify and rank important predators and then teach about these. Sometimes must reoptimize approaches as we learn and also, studying communities of arthropods is challenging because some systems still contain many insects that are potentially interacting in ways that contribute to the functioning of agricultural systems. Therefore, our big challenge is creating feasible projects to study communities. Communities of insects can be highly complex in many systems, and our current goal is elucidating the structure of many agricultural systems, and then learning about how interactions are shaped or could be reshaped by management practices or adoption of new practices focused on biological control and more efficient harvesting of ecosystem services.

Opportunities

Over the last few years we have provided training opportunities for a diverse group of undergraduate students and multiple institutions, graduate students, technicians, and post-docs. Our program provides training in community ecology, molecular ecology, and the handling of complex data.

Dissemination

We frequently publish peer-reviewed journals, newsletters, popular press outlets and internal sources (University of Georgia); therefore, we are reaching audiences from local to international.

Biology and Management of Small Fruit Diseases

Project Director

Jonathan Oliver

Organization

University of Georgia

Accession Number

1016575

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The climate in southern Georgia provides the opportunity for numerous fruit crops to be cultivated, and fruit production (including blueberries, blackberries, and citrus) is an important part of the Georgia agricultural economy. Unfortunately, the warm, humid climate also provides ideal conditions for the development of numerous disease issues that can cause economic damage to these crops, and Georgia fruit growers need science-based tools and recommendations for disease management. Through research, training, and extension activities, this project aims to provide growers with the necessary information to manage the key diseases affecting fruit crops grown in southern Georgia.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The major activities of this project provide information for Georgia small fruit growers and enable them to better manage significant disease issues that are of economic importance in the warm, humid environment in southern Georgia. Recommendations for improved fungicide use and spray timings, as well as for the use of disease resistant/tolerant cultivars help to ensure that Georgia small fruit growers are competitive with other producers worldwide. Understanding the biology of the devastating and widespread bacterial leaf scorch pathogen helps identify targets in the disease process, potentially enabling novel disease control opportunities.

Products

Journal Articles:

Ali, E., Bennett, A., Stackhouse, T., Waliullah, S., & Oliver, J.E. (2021). First Report of Citrus tristeza virus Infecting Citrus Trees in Georgia, USA.. Plant Dis. doi:10.1094/PDIS-02-21-0365-PDN

Reports:

Oliver, J., Williams, Z., Holland, R., & Thompson, S. (2021). Evaluation of chemical fungicides for control of leaf and fruit spot and fruit rot of pomegranate in Georgia, 2020 (Plant Disease Management Reports, 15:PF033)

Oliver, J., Matewe, C., Hemphill, W., Lewis, K., & Smith, E. (2021). Evaluation of chemicals for control of Phytophthora root rot of blueberry in Georgia, 2018-2019 (Plant Disease Management Reports, 15:PF024)

Oliver, J., Lewis, K., Williams, Z., & Jacobs, J. (2021). Management of leaf spots in southern highbush blueberries with chemical fungicides in Pierce County, Georgia, 2020 (Plant Disease Management Reports, 15:PF020)

Oliver, J., Lewis, K., Jacobs, J., & Williams, Z. (2021). Management of leaf spots in southern highbush blueberries with chemical fungicides in Bacon County, Georgia, 2020 (Plant Disease Management Reports, 15:PF021)

Oliver, J., Jacobs, J., & Williams, Z. (2021). Management of fruit rots in southern highbush blueberries with chemical fungicides in Pierce County, Georgia, 2020 (Plant Disease Management Reports, 15:PF023)

Oliver, J., Williams, Z., Holland, R., Thompson, S., & Jacobs, J. (2021). Management of fruit rots in southern highbush blueberries with chemical fungicides in Bacon County, Georgia, 2020. (Plant Disease Management Reports, 15:PF022)

Oliver, J., & Covington, A. (2021). Management of mummy berry in rabbiteye blueberries with chemical fungicides in Union County, Georgia, 2020. (Plant Disease Management Reports, 15:PF009)

Oliver, J., & Glenn, T. (2021). Management of mummy berry in rabbiteye blueberries with chemical fungicides in Stephens County, Georgia, 2020 (Plant Disease Management Reports, 15:PF008)

Briefly describe how your target audience benefited from your project's activities.

The ultimate target audience for this work are the Georgia producers of blueberries, blackberries, and citrus. The findings from this research work have already led to enhanced disease management recommendations that have been directly utilized by Georgia fruit growers, extension personnel, crop consultants, industry professionals, and other scientists.

Briefly describe how the broader public benefited from your project's activities.

Increasing our knowledge of key diseases affecting small fruit crops in Georgia has provided growers in Georgia and surrounding states with improved disease management practices, and this should enhance the economics, sustainability, and competitiveness of Georgia small fruit growers. Furthermore, the economic implications of this research reach far beyond and benefit the small fruit industry as a whole, the many associated industries, and Georgia's economy.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems: No major changes or problems were encountered in my approach to this project. However, due to COVID-19 precautions and restrictions on in-person meetings, many meetings and training events were carried out virtually rather than in person during this reporting period.

Opportunities: Goal: Characterize the biology and epidemiology of Xylella fastidiosa subsp. multiplex, cause of bacterial leaf scorch on blueberry.

Training and professional development (during time period): Training initiated for Ph.D. student who began work on X. fastidiosa in Fall 2020. Started the Xylella Working Group and held regular meetings (Fall 2020, Winter 2021, Spring 2021, Summer 2021) with several other Xylella researchers and graduate students working on Xylella-related projects in Georgia in order to disseminate information on Xylella fastidiosa and train and develop the next generation of researchers. Two training events for extension personnel were held on 7 July 2021 and 18 August 2021, where agents received training based on the new knowledge of X. fastidiosa gained through the research activities of this project.

Goal: Characterize tolerance and/or resistance of blueberry cultivars to X. fastidiosa subsp. multiplex.

Training and professional development (during time period): Training initiated for Ph.D. student who began work on X. fastidiosa in Fall 2020.

Goal: Evaluate and optimize chemical and cultural control options for control of blueberry diseases caused by fungal, oomycete, and nematode pathogens (including Exobasidium, Phytophthora, and replant disease).

Training and professional development (during time period): Training initiated for two M.S. students who began work on fungal pathogens causing pre-harvest and post-harvest fruit rots on blueberry in Fall 2021. A training event for extension personnel was held on 25 February 2021, where agents received training on management of Phytophthora root rot and other blueberry diseases. Two training events for extension personnel were held on 7 July 2021 and 15 September 2021, where agents received training on management of several blueberry diseases based, in part, on new knowledge generated as a part of this research project.

Goal: Characterize the biology and epidemiology of the pathogens causing blackberry cane diseases (including the cane blight fungus and the parasitic alga C. virescens that causes orange cane blotch).

Training and professional development (during time period): Two training events for extension personnel were held on 7 July 2021 and 18 August 2021, where agents received training based on the new knowledge of cane blight and orange cane blotch gained through the research activities of this project.

Goal: Develop monitoring tools/programs for bacterial and viral threats to small fruit production in Georgia (including R. solanacearum, X. fastidiosa subsp. multiplex, BNRBV, and BRRV on blueberry, and CLas on citrus).

Training and professional development (during time period): Provided instruction to county agricultural agents and growers regarding the identification of Huanglongbing and submission of samples for CLas testing through presentations at the 2021 Southeastern Fruit and Vegetable Conference, the 2021 Georgia Citrus Association Annual Conference, and Citrus Grower's Summer Update 2021, Lowndes County. A training for new cooperative extension personnel was held on 31 March 2021 where agents received instruction regarding the identification of Huanglongbing and submission of samples for CLas testing. In

addition, a hands-on training event for cooperative extension agents and Georgia citrus growers was held on 27 April 2021, to train agents and citrus growers to identify symptoms of numerous bacterial and viral diseases of citrus (including Huanglongbing, Citrus tristeza virus, Hop stunt viroid, and citrus canker), and utilize diagnostic test kits for the in-field identification of some of these pathogens. Furthermore, a hands-on training event for cooperative extension agents was held on 29 June 2021, where agents were trained to identify symptoms of R. solanacearum on blueberry and utilize provided diagnostic test kits in the field.

Dissemination

Goal: Characterize the biology and epidemiology of Xylella fastidiosa subsp. multiplex, cause of bacterial leaf scorch on blueberry.

Disseminated: Information on the biology and epidemiology of X. fastidiosa was presented at regional conferences and meetings including the Southeastern Fruit and Vegetable Conference (6 January 2021) and the Alma Blueberry Growers Meeting (13 January 2021), and as part of Xylella Working Group Meetings (17 August 2021).

Goal: Characterize tolerance and/or resistance of blueberry cultivars to X. fastidiosa subsp. multiplex.

Disseminated: Results from greenhouse experiments were presented at regional conferences and meetings including the Southeastern Fruit and Vegetable Conference (6 January 2021) and the Alma Blueberry Growers Meeting (13 January 2021), and as part of Xylella Working Group Meetings (17 August 2021).

Goal: Evaluate and optimize chemical and cultural control options for control of blueberry diseases caused by fungal, oomycete, and nematode pathogens (including Exobasidium, Phytophthora, and replant disease).

Disseminated: Results from field trials were presented at regional conferences and meetings including the Southeastern Fruit and Vegetable Conference (6 January 2021), the Alma Blueberry Growers Meeting (13 January 2021), and the MBG Blueberry Horticulture Day (24 February 2021). In addition, field trial results were disseminated in the media via Southeast AgNet Radio Network interviews and in multiple articles published in the Georgia Blueberry Growers Association Newsletter, the Vegetable and Specialty Crop News Magazine, the UGA IPM Newsletter, and in the scientific journal Plant Disease Management Reports.

Goal: Characterize the biology and epidemiology of the pathogens causing blackberry cane diseases (including the cane blight fungus and the parasitic alga C. virescens that causes orange cane blotch).

Disseminated: Results were presented at regional conferences and meetings including the 2021 Southeastern Fruit and Vegetable Conference (7 January 2021) and the 2021 North American Raspberry & Blackberry Conference (25 February 2021). In addition, information about cane dieback was published in the Small Fruit News newsletter and information about fungicide-resistant blackberry pathogens were published in The Bramble newsletter.

Goal: Develop monitoring tools/programs for bacterial and viral threats to small fruit production in Georgia (including R. solanacearum, X. fastidiosa subsp. multiplex, BNRBV, and BRRV on blueberry, and CLas on citrus).

Disseminated: Results of the CLas survey were presented at regional conferences and meetings including the 2021 Southeastern Fruit and Vegetable Conference (7 January 2021), the 2021 Georgia Citrus Association Conference (22 February 2021), the Plant Health 2021 virtual conference (6 August 2021), and the Citrus Grower's Summer Update 2021 (25 August 2021). Information about LAMP detection of X. fastidiosa in blueberry was also presented at the Plant Health 2021 virtual conference (6 August 2021). In addition, a first report of Citrus tristeza virus on citrus in Georgia was published in the scientific journal Plant Disease.

Plans

Goal: Characterize the biology and epidemiology of Xylella fastidiosa subsp. multiplex, cause of bacterial leaf scorch on blueberry.

Plan: Prepare manuscript summarizing thesis research on X. fastidiosa field work for publication. Perform additional genetic characterization to understand the biology of X. fastidiosa isolates causing bacterial leaf scorch on blueberry. Characterize the spread of X. fastidiosa in the field, and conduct field trials examining the impact of novel control approaches on bacterial leaf scorch severity and spread.

Goal: Characterize tolerance and/or resistance of blueberry cultivars to X. fastidiosa subsp. multiplex.

Plan: Continue examining host responses of blueberry cultivars in the greenhouse.

Goal: Evaluate and optimize chemical and cultural control options for control of blueberry diseases caused by fungal, oomycete, and nematode pathogens (including Exobasidium, Phytophthora, and replant disease).

Plan: Field trials are planned in 2022 to examine chemical and cultural controls for mummy berry, Phytophthora root rot, replant disease, blueberry fruit rots, and leaf spot diseases of blueberry. Fungal isolates causing fruit rot on blueberry will be collected and characterized to assess the prevalence of fungicide resistance.

Goal: Characterize the biology and epidemiology of the pathogens causing blackberry cane diseases (including the cane blight fungus and the parasitic alga C. virescens that causes orange cane blotch).

Plan: Prepare manuscripts summarizing thesis research on orange cane blotch and cane blight for publication. Investigate the prevalence of fungicide resistant fungal pathogens that cause leaf spot and cane dieback diseases in Georgia.

Goal: Develop monitoring tools/programs for bacterial and viral threats to small fruit production in Georgia (including R. solanacearum, X. fastidiosa subsp. multiplex, BNRBV, and BRRV on blueberry, and CLas on citrus).

Plan: Continue to assist and train county extension agents in their in-office testing efforts focused on R. solanacearum and X. fastidiosa subsp. multiplex. Continue survey of commercial and residential citrus in Georgia for CLas and citrus canker.

Development and Integration of Intelligent Vehicles and Sensors for Crop Scouting, Spraying and Harvesting

Project Director
Glen Rains
Organization
University of Georgia
Accession Number
1015377

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Robotics and automation are burgeoning technologies in the agricultural sector that require researcfh and testing for agricultural operations. Many robotic rovers are designed to accomplish one task, leaving the rover unused fro a large part of the year. We are developing multi-pupose rovers and attachments that keep autonomous vehicles working year round.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We have developed attachments for a small electric rover that will be used to control weeds non-chemically, scout for pests, and harvest cotton, Weed control will be accomplished using a combination mechanical and laser weed cutting mechanism. Scouting is accomplished using stereo camera and other attachable sensors. Our harvest system has autonomously harvested cotton bolls in the field. We are currently developing a second version that will pick bolls faster

Products

Barnes, E.; Morgan, G.; Hake, K.; Devine, J.; Kurtz, R.; Ibendahl, G.; Sharda, A.; Rains, G.; Snider, J.; Maja, J.M.; et al. (2021). Opportunities for Robotic Systems and Automation in Cotton Production, Agriengineering, 339-363. doi: 10.3390/agriengineering3020023 K.G. Fue, W.M. Porter, E.M. Barnes, G.C. Rains. (2021). Ensemble Method of Deep Learning, Color Segmentation, and Image Transformation to Track, Localize, and Count Cotton Bolls Using a Moving Camera in Real-Time, Transactions of the ASABE. 64(1): 341-352. (doi: 10.13031/trans.13112)

Briefly describe how your target audience benefited from your project's activities.

We are working to develop a low-cost and dependable rover that can be used across several crops and stages of crop management. This would help small and mid-sized farmers farm crops such as cotton, which required very expensive equipment.

Briefly describe how the broader public benefited from your project's activities.

I have had two PhD and one MS student working on this project. One student has graduated and is a lecturer at Sokoine University of Agriculture, Tanzania. Other students are still working on the project. We have presented results at multiple conferences including the Annual ASABE, Beltwide Cotton and the University of Georgia Integrative Precision Ag symposium. We have also published three papers in the last year.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Dissemination

Mwitta, C., Rains, GC, Prostko, E. (2021). Laser Treatment on Weeds as Controlling Mechanism, Beltwide Cotton Conference, Virtual Presentation. Mwitta, C., Rains, GC, Prostko, E. (2021). Laser Treatment on Weeds as Controlling Mechanism, Data Science and AI for Integrative Precision Agriculture and Phenomics Symposium, Athens, GA, Sept 17. Poster Rains, GC. (2021). Data Driven and robotic Technologies for IPA, Data Science and AI for Integrative Precision Agriculture and Phenomics, Athens, GA, Sept 17. Presentation Robotic and Automation Applications in Agriculture, Sage University Summer School, Indore, India, May 24 – June 4, Zoom Meeting, 40 students. Presentation

Plans

We will field test laser control of weeds in cotton and peanut plot. Laser treatment will be assessed for ability to kill and or stunt growth of weeds close to the crops. We will also test a sickle bar cutter for managing larger and more abundant weeds between rows. WE will also test a modified end-effector for cotton harvesting and field test the ability to harvest multiple times during the season. This will help improve the quality of the picked bolls and reduce the risk of severe weather on yield.

Developing Ecologically-Based Pest Management Programs for Southeastern Fruit Production

Project Director
Brett Blaauw
Organization
University of Georgia
Accession Number
1013232

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

We will develop and disseminate extension materials on the biology and seasonality of Georgia and South Carolina fruit pests, distribution and movement patterns of plum curculio in the southeast, and impact of agricultural practices on pollinator communities. The perpetual use of insecticides and continued risk of new invasive insect pests, IPM and beneficial insects in Georgia and South Carolina fruit production are in jeopardy, and the projects proposed here aim to alleviate those risks. Through standard and innovative extension methods, I hope to develop and help growers adopt effective IPM strategies in the Southeast.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Objective 1: Investigate the biology and seasonality of fruit pests 1A: San Jose scale (SJS) infestations were monitored in Southeast peach production from March through September. Season long activity led to substantial SJS populations late in the 2021 season. We determined that SJS immatures are active nearly all season long, but there are four distinct generations or peaks in activity: early-April, late-June, early-August, and late-September. These peak abundance dates may provide optimal timings for enhancing effective management programs. Growers who targeted peak crawler activity periods reported better control and less damage from SJS in 2021.

1B. Assess brown marmorated stink bug pressure in Georgia apple production We used a combination of pheromone-baited sticky cards and pheromone-baited pyramid traps to monitor BMSB at two Georgia commercial apple orchards and one South Carolina peach orchard. From May to November we collected nearly 4,000 BMSB. That is a concerning abundance of stink bugs, but fortunately growers documented only minor levels of injury. Phenology and peak abundance of adult and nymphs were determined, and monitoring will continue in subsequent seasons.

1C. Survey for and identify key insect pests of Georgia grape production. The major grape pest, grape root borer was monitored at four Georgia commercial vineyards. Timing and abundance were determined throughout the season, which will be used to help establish management programs in subsequent seasons. Additionally, sharpshooters were monitored at four Georgia vineyards from April through July. Similar to previous seasons, we observed that the glassy-winged sharpshooter (which was initially thought to be the main sharpshooter causing issues in Georgia wine grapes by transmitting Pierce's disease) was not common in North Georgia vineyards. Rather, other Pierce's disease transmitting sharpshooters, such as the versute sharpshooter and the red-banded sharpshooters, were much more common. Growers generally monitor for glassy-winged sharpshooters, but they should now focus their attention to the smaller, more abundant species. Objective 2: Assess within orchard distribution and movement patterns of plum curculio Objective 2 was completed in 2020. Objective 3: Investigate impact of agricultural practices on the pollinator communities of Georgia and South Carolina peaches and apples.

3A. Through a combination of vacuum sampling and bee bowls (brightly colored blue, yellow, and white bowls filled with soap water), we assessed the pollinator community visiting peach and apple flowers during bloom and the subsequently throughout the season. We observed that the most common peach flower visitors were flies from the Anthomyiid family, followed by honey bees. A diverse group of insects visited peach flowers, including lady beetles. Through bagging of peach flowers, we determined that insect-mediated pollination can increase fruit set by an average of 20%. This means that bees, and possibly flies, may be important pollinators for peaches.

3B. Evaluate pollinator exposure to pesticides within orchards throughout the season. In order to evaluate the threat of pollinators visiting peach we developed a greenhouse bioassay. We used potted peach trees, of the Julyprince variety, which have nectar producing lobes on their leaves, known as extra-floral nectaries (EFN). These EFN's are attractive to insects, luring pollinators into the orchards even after crop bloom, which subsequently has the potential to subject the EFN visiting pollinators to commonly used systemic insecticides. As such, we used the potted plants to evaluate the potential risks pollinator communities from systemic insecticide applications over time. The neonicotinoid insecticide imidacloprid was applied to replicated potted plants as a foliar spray and a soil drench, and the concentration of neonicotinoids in the extrafloral nectar were compared between the two treatments with untreated trees. Imidacloprid concentration was assessed using enzyme-linked immunoassay (ELISA) kits (Abraxis, Inc, Warminster, PA). We determined that imidacloprid was present in extrafloral nectar upwards of two weeks post application for both foliar and soil applied treatments. With these preliminary results, we have obtained a grant through the Southern IPM Center to further look at insecticides in EFN.

Briefly describe how your target audience benefited from your project's activities.

The primary target audience of these projects are the commercial peach, apple, and grape industries of Georgia and South Carolina. This work additionally will benefit and targets Southeastern growers, consultants, extension educators and specialists, university and USDA researchers, and the general public. Furthermore, with the Presidential memorandum to promote pollinator health and the current restrictions on neonicotinoid use due to bee health concerns, tree fruit growers will benefit from the assessment of how pest management impacts the pollinator community.

Briefly describe how the broader public benefited from your project's activities.

Conference Papers and Presentations published in 2021:

Tzu-Chin Liu and Brett R. Blaauw. 2021. Seasonal activity of plum curculio in Southeastern peaches. Annual Meeting of the Entomological Society of America. Denver, CO.

Jordan Bailey and Brett R. Blaauw. 2021. Investigating insecticide concentrations in peach extrafloral nectaries. Annual Meeting of the Entomological Society of America. Denver, CO.

Tzu-Chin Liu and Brett R. Blaauw. 2021. Temporal and spatial distribution of plum curculio in southeastern peach orchards. Entomological Society of America -Southeastern Branch Annual Meeting (Virtual).

Brett R. Blaauw. 2021. Advances in control of scale insects. Entomological Society of America -Southeastern Branch Annual Meeting (Virtual).

Brett R. Blaauw. 2020. Advances in sustainable management of San Jose scale in southeastern peach production. In Entomological Society of America's Annual Meeting. 2020 Entomology Virtual Annual Meeting.

Brett R. Blaauw. Entomology 2021. Vineyard Workshop. August 3, 2021, Ellijay, GA.

Brett R. Blaauw. Insect pest update 2021. Commercial Grape IPM Meeting. February 25, 2021, Dahlonega, GA (virtual).

Brett R. Blaauw. Apple Insect Pest Management Update. 2021 North Georgia Apple Production Meeting. February 16, 2021, Ellijay, GA (virtual).

Brett R. Blaauw. Stink Bugs: Monitoring and Management Recommendations. Chilton Area Peach Production Meeting. January 26, 2021, Chilton County, AL (virtual).

Brett R. Blaauw. Advances in horticultural oil use in the management of San Jose scale. Southeast Regional Fruit and Vegetable Conference. January 7, 2021, Savannah, GA (virtual).

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

For Objective 3B, we had initially planned to evaluate the exposure of pollinators in the field to insecticides in extrafloral nectaries. Unfortunately, this proved to be too complicated, so we decided to test whether or not the systemic insecticide, imidacloprid, would be present in extrafloral nectar through greenhouse bioassays.

Opportunities

In August of 2021, members of the lab participated in an extension agent training workshop on diseases and insect pest monitoring and management in grapes. Through a combination of slideshow, field, and lab specimen examination, eight Georgia extension agents were trained on the identification of and general management of key grape pests in Georgia.

Dissemination

Pest abundance and activity for grapes were shared and discussed with growers throughout the study through several phone calls and blog posts (https://site.extension.uga.edu/viticulture/). Results from San Jose scale and plum curculio monitoring were discussed directly with peach growers at meetings, over phone calls, and with blog updates (https://site.extension.uga.edu/peaches/). Furthermore, pests of concern have been updated in the "Southeastern Peach, Nectarine, and Plum Pest Management and Culture Guide" and the "MyIPM" smartphone application.

Critical Issue

Sustainability, Conservation and the Environment

Closing Out (end date 09/07/2023)

U.S. Agricultural Trade and Policy in a Dynamic Global Market Environment

Project Director

Gopinath Munisamy

Organization

University of Georgia

Accession Number

1025555

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Trade policy has recently become a critical tool for achieving political and other non-economic objectives. However, U.S. agricultural and food industries - heavily dependent on global markets - have been adversely affected by the weaponization of trade policies. Progress made over decades in gaining market share is at risk along with the livelihood of millions of farmers and farm laborers.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

My work explored ways in which weaponized trade policies affected U.S. agriculture industries. Producers and intermediaries scrambled to find alternative markets to sell, and the resulting uncertainty appears to have affected farmers' ability to employ additional capital and labor. South east Asian countries are an important destination for U.S. agriculture (during and before trade war). However, their proposed integration with neighbors (China, Oceania) can add to the list of headwinds faced by U.S. agriculture.

Products

Gopinath, M. 2021. “Does Trade Policy Uncertainty Affect Agriculture?” Applied Economic

Perspectives and Policy, Volume 43, Issue 2, pp. 604-618.

Beckman, J., M. Gopinath and K. Daugherty. 2021. “Options for ASEAN Trade Expansion:

Within, Plus Three or Six, European Union or the United States?” The World Economy, Volume 44, Issue: May, pp. 1177-1204.

Gopinath, M., F. Batarseh, J. Beckman, A. Kulkarni* and S. Jeong*. 2021. “International

Agricultural Trade Forecasting Using Machine Learning.” Data & Policy, Volume 3,

Issue: January, e1.

Briefly describe how your target audience benefited from your project's activities.

Academics, stakeholders in the agricultural and food industries, and general public learned about the impact of trade policy uncertainty. Options to maintain stable policies, especially with the ongoing pandemic, became the focus of policymakers.

Briefly describe how the broader public benefited from your project's activities.

Educated the public about the importance of stable policy and dialogue among major economies of the world. Uncertainties affect not only producers (e.g. profitability, job creation) but also consumers (e.g. price spikes, volatility).

Management and Policy Challenges in a Water-Scarce World

Project Director
Jeff Mullen
Organization
University of Georgia
Accession Number
1025554

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The Georgia State water plan needs reliable estimates of future agricultural water demand to anticipate where and when potential water scarcity may arise and to prepare effective water management strategies.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Developed county-level estimates of monthly agricultural water withdrawals for multiple climate scenarios from 2020-2060. These estimates were based on projected crop prices and projected irrigated acreage.

Briefly describe how your target audience benefited from your project's activities.

The agricultural water demand estimates will be used by the state Water Planning Councils to conduct "gap analyses" and develop water management strategies at the state and watershed levels.

Briefly describe how the broader public benefited from your project's activities.

As water is a necessity for many residential, commercial, industrial, agricultural, and recreational activities, effective, efficient, and equitable water management is in public interest. Providing science-based estimates of water demand facilitates facilitates effective, efficient and equitable water management.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

Trained 2 MS students in water demand forecasting.

Dissemination

Results were provided to GA Environmental Protection Division for dissemination to state Water Planning Councils.

Sustainable and antimicrobial cotton denim textiles using nanocellulose technology

Project Director
Sergiy Minko
Organization
University of Georgia
Accession Number
1023650

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Dyeing of one pair of blue denim jeans consumes about 50–100 liters of water loaded with toxic reducing agents and alkali that remain as effluents in wastewater. We developed the natural indigo-based nanocellulose gel coating process as a ‘green’ alternative to the conventional indigo dyeing process.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Cotton fabric samples were coated with nanocellulose hydrogel mixed with natural indigo particles and post-treated with chitosan. This novel technology utilizes the high surface area (~103 m2/g) and the fibrillary mechanism of adhesion of nano-fibrillated cellulose (NFC) materials. Nanocellulose gel acts as a carrier for indigo particles, and post-treatment with chitosan forms a film due to intra- and inter-molecular hydrogen bonds between cotton and nanocellulose, which improves the fixation and adhesion of nanocellulose gel with indigo particles. Conventionally, dyeing with indigo requires several dips in a reduced vat followed by oxidation to develop darker shades. With our innovative dyeing technology, to get the desired percentage shade, indigo particles are added to the nanocellulose gel based on the weight of the fabric, making it a one-step process. The conventional indigo dyeing process requires multiple dyeing steps by manipulating many variables, such as the amount of reducing agent, alkali to maintain pH, amount of dye, dipping time, and oxidation time. This unique method reduces the time- and energy-consuming steps involved with conventional indigo dyeing and provides an environmentally friendly dyeing

process by avoiding reducing agents and alkali and reducing water consumption up to a factor of 25. This technology secures over 90% dye fixation compared to the 70–80% of conventional dyeing. The color performance in terms of wash fastness and rub fastness was comparable with conventional dyed fabric. It was also found that there was no significant change in comfort properties such as air permeability, bending length and weight gain of the nanocellulose indigo-dyed fabrics.

The lab-scale yarn coating setup was developed, as shown in the above picture. After several experiments, the fixation of indigo in cotton yarns was only 50-60%. In contrast, the fixation of indigo in fabric was over 90%. Our current yarn coating setup is identified as the main reason for the low fixation of indigo in cotton yarns. As a result, an advanced yarn coating setup is currently being developed. The cotton yarn (6 cotton count) used in this study was obtained from Mount Vernon Mills Trion, Georgia.

We found in the preliminary study of the same technology using Nanocrystalline cellulose (NCC) instead of NFC to have low fixation of indigo. However, further experiments are needed to confirm these results.

The preliminary antimicrobial test results (parallel streak -qualitative method) of the nanocellulose- natural indigo gel dyed cotton textile showed no growth of bacterial colonies. This property indicates that the treated cotton textiles hold bacteriostatic activity. However, more experiments are needed to be performed to study the antimicrobial activity quantitatively.

The 1% NFC gel used in the study was produced by boiling the kraft wood pulp powder with water and carboxymethyl cellulose. The mixture was passed through a homogenizer for 10 minutes at a pressure of 700. More than 1% nanocellulose gel was very viscous for the study. Nano-fibrillated cellulose (NFC) hydrogels using the powder of hemp fibers were produced using a high-pressure homogenization method. The hydrogel was characterized by specific surface area, dimensions of the fibrils, and rheological properties of the hydrogel.

Products

Rai, S., Saremi, R., Sharma, S., & Minko, S. (2021). Environment-friendly nanocellulose-indigo dyeing of textiles. Green Chemistry, 23(20), 7937-7944. DOI: https://doi.org/10.1039/D1GC02043A

Briefly describe how your target audience benefited from your project's activities.

This technology provides an eco-friendly and sustainable alternative to conventional indigo dyeing for denim. After the publication of our work in the Journal, 'Green Chemistry', and ensuing media coverage, we are contacted by many companies to advance this technology at a commercial scale.

Briefly describe how the broader public benefited from your project's activities.

The proposed project developed an eco-friendly and sustainable method of indigo dyeing for denim, which benefits communities towards developing and applying new advanced technologies for a cleaner dyeing process and saving our fresh drinking water.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

Covid-19 restricted mobility and delayed the visits and interactions with potential partners as well as attendance of conferences. For example, the paper was accepted for oral presentation ACS Spring National Meeting & Expo 2020, Philadelphia, PA but was cancelled due to covid.

Opportunities

One graduate student and one postdoctoral associate were involved and trained within the reported period. They were trained via discussions with the mentors (PIs), participating in lab meetings and in the department seminars.

Dissemination

The graduate students have communicated and shared the developed method with Mount Vernon Mills Trion, Georgia. The results were presented at the Seminar of the Department of Textiles, Merchandising and Interiors.

The manuscript was published in a high-impact journal 'Green Chemistry'. The publication attracted media coverage, including UGA Today, WUGA (radio), Atlas IDTV (Television), Business Insiders, and Sourcing Journal. In turn, we are contacted by many denim's yarn dyeing and jeans manufacturers, such as Kontoor Brands, Barracuda Technologies Inc., Adriano Goldschmied, Cone denim (Elevate Textiles) and Fashion for Good, to advance this technology at a commercial scale.

Plans

1. Compare chitosan post-treatment with other agents such as carboxylic acids and a combination of carboxylic acid and chitosan to improve the fixation and other color performance of the nanocellulose-indigo-dyed fabrics.

2. Develop a more advanced pilot-scale coating setup for yarns for better fixation and color performance.

3. More experiments for NCC and indigo formulation.

4. Continue with the qualitative and quantitative antimicrobial test and other functional properties mentioned in the proposal and work towards the publications.

Investigating the role of exogenous enzymes on gastrointestinal and whole-bird physiology and susceptibility to Eimeria-based enteritis

Project Director
Oluyinka Olukosi
Organization
University of Georgia
Accession Number
1021533

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The project investigates the potential gut health benefit from using feed enzymes that break down complex carbohydrates to smaller compounds with potential prebiotic effects. The prebiotic effect can help improve gut health and sustain bird productivity especially during sub-clinical ill-health. Because of the drive to reduce non-therapeutic antibiotics in animal feed, alternatives to antibiotics such as prebiotics are being suggested and the use of enzymes may thus help reduce the need for extra prebiotics by utilizing the simpler carbohydrates that are generated as a result of enzymes supplementation.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

With the pressure to reduce the use of antibiotics in the production of poultry species, there is need to investigate alternatives that are effective in enhancing animal health. The proposed project investigated the role of dietary enzymes in supporting the health of the digestive tract, and thus contributing to the overall health of the animal. Digestive enzymes are primarily added in diets to supplement the enzymes that are produced in the digestive tract. In the first set of experiments, we tested diets with different levels of protein and fiber, along with respective enzymes, in order to establish the factors (fiber or protein, or their interaction) that promotes availability of potential prebiotic substances in the mid-section of digestive tract. The result showed that among the factors investigated [fiber, protein, fiber enzyme (xylanase) or protein enzyme (protease)], the fiber content of

the diet was the major factor influencing how much of prebiotic compounds are produced from the diets fed to broilers. In the next set of experiments (Experiments 2 and 3), we investigated possible effects of digestive enzymes on two diets, with high (Experiment 2) or low (Experiment 3) dietary fibers, on response of broilers chickens when such chickens have coccidiosis, a common poultry disease. The result of the experiments showed that the disease caused depression in growth of the birds as well as resulted in damage to the intestine of the birds. Supplementation of protease and xylanase (enzymes) helped to alleviate some of the negative effects of coccidiosis and promoted a healthy intestinal milieu. In the Experiment 4, the objective was to investigate the particular role of feed prebiotics on growth performance, nutrients utilization and gut health of broilers. The objective of this experiment was to establish the optimum level of prebiotics to be included in diets that will later be used to compare the effect of feed prebiotics with that of enzymes that generate prebiotics in the digestive tract of broilers. The results from Experiment 4 showed that the feed prebiotics improved growth of broiler chickens not challenged with coccidiosis. In addition, the use of feed prebiotics helped reverse some of the negative effects of coccidiosis by improving nutrient utilization, enhancing the cellular integrity of the intestine and by promoting a healthier microbial community in the hindgut. The next two experiments, the last experiments in the project, (Experiments 5 and 6) used diets with different levels of fiber and appropriate enzymes, in comparison with supplementing such diets with feed prebiotics. In Experiment 5 (low fiber), the use of protease or xylanase were compared with feed prebiotic. In terms of growth performance, protease supplementation increased weight gain in the 21-day old birds but xylanase plus protease, or feed prebiotic did not significantly increase weight gain. In Experiment 6, the use of enzymes and feed prebiotic were compared in high-fiber diets. Coccidiosis challenge reduced growth performance and the enzymes or prebiotic supplementation only marginally increased weight gain, but not significantly. Further analyses are ongoing regarding effect of the enzymes compared with feed prebiotic on metabolic products of microorganisms in the hindgut of the birds, nutrient utilization, gene markers for transport of nutrients into the intestinal cells, as well as on hindgut microbiota profile.

Products

Lin, Y., O. A. Olukosi. 2021. Qualitative and quantitative profiles of jejunal oligosaccharides and cecal short-chain fatty acids in broiler chickens receiving different dietary levels of fiber, protein and exogenous enzymes. Journal of the Science of Food Agriculture, 101: 5190-5201. https://doi.org/10.1002/jsfa.11165

Lin, Y., O. A. Olukosi. 2021. Exogenous Enzymes Influenced Eimeria-Induced Changes in Cecal Fermentation Profile and Gene Expression of Nutrient Transporters in Broiler Chickens. Animals. 2021; 11(9): 2698. https://doi.org/10.3390/ani11092698

Briefly describe how your target audience benefited from your project's activities.

The results of the first three experiments have been published in open access publications and they both have been widely downloaded. The journals used are those that have international reach and well consulted by animal nutritionists.

Briefly describe how the broader public benefited from your project's activities.

The results of the first four experiments in the project have been presented at various conferences attended by a wide variety of audience, including international participants. In addition, two peer review publications have been published; and additional three are in various stages of preparation and review.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes/Problems

The first experiment was previously designed as a 2x2x4 factorial (fiber, protein, enzymes). But it turned out that such treatment arrangement is not optimum to explain the role of the four factors involved (fiber, protein, protease, xylanase) because although protease and xylanase can be grouped together as “enzymes”, it is more optimal to consider them as separate factors. Therefore, the experiment was run a second time to delineate each of the factors involved. That caused a delay in the progress at the beginning of the project. Also, an additional objective was added to the project at a later point. Initially, the use of feed prebiotic was not an objective in the project. As the project progressed, it became clear that it will be necessary to first establish the best dietary level of prebiotic that will be used to compare with enzymes. Consequently, an additional objective was included so that the specific treatments to be used in the last project objective (comparing enzymes with prebiotics) will be informed by the results of the additional objective which was specifically for determining the optimum level of prebiotics to use for broiler chickens.

Opportunities

One PhD student is being trained from the experiments being conducted under this project. The student has been able to attend and make presentation at conferences and is working on publication of the results.

Plans

The remaining part of the project is to complete the data on nutrient utilization as influenced by the treatments used in the experiments as well as completing the data on effect of the treatments on possible microbial shift in the digestive tract.

Costs and Benefits of Natural Resources on Public and Private Lands: Management, Economic Valuation, and Integrated Decision-Making

Project Director
John Bergstrom
Organization
University of Georgia
Accession Number
1020381

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Federal regulatory impact analyses use a benefit-cost analysis framework, which requires quantification of the monetary value of potential changes in ecosystem goods and services that result from economic activity and policies. The need for valid and reliable economic estimates of ecosystem services continues to grow as management philosophies and people's demands for environmental quality change. Federal land management agencies have adopted sustainable ecosystem management as a guiding principle, which requires information on the trade-offs among environmental, social, and economic aspects. The objectives of this project are designed to provide this type of information for ecosystem services that are not valued directly by markets, as needed by decision makers in the public and private sectors.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Previous research suggests that coastal housing values capitalize the quality of nearby beaches but note potential problems related to measurement errors and reverse causation due to beach replenishment. We offer the first hedonic analysis of communities not engaged in beach replenishment, obviating concern over reverse causation. Statistical evidence supports hedonic specifications that account for proximity to the shoreline, though marginal willingness to pay (WTP) varies with the specification. Using an instrumental variables approach, we find significant downward bias in ordinary least squares estimates of marginal WTP derived from the sale of vacant lots compared to two-stage least squares estimates on the vacant lots. Notably, we do not find evidence of the same downward bias in WTP derived from the sale of existing homes. Concern over resilience to natural disasters often focuses on moral hazard; expectations of disaster assistance may lead households in hazard-prone communities to forego insurance. This has been dubbed "charity hazard" in the literature on natural disasters. We examine flood insurance uptake using household level survey data and employ instrumental variables (related to local history of aid distribution and political economy) to address endogeneity of individual expectations of eligibility for disaster assistance. To avoid potential problems with reverse causation, we drop any households that could have received payments in the past (triggering mandatory flood insurance purchase). We find coastal households that exhibit positive expectations of disaster aid eligibility are 25 to 42 percent less likely to hold flood insurance. We estimate that charity hazard could be responsible for 817,000 uninsured homes in the United States corresponding to a loss of $526 million in forgone annual revenue for the National Flood Insurance Program.

Transitioning the electric power sector to rely more on wind and solar photovoltaics (WPV) has long been cited as a potential solution to reducing harmful greenhouse gas emissions associated with fossil fuel electricity production. An under-explored implication of this transition, however, is whether increasing the amount of net generation supplied by WPV negatively impacts power system reliability? In this paper, we empirically investigate the preceding question using an unbalanced panel dataset of utility-scale operations between 2013 and 2017. Disruptions in power system reliability are measured by the frequency and duration of power system disruptions experienced by end-consumers. Results suggest net generation from WPV, on average, has a significant positive impact on the length of power system disruptions experienced, but only at low levels of net generation from WPV. As net generation from WPV increases, the duration of power system disruptions decreases. To provide insight into the policy implications of these results, we forecast disruptions in power system reliability, assuming different renewable energy policy scenarios for states across the United States with active renewable support policies in place. We estimate the economic costs of forecasted disruptions using an open-source, interruption cost estimate calculator.

Relatively little research thus far has been done to identify and measure the extent of household energy insecurity in the United States. One factor contributing to the lack of research is the absence of a single, consistent, and universally accepted energy insecurity index measure. This paper addresses this gap in the literature by estimating and comparing alternative empirical procedures available to generate an energy insecurity index using data from the 2015 Residential Energy Consumption Survey. Results suggest that in 2015 between 9 and 22% of U.S. households surveyed identified as energy insecure. The extent of energy insecurity experienced, however, varied based on which empirical procedure was used to construct the index. Examination of the content, construct, and convergent validity of the results suggests the dichotomous Rasch model provides a conceptually, empirically strong, and valid index for measuring the extent of household energy insecurity.

Briefly describe how your target audience benefited from your project's activities.

University faculty and graduate students, State and Federal economists and natural resource managers, natural resource and environmental organizations (NGOs) and consultants.

Briefly describe how the broader public benefited from your project's activities.

Journal articles published in 2021:

Craig E. Landry, Sarah Anderson,Elena Krasovskaia, and Dylan Turner. 2021. Willingness to Pay for Multi-Peril Hazard Insurance, Land Economics (Nov) 97(4).

Craig E. Landry, Dylan Turner, and Tom Allen. 2021. Hedonic Property Prices and Coastal Beach Width,Applied Economic Policy & Perspectives.

Craig E. Landry, Dylan Turner, and Tom Allen. 2021. Hedonic Property Prices and Coastal Beach Width,Applied Economic Policy & Perspectives.

Harrison Laird, Craig E. Landry, Scott Shonkwiler, and Dan Petrolia. 2021. Riders on the Storm: Hazard Insurance and Mitigation, Journal of Ocean and Coastal Economics.

Steele, Amanda H. and John C. Bergstrom. Teaching by the Case Method to Enhance Graduate Students' Understanding and Assessment of Wicked-Type Problems: An Application Involving the Bears Ears National Monument. Applied Economics Teaching Resources 3, 3 (2021): 1-78.

Pless, Rachel, Susana Ferreira, John C. Bergstrom, Adam N. Rabinowitz. Spatial and Temporal Trends in the Economic Value of Biotic Pollination Services in Georgia, USA: 2009–2017. Journal of Agricultural and Applied Economics (2021), 53, 322–340.

Sardana, Kavita, John C. Bergstrom, and J.M Bowker. Effects of Ad-hoc Data Truncation and Homogeneous Preferences on Recreational Demand and Values: An Application to the George Washington & Jefferson National Forests. Journal of Agricultural and Applied Economics. 53, 1 (2021): 153–167.

Landry, C.E., J. Bergstrom, J. Salazar, and D.A. Turner. How Has the COVID?19 Pandemic Affected Outdoor Recreation in the U.S.? A Revealed Preference Approach. Applied Economics Perspectives and Policy. 43, 1 (2021): 443-457.

Steele, Amanda H., J. Wesley Burnett, and John C. Bergstrom. The Impact of Variable Renewable Energy Resources on Power System Reliability"]. Energy Policy. 151 (2021).

Steele, Amanda H. and John C. Bergstrom. Brr! It's Cold in Here" Measures of Household Energy Insecurity for the United States. Energy Research & Social Science. 72 (2021).

Book chapters published in 2021:

Bergstrom, John C. and John B. Loomis. What is the Total Economic Value of River Restoration and Why is it Important? Chapter 9 in Morandi, Bertrand, Marylise Cottet, and Hervé Piégay (Editors). River Restoration: Political, Social, and Economic Perspectives. Wiley-Blackwell: Hoboken, NJ (first published online, 2021).

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

Professional training and development were provided for graduate students at the University of Georgia.

Dissemination

Results have been disseminated to communities of interest through referred journal articles, book chapters, and presentations at professional meetings.

Collection development, faunistics, and systematics of insects in Georgia.

Project Director
Joseph McHugh
Organization
University of Georgia
Accession Number
1020495

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Scientific names provide the language of biology. People cannot effectively convey information about organisms unless they can refer to particular types of living things clearly and precisely. Biologists cannot publish new research about living things unless they can link their discoveries to actual organisms by using unambiguous scientific names. These names serve also as the key to accessing past research, allowing people to efficiently search the vast body of scientific literature for relevant publications about particular organisms.

Precise identifications of insects are usually needed before informed decisions can be made in agricultural, medical, ecological, legal, and research settings; however, most insects are very difficult to identify. The insects dwarf all other forms of life in known species diversity. Accurate identification of insects typically requires examination of specimens in research collections and assistance from specialists.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

This year, the staff of the UGCA provided taxonomic assistance to a large audience, including the general public, private companies, governmental agencies, educational institutions, and to the scientific communities at the University of Georgia and around the world. The staff maintains and augments the research collection so that it will continue to be a valuable biological resource for the foreseeable future. The UGCA serves as a repository for voucher specimens that permanently link published research to specific types of organisms in nature. In addition, the collection participates in various formal and informal outreach education events about arthropods.

LITERATURE CITING UGCA MATERIAL OR ASSISTANCE (since last annual report):

1. Cardona, G., J. McHugh, B. Clark, and D. Batzer. 2021. Wetlands provide a source of arthropods beneficial to agriculture: A case study from central Georgia, USA. Journal of Entomological Science. 56: 424-440. DOI: https://doi.org/10.18474/JES20-61

2. Chatzimanolis, S., Cofer, W.G., Hightower, H.J., Roy, M.K. and Sanders, J.L., 2020. New Records of Beetles (Coleoptera) from the Tennessee Valley of Southeastern USA. The Coleopterists Bulletin, 74(3), pp.605-618.

3. Colijn, E.O., Beentjes, K.K., Butôt, R., Miller, J.A., Smit, J.T., de Winter, A.J. and van der Hoorn, B., 2020. A catalogue of the Coleoptera of the Dutch Antilles. Tijdschriftvoor Entomologie, 162(2-3), pp.67-186.

4. DiLorenzo, C.L., G.S. Powell, A.R. Cline, and J.V. McHugh. 2020. Carpophiline-ID, a taxonomic web resource for the identification of Carpophilinae (Nitidulidae) of eastern North America. (vers. 09.29.2020) Website, University of Georgia, retrieved from https://site.caes.uga.edu/carpophiline-id/

5. DiLorenzo, C.L., Powell, G.S., Cline, A.R. and McHugh, J.V., 2021. Carpophiline-ID: an interactive matrix-based key to the carpophiline sap beetles (Coleoptera, Nitidulidae) of Eastern North America. ZooKeys, 1028, p.85.

6. DiLorenzo, Courtney; Powell, Gareth; Cline, Andrew; McHugh, Joseph (2022), Carpophiline-ID: An interactive matrix-based key to the carpophiline sap beetles (Coleoptera, Nitidulidae) of Eastern North America, Dryad, Dataset, https://doi.org/10.5061/dryad.h44j0zphq

7. Eger Jr, J.E., 2020. A new species of Diolcus Mayr (Hemiptera: Heteroptera: Scutelleridae: Pachycorinae) with a reexamination of the subfamily and generic placement of Nesogenes boscii (Fabricius)(Hemiptera: Heteroptera: Scutelleridae: Elvisurinae or Pachycorinae).

8. Khan, F.Z. and Joseph, S.V., 2021. Characterization of impressions created by turfgrass arthropods on clay models. Entomologia Experimentalis et Applicata, 169(6), pp.508-518.

9. Lago, P.K., 2021. A Review of Central American Astaena (Coleoptera: Scarabaeidae: Melolonthinae: Sericini), with Descriptions of New Species. Transactions of the American Entomological Society, 147(2), pp.209-471.

10. McHugh J. 2021. Sphindidae in Catálogo Taxonômico da Fauna do Brasil. PNUD. Available in: <http://fauna.jbrj.gov.br/fauna/faunadobrasil/146018>.

11. Meeds, A.W. and Bertone, M.A., 2021. Alcaeorrhynchus grandis (Dallas)(Hemiptera: Pentatomidae: Asopinae) in North Carolina and Its Known Range in the United States. Proceedings of the Entomological Society of Washington, 123(2), pp.432-436.

12. Miller, D.R., Crowe, C.M. and Sweeney, J.D., 2020. Trap height affects catches of bark and woodboring beetles (Coleoptera: Curculionidae, Cerambycidae) in baited multiple-funnel traps in Southeastern United States. Journal of economic entomology, 113(1), pp.273-280.

13. Miller, D.R., Crowe, C.M., Mayo, P.D., Silk, P.J. and Sweeney, J.D., 2021. Interactions Between syn-and anti-2, 3-Hexanediol Lures on Trap Catches of Woodboring Beetles and Associates in Southeastern United States. Environmental Entomology.

14. Messer, P.W. and Raber, B.T., 2021. A Review of Nearctic Selenophorus Dejean (Coleoptera: Carabidae: Harpalini) North of Mexico with New Species, New Synonyms, Range Extensions, and a Key. The Coleopterists Bulletin, 75(1), pp.9-55.

Briefly describe how your target audience benefited from your project's activities.

During the past year, the UGA Collection of Arthropods (UGCA) provided biological information and expert identifications for thousands of insects to a large audience, including the general public, private companies, governmental agencies, and educational institutions. The UGCA continued to curate its existing research collection (approx. 2,070,000 pinned specimens, 50,000 vials, 30,000 slides) while augmenting it with strategically acquired new material that will help to detect newly introduced species, record changes in the distribution and phenology of native species, document research done on insects in the region, and provide a wealth of information about the biology and diversity of Georgia's entomofauna.

Briefly describe how the broader public benefited from your project's activities.

The UGCA has supported entomological education through formal courses (e.g., providing museum internship course opportunities, and hosting visiting classes), and through informal outreach education (e.g., exhibiting specimens at the SunBelt Ag Expo in Moultrie, GA). During the past year UGCA personnel hosted 8 visiting researchers, initiated 12 loans (approx. 3,000 specimens), and responded to 5 requests for UGCA specimen data for researchers around the world. The UGCA grew by approximately 10,000 specimens. We continued reorganizing and upgrading our existing holdings.

In the past year, we replied to about 80 formal requests for information about insects, and provided approximately 135 formal insect identifications for the following organizations and institutions: Bites Pest Solutions Inc., Center for Invasive Species and Ecosystem Health, Cornell University, European Union Reference Lab for Insects and Mites, Georgia Department of Agriculture, Georgia Forestry Commission, Georgia Institute of Technology (Assist. Director of Facilities), Kentucky Division of Forestry, New York State Dept. of Conservation, UGA Department of Entomology, UGA Experimental Station (Griffin), UGA Experimental Station (Tifton), UGA Extension Service, UGA Odum School of Ecology, UGA Office of Marketing and Communications, UGA Recreational Sports, UGA Warnell School of Forestry, University of Minnesota Plant Disease Clinic, U.S. Forest Service, U.S. Department of Homeland Security (U.S. Customs and Border Protection), USDA-APHIS-PPQ, USDA Emerald Ash Borer Survey Program.

Due to the establishment and subsequent population explosion of the exotic Joro spider (Trichonephila clavata) in north Georgia, we also fielded approximately 1000 requests for photo-based identifications and requests for information about spiders. In addition, we responded to interview requests from the press including The Flagpole, Better Homes and Gardens, Wall Street Journal, Georgia Reporter, and various radio stations.

The UGCA staff provided authoritative identifications for several thousand specimens of Curculionidae that were sampled as part of the national Cooperative Agricultural Pest Survey Program (CAPS) for the state of Georgia and Walnut Twig Beetle Survey (GA Forestry Commission). Expert identifications form the foundation that supports pest monitoring programs.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

The covid pandemic continued to hamper in-person interactions at the UGCA. This reduced the number of outreach activities, visits by researchers, and activities of undergraduate interns in the museum building.

Opportunities

Dissemination

The UGCA has been actively digitizing data at the specimen level. At this point, we have captured and uploaded specimen label data for 27,658 specimens. With an NSF grant, we digitized most of the North American specimen records for Lepidoptera. In the past year, UGCA data that were uploaded to the Global Biodiversity Information Facility (GBIF) were accessed and acknowledged in research publications 41 times (see list at: https://www.gbif.org/resource/search?contentType=literature&year=2020,2021&gbifDatasetKey=4c3b15bd-c98f-448c-9556-810fd82e8e30).

The UGCA was also cited in 14 research publications for assistance, including: a) providing access to reference specimens to assist identifications, b) serving as the repository for research voucher specimens, or c) being the source of loaned research material for a study. These publications, based in part on UGCA material, contributed new identification keys, new classifications, new biological information, descriptions of newly discovered species, and information about newly introduced pest species.

Studying Commodity Prices and Effective Risk Management Decisions

Project Director
Berna Karali
Organization
University of Georgia
Accession Number
1014363

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Commodity prices are subject to high volatility. Better understanding price and volatility dynamics of agricultural and energy commodities helps farmers and producers in their production, pricing, marketing, and risk management strategies. Another important issue in commodity markets is the economic value of public information and its impact on commodity prices. While the reports published by the USDA has been widely considered as the benchmark in the past, their value is now under scrutiny with the emergence of large data sets collected by private firms.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The value and impact of USDA reports are investigated in two research projects. First, the accuracy of USDA's crop acreage and production forecasts for corn, soybeans, and winter wheat relative to their private counterparts over 1970–2019 is examined to determine if USDA's relative accuracy advantage is maintained during the big data environment. Second, the simultaneous release of various USDA reports, or report clustering, is taken into account to investigate when various USDA information releases cause the largest market reactions in crop and livestock markets over 1985-2018.

The impact of major hurricanes in the North Atlantic Ocean on the stock market returns of the largest, publicly traded energy companies in the U.S. is investigated using event study methodologies. The most notorious, economically damaging hurricanes until 2015 are considered: Hugo (1989), Andrew (1992), Katrina (2005), and Sandy (2012). Energy companies are categorized into five groups according to their carbon-dioxide emissions intensity: coal, oil, natural gas, nuclear, and renewables.

Products

Isengildina-Massa, O., X. Cao, B. Karali, S.H. Irwin, M.K. Adjemian, and R. Johansson. 2021. "When does USDA Information have the Most Impact on Crop and Livestock Markets?" Journal of Commodity Markets 22(June 2021):100137.

Isengildina-Massa, O., B. Karali, and S.H. Irwin. (2020) "Can Private Forecasters Beat USDA? Analysis of Relative Accuracy of Crop Acreage and Production Forecasts." Journal of Agricultural and Applied Economics 52(4):545-561.

Liu, H., S. Ferreira, and B. Karali. "Hurricanes as News? Assessing the Impact of Hurricanes on the Stock Returns of Energy Companies." International Journal of Disaster Risk Reduction 66(December 2021):102572.

Briefly describe how your target audience benefited from your project's activities.

Target audience, mostly academic faculty and few industry analysts conducting research on commodity price analysis, is provided academic journal publications that details the project activities and results.

Briefly describe how the broader public benefited from your project's activities.

One of the research projects on USDA reports demonstrated that USDA forecasts of crop acreage and production often had significantly smaller errors than their private counterparts. The accuracy of both USDA and private forecasts has improved over time, but the accuracy of USDA forecasts has improved more than that of private forecasts, maintaining the USDA's relative accuracy advantage. These findings suggest that the methods used by USDA to forecast crop acreage and production continue to remain effective in the big data environment and the USDA has not lost its edge over the private analysts with the increased availability of data and technical tools for its analysis.

The second research on USDA reports showed that information clusters containing Grain Stocks, Crop Production Annual Summary as well as Prospective Plantings and Acreage reports had the largest impact on the crop markets and this impact has been increasing over time in most cases. Research findings raised substantial concerns regarding USDA's decision to remove Objective Yield Estimates from August corn, soybean, and cotton Crop Production forecasts announced in March 2019 as these reports are found to have strong informational value in these markets. Further, the impact of Hogs and Pigs reports on the lean hog market has deteriorated over time, most likely illustrating the implications of rapid increases in consolidation and vertical integration in the livestock industry over the last three decades.

The research findings on the hurricane impacts on energy company stocks suggest the hypothesis that energy capital markets react to climate-related events is plausible and the evidence is stronger for more recent events. Firms with cleaner fuel mixes are found to experience positive cumulative excess returns relative to coal, and the difference is the largest and most persistent for renewable stocks. The significant and large negative cumulative abnormal returns in the coal industry relative to other sectors, particularly renewables after Sandy suggests that investors in capital markets are paying more attention to climate change information.

Assessing the environmental health of Georgia wetlands and rivers using aquatic invertebrates

Project Director
Darold Batzer
Organization
University of Georgia
Accession Number
1011549

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Aquatic habitats are being impaired by various human impacts. This project assesses the environmental health of Georgia wetlands and rivers using aquatic invertebrates.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Journal articles published for the project provided basic knowledge about aquatic invertebrate ecology, how invertebrates respond to habitat restoration, and why invertebrates from wetlands may benefit agriculture.

Products

Wissinger, S. A., Klemmer, A. J., Braccia, A., Bush, B. M., & Batzer, D. P. (2021). Relationships between macroinvertebrates and detritus in freshwater wetlands. FRESHWATER SCIENCE, 18 pages. doi:10.1086/717487

Jackson, C. R., Sytsma, C., Sutter, L. A., & Batzer, D. P. (2021). Redefining Waters of the US: a Case Study from the Edge of the Okefenokee Swamp. WETLANDS, 41(8), 10 pages. doi:10.1007/s13157-021-01512-8

Cardona-Rivera, G. A., Clark, B., McHugh, J., Bush, B., & Batzer, D. P. (2021). Wetlands Provide a Source of Arthropods Beneficial to Agriculture: A Case Study from Central Georgia, USA. JOURNAL OF ENTOMOLOGICAL SCIENCE, 56(3), 424-440. Retrieved from http://gateway.webofknowledge.com/

Pires, M. M., Grech, M. G., Stenert, C., Maltchik, L., Epele, L.B., McLean, K. I., . . . Batzer, D. P. (2021). Does taxonomic and numerical resolution affect the assessment of invertebrate community structure in New World freshwater wetlands?. ECOLOGICAL INDICATORS, 125, 7 pages. doi:10.1016/j.ecolind.2021.107437

Lu, K., Batzer, D. P., & Wu, H. (2021). Aquatic invertebrate assemblages during the spring-thaw season in wetlands of Northeastern China. HYDROBIOLOGIA, 848(17), 3943-3953. doi:10.1007/s10750-021-04615-9

Wu, H. T., Yang, M. Y., Lu, K. L., & Batzer, D. P. (2021). Effects of Ecological Restoration on Trophic Dynamics in Estuarine Wetlands. WETLANDS, 41(1), 7 pages. doi:10.1007/s13157-021-01408-7

Briefly describe how your target audience benefited from your project's activities.

Scientists, students, and farmers can use the information to enhance their work.

Briefly describe how the broader public benefited from your project's activities.

The project provided basic knowledge about aquatic invertebrate ecology, how invertebrates respond to habitat restoration, and why invertebrates from wetlands may benefit agriculture.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Changes or Problems

None

Opportunities

Training was provided for 4 graduate students, and for international collaborators.

Dissemination

Six journal articles were published.

Plans

Continue as before.

Enzyme-enhanced Composting for Reduced Environmental Risks and Improved Carbon and Nutrient Conservation

Project Director
Qingguo Huang
Organization
University of Georgia
Accession Number
1011612

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Hormones, antimicrobials and other micro-pollutants of emerging concern in biosolids may only degrade partially or not degrade at all during composting. Because micro-pollutants can be toxic at very low concentrations, only moderate degradation of them during composting does not make biosolids environmentally safe. In addition, the degradation products are unknown and whether they are toxic has not been adequately assessed. Therefore, more efficient treatments targeting bioactive micro-pollutants are needed to make composted biosolids environmentally safe for fertilizer uses.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

We have studied an innovative approach to degrade micro-pollutants by enzyme-catalyzed oxidative humification reactions (ECOHRs). Specifically, through a series laboratory studies and literature review, we systematically assessed the transformation of representative micro-pollutants during ECOHRs by different enzymes under different conditions. We have also studied how such ECOHR reactions may impact the natural organic matter.

Products

Sun K., Li S., Si Y., Huang Q.*, 2021, Advances in laccase-triggered anabolism for biotechnology applications, Critical Reviews in Biotechnology, 1-25.

Zhong C., Zhao H., Cao H., & Huang Q., 2019, Polymerization of micropollutants in natural aquatic environments: A review. Science of the Total Environment, 133751.

Sun K., Li S.-Y., Chen H.-L., Huang Q., & Si Y., 2019, MnO2 nanozyme induced the chromogenic reactions of ABTS and TMB to visual detection of Fe2+ and Pb2+ ions in water. International Journal of Environmental Analytical Chemistry, 99(6), 501-514.

Sidhu S. S., Huang Q., Carrow R. N., & Raymer, P. L., 2019, Short-term and Residual Effects of Laccase Application on Creeping Bentgrass Thatch Layer. HortScience, 54(9), 1610-1620.

Briefly describe how your target audience benefited from your project's activities.

The results of our study provide a knowledge base for devising and implementing ECOHR-based methods to remove micro-pollutants from the environmental matrices, including from biosolids during composting. This will benefit the science community, regulatory agencies and the practitioners related to the activities of biosolids treatment and land applications.

Briefly describe how the broader public benefited from your project's activities.

The results of the study leads to improved understanding of the environmental transformation of micro-pollutants and more effective methods to remove them in the environment. Therefore, it will contribute to more effective management of the environmental and public health risks associated with micro-pollutants, leading to cleaner and safer environment that is to the benefit of the public.

Assessing Carbon Balance of Farming Systems Constituting Agricultural Crops and Forest Ecosystems

Project Director
M Leclerc
Organization
University of Georgia
Accession Number
225492

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The CO2 and water vapor exchange over farming systems constituted of both agricultural crops and forest ecosystems is poorly quantified at the farm scale. The purpose of the study is to assess quantitatively both carbon balance and water-use efficiency of typical farming systems in Georgia.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

1. Peanut is an important row crop in Southeast, especially in Georgia. With increasing drought frequency, it is crucial to improve water-use efficiency while maintaining high peanut yield through different management practices. The impact of several key management practices on both peanut water-use efficiency and yield were quantified. Ecosystem water-use efficiency is defined as the ratio of CO2 exchange and evapotranspiration measured using the eddy-covariance method. Management practices include different kinds of tillage, seed rates, peanut planting dates, and planting patterns. 1) Tillage: Using the eddy-covariance technique, the study dispels the controversy in water-use efficiency (WUE) and yield in peanut conservation/strip-tillage versus conventional tillage. The 3-year study showed contrasting inter-annual variability in precipitations. Results from 2019 (short rainfall) and 2021 (extra rainfall) suggest that strip-tillage peanut exhibited a considerably larger water-use efficiency than conventional, while there was no significant difference found in 2020 (normal rainfall). This study revealed that strip tillage performs well in achieving greater WUE and yield than conventional tillage in too dry or too wet years. However, when there is an average year with normal rainfall, both conventional tillage and strip tillage can perform well. Thus, strip tillage is likely a better option for sustainable peanut production, considering the current weather variability. (2) Seed rate: The influence of different peanut seed rates on the water-use efficiency and yield has been studied with the eddy-covariance technique. Preliminary results suggest that peanut ecosystem with 9.5 seeds/ft presents a larger WUE than with 4.5 seeds/ft during the late growth stage (Day After Planting (DAP) > 110) and it is reversal at early growth stage (DAP < 110). 9.5 seeds/ft also gives higher yield than 4.5 seeds/ft. 3) Planting date: This study quantifies the efficacy of peanut planting date on key variables such as water-use efficiency and yield using the eddy-covariance method. During the early growing stage, results suggest that the late sowing date (early June) presents the highest water-use efficiency. The latest planting date also has the greatest yield. Furthermore, when looking at the last 20 years of climatological record, it is found that a late sowing date carries a risk of 40**%** of low temperature late in the season, potentially reducing the yield in those years. The late planting date also carries a risk of 15**%** probability often or more consecutive rainy days in the narrowed harvest window of late planted crop, potentially impacting a timely harvest. 4) Planting pattern: This study investigates single- and twin-row planting patterns on peanut ecosystem water-use efficiency and yield using the eddy-covariance method. Results suggest that, in 2016, the early canopy closure of the twin-row crop resulted in 31.8**%** greater CO2 flux and in 27**%** greater water-use efficiency early in the season. In mid and late peanut growth stages in 2018, with high precipitation and low vapor pressure deficit, the water-use efficiency was greater by 9**%** while the CO2 flux of twin-row planted peanut was greater than single by 7-10**%**, respectively. The twin-row peanut yield was greater than that of the single-row pattern in 2018. These results suggest that with high precipitation and low vapor pressure deficit, greater water-use efficiency of twin-row peanut could be one of the reasons for its greater yield when compared to single-row peanut. 2. Georgia is the one of the largest producers of pecan in the U.S. To expand and deepen the burgeoning database of pecan tree growth/irrigation information, measurement and collection of both pecan characteristics data and biophysical, micro-meteorological, and other environmental data were continued in King Spring Pecans, Hawkinsville, GA. Pecans require ample amount of water during the growing season to produce quality nuts. A slightest water stress during kernel filling stage can result in degradation of nut quality. Pecan tree transpiration was estimated with sap flow measurements and analyzed for its relationships with environmental conditions. It is controlled by solar radiation, vapor pressure deficit, and reference evapotranspiration. Understanding pecan transpiration under different environmental conditions help make reasonable irrigation scheduling. 3. A little understood ecosystem in the state of Georgia is the coastal zone. Salt marshes are among the most productive and dynamic ecosystems on Earth and globally sequester an average of 210 g C m−2 yr−1. To understand the role of this ecosystem in the carbon cycle and its changes as a result of rapid climate change and human disturbance, a baseline record on carbon dioxide (CO2) exchange between this ecosystem and atmosphere needs to be established. The study goal is to determine the effects tide events on the exchange of CO2 in a salt marsh ecosystem dominated by Spartina alterniflora using the eddy-covariance method near Sapelo Island, GA. The net ecosystem exchange was found to be highest in spring and summer than in fall or winter. High tides that flooded the marsh reduced measured net ecosystem exchange; the system was most responsive to tidal flooding in the spring when plants were short but actively growing. The net ecosystem exchange saturated at photosynthetic active radiation levels of ~1500 µmol m-2 s-1 and was reduced at high photosynthetic active radiation by high (>32°C) temperatures or high (>2 kPa) vapor pressure deficits. The marsh was a net carbon sink for most months of the year but was a net source for winter months in some years. As climate warms in the future, air temperatures greater than the thermal optimum for Spartina alterniflora are likely to suppress marsh net ecosystem exchange. A peer-reviewed paper based on the results is in revision with reviewers' comments for publication. 4. Application of remote sensing in agriculture In this project, this study uses remote sensing technology by using a drone/multi-spectral camera package. A 2016 survey found that the tomato spot wilted virus (TSWV) infection in Georgia peanut can reduce

the yield and revenues by as much as 50%. This directly impacts the growers' profitability of their operations. We conduct this study to quantify the effectiveness of this remote sensing-based method to detect and identify the emergence of plant diseases. By obtaining early high-quality data, pesticide application can be reduced while preserving both yield and grower's revenues. The development and severity of the virus infection are directly related to planting density. This project collects aerial imagery using drone-mounted multi-spectral camera to detect the disease incidence in three different planting densities. In these projects, two double pink STEM students are trained to use this technology with the drone-based spectral camera and apply the spectral images to solve the agricultural issues.

Products

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(See remaining Products in Comments section below.)

Briefly describe how your target audience benefited from your project's activities.

The target audience is: 1. Policy makers interested in carbon capture by vegetation such as crops, forests and marshes; 2. Scientific community involved in modeling the carbon uptake at the regional and continental scales; 3. Peanut farmers and farm managers; 4. Pecan orchard growers and orchard managers 4. Land planners, ecologists, climate change modelers with emphasis to coastline changes. The project contributes to the quantification of water-use efficiency and on the documentation of carbon sources and sinks at the agricultural crop and forest as well as coastline carbon sinks on the Georgia coastline at the landscape level with the goal of providing policy makers, farmers and managers with enhanced information to promote greenhouse gas reduction.

Briefly describe how the broader public benefited from your project's activities.

With this project results, more reasonable management practices can be applied in agricultural production with high water-use efficiency, i.e. more carbon is removed from the atmosphere with less water consumption. Thus, this contributes to optimizing yield and water, benefiting the society.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Graduate students had the opportunity to learn data collection and analysis, modeling, writing of results for a thesis and for a manuscript submission in an internationally respected high-impact journal; gain preparation and presentation expreience with oral presentations at several regional, national and international conferences, meetings, and Field Days; earn 2020 First Place at a ASA southern Branch conference; and operate a spectral camera drone and apply images to solve agricultural issues.

Dissemination of reseearch can be found in the Products section above (and continued below).

Products (cont. from 2nd question above)

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Sustainability, Conservation & the Environment

Project Director

Mark Latimore

Organization

Fort Valley State University

Accession Number

7000389

2021 Results - Holistic Organic Plant and Animal Production/Sustainable on Campus

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The holistic organic farm site, which consists of 18 acres, has completed its 10th year of production. The site consists of 9 acres of plant production and 9 acres of animal production. Plant production consists of blueberries, muscadines, persimmons, pecans, Chinese chestnuts, and one fourth acre of vegetables. The animal production consists of cows, sheep and goats.

Plant Production: Ninety-eight percent of the plants survived and are producing really well, serving the Fort Valley State University (FVSU) and the community with organically fresh-produced fruits and vegetables. Organically grown produce is the way to go today because the federal standard requirements for the sale of produce to the public have changed dramatically over the last 5 to 10 years. Because most organically grown produce are 90 to 98 percent resistant to the attack of most pest, such as insects and diseases, the marketability of these crops remain high in comparison to the conventionally grown crops. Although organically crops are high priority in the market place today, they are still subject to additional standards according to the Federal Regulations.

All produce are required to meet the minimum marketable standards according to the regulations of the Good Agriculture Practice (GAP) method. Because of this most recent institution of the GAP method, we, at the FVSU, applied for the federal GAP certificate during the year of 2020 and were approved and received the certificate for three crops grown on the farm site. These crops were muscadines, persimmons and blueberries. Even though a farmer or gardener is allowed to receive up to $25,000 per year from their crops without penalty; however, this income limitation is not expected to last very long in the future. That is why the Agriculture and Natural Resource (ANR) section of the Cooperative Extension Program at FVSU, both at the university and at the county level, is in the process of training and developing our farmers, gardeners and other interested persons how to prepare their crop growing areas to meet the standard requirements to receive their GAP certificates.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Conducted sustainable demonstration projects on the campus of Fort Valley State University campus, which were extended to the farmers, gardeners, and other interested persons by way of workshops, and hands-on field day activities. Demonstrations were also carried out on different community garden site located in several cities in the state of Georgia: Sylvester, Columbus, and Macon.

I received a one-year project grant in the amount of $160,000 during the period of 2020 and 2021 where FVSU and grant partners conducted two workshops located in the following cities in the state of Georgia: Fort Valley and Hampton. Hampton is a city in Southwest, Georgia where the community is eager to learn and grow their own fruit, vegetables and small ruminant animals as a source of food.

Briefly describe how your target audience benefited from your project's activities.

These workshops improved the knowledge of the participants. More than 80% of the attendees indicated that they left the workshop meetings feeling satisfied about the helpful knowledge that they received about establishing, maintaining and marketing of fruits and vegetables, as well as small ruminant animal production. These achievements align with the goals/objectives outlined in my last performance review as they continue to meet the needs of the clients.

Eighty (80%) of my clients indicated that they gained an increase in knowledge and wisdom.

Results showed that more than 75% of the participates were able not only to speak knowledgeable about how to plant, maintain, and harvest many of the crops and/or animals correctly but also predict the possible income from the crops or animals produced.

Briefly describe how the broader public benefited from your project's activities.

Training available for farmers, gardeners and other interested persons on how to prepare their crop growing areas to meet the standard requirements to receive their GAP certificates.

2021 Results - Landowner Initiative for Forestry Education (LIFE)

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

To ensure that the needs of the small, limited resource, minority farmers and landowners are addressed, the FVSU Cooperative Extension Program through created the Landowner Initiative for Forestry Education (LIFE). This program will focus on the overall goal of increasing outreach, awareness and technical assistance to minority and limited resource farmers/landowners in the areas of sustainable natural resource practices and effective estate planning including the incorporation of computer technology.

The objectives of the program are to: 1. Create an electronic database, including GIS, of small, minority and limited resource landowners that are located in the black-belt counties of Georgia; 2. Provide workshops on forestry and wildlife management and protection strategies with emphasis placed on long-term planning; 3. Increase communications and outreach to small, minority and limited resource farmers/landowners on current natural resources management including forestry and estate planning.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In 2021, the project partnered with organizations to coordinate virtual workshops. The partnering organizations consist of the following:

• USDA Natural Resources Conservation Service

• USDA Farm Service Agency

• Georgia Heir Property Law Center

• UGA Warnell School of Forestry.

The project co-sponsored three (3) educational workshops in the following months: March 2021; June 2021; September 2021.

Briefly describe how your target audience benefited from your project's activities.

This project focused on minority and underserved landowners in the Black-belt region of Georgia. The project co-sponsored three (3) educational workshops in the following months: March 2021; June 2021; September 2021. The workshops included sessions on the following: Disaster & Risk Management Programs for Landowners, USDA Cost-share Programs, and Estate Planning. These virtual workshops reached over 550 participants through Zoom and Facebook Live platforms.

Briefly describe how the broader public benefited from your project's activities.

Increase the sustainability of farms and landownership

Sustainability, Conservation and the Environment

Project Director
Laura Perry Johnson
Organization
University of Georgia
Accession Number
7000208

Economic Contribution of Georgia's Agriculture

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Like other segments of the economy, agriculture and related industries need to demonstrate to stakeholders their economic footprint within the overall economy to promote understanding of industry size and impact. Fully defining the industry impact includes documenting the linkages with related industries along the supply chain - input sectors, related manufacturing or processing, and the spending of employees in all of the sectors. Further, there is a gap of available information at the county level; important for understanding and addressing ag-related issues that may vary by county.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

In order to address the need throughout the agriculture/agribusiness and economic development community, we use data collected through the Farm Gate Value Report (CAED) to help quantify the economic contribution of the primary ag sectors plus the related industries along the supply chain - input sectors, related manufacturing or processing, and the spending of employees in all of the sectors. Specialized economic software is used to implement input/output analysis, an approach which employs a model and large data sets to trace and quantify interdependencies between sectors producing products and those from which they purchase inputs. The result of the analysis gives both the economic output and jobs contribution of these important sectors, demonstrating the current economic footprint of food and fiber industries.

Briefly describe how your target audience benefited from your project's activities.

The figure for the value of Agriculture as the number one industry in Georgia is quoted widely in the popular press and research-related articles, as well as used by specific commodity and industry groups or for targeted analysis, such as in disaster assistance. Each year, over 10,000 of these summary booklets are printed and distributed by request at various CAED/CAES functions, to county leadership, to the Agriculture Commissioner and other economic development and agribusiness groups. In addition, the summary is designed and printed for easy online viewing and featured on the CAED website. A recent rollout of an online interactive map graphic featuring the results of the county-level analysis for each of Georgia's 159 counties has proven to be a valuable resource, garnering hundreds of views and thousands of tool-tip hovers each month.

Briefly describe how the broader public benefited from your project's activities.

Economic information about Georgia's agricultural industry available to the public.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Extension's Response to Disasters

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Since 2016, Georgia has experienced five tropical storms. In addition, Georgia is susceptible to strong Summer and Spring storms. Tropical storms and other extreme events can cause widespread, long-term flooding and power outages. These can result in significant and costly agricultural damage, including crop and livestock losses, destruction of fruit and nut trees, and major interruptions of supply and logistics chains.

While a remote possibility, Georgia has two nuclear power plants in SE Georgia and has two located on our border. An outbreak of Avian influenza in the United States $850 million is response activities and indemnity payments, with a total cost of $3.3 billion. Finally, human-borne illness can negatively impact the economy in GA and nationwide. As seen with the COVID-19 pandemic, direct costs of illness and the ripple impacts on the economy can reduce the production of goods and services, can cause a recession whose impacts may last for several years.

Many UGA Extension faculty and staff that are involved in their community disaster responses. This can include being part of Emergency Operation Centers, gathering economic damage data, helping farmers and landowners navigate recovery programs, assisting in reopening offices, as well as supporting their own families during this time.

Post event studies have shown Extension employees feel unequipped to respond to all scenarios. Additionally, they report feeling overwhelmed by the requests from multiple sources, including federal, state and local entities, as well as Administration and their families. Collectively, these responses indicate that these individuals simply did not know what would be required of them in their capacity as a UGA employee (Ali, et al, 2020).

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A USDA-NIFA Special Needs Grant was applied for to build the capacity of UGA Extension to respond to natural disasters and emergency preparedness. The proposal was awarded $150,000 to develop specially trained small teams in each of the UGA Administrative districts. Teams will receive specialized training to accomplish the following objectives:

1) Develop internal capacity for UGA Extension to respond to natural disasters and emergencies;

2) Expand external collaborations with local, state and regional agencies who have a role in disaster response; and

3) Create and implement Continuity of Operations Plans (COOP) and a toolkit of resources for each UGA County Extension Office in Georgia.

District team members and team leaders have been identified. Leaders work in coordination with UGA Extension Administration to convey requests and training needs from the field and provide Administrative updates (including when and how to respond) to the field.

State Agency partners and contacts have been established to begin understanding UGA Extension's role in response and better understand our partners' place in response. Thus far, the project team has communicated with GEMA, GDA, DBHDD, DPH, and CEMA. Additional agencies and organizations may be sought based on feedback from team and partners.

A COOP template has been developed for the team members to use with each county in their district. Each COOP template will be revised as needed in each county to develop an individualized product suitable for the variation found from one county to the next.

The Principle Investigator and the Co-PIs coordinated, planned and hosted a 3-day training on emergency response for the members of the district teams. This included presentations by our partners on their response roles and what they view as Extension's role. Team meetings and activities were used to building a working relationship and scenario-based exercises to practice preparing for response. Subject matter trainings were held to build expertise in different areas, including impacts on wells, household cleanup, food safety, and family preparation. Finally, Mental Health and Wellbeing training for Extension responders was taught by UFL IFAS faculty. Three main results are highlighted below.

Briefly describe how your target audience benefited from your project's activities.

An initial three-day training was conducted with the teams in August 2021. Attendees were surveyed before and after the training regarding their ability/confidence to participate in an emergency or natural disaster response. The results indicated increased capacity and confidence in the teams to fulfill the objectives of the program.

A follow-up training with Property Heirs will occur in October. This training highlights how generational properties can be impacted by disasters and what people need to do to help Georgians navigate relief programs in this circumstance

A Certified Emergency Response Training (CERT) will be hosted in winter 2022 to give district team members practical, hands-on experience in responding to disasters.

A training with an UGA Extension specialists on agricultural damage assessment using drones is being scheduled for winter 2022.

This program and these data were presented at the 2021 Extension Disaster Education Network (EDEN) Annual Meeting. As a result, additional collaborations with other state Extension Systems are being developed to support natural disaster and emergency response capacity in other regions of the country. In addition, the UGA Extension Delegation proposed and was awarded to host the 2023 EDEN Annual Meeting in Savannah Georgia.

Briefly describe how the broader public benefited from your project's activities.

Disaster preparedness

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Forecasting Agricultural Water Use

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Increasing water demand and shifting climate conditions will continue to put increased pressure on Georgia's water resources. In an effort to proactively develop water management strategies, the state puts together a State Water Plan every 5 years. To do that effectively requires good information on future water use within each Water Planning Council's watershed.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Developed county-level estimates of agricultural water use under different climatic conditions for 2021-2030. Each forecast was broken down by surface water and groundwater; the forecasts were also aggregated up to the watershed level.

Briefly describe how your target audience benefited from your project's activities.

These forecasts are used by the Water Planning Councils to anticipate water demand and develop appropriate water management strategies. The forecasts and water management plans are ultimately incorporated into the State Water Plan.

Briefly describe how the broader public benefited from your project's activities.

Broader public benefits from appropriate water forecasting and planning to ensure continual water availability.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Georgia Green Landscape Stewards Program

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

According to a report published by the Natural Resources Conservation Service, as of 2012 4.6 million acres in Georgia were allocated to developed land. Developed land is the fastest growing land use category with acreage more than doubling between 1982 and 2012. As we face global crises such as climate change, biodiversity loss and water shortages, the choices we make in our individual landscapes have a significant impact on our local and global ecosystems.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Utilizing funding from a mini-grant from the Center for Urban Agriculture at the University of Georgia, Camden County Agriculture Agent Jessica Warren and Northeast Area Water Agent Martin Wunderly worked to create a sustainable landscape program in which clients could learn from educational modules at their own pace, implement practices in their landscapes and evaluate their landscape practices for recognition. Participants must reach a minimum score of 70 points on the scoring metric in order to certify their landscape. Educational and scoring metric components include composting, mulching, pollinator habitat, welcoming wildlife, water conservation, water quality, stormwater, invasive species, native plants and biodiversity. Certification is free and participants have the opportunity to purchase an attractive yard sign that designates their property as a Georgia Green Landscape. The program is open to all Georgia residents and businesses. Clients can navigate the program on their own or through the leadership of their local extension agent. The website contains an “UGA Agent Resources” tab that contains ready to use presentations and marketing materials through a password protected shared file.

Briefly describe how your target audience benefited from your project's activities.

Since the program launched in March of 2021, 68 landscapes in 29 different counties have been certified through the Georgia Green Landscape Stewards Program. There have been more than 1239 views of program educational components through the program’s YouTube channel, and more than 2241 unique views of the program website (https://site.extension.uga.edu/georgiagreen/). Master Gardener groups have been especially excited about the program and promoting it in their local communities. In addition to residential landscape certifications, there have been several church and public demonstration garden certifications. Educational components were also offered as a live webinar series following the program launch. Evaluations from the webinar series stated that 100% of respondents had an increase in knowledge due to the series. The program has received much positive feedback from clientele including the quotes below which also help document behavior changes due to the program.

Participant comments included:

- “Thank you. Going through the checklist made me aware of some areas where I am weak. I will work on ongoing improvement!”

- “It was a very informative lecture by Jessica Warren extension agent, on supporting the GA ecosystem and the necessity of planting and maintaining native corridors for pollinators which are not just butterflies. Great presentation!!!!! Simply put, informative and inspirational."

- “I just wanted to say that I thought the program was really well done. The videos were both informative and interesting, and the scorecards were a great tool for assessing key practices. I’m hoping the yard sign will help serve as a form of

advertisement, since the concepts in this program are extremely important."

- "The stick pile my boyfriend keeps in the yard and I have wanted to clean up is probably why we have so much biodiversity already. I just took down our hummingbird feeder and we are getting a frog pad for the pool. Also, going to pick up the dog's business more often."

- "I will implement poster/brochure session at future garden club plant sales/also advise club members club will not sell any plants listed as invasives on Georgia Green Landscapes Steward Program."

- "I learned about the different types of mulch and their advantages and disadvantages. I will use this information with my school garden projects and community gardens. I love this series!"

- "I didn't know that the newer classes of pesticides were more water soluble. I'm going to put together a chemical spill kit for my home. I plan to establish a rain garden in an area of my property that is part of the stormwater path to a nearby lake."

- "It's really important to NOT over fertilize your lawn/plants. I plan to send off soil for testing!"

- "This was a great all-around series. I learned so much about the full picture of native gardening - from the best plants to how to compost, conserve, water, etc, etc. Totally enjoyed it and would highly recommend. Many thanks to Jessica and Martin."

Briefly describe how the broader public benefited from your project's activities.

The choices we make in our individual landscapes have a significant impact on our local and global ecosystems.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Georgia Green Landscape Stewards, Sustainable Practices for Water Resources

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Soil and water conservation, flood damage prevention, and water quality protection need to be addressed for all types of land use activities and property sizes to promote sustainable water resource practices. Sustainable water resource management on the individual property landscape can add up to large beneficial impacts on local water quality and availability. By incorporating soil and water conservation practices, stormwater control, and green infrastructure in home landscapes, property owners can help reduce negative impacts on Georgia's natural resources and protect water supplies for future generations.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

With a small start-up grant from the University of Georgia Center for Urban Agriculture, the Georgia Green Landscape Stewards program was developed by UGA Extension ANR agents to provide fact-based information to property managers and help them implement sustainable resource practices in their landscape (https://site.extension.uga.edu/georgiagreen/). It is a certification

program for businesses and residences in Georgia that promotes sustainable landscape maintenance actions and recognizes land owners for their efforts. A sustainable landscape action certification checklist was created to grade participation and assist with Green Landscape Steward qualification. A Georgia Green Landscape Stewards website and YouTube video channel were developed for participants that included stormwater, water quality, and conservation videos, presentations, and Extension agent resources. Water conservation, water quality, and stormwater webinars were presented to statewide zoom audiences in the spring of 2021. These presentations covered sustainable landscape actions that help protect surface water quality and water resource supplies. Soil and water conservation, smart irrigation, stormwater green infrastructure and rainwater infiltration were some of the topics covered.

Briefly describe how your target audience benefited from your project's activities.

Georgia Green Landscape Stewards are helping homeowners conserve natural resources by implementing sustainable landscape maintenance practices on their property. Over 1,200 viewers have watched educational component videos on the YouTube channel, and more than 2,200 unique visitors to the website have been educated on sustainable landscape practices in the program's first year (March – October 2021). Participants have reached certification level status at 65 different properties in Georgia, and the program is averaging more than 5 certified landscapes per month and will continue to grow. By applying sustainable water management practices, program participants are protecting water resources and saving maintenance and utility costs usually associated with traditional intensive landscaping methods.

Briefly describe how the broader public benefited from your project's activities.

Water Conservation

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Georgia's "Using Pesticides Wisely" Program Changes Agriculture for the Better

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

As the world's population is expected to approach 10 billion people by 2050, family farms are faced with a mighty challenge of feeding and clothing them all. To meet this demand, science confirms growers must have access to economically effective pesticides. Furthermore, new technologies like auxin-tolerant cotton and soybeans and their respective herbicides will be a vital part of long-term agricultural sustainability. However, it is equally important that all pesticides are used carefully and strategically in ways that protect the consumer of agricultural products, pesticide applicators, our environment, pollinators, and endangered species while managing pests effectively and economically.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

With pesticide stewardship being critically important to the sustainability of humankind, University of Georgia Extension and the Georgia Department of Agriculture teamed up to create the first of its kind large-scale classroom and on-farm training program titled "Using Pesticides Wisely". The program has included the following: 1) Over 125 field experiments conducted across the state developing methods to improve on-target pesticide applications; 2) in-person classroom training events at 153 locations; 3) Extension Agents conducting one-on-one in-person trainings for over 1000 pesticide applicators helping them make better decisions when applying pesticides; and 4) during the pandemic, educational programs continued with a mixture of both virtual (15 webinars) and in-person trainings following safety guidelines.

Briefly describe how your target audience benefited from your project's activities.

The Using Pesticides Wisely program collectively trained 11,379 pesticide applicators since its creation in 2014 leading to a 78% reduction in pesticide drift complaints documented by the University of Georgia Cooperative Extension Service. Additionally, the Georgia Department of Agriculture has only confirmed one dicamba drift complaint from use in agronomic crops since the commercialization of the auxin technologies during 2016.

Briefly describe how the broader public benefited from your project's activities.

Pesticide stewardship is critically important to the sustainability of humankind.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Industry-Funded Turfgrass Research and Extension Infrastructure

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Turfgrass is a multibillion-dollar industry that encompasses lawns, parks, sports fields, sod production and golf courses with over 62 million acres in the US. In the state of Georgia alone, turfgrass covers 1.8 million acres, making it one of the largest agricultural commodities with a maintenance value of $1.56 billion. This industry accounts for 111,000 full- and part-time jobs. Because of high demands in aesthetic quality and playability, mitigating disease (dollar spot, rhizoctonia large patch, spring dead spot, Pythium anthracnose, fairy ring nematodes etc) and physiological stress factors (temperature extremes, water stress, light, salt, and poor soil quality) represents major expenses to the turfgrass industry. Despite the importance of the subject, there is a severe lack of research infrastructure and turfgrass facilities in where to carry out investigation and extension educational activities which are essential for attainment of crucial research data and its dissemination

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Collaborations were established with essential turfgrass industry companies and professionals to act on the dire need for infrastructure research facilities. Bayer Environmental Science, Green Tee Golf Inc, Sports Turf Company and NG Turf and Pike Creek Turf answered to the call. Bayer Environmental Science provided funds for the construction of a 9600 sq ft research golf green built at USGA specifications which entails the subgrading of the area, subsurface drainage, rock gravel layer, sand, root zone mix, as well as covering, smoothing, and firming. A UGA-develop turfgrass bermudagrass species -TifEagle- sprigs were used as turfgrass putting surface. The experimental green has 8 independent irrigation zones. The cost of this research facility was estimated in $89,000 dls. All funds were donated by the industry. Additionally, a 22,000 sq ft sports field research and education area was built as a soccer pitch. The turfgrass surface was sprigged with bermudagrass Tifway which is highly resistant to wear. The area was prepared, tilled, subgraded by Sports Turf Company and company $18,000 dls. All funds, time, resources, and expertise were donated by the turfgrass industry at no cost to UGA. It is important to note that despite university shutdowns, labor shortage and overall uncertainty due to COVID, partnerships between UGA scientists and Extension specialists and Industry professionals was sustained, continued, and expanded while always maintaining COVID guidelines and protocols.

Briefly describe how your target audience benefited from your project's activities.

Two brand-new turfgrass research and extension state of the art infrastructure facilities were built despite of the challenges brought by COVID during 2020. These facilities are now available to researchers and extension specialists at the UGA griffin campus. The total cost of these industry-funded projects is estimated at US $ 107,000 dls. The partnership between the turfgrass industry and turfgrass scientists at UGA has already yielded fruits. The research golf green and the sports field area have been used to conduct a myriad of fungicide evaluation trials and several physiological stress-related investigations. Several extension educational activities have been carried out. More disease and physiological stress management trials will be conducted this fall 2021 and spring 2022. As COVID restrictions and uncertainty ease, face to face educational extension activities are expected to increase exponentially. The final goals of these infrastructure project are to provide turfgrass managers with new disease and physiological stress management tools, improved disease control, and better turf quality in our

state. Results from these investigations and extension activities will benefit the turfgrass industry, practitioners and public at large. Anecdotally, the soccer pitch has also been used as an area to carry out team-building activities and soccer matches to promote health and wellness among faculty and staff on campus.

Briefly describe how the broader public benefited from your project's activities.

N/A

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Critical Issue

Urban Agriculture

Assessment of epigenetic contributions to the success of the red imported fire ant

Project Director
Brendan Hunt
Organization
University of Georgia
Accession Number
1014940

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The red imported fire ant exhibits remarkable variation in social organization, with monogyne and polygyne colonies that are regulated by a large genetic region termed a supergene. We are studying the effects of supergene genetic variants on gene regulation through changes to epigenetics. This research will lead to a better understanding of the function of epigenetic information, developmental plasticity, gene regulation, social behavior, and the physiological responses of fire ants to the changing environment.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Our research is revealing the genetic differences and regulatory processes that cause some fire ants to live in large colonies with multiple reproductive queens and others to live in single colonies with a single reproductive queen. We have continued to examine genetic variants and gene activity of fire ants with trait variation of interest and prepare publications for high quality, peer-reviewed scientific journals. This is resulting in the training of graduate students and has resulted in obtaining additional funding from NSF.

Briefly describe how your target audience benefited from your project's activities.

This work is helping evolutionary and functional geneticists to better understand how variation in gene regulation systems may serve as a recurring source of complex behavioral trait variation in insects and other animals.

Briefly describe how the broader public benefited from your project's activities.

This research is providing valuable insight into the molecular mechanisms underlying the success and impact of the red imported fire ant as an invasive species with a tremendous economic impact in the southeastern United States.

Improving water quality and quantity on agricultural and urban landscapes through Best Management Practices

Project Director
Gary Hawkins
Organization
University of Georgia
Accession Number
1011561

2021 Results

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Non-point source pollution in both agricultural and urban areas is an issue requiring education and implementation of best management practices (BMP). My program researches and provides education on various ways to use BMPs to protect water quality.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

My program being more education related to research, the information gained from research projects has allowed me to pass that information onto farmers, engineers, designers and citizens. This information can help them better understand and implement practices in their situation to protect water quality.

Products

One book chapter was worked on and is in the final stages of publication.

Briefly describe how your target audience benefited from your project's activities.

Farmers have benefited from learning more about the reduced erosion and water retention associated with conservation tillage and other agricultural BMPs. Engineers/designers have learned from the presentations related to stormwater management research. Citizens have learned from my education outreach efforts and working with them to reduce erosion and protecting water quality on their properties. This includes runoff reduction/management and on-site waste management.

Briefly describe how the broader public benefited from your project's activities.

Research related to the BMPs used in agricultural and urban areas benefits the broader public by reducing the amount of nutrients and sediment entering local and regional waterbodies.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

Opportunities

There were many opportunities for training and professional development. These included field days, presentations, and one-on-one visits. These were done in conjunction with local soil and water groups, national/international conferences, extension

agent trainings, and home visits with extension agents.

Dissemination
Information was disseminated through presentations, site visits and phone calls.

Plans
I expect the same outputs will continue as the current reporting period.

Urban Agriculture

Project Director
Laura Perry Johnson
Organization
University of Georgia
Accession Number
7000209

Griffin African American Oral History Project

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The Fairmont Community is located on the north side of Griffin, the largest city in Spalding County. Once a proud, middle-class African American community, the residents of Fairmont currently face challenges associated with poverty, as well as a history of exclusion, segregation, and neglect. The Fairmont Vocational High School dominated intellectual life in the community until it was closed in 1973, shortly after Griffin schools were integrated. The original Fairmont school building is a Rosenwald School. Julius Rosenwald, leader and founder of the Rosenwald Fund, worked with Booker T. Washington, local communities, and public school systems to construct schools, by leveraging community, public school system, and Rosenwald funds. Over the course of twenty years, over 5,000 Rosenwald schools were built in 15 states, and they played a significant role in the education of African Americans in the twentieth century. Very few Rosenwald schools remain today. The Fairmont Rosenwald is in exception condition for its age.

In 2015, John Cruickshank, the UGA Griffin Campus Librarian was asked to discover the origin of the name Fairmont. He made a presentation to the Educational Prosperity Initiative about the origin of the name and quickly realized that many in the audience participated in the local civil rights movement. A small group decided to attempt to record this history.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The oral history team consisted of UGA staff and faculty and the president of the local chapter of the National Association for the Advancement of Colored People (NAACP). They worked closely with UGA Special Collections Libraries and the Richard B. Russell Jr. Library for Political Research and Studies to developed procedures and methodologies to conduct the interviews and create the recordings. Interviewees were invited to recording sessions at the Georgia Center for Urban Agriculture on the Griffin Campus. The project received strong support in the community. Griffin Housing Authority; Spalding County Collaborative; Fairmont Alumni Association; University of Georgia Griffin campuses; the Educational Prosperity Initiative (an affiliate of the Spalding County Collaborative); and many other individuals supported this project, suggesting interviewees and helping to gain their confidence.

Briefly describe how your target audience benefited from your project's activities.

Ultimately the team interviewed 23 people who participated in Griffin's Civil Rights Movement (1965-1970s), lived through the changes brought on by the movement, or had unique perspective on the community. The interviews last 1-2 hours. The Russell Library has hosted the interviews on online streaming platforms and created indexes and transcripts of the interviews. This allows both the public and researchers to easily and quickly search the interviews. The collection has been added to the archives of Richard B. Russell Library for Political Research and Studies and can be heard here: https://georgiaoralhistory.libs.uga.edu/RBRL418GAA

The Griffin civil rights movement serves as a microcosm for the county. Though local newspapers or other sources did not record the details of the movement, ordinary people did extraordinary things. This project records accomplishments, aspirations, survival skills, and the rich culture of the African American community in Griffin.

The impact of this project is far-reaching. The collection has helped diversify Special Collections Libraries' oral histories, making them more inclusive and representative of all Georgians. It has also created diverse teaching and student learning opportunities (including an experiential learning internship for a student assistant) that allow for engagement with histories and experiences of underrepresented and historically marginalized communities in Georgia.

Briefly describe how the broader public benefited from your project's activities.

On a local level community partnerships and engagement with municipal and community organizations were strengthened. The project helped shore up support for renovation of the Fairmont Rosenwald School and renovations of the building are now in progress. A steering committee was established to plan for the development of a museum in the school. The committee will use these recordings in both the museum and on the museum web site. The committee has also supported the creation of video interviews with Story First Films of Griffin, GA. Members of this oral history team are assisting with this project, creating video interviews of former alumni of Fairmont Vocational High School for inclusion in the museum.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

The Winterville Marigold Market

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

With a population of just under 129,000 individuals, Athens is the 6th most populous city in Georgia. This number does not account for the thousands of students and tourists that reside in or visit the city, throughout the year. This makes Athens-Clarke County an important market option for farmers, in the region, hoping to sell their produce direct to consumer. The closest city with a population of at least this size, is Atlanta – located over 70 miles away. The Athens Farmers Market was established 15 years ago and has been highly successful but receives more vendor applications than it can accept, each year. They also only accept producers who are certified organic or certified naturally grown. There is room to support a growing farmer community in Athens and the surrounding areas, but there are some barriers to entering the Athens local food market, especially for small producers who are just getting started.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The City of Winterville teamed up with the Athens-Clarke County (ACC) Extension office, to create the Marigold Market, with the goals of addressing food insecurity in the east Athens area and also to foster the growth of a local food system and small businesses. As a fundamental partner, contributing to the success of the Marigold Market, ACC Extension participated in regular planning meetings, grant-writing meetings and board meetings, throughout the year, leading up to and during the market

season. ACC Extension also helped find and recruit produce vendors and provided a pre-market produce safety presentation, for vendors. Because the goal of this market was to reduce barriers for small and beginning producers, the board decided to offer multiple vendor participation options. A vendor can commit to the whole season, to one month or even one week at a time. This allows more flexibility for a producer to participate, as they are able, depending on if they have enough money for vendor fees, enough staff or enough produce, on a given week or month. The board also used some of the Georgia Food Oasis grant funds, that were awarded to the Market, for purchasing tables and tents that could be made available to vendors, if they are unable to provide their own. Another decision that the board made, in order to reduce market entry barriers was to not require organic practices. The Marigold Market promotes and educates producers about produce safety and best management practices on-farm, but does not require organic or CNG certification.

Briefly describe how your target audience benefited from your project's activities.

The Market has grown steadily during the first in-person season. It regularly receives approximately 300 visitors to each Saturday market. It has provided a venue for over 30 local, small businesses to sell their products to the community. From May through September, of this season, total sales have amounted to $47,627. This money goes directly back to the vendors. $22,633 has gone to farmer vendors. There are 14 farmers participating, on some level, at the Market, this season. For over half of these farmers, it is their first time selling their product at a market.

The success and support that the market has from the city of Winterville has led to the creation of the Marigold collective. This collective will be a food and agricultural hub for the area; providing a market, a food hub, a commercial kitchen and a honey house. The honey house will provide a space for honey producers to extract and bottle honey that can be sold direct to consumer or in a wholesale market. Thanks to a collaboration with the Eastern Piedmont Beekeepers Association, and a grant funded by Georgia Beekeepers Association, there is equipment and a space for the honey house to begin as early as fall 2021.

Briefly describe how the broader public benefited from your project's activities.

The success and support that the market has from the city of Winterville has led to the creation of the Marigold collective. This collective will be a food and agricultural hub for the area; providing a market, a food hub, a commercial kitchen and a honey house. The honey house will provide a space for honey producers to extract and bottle honey that can be sold direct to consumer or in a wholesale market. Thanks to a collaboration with the Eastern Piedmont Beekeepers Association, and a grant funded by Georgia Beekeepers Association, there is equipment and a space for the honey house to begin as early as fall 2021.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

"Get Growing" Webinar Series Connects Plant Enthusiasts for Health and Well-being

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Research has established that increased frequency of gardening activities is correlated with increased well-being and reduced stress. Additionally, gardening activities support connections with other individuals, such as neighbors and family members. The COVID-19 pandemic isolated individuals from social interaction. Some individuals experienced depression, stress, and anxiety. Simultaneously, individuals turned to plants and gardening for something to do and occupy their new-found time during the pandemic.

As pandemic conditions persisted and infection rates spiked again in 2021, individuals continued to experience isolation and stress. This could be more pronounced among individuals who are retired and lack the daily professional interactions with others in addition to those with family members and friends. American Association of Retired Persons (AARP) approached UGA Extension for assistance in providing virtual engagement for AARP members for the purpose of reducing stress and offering an antidote to depression and isolation.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

UGA Extension faculty and AARP Associate State Director of Community Outreach collaborated to host a webinar series for AARP members spanning five months (May-September 2021). Each webinar included a segment on the health and well-being benefits of consumer horticulture, a horticultural topic and related hands-on horticultural activity, and a final segment on the Georgia Master Gardener Extension Volunteer Program. Seven Extension faculty delivered the horticultural content, while the AARP partner promoted the sessions, coordinated registration, and sent out follow-up emails prepared for each session. Follow-up emails included an evaluation survey, links to Extension publications related to the topic, and information for the next webinar. A total of 278 AARP members from 24 Georgia counties participated in the five webinars.

Briefly describe how your target audience benefited from your project's activities.

While almost half of participants (48.5%) indicated prior experience with the various horticultural topics, they did not consider themselves especially experienced as gardeners (M = 2.74, SD= 1.373, 5-point scale). Participants averaged 83% accuracy in post-session horticultural questions related to the sessions that they attended. After the webinar, most respondents indicated an intention to read recommended Extension publications (83.3%), contact the Extension office (68.2%), or start a gardening project, such as the one presented in the session they attended (93.9%).

Post-series evaluations revealed that the majority of respondents (82.9%) agreed that gardening and working with plants offer a way to reduce stress and anxiety. Respondents felt somewhat connected to other people who like gardening and indicated a high level of encouragement after the webinar (5-point scale, 1=strongly disagree, 5=strongly agree; M=4.38, SD=.956). Says cohost AARP Associate State Director of Community Outreach, “The series provided a mental break from hearing about the current climate of politics and COVID-19. It was wonderful to be able to meet our members where they are and inform them about something they love doing.”

Briefly describe how the broader public benefited from your project's activities.

Educational content on gardening available to the public.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Critical Issue

Youth & Family Development

Youth & Family Development

Project Director

Mark Latimore

Organization

Fort Valley State University

Accession Number

7000391

2021 Results – FVSU 4-H Program

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

According to the 2021 KIDS COUNT® Data Book, and the 2020 U.S. Census Bureau; Georgia ranks 38th in the nation in child and family well-being. Therefore, the Fort Valley State University (FVSU) Cooperative Extension 4-H program serves as a critical resource of learning in the local rural central Georgia area, and other underserved communities throughout the state. These underserved communities throughout the state were devasted by COVID-19 which increased homelessness, health disparities, food insecurities, increased youth suicide rates (especially among African-American males between the ages of 10-14), according the CDC (2020) Youth Health Report. The Fort Valley State University Cooperative Extension 4-H Program is an: 1890 4-H Positive Youth Development Program that engages underserved vulnerable populations of youth where they are, through experiential learning opportunities in Civic Engagement/Leadership, Science, Employability Skills/Entrepreneurship, Healthy Living, Novice Agriculture Education, College and Career Readiness, and Mentoring outreach education learning opportunities. The Fort Valley State University Cooperative Extension 4-H Program served a Total 7,349 Youth Participants.

According to the Georgia Data Summary (2020), communities can promote healthy lifestyles in children by creating safe and supportive environments for healthy eating and physical activity. Obesity in children and youth is a significant public health problem in Georgia. According to the Georgia Data Summary (2013, 2015, 2017), obesity in children and youth is a significant public health problem in Georgia. Twenty thousand and five hundred (20,500) (15%) children aged 2-4 years in the Women, Infant, and Children (WIC) program are obese. 28,000 (24%) third grade children are obese, 43,000 (15%) middle school students are obese, and 55,000 (12%) high school students are obese. Georgia exceeds the Healthy People 2020 national goal for children and youth in every age, sex, race, and ethnic group. According to the Georgia Data Summary (2016), communities can promote healthy lifestyles in children by creating safe and supportive environments for healthy eating and physical activity. Obesity-related hospitalizations of children in Georgia cost $2.1 million a year and continue to rise. Obese children are at increased risk for other medical conditions. Obese children are at increased risk for: hypertension, diabetes, asthma, decreased well-being (low self-esteem), and sleep apnea. According to the Georgia Department of Health, special attention is needed in communities that experience health disparities and have environments that are not supportive of healthy nutrition habits or physical activity opportunities.

Annually, according to a 2019 NIFA/USDA report, the USDA produces over 50,000 employment opportunities for people who graduate from college with a degree in agriculture. However, the US only has an average of 36,000 people who graduate annually from college with a degree in agriculture. In an effort to close the agriculture degree deficit gap, the Fort Valley State University Cooperative Extension 4-H program engages youth participants in the process of becoming prepared to meet the Agriculture/STEM challenges of the 21st century. The purpose of the 4-H Science Program is to increase the amount of youth that pursue agriculture/STEM degrees and careers. All learners need and deserve 21st century learning opportunities to thrive as tomorrow's leaders, workers, and citizens. 21st century skills are what students need to succeed in today's globally and digitally interconnected world. A profound gap exists between the knowledge and skills most students learn in school and the knowledge and skills they need for success in their communities and workplaces. In an effort to close this gap, the FVSU 4-H program utilizes NIFA/USDA Positive Youth Development Best Practices. Positive youth development involves and engages every element of the community, schools, homes, community members, and others. Young people are valued through this process. Positive youth development is an investment that the community makes in young people. Youth and adults work together to frame the solutions through dissemination of 4-H citizenship/leadership, mentoring and healthy living education. In an effort to stem the national health issues of the 21st century, the Fort Valley State University Cooperative Extension 4-H healthy living program works to ensure that our Georgia's youth and their families learn how to make healthy decisions related to the personal behaviors in which they engage. For example: According to the 2020 US Census Bureau, as it relates to the FVSU 4-H Program Underserved Communities that we serve; one of our FVSU's 4-H Healthy Habits Program's is located in a rural, poverty-stricken community of Sylvester, Georgia, with a population of less than 6,200. The population of Sylvester, Georgia is 60.3% Black or African American, 36.5% White, and 1.69% Two or More Races; 31.9% of the population live below the federal poverty line, a number that is higher than the national average of 13.1%. The very definition of Underserved Communities aligns perfectly with the purpose of why 1890 Land grant Universities 4-H Program exists, and with the audiences we serve. Underserved youth are those who currently, or in the recent past, were not served by 4-H Youth Development. Underserved youth may include specific racial and ethnic groups, youth from military families, special needs youth, youth from low-income families, urban or extremely rural families, and non-traditional families, including those impacted by the justice system. Underserved youth populations overlap with rural youth but may also include isolated youth in urban centers.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

The Fort Valley State University Cooperative Extension 4-H Program served a Total 7,349 Youth Participants. The Fort Valley State University Cooperative Extension 4-H Program provides virtual and face-to-face positive youth development experiential learning opportunities for youth and adults to create sustainable community change. This occurs through strong working collaboration between the Fort Valley State University Cooperative Extension 4-H Program staff, community stakeholders, and 4-H adult volunteers working together through community-based collaborative partnerships to create sustainable community change that grows youth and adults' lifelong success. The FVSU 4-H Program is an: "1890 4-H Positive Youth Development

Program that engages underserved vulnerable populations of youth where they are, through experiential learning opportunities in Civic Engagement/Leadership, Science, Employability Skills/Entrepreneurship, Healthy Living, Novice Agriculture Education, College and Career Readiness, and Mentoring outreach education learning opportunities.

Briefly describe how your target audience benefited from your project's activities.

The FVSU 4-H Healthy Living Nutrition education program impacted underserved/at-risk/minority youth and their families with quality healthy living education and other learning opportunities. Improved dietary choices and increase physical fitness. Improved attitudes toward and understanding of healthy foods. Increase family participation in eating at least one meal together daily. Improved knowledge of local resources available to underserved youth and their families that support and provide further information on healthy living.

Short-term Outcome

The Fort Valley State University 4-H Program utilizes the National 4-H Common Measures Surveys to acquire Outcome measures. The National 4?H Common Measures instruments are designed to assess the impacts of 4?H programs in science, healthy living, civic engagement, college/career readiness, and universal positive youth development. Please note that the tools are approved for use with 4?H youth programs only. The goals of Common Measures are to: Identify a common core of youth outcomes and indicators which can be used to improve programs, provide a process for assessment and report from a national data base, provide state 4 H programs with resources to assist them in the planning of local, state-wide and regional evaluations.

Based on national 4-H common measures pre and post testing results and post program evaluations of each respected area there were increases in youth participants acquiring knowledge in the following areas: Healthy Living: 95% of youth participants increased their knowledge of healthy eating habits, Science education: 87% of youth participants increased their knowledge of science technology, Leadership/Civic Engagement: 85% of youth participants acquired strategies to enhance their ability to make good decisions, and Entrepreneurship: 88% of youth participants learned information that taught them how to start their own business.

Briefly describe how the broader public benefited from your project's activities.

Positive youth development involves and engages every element of the community, schools, homes, community members, and others. Young people are valued through this process. Positive youth development is an investment that the community makes in young people. Youth and adults work together to frame the solutions through dissemination of 4-H citizenship/leadership, mentoring and healthy living education.

Youth & Family Development

Project Director

Laura Perry Johnson

Organization

University of Georgia

Accession Number

7000005

4-H State Officers Build Leadership

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

The mission of Georgia 4-H is to assist youth in acquiring knowledge, developing life skills, and forming attitudes that will enable them to become self-directing, productive and contributing members of society. This mission is largely accomplished by providing various leadership opportunities for our state's youth in partnership with caring adults trained in positive youth development. The 4-H Study of Positive Youth Development found that youth involved in 4-H are 3.4 times more likely to contribute to their communities than youth who do not participate in 4-H. Leadership studies indicate that youth who participate in leadership roles are highly motivated and more developmentally adjusted than their peers, and, in general, are more likely to feel an improved sense of support from their local communities (Anderson, Sabatelli, and Trachtenberg, 2006). Furthermore, if adolescents are to develop the skills necessary for adulthood, they must learn basic skills for everyday life

(Carnegie Council for Adolescent Development, 1995). Through training, members of the Georgia 4-H State Board of Directors gain skills in public speaking, etiquette, social interaction, decision making, teamwork, and other leadership and life skills that build self-esteem.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Georgia 4-H State Officers go through an intensive three day training in which they are taught how to present and speak at a podium, theme planning, etiquette, donor relations, leadership and personality styles, teamwork, and more. The training is designed and implemented by members of the state 4-H faculty and involves numerous guest presenters. Newly-elected officers are also assigned prior Board members to serve as mentors and are given the chance to meet together during the training. Additional training and planning sessions are held throughout the year via in-person and online meetings. State 4-H faculty serve as advisers to the Board -- setting high expectations, creating a safe environment, and providing constructive feedback on an ongoing basis. Board members are empowered to exercise independence and shine in a variety of settings and before diverse audiences as they represent the more than 190,000 4-H youth in Georgia.

Briefly describe how your target audience benefited from your project's activities.

The nine youth members of the 2020-21 Georgia 4-H State Board of Directors and nine members of the 2021-22 4-H State Board collectively traveled more than 9,000 miles in their roles as State 4-H Officers, representing Georgia 4-H at over 30 events. Each officer participated in over 150 hours of training. They met and had meaningful engagement with approximately 50 people of influence. State Officers also wrote more than 150 thank you notes to donors, volunteers, stakeholders, and supporters on behalf of all members of Georgia 4-H. These data points are especially impressive considering the limitations imposed by the ongoing COVID-19 pandemic. Our state officers have been able to demonstrate leadership, model stability, and embrace optimism as they helped lead some of our largest virtual and in-person programs during the pandemic.

Briefly describe how the broader public benefited from your project's activities.

Dr. Kay Kelsey, in "The Sharpening Stone: A Phenomenological Study of Youth Leadership Experiences as a 4-H State Board of Director" (submitted for publication), used a phenomenological research design to understand and describe the essence of the state officers' lived experience. From this research, Dr. Kelsey concluded that the Georgia 4-H State Board of Directors Program, "in addition to an average of 7.68 years as a 4-H member, served to improve and sharpen members' leadership and life skills…." Also, "members made statistically significant positive changes for 100% of the questions for communication; 100% for decision making; 100% for understanding self; 100% for working with groups; 50% for management; 80% for learning; and 25% for getting along with others." These results were true, regardless of the specific position an individual held on the Board.

Importantly, members "defined leadership as 'serving others' and engaged in community service. 4-H afforded members a plethora of opportunities to gain confidence, express their authentic selves, and transition into adulthood with an increased sense of self-awareness, increased responsibility, and autonomy. They translated their service to others in a variety of community service projects. This finding is similar to Boyd, Herring, and Briers (1992) and Fitzpatrick et al. (2005) who reported that 4-H alumni spent seven years on average in 4-H programs and benefited from length of exposure to positive youth development activities."

"Adult 4-H leaders were influential on members' development by teaching just-in-time lessons on diversity, inclusion, kindness, finding one's authentic voice, reciprocity, and being nurturing. Adult leaders treated members with respect and set high expectations for personal behavior and performance…." Through participation as a State Board of Director (SBD), "[m]embers were aware of their ability to grow and contribute meaningful leadership not only in the context of 4-H but also in their families, schools, and communities. Overall, the SBD experience helped members to sharpen their LLS by offering structured training, creating a supportive environment for risk taking, giving members autonomy, holding high expectations for performance, and providing feedback."

Reference: Kelsey, K. (manuscript submitted for publication). The Sharpening Stone: A Phenomenological Study of Youth Leadership Experiences as a 4-H State Board of Director.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

4-H at Home Grant related to Plant Biotechnology

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Plants are the key to a healthy and sustainable food system. In addition to providing oxygen, plants supply 90% of human calorie intake and 80% of human protein intake. Animal products are the remainder of these intakes; it is important to note that animals must derive their nutrition from plants (Chawla, 2009). As the world population continues to expand, there is a critical need to address food supply concerns. Kalia (2018) explains that plant biotechnology "encompasses a multitude of scientific tools and techniques for screening and genetic manipulation of plants to develop beneficial or useful plant/plant products." Plant breeding and biotechnology assist in the developing of new varieties and traits, leading to higher-yielding crops and food with improved nutrition, taste, and storage life.

Farmers and producers have been modifying plant genes for more than 10,000 years. Many "modern" or common vegetables and fruits were domesticated through plant breeding programs. Additionally, plant biotechnology also allows for the modification of plant traits such as insect resistance, disease resistance, and herbicide tolerance. In the United States, the majority of all corn, soybeans, and cotton are grown using biotechnology. While 4-H is certainly rooted in agriculture production, there are no curriculum sets offered by National 4-H Council related to plant breeding and biotechnology. Furthermore, while traditional in-school science education teaches biology and genetic content to youth, it is estimated very few formal science programs teach plant biotechnology to students before college.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Through a partnership with National 4-H Council and funded by U.S. Department of Agriculture (USDA) Agriculture and Food Research Initiative (AFRI), Georgia 4-H was awarded the 4-H at Home Grant. The $15,000 award supported the creation of lesson plans and materials for National 4-H Council to share via the 4-H at Home platform. Aligned with the first priority area for the USDA-AFRI, Georgia 4-H created six lesson modules related to plant biotechnology for middle (grades 6-8) school 4-H youth. According to USDA-AFRI, the Plant Health and Production and Plant Products (PHPPP) program area of the AFRI "was established to increase knowledge of plant systems and the various factors that affect agricultural plant productivity." Additionally, this project aligned with the National 4-H Mission Mandate of science, technology, engineering, and mathematics (STEM).

The goal of the six-part series is for young people to gain a greater understanding and appreciation of plant/crop production and plant biotechnology, while exposing youth to potential career opportunities. The proposed lesson module topics include: (a) plant classification, (b) parts of a plant and plants we eat, (c) simple plant genetics, (d) wild mustard selective breeding, (e) engineering a greenhouse, and (f) apple taste-testing. Aligned with the experiential learning process (Kolb, 1984) and the framework provided by National 4-H Council, each learning experience included a description of the activity, supplies & materials, activity steps, formative assessment, reflection questions, and a connection to one or more agriculture-related workforce development opportunity.

To ensure high-quality, interactive, and fun lessons, Georgia 4-H piloted three of the activities during 4-H Summer Camp offered at Rock Eagle 4-H Center. Each cabin was provided a STEM kit with lesson plans and resources for youth to build designer plants, engineer a greenhouse, and play the mustard mania board game. Due to COVID-19 protocols, each cabin acted as a cohort during the week of camp, and there were times (inclement weather, etc.) when adults may have had to facilitate activities with campers. Not only was Georgia 4-H able to pilot the lessons and receive feedback, but adult leaders did not have to prepare or pack any materials or resources.

Briefly describe how your target audience benefited from your project's activities.

Adult leaders (faculty, staff, and volunteers) participating in Summer Camp at Rock Eagle 4-H Center were able to access the STEM kit during their weekly camping session. State 4-H staff and counselors prepared and restocked the kits on a weekly basis, creating an easy-to-implement model for adult leaders. While adult leaders were not required to facilitate the activities or report their actions, it is easily estimated over 1,000 youth benefitted from the STEM kits.

"These are great lessons for any time, but it's always a plus when an outstanding curriculum can meet a very practical need," said Georgia 4-H camping specialist Charlie Wurst. "COVID restrictions made us restructure our plans for rainy day activities, and it was great to have top-notch programming available to our leaders in each of our 45 cabins in the event inclement weather disrupted the regular camp schedule."

One 4-H leader commented before camp, "Thank you! I really appreciate this resource. These activities are much better than what I have in my bag right now for camp. I thought of a few things, but they are not as in-depth with learning objectives." While another leader shared, "the STEM kits were great! At first, I was a little reluctant because I didn't want them to feel like they were doing school work, but the activities were so much fun that the kids asked to do one every day! I look forward to using the resources with my county program."

Briefly describe how the broader public benefited from your project's activities.

Lesson plans were submitted to National 4-H Council for formatting and publication on the 4-H at Home website.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Supporting Parents From The First Steps

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

Due to on-going COVID-19 safety guidelines during FY 2021, face-to-face screening in the local birthing hospital, Piedmont Columbus Regional, was restricted. The First Steps Coordinator had to shift to virtual and telephone platforms. With most of the screening done via phone call. This required an adjustment to the typical engagement strategies used when in person.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

A personal screening with each participant is conducted to determine the resources they may need to create the best environment for their family. After the screening, the family is provided a First Steps packet that includes a localized community resource guide, New Parent Guide, and brochures for local and online resources. When more on-going support is needed, a referral to one of the UGA Extension Home Visiting programs is offered.

The primary platform for screening prenatal and new parents during FY 2021 was via telephone using approved information supplied by Piedmont Columbus Regional.

Another change involved distribution of the First Steps packets that are usually given in-person. During FY 2021 First Steps packets had to be mailed during the COVID-19 restrictions which resulted in a gap between screening and family access to the informational packet. An innovation developed by the First Steps Coordinator during this time was a Digital First Steps packet. This digital tool for participants includes links to community and online resources for families in the six informational categories included in the basic First Steps packet. After screening, the digital packet can be emailed to participants to provide quicker access to some of the most frequently needed resources.

Briefly describe how your target audience benefited from your project's activities.

During the FY 2021 grant year, 568 families were screened, received a First Steps packet, and were referred to local community resources. These screenings resulted in 1,269 referrals to community resources. While reasons for community referrals varied by participant, the most frequent reasons for referrals during FY 2021 were Parenting Resources, Books/Reading Materials, Health Care, Tobacco Cessation, Care Seat Safety, and Nutrition Education. Additionally, the First Steps screenings during FY 2021 resulted in 153 referrals to UGA Extension Home Visiting Programs.

Throughout the year, the First Steps Coordinator provides a follow-up call with First Steps participants to conduct a short satisfaction survey. During FY 2021 there were 141 surveys conducted (25%) of First Steps participants. Ninety-one percent (91%) stated that the materials were helpful. Eighty-five percent (85%) were pleased with the service they received from First

Steps and 84% said that they would contact us again if they needed additional services.

Briefly describe how the broader public benefited from your project's activities.

Community benefits from services and resources being used efficiently.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Virtual Cooking Club

In 2-3 sentences, briefly describe the issue or problem that your project addresses.

According to the CDC, the national obesity rate for youth (2-19 years) is 18.5%. Learning basic cooking skills can encourage youth to choose and prepare healthy foods for themselves. Youth cooking interventions have been shown to have positive outcomes on diet behaviors, such as increased fruit and vegetable consumption and decreased fast food consumption.

Briefly describe in non-technical terms how your major activities helped you achieve, or make significant progress toward, the goals and objectives described in your non-technical summary.

Since April 2020, UGA and University of Idaho Extension pivoted from in-person cooking clubs to offer 23 two-hour live cook-a-long workshops for youth of all ages with adult supervision. Throughout each class, nutrition and food safety principles are taught through the hands-on preparation of two dishes. Session objectives include making youth more comfortable and confident in the kitchen through practicing cooking techniques, knife skills, and following recipes, while gaining knowledge and acceptance of nutritious foods and safe food handling.

Over 950 children and parents attended virtual cooking club since April of 2020 from 10 Georgia counties and 5 states. Average attendance was 43 participants with 68% of families attending two or more sessions, tripling attendance compared to in-person programming.

Post evaluations and unsolicited feedback showed 88% gained food safety and nutrition knowledge, 92% increased self-efficacy for cooking, 93% of participants gained cooking skills and 100% of recipes had been made again by participant families. Participants valued each free cooking class at an average of $33.

Briefly describe how your target audience benefited from your project's activities.

Testimonials showed participants had:

Increased Interest & Confidence in Cooking: “[My 5-year-old] felt such a huge sense of accomplishment being able to make dinner and treats for our family and it’s been so fun to see how proud she is and listen to her tell dad all about it over the dinner she made.”

Increased Cooking Skills, Food Safety & Nutrition Knowledge: “My 10-year-old daughter is learning a very important skill in cooking and is also being prepared, organized, and careful with cooking tools and the stove. All while having fun!”

Positive Family Interactions & Quality Time: “It has brought my 8-year-old and I closer as this is 'our' thing we do together. [This] is a very worthwhile project that we have taken very seriously during quarantine!”

Briefly describe how the broader public benefited from your project's activities.

Program helps youth have better diet behaviors.

Describe and explain any major changes or problems encountered in approach. Additionally, note opportunities for training and professional development provided, how results have been disseminated to communities of interest, and any new details regarding what the project or program plans to do during the next reporting period to accomplish the goals.

N/A

Type	Projects / Programs
Projects / Programs without a Critical Issue	0

Not Provided