FY 2020 Annual Report of Accomplishments and Results

Florida
University of Florida
Florida A&M University

I. Report Overview

The NIFA reviewer will refer to the executive summary submitted in your FY 2020 Plan of Work located in the Institutional Profile. Use this space to provide updates if needed.

1. Executive Summary (Optional)

COVID-19 had a significant impact on our outreach to Extension clientele last year as we pivoted from face-to-face to virtual programming, but we rose to the challenge and exceeded expectations. In 2020, the number of educational materials produced by Extension faculty increased by 20% over last year and web visits went up 11%. Electronic consultations (i.e., email, text, phone) increased by 38%, helping to offset a decline in in-person consultations (-43%). Although group learning participants decreased by 42%, our social media contacts increased by 126%. Current guidelines for UF/IFAS and FAMU Extension faculty are to only count participants as group learning participants if they collect race, ethnicity, and gender (REG) data. While we did put in place registration forms for online platforms (e.g., Zoom, Microsoft Teams, Google Sites), there are many opportunities for people to attend Extension programs without registration or where registration requirements may impede participation (e.g., Facebook Live, podcasts, videos, etc.). Much of our online training and education was considered Social Media contacts in our reporting system although the amount of work and planning for these virtual trainings far exceeded than that for the traditional, in-person training they had originally planned. Extension faculty also worked hard to ensure volunteers continued to engage with Extension during the pandemic, with nearly 20,000 volunteers (-23% from 2019) reporting more than 560,000 volunteer hours (-39%).

The pandemic threatened many years and millions of dollars' worth of UF/IFAS research. Research activity required compliance with pandemic prevention protocols, so dean-level approval was required for more than 2,000 requests, involving 1,958 personnel. The request portal designed by UF/IFAS was adopted by the entire UF research community. Meanwhile, UF/IFAS research faculty doubled down on their ambitions for future projects. From March to August, they used their time away from the lab and the field to apply for $338 million worth of grants – nearly twice the

amount they had applied for in the same time period in 2019 – and peer reviewed publications increased by 18% between 2019 and 2020 (1,845 from 1,565).

Both UF/IFAS and Florida Extension are undergoing a strategic planning process and have new leadership. Dr. Scott Angle is our new Vice President for Agriculture and Natural Resources as of July 2020 and Dr. Tom Obreza has served as interim Extension dean since January 2020. We are nearing the end of a search for a new Extension dean.

An infographic was created to demonstrate to faculty the importance of evaluation and reporting to telling the UF/IFAS story and demonstrating value or impact. This has been distributed in trainings of and communication to county faculty and state specialists. The key results of a statewide needs assessment were also distributed to our faculty and Extension teams in 2020 through several infographics and discussed via the dean's monthly webinar, Extension Connections. Begun in 2013, Extension Connections was also used during the year to disseminate information about COVID-19's impact on the organization and latest policies and procedures. Faculty use the statewide results when planning their Extension programs but also to share results with their stakeholders, partners, advisory committees, etc.

Our Extension teams, made up of both county agents and state specialists, continued to spend a lot of time in 2020 reviewing and refining the 90+ indicators we use in our reporting system to capture evaluation data (with a focus on behavior change) on a statewide basis. Implemented in 2018, the Workload Indicators have become increasingly integrated into the teams' plans of work and evaluation tools and methods. In addition, we are piloting a new modules in our reporting system to collect more information about our Extension programs and our clientele that should give us an improved and more comprehensive perspective on our activities statewide once fully adopted.

As part of our strategic planning initiative, in 2020 UF/IFAS Extension surveyed 367 county and state faculty and asked them their satisfaction and dissatisfaction with our Extension Roadmap (which is our programmatic team structure and closely aligns with the Critical Issues). This offered a unique perspective we have not considered in many years, if ever. Typically, we are asking stakeholders about their needs and how well we are meeting them. The highest degree of satisfaction among the Extension faculty was on "the degree to which Roadmap priorities align with local community priorities." Other questions in the survey related to job satisfaction, work/life balance, job benefits, and satisfaction with support available for technology, communications, marketing, financials, grants, etc. These data will be analyzed and incorporated into our next Extension strategic plan as we plan to focus more on organizational needs rather than any significant shifts in Extension programs.

II. Merit and Scientific Peer Review Processes

The NIFA reviewer will refer to your 2020 Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Process	Updates ONLY
1. The Merit Review Process	Due to COVID-19 restrictions, UF/IFAS Extension did not conduct County Program Reviews in 2020.
2. The Scientific Peer Review Process	UF/IFAS - no change except for new safety protocols and approvals as described above.

III. Stakeholder Input

The NIFA reviewer will refer to your 2020 Plan of Work. Use this space to provide updates as needed or activities that you would like to bring to NIFA's attention.

Stakeholder Input Aspects	Updates ONLY
1. Actions taken to seek stakeholder input that encouraged their participation with a brief explanation	• Statewide needs assessment conducted of 1,500 residents using Qualtrics panel. • Due to pandemic, Customer Satisfaction survey conducted for five counties rather than the typical 12-14.
2. Methods to identify individuals and groups and brief explanation.	• No change although some activities reduced in 2020 and due to safety protocols and/or moved online. • Pandemic-related activities and outreach lead to new or expanded audiences.

3. Methods for collecting stakeholder input and brief explanation.	• UF/IFAS – secondary data collection continued throughout 2020 as we build integrated data dashboards for internal and external stakeholders. Planning continues for surveys, focus groups, and listening sessions in 2021 as part of strategic planning process.
4. A Statement of how the input will be considered and brief explanation of what you learned from your stakeholders.	• Pandemic has highlighted areas of need for both our internal and external stakeholders that will undoubtedly shape our future but too early to give specifics. • FAMU's Viticulture Research Program provides leadership, undertake research, extension and development activities that contribute to state industry growth and development. The Center is the only specialized research program among the 1890 colleges and universities dedicated to grape and small fruit, and it is a national leader in muscadine grape research.

IV. Critical Issues Table of Contents

V. Activities and Accomplishments

Please provide information for activities that represent the best work of your institution(s). In your outcome or impact statement, please include the following elements (in any order): 1) the issue and its significance (e.g., who cares and why); 2) a brief description of key activities undertaken to achieve the goals and objectives; 3) changes in knowledge, behavior, or condition resulting from the project or program's activities; 4) who benefited and how. Please weave supporting data into the narrative.

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No.	Project or Program Title	Outcome/Impact Statement	Critical Issue Name or No.
1.	**Innovative Research on Citrus Canker is Recognized by Peers**	Researcher. Scholar. Change agent. Nian Wang, a professor at the University of Florida Institute of Food and Agricultural Sciences, has been recognized for all of these roles by the American Phytopathological Society (APS) at its 2020 annual meeting in August. Wang received the Ruth Allen award, which honors people who have made an outstanding, innovative research contribution that has changed, or has the potential to change, the direction of research in any field of plant pathology. "Recognition from one's peers is a great career accomplishment," said Michael Rogers, UF/IFAS Citrus Research and Education Center director. "Dr. Wang's groundbreaking work in gene editing, leading to breeding disease-resistant citrus plants, is critical to the future of the global citrus industry." Wang has made impressive strides in the understanding of the biology of the causal agent for citrus canker disease, and Candidatus Liberibacter asiaticus (CLas) responsible for Huanglongbing disease (HLB) of citrus. More importantly, Wang has been a leader in adapting the CRISPR/cas9 technology for site-specific gene editing in plants for disease control. His targeted gene editing of citrus species not only has yielded plants that are highly resistant to citrus canker, it also represents a first and highly important demonstration of the power of this technology in plant disease control. Wang has published widely on practical methods of control of HLB, such as application of plant defense activators and antibiotics. His findings of highly sensitive and selective detection of the bacterium that causes HLB has led to key understandings of how the pathogen affects the plant. Wang also has revealed much about the citrus microbiome, and its linkage to the health and susceptibility of citrus to HLB. His work is also showing how the other microbiological components of citrus such as citrus rhizosphere bacteria can induce systemic resistance against citrus canker disease. Wang has received considerable recognition of his research, having accepted more than 34 invited speaker opportunities at national and international meetings. He has published 91 peer-reviewed publications, many in very high visibility journals such as PNAS as well as 9 reviews, books, and book chapters.	1
2.	**Strengthening Florida's Agricultural**	According to the 2017 Census of Agriculture, Florida contains 47,590 farms, totaling 9.7 million acres of land in agricultural production (USDA, 2017). As such, agricultural lands account for approximately 28% of the total land area of Florida. In addition to generating food and other agricultural products, these lands provide an array	1

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	Community Through Increased Citizen Awareness	of ecosystem services that benefit Florida residents including food, water filtration, flood protection, carbon sequestration, pollination, and recreation. However, agricultural lands and the ecosystem services provided by these lands are under threat from rapid population growth and urban development in Florida. It is estimated that by 2060, approximately 2.7 million acres of existing agricultural land in Florida (~28.3% of all agricultural land) will be converted to urban development to house the state's growing population. It is reasonable to expect that the conversion of agricultural land to urban development will reduce the provision of ecosystem services in Florida, which in turn will adversely affect the welfare of Florida residents. Not only does Florida agriculture provide food, environmental benefits, and tourism, it also provides over 1.5 million jobs and contributes over 140 billion dollars in annual economic impact to the state economy. Public support of policies that support agriculture and protect agricultural lands in Florida may be a critical factor to sustaining agriculture. However, many Florida residents are unaware of the various ecosystem services provided by agricultural lands or the threats that population growth and poorly planned urban development pose to agriculture in Florida. Government officials, community leaders, and the general public influence purchasing behaviors and policy that affect agriculture, and they must be educated about the existence and value of Florida agriculture if they are to take action to support it. Educating people about agriculture is a first step towards cultivating positive attitudes about agriculture, and empowering people to actively support agriculture through purchasing behaviors, advocacy, or policy. The impacts of agricultural literacy translate to policies that support agriculture and preservation of agricultural lands, expanding the workforce in agricultural-related careers, creating a diversified economy, protecting food security, and the quality of our air, water, ecosystems, and wildlife. Agriculture and food systems awareness activities conducted by Extension Agents and Specialists throughout the State included the following: • Agricultural tours, youth agriculture field days, and on-farm events that offer the opportunity to see agriculture in action and meet the people who raise their food and agricultural products. • Community and youth garden programs that not only educate people about how vegetables and fruits are grown, but also enhance food security by teaching people how to grow their own food.	

		• A regional Shellfish Trail tourism campaign • Working with agricultural producers, market managers and harvesters to sell their products directly to local consumers, including families with high levels food insecurity, which was intensified due to COVID-19. These efforts included assisting agricultural producers with shifting to previously unused marketing channels such as online ordering and sales, delivery services, and drive-through pick-ups. • Connecting agricultural producers with additional processors and wholesale buyers • Working with farmers to tell their story through media channels, doing media interviews on agricultural topics, writing news articles and blogs, and doing social media posts • Educating the public about agriculture by highlighting UF research programs • Using popular topics (home food production, wildlife, pollinators, etc.) to educate about agriculture • Agricultural exhibits and demonstrations at community fairs and festivals • Development of materials that are aimed at educating the general adult public about agriculture, including a Cattle Ranching Infographic Series Faculty reporting their Extension activities under "Citizen Awareness of Food Systems and the Environment" indicated the following results reported by participants in agricultural awareness activities completing post-event surveys: • 85% average increase in participant awareness of agriculture's economic importance, the amount of land in agricultural production and/or types of agricultural production. • 77% average increase in participant awareness of agriculture's beneficial ecosystem services. • 640 participants said that they support keeping land in agricultural production in Florida, through engagement in the political process.	

		• 1,201 people participated in agritourism activities. • 1,434 participants reported increasing purchases of Florida-grown food.	
3.	**Food Safety Training Provides Critical Information During COVID-19 to Growers and Workers**	A total of 195 growers completed the Produce Safety Alliance (PSA) Grower Training in 5 in-person and 6 remote courses. Of these, the majority are from Florida and represent farms, retail establishments, food services operations, commodity boards/grower associations, auditors/audit scheme associations (i.e., Global Food Safety Initiative, British Retail Consortium, Primus), USDA, FDA, FDACS and multiple universities (including University of Florida, Florida A&M, and Florida International). A standardized, validated pre-/post-test was developed by the Southern Center for FSMA training to measure knowledge gain at PSA workshops. PSA training results (n = 85) showed post-test scores (24.40 out of 25) were higher than pre-test scores (22.95 out of 25), indicating an increase in knowledge after participation in PSA training. To respond to COVID-19 concerns, farmworker hygiene food safety modules were developed. Some modules focused on CDC Issued Guidance for COVID-19 in Agricultural Workplaces. Those CDC-based modules were offered in both English and Spanish with participants receiving a certificate of attendance, which is critical for them to pass their various food-safety requirements and for economic success in domestic and international markets. These modules have been downloaded over 70 times by 10 different citrus companies. In all, 518 people were trained in food safety, 643 in personal hygiene, and 460 on CDC COVID-19 guidelines (1,621 total). Packinghouses in the Indian River district represent the majority of export citrus shippers and have been leaders in adopting stringent food safety practices. The Indian River Citrus League estimates the value of each program per person is approximately $50 per person based on training costs if they paid private consultants. Thus, the annual value of food safety, personal hygiene, and CDC COVID-19 guidelines training was estimated at $81,050 (= 760 trained @ $50/attendee). Certain Fresh Citrus training programs, i.e., Food Safety and Personal Hygiene, are considered “major musts” and failing to comply with audit requirements can result in failing the audit, causing the company extra costs in lost production and additional audit inspections/requirements. Some packinghouse managers also made comments connecting the food safety/personal hygiene/workplace health	1

		trainings and reduced employee absences (unplanned sick). They believe some of the reduction can be attributed to employees making behavior changes and practicing healthier behaviors at work and home. The UF/IFAS Food Safety Team engaged with North Carolina St. University to develop and distribute a number of COVID-19 factsheets. We also initiated a Virtual Office Hours to answer questions monthly for our stakeholders, 596 stakeholders participated in these office hours. Questions and discussions ranged from general food safety to specific COVID-19 related activities and advice related to the food industry.	
4.	**Popular Community Gardens Provide Food Security and Health Benefits During Pandemic**	As the COVID-19 pandemic arrived, many people sought alternate ways to secure fresh food at home. The UF/IFAS Extension Marion County partnered with UF/IFAS Extension Columbia, Orange, and Sumter Counties. 12 agents worked together to implement the Victory2020 Garden project. As part of this project, social media such as blogs, Facebook, and the office website was used to promote workshops and provide educational information. A private Facebook group was developed specifically for the Victory2020 Garden participants (1,400 members and 42,839 engagements in 2020). Over the past six months, Victory2020 had over 2,300 participants from 40 states, two US territories, and five countries (US, Japan, Canada, Germany, and the Philippines). Each participant received a mailing of seed packets, educational posters, social media posts, informative emails to participants, Canvas communication creations, educational videos and Zoom sessions. Of the 289 households that responded to a follow-up survey, indicated that 831 individuals benefited in the households. In addition, these individuals indicated they shared the information with more than 5,130 other people. These programs clearly are important for not only food security fears, but also for personal health and intrinsic benefits people receive. Based on data from a follow-up survey for the Victory2020 project, 90% indicated youth increased their knowledge of home food production, 86% said their gardening skills improved, 76% improved their mental health, 78% increased their physical activity, and 71% reported eating more fruits and vegetables. Moreover, many of the organizations that work with this program area are either consuming food or donating it to local families in their communities. Local community organizations grow the vegetables and donate to families in need. While it is very early in the season, more than 14 lbs. of collards have already been donated to local families. The current donations provide $36.28 savings for local families ($2.63 per pound) in fresh collard greens (https://www.ers.usda.gov/data-products/fruit-and-vegetable-prices).	1, 4, 5

		The UF/IFAS Extension Pasco County Community Gardens program kept two program assistants working full time during the shutdown, offering virtual learning opportunities, creating safe spaces for physically distanced gardening, and keeping spirits up among those in the gardens by providing human contact during a very isolating event. The community gardens in Pasco County filled all open plots during the pandemic and they remain filled to this date with more gardens in development as a result of the need. A food forest is also being created to offer more outdoor educational opportunities optimizing physical distancing while still providing food production for those in need as well as those looking to stay active but safe at the same time. The Pasco County program currently operates 8 community gardens with four new ones being built between fall 2020 and summer 2021. Gardens were always important, but their value had been obscured by fast-paced lives and easy access to food. The pandemic holds a silver-lining where Agricultural operations and community garden spaces are once again seen as critical and essential to our nutritional and emotional well-being.	
5.	**New Working Laboratory Focused on Food Systems Will Enhance Research and Extension**	Food systems, including urban food systems, are an area of increasing importance to the United States Department of Agriculture, the Florida Department of Agriculture and Consumer Services, and the University of Florida. We have created a working laboratory of faculty members in the Institute of Food and Agricultural Sciences that includes individuals with specializations in food safety, farm economics, consumer behavior, non-profit development and management, health disparities, urban agriculture, and research design and methodology. This laboratory, the Social Dimensions of Food and Agriculture (SDFA), includes faculty members and graduate students. Members of the laboratory are actively involved in multiple research projects at the local, state, national and international level. The outcomes of their work include the impacts of the research projects and the important role the laboratory plays in training for graduate students and also in working with new faculty members to establish robust research and Extension programs.	1,4
6.	**Florida Food System and COVID-19 Project Shows Some Sectors Thriving While Others Hurting**	A food system is comprised of many subsystems, including various input supplies, food production methods, ways of processing and packaging, distribution and marketing techniques, ways of preparation and consumption, and actors and organizations integral to these subsystems. The COVID-19 pandemic has affected many of these sectors within the food system and throughout the agricultural industry. In a project titled The Florida Food System and COVID-19, 26 researchers and agents from UF/IFAS, in collaboration with seven Florida Gulf Coast University (FGCU) faculty, gathered responses from owners or	1

		managers of agriculture and food system operations (including food banks) around Florida to capture stories related to the impacts, adaptations, innovations, and issues that have arisen throughout the food system during the pandemic. The researchers and agents on the team discovered that some sectors of the Florida food system were heavily negatively impacted by the COVID-19 pandemic, some had minimal impacts, and some even had positive impacts. The team found that organizations and farmers that were able to adapt, innovate, and build new partnerships fared the best during the COVID-19 pandemic. Understanding how the pandemic impacted the local and state food system will help the Florida Extension support farmers, form partnerships, and build future Extension programs. Based on 729 responses, an estimated $894.44 million in sale revenue losses to field crops, horticultural crops, fruits and nuts, livestock and aquaculture, and animal products in Florida. Many food banks and school food services reported an increase of 500% in demand. But some sectors saw a dramatic increase in sales. For example, the Red Hills Online Farmers Market (RHO), significantly increased overall sales during the pandemic. The RHO Market had to create a waiting list for new customers and re-worked their entire distribution process because of increased demand. One local farmer, who pre-pandemic grew most of their crops for local restaurants, had to shift to relying much more heavily on selling through the RHO Market and their community supported agriculture program. The Second Harvest of the Big Bend had a very large increase in demand and found that populations needing food assistance had shifted. They had many new challenges because of the pandemic, but they were able to build new partnerships and were optimistic for the future. The Extension agent in Leon County collaborated with the local farming community during many events and programs and promoted these communities through newspaper articles and social media. This includes organizations such as the Red Hills Small Farm Alliance (RHSFA), the Frenchtown Neighborhood Improvement Association, the Southside Farmers' Market, the Millstone Plantation Farm Tour, the Leon County Farm Bureau, the Apalachee Beekeepers Association, and the North Florida Fair. When the agent collaborates with and promotes these farmer-related organizations, not only does it improve their recognition, but it also provides them with UF/IFAS science-based resources and increases Leon County citizens awareness of local agriculture.	

		The RHSFA, for instance, as it is an organization of over 50 local farmers within 100-mile radius of Tallahassee that partner to strengthen the local farming community. By supporting the RHSFA, more customers become informed about these small businesses and local agricultural options. According to a Civic Economics Andersonville Study of Retail Economics, for every $100 that is spent at an independent business, $68 returns to the local economy. By comparison, only $43 returns to the local economy when spent at a national chain. This means that if every family spent $10 per month purchasing from local farmers instead of national chains, over $9.3 billion would return directly to local economies. Buying local will also keep the Leon County community unique, support community groups, reduce environmental impacts, create jobs, and will encourage local prosperity overall. For 2011-2012, the total value of local foods purchased in Florida was estimated at $8.3 billion, generating an estimated 183,625 jobs, $6.5 billion in labor income, and $10.5 billion in value-added contributions to the Gross State Product. In addition, programs such as Farmers' Market Nutrition Program trainings, market manager workshops, food safety plan trainings, and Food Safety Modernization Act education that the Agent helps to provide keeps farmers informed about changing technologies, best management practices, and regulations. This can deliver economic benefits to farmers, increase healthy and nutritious options for SNAP recipients, and can improve farmer food safety plans and sustainability.	
7.	**Research and Extension Efforts to Combat Mosquitos is Critical to Public Health**	Medically important insect vectors pose serious veterinary and public health risks in Florida, the U.S., and around the world. Of Florida's 16 non-native (or suspected non-native) mosquito species, nearly two-thirds were discovered just in the past two decades. Mosquitoes can transmit dengue, chikungunya, Zika, West Nile, and eastern equine encephalitis viruses. During 2020 alone, 86 West Nile and 71 dengue virus human infections were documented in Florida, with over half of the West Nile virus human cases in Miami-Dade County. Controlling mosquitos is essential to protecting the public health of Floridians. In 2020, researchers discovered a new (to Florida) mosquito vector in South Florida, Aedes scapularis, that can survive across both urban and rural areas and transmits yellow fever, equine encephalitis, dog heartworm and other pathogens to animals and humans. UF/IFAS scientists used a process known as ecological niche modeling, which uses a machine-learning algorithm to predict the potential distribution of a species across the landscape. The process is often used to determine areas that could be invaded by a nonnative species. The output model, which is updated regularly, is useful to mosquito control districts monitoring this new vector.	1

		One state specialist (i.e., a faculty member with a joint research/extension appointment) assisted in the Florida Mosquito Control Association's Dodd Short Course series in a course focused on data manipulation and visualization in Excel for mosquito control district personnel. This course was prior to pandemic restrictions and offered mosquito control district personnel a hands-on opportunity to work with mosquito trap data and to make graphs of mosquito vector species counts that could be included in weekly or annual reports. Several participants had little or no experience with Microsoft Excel so the extra guidance participants to achieve the course objectives as well as greater confidence in working with data technologies, such as Microsoft Excel, when they returned to their districts. Another state specialist focuses on insecticide resistance, which can interfere with control of mosquito populations. In 2020, she provided research-based, tailored recommendations of effective insecticides to the mosquito program managers. Working very closely with Miami-Dade County Mosquito Control to test many of their southern house mosquito populations, Miami-Dade implemented the recommendations that provided by UF/IFAS researcher and indications are the cases West Nile virus cases in Miami-Dade County would have been much higher without the population specific insecticide recommendations given. Other work by UF/IFAS state specialist is focused on improving knowledge competency in mosquito identification and vector ecology among professionals engaged in vector and pest control, particularly biologists and technicians employed by mosquito control programs at the city and county levels. In addition, this specialist also conducted research to better understand why mosquitoes vary in their susceptibility to dengue virus and Zika virus and in their ability to transmit these viruses. Experiments were performed using colonies of the yellow fever mosquito (Aedes aegypti) derived from natural populations. This mosquito is the major vector of multiple arboviruses and is found throughout the tropics and subtropics, including parts of Florida, Louisiana, Texas, and California. In these experiments, mosquitoes were exposed separately to dengue and Zika and followed for 21 days, with mosquitoes screened for virus in specific tissues at various timepoints. Mosquitoes from western central Florida were highly susceptible to Zika (nearly 100% infection at all timepoints) but less so to dengue (30 - 70% infection). The time from virus exposure to detection in legs and wings (i.e., time to dissemination) was approximately 6 days shorter for Zika (5.6 days) than dengue (11.9 days). This finding, important to public	

		health, indicates that an epidemic of Zika could ramp up faster and be perpetuated more easily than dengue, at least for this particular mosquito population.	
8.	**Scouting for New Invasive Pest, Asian Thrips, Minimizes Snap Bean Grower Losses**	Florida ranks #1 in the U.S. for snap bean production, producing more than one-third of the total U.S. production.[1] Florida has about 28,000 acres of snap beans, with about 7,500 acres in Miami-Dade County, 6,600 in Palm Beach County, and 6,500 in Hendry and Collier Counties.[2] Florida average snap bean yields are approximately 180 thirty-pound bushels/acre[3], and at $30 per bushel, growers will gross about $5,400 per acre. Production costs are $4,000 to $4,700 per acre3, with a net return of $700-1,400 per acre. In March 2020, a new invasive species, the Asian bean thrips, was identified in Homestead, FL, and snap bean growers reported losses of 30% were reported. This amounts to a reduction of $1,620 per acre, resulting in net losses. Across South Florida, this could amount to $33.6 million dollars of losses. A newly hired commercial vegetable production agent initiated a regional scouting effort in Palm Beach, Hendry, and Collier Counties to identify population level dynamics throughout the 2020-2021 growing season. The scouting team included 4 scouts, a thrips ID specialist, and the agent. The agent scouts weekly and has covered 57 locations on 17 farms which gross 12,000 acres. Weekly updates are sent with population levels throughout the scouting area. Recent scouting reports can be found at the following website: South Florida Growers' Meeting: Asian Bean Thrips. Results are ongoing, with Asian bean thrips first identified in the region at the end of October and becoming widespread by early December. Population levels remain low in most locations, with only isolated occurrences of populations above 'best-guess' threshold levels. Scouting is well documented to reduce insecticide applications, and with this regional effort reducing 1-2 preventative insecticide sprays per crop cycle, this has saved growers $0.8 to $1.6 million at the midpoint of the growing season. It is expected that Asian bean thrips populations will build throughout the spring cropping season and may reach threshold levels region-wide by the third or fourth cropping cycle. Losses can be minimized, and timing of insecticide application is critical for control of the pest. It is expected that the regional scouting effort will minimize grower losses, and could therefore save growers $1,500 per acre, or $19.8 million per cropping cycle across the region being scouted. [1]Zhang, S., D. Seal, M. Ozores-Hampton, Mary Lamberts, Y. C. Li, W. Klassen, and Teresa Olczyk. 2017. Snapbean Production in Miami-Dade County, Florida. UF/IFAS EDIS. https://edis.ifas.ufl.edu/tr005.	1

		[2]USDA-NASS. 2017. Table 29. Vegetables, Potatoes, and Melons Harvested for Sale: 2017 and 2012. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Florida/st12_2_0029_0029.pdf. [3]Olson, S.M., E.H. Simonne, W.M. Stall, S.E. Webb, S. Zhang, S.A. Smith, E.J. McAvoy, and M. Ozores-Hampton. 2011. Legume production in Florida: Snapbean, lima bean, southern pea and snowpea, p. 125–140. In: S.M. Olson and B. Santos (eds.). 2011–2012 Vegetable production handbook for Florida. Vance Publ., Lenexa, KS.	
9.	**Pest Management University Thrives During COVID-19 Lockdown**	Pest Management University was created as a cooperative effort between the University of Florida, the Florida pest management industry, and the Florida Department of Agriculture and Consumer Services (DACS), the regulators of the pest control industry in Florida. All courses at Pest Management University (PMU) are IPM-based. We started 2020 with record numbers of student registrations. COVID-19 forced us to rethink our content delivery. As a result, we were able to reach more people, in more states and countries than in 2019. In 2020, we had 1,649 participants, with 1,235 via webinar and 414 PMU in-person or hybrid, from 24 states and 14 countries. Before the COVID-19, PMU added a Rodent Academy and State of Urban Rodents to our course line up and delivered this in January 2020. In mid-March, all in-person programs were cancelled due to COVID-19, but the pest control industry was deemed an essential service at the federal and state levels. COVID-19 caused us to rethink our content delivery in order to meet stakeholder training needs. Due to our very able team, we were able to build a functional system that connected registration to Zoom online delivery system that used the polling function to capture knowledge gained. This system served as our delivery system for the webinar series we assembled as well as the hybrid version of our in-person PMU offerings. The webinar recording was rendered, edited to meet FDACS requirements for online CEUs, and loaded into Canvas Catalog. We developed a 14 CEU webinar series that allowed our clientele to maintain their certifications. The average knowledge gained for the webinars was 11.8%, which is lower than our in-person offerings. As PMU was cleared to hold in-person programs for 10 people or less, we modified our in-person courses to a hybrid structure, offering lectures online for 4-5 evenings with the hands-on component offered in one day for 8 students at a time. When we advanced to phase III, we restored the fully in-person classes, but with small class sizes to adhere to UF health guidance. PMU delivered 15 classes to 414 attendees from 113 companies including	1

		2 school districts, and 2 county Extension offices. Number of certified operators developed through PMU was 68. The average knowledge gained for all students was 23.2%. All students taking the state exam at PMU in the wood-destroying organisms (WDO) and general household pest (GHP) categories passed. Financial income incentives range from $25 per week increase to up to $5,000 per year.	
10.	**Watermelon Producers' Established Relationship with UF/IFAS Helped Make 2020 Season Successful**	The Suwannee Valley region contains about one-third of Florida's 25,500 acres in total watermelon production (USDA NASS, 2019). The extension agents covering this 7,500-acre region work collaboratively to provide a comprehensive service during the season. Farm visits followed by weekly recommendations on crop nutrition, disease and pest management keep all producers informed as they rely on these updates to make timely management decisions. At the end of the 2020 season, this group conducted a multi-county survey to better understand the industry and the impacts of Extension in their production. The survey was accessed and completed by forty-seven producers and representatives of the allied industry covering this region. Ninety-two percent of respondents indicated that UF/IFAS services are an important part of their operation and contribute significantly to their economic success. Forty-eight percent of them qualified for the economic benefit received to be in the range of $50-$200 per acre and an additional twenty percent of them qualified for the economic benefit received to be over $200 per acre. Using the range of $50-$200 for the total value of educational services to total value in the region would be between $375k to 1.5 million. On average, our clientele used at least three services provided by Extension with the highest ranked being one on one consultation with county faculty, sap testing, and consultation with regional specialized agents. The efforts of county faculty in watermelon producing counties in north Florida have kept stakeholders engaged with extension as the survey indicates that on average, this clientele attends at least four agent-led events including local seasonal crop updates, continued education credit trainings and the Suwannee Valley Watermelon Institute. Despite the current pandemic and all the challenges that came with it, seventy-three percent of our producers reported an excellent season. They expressed gratitude towards extension agents as we continued to support them through the uncertainty and limitations associated with COVID-19. This group continues to work together in the off season to bring new educational materials, management approaches and science-based information to assist our producers and keep them productive.	1

11.	**St. Lucie County Responds to Needs of Producers and Workers**	Worker Protection Standards training is conducted to increase understanding of ag-workers and others about PPE to protect themselves against pesticide exposure and to teach them to practice habits that will help them avoid health damage from pesticide exposure at the farm and at packinghouses. The training also helped them avoid violation of federal law and save them from penalty fines. 370 workers were trained in St. Lucie County in Fresh Fruit training program to practice personal hygiene, hand-washing practices and food safety in their work environment. In addition, the St. Lucie County Extension worked with the county's departments of Public Safety and Florida Department of Agriculture and Consumer Services (FDACS) to provide free Covid-19 testing for the agricultural community. Most agricultural workers are immigrants with H2A visas that live and transport together (usually with buss). Regarding the Covid-19 pandemic, there has been a big concern that the possibility of virus spreading in ag community is higher than other communities. COVID-19 testing was conducted at the St. Lucie County Fairgrounds for the agricultural community in St. Lucie and neighboring counties. Many agricultural workers have H2A visa meaning that they may not have proper health insurance to cover their test cost. Free covid-19 testing provided a great opportunity for agricultural workers to get tested in a central location with no concern about test costs or insurance. The partnership between St. Lucie County Extension and two other organizations provided an opportunity for agricultural workers to get a free Covid-19 test and in a case if their result was positive, they can stop spreading the virus in both their community and workplace as well.	1
12.	**Monitoring for Sugarcane and Rice Pests Helps Central Florida Producers Reduce Losses**	The Mexican rice borer (Eoreuma loftini) is an invasive pest of sugarcane and rice that was first detected in Florida in 2012. The pest, which occurs in central Florida, is expected to become established in the southern region of the state where sugarcane and rice are produced. Thus, it is important for stakeholders to be able to identify this new pest, as well as to learn and implement monitoring methods and management tactics. A UF/IFAS researcher at the Everglades Research and Education Center worked with two county Extension agents who have sugarcane and rice responsibilities to coordinate and conduct a multi-county pheromone trapping program for detection of E. loftini populations in Florida. This program used pheromone traps at 27 locations during the summer in central Florida. They found that the southernmost leading edge of the E. loftini infestation in Sumter County moved 3.5 miles since summer 2019. The easternmost leading edge in Lake County moved 8 miles. This information is communicated to growers in those areas. Extension programs focusing on integrated pest management are necessary to increase the sustainability, profitability, and competitiveness of agricultural and horticultural enterprises. The work on E. loftini is an example of UF/IFAS's role in the detection and management of invasive species new to Florida, ultimately preventing crop losses.	1

13.	**Development of Muscadine Cultivars with Superior Characteristics (FAMU)**	Improve economic and marketing competitiveness for small and limited resource farmers by developing a model of economically feasible and beneficial breeding pipeline evaluation trial and to screen and compare 11 advance breeding lines with currently cultivated standard cultivars under diverse growing conditions (in the state and the southeastern region). Completed the first chromosome-level assembly of the Muscadinia rotundifolia genome. We assembled each of Muscadinia 20 chromosomes from end-to-end with few assembly gaps and unplaced scaffolds. By combining Illumina sequencing, Pacbio sequencing, and Hi-C, we generated a highly accurate, nearly complete draft genome, enabling genetic, genomic, transcriptomic, and proteomic studies. Synteny analysis revealed highly conserved chromosome structure compared to Vitis genomes. Hi-C analysis on adult leaf tissue revealed semi-discrete topologically associated domains, and evidence for intertelomeric contacts during interphase. We provide a web-based genome browser to access, download, and browse the Muscadinia genome and transcriptome data that will be publicly available to enable future studies. The resources developed here enable Muscadinia rotundifolia as a model species to understand the evolution of grapevine chromosomes, biotic/abiotic stress resistance, and antioxidant production. Two (2) new patented muscadine grape cultivars were released: 'Floriana' US 2020/0084932 P1 and 'Florida Onyx' US PP31,407 P2.	1
14.	**Development of Florida Hybrid Bunch Cultivars for Wine with Improved Taste, Color, and Shelf-life (FAMU)**	Improved procedures and techniques of farming operations that will sustain small farm operations. Four (4) advance selections and 2 candidate new cultivars 'Blanc du Soleil' and 'Blanc du Leon,' are under evaluation in FL and TX.	1
15.	**Enhancement of Nutraceutical Properties and Utilization of Value-added Products from Muscadine**	The efficacy of muscadine berry phytochemicals against a variety of cancers (liver, pulmonary and mammary) was determined and the elite varieties with potent anti-cancer activity against specific tumors have been identified. The efficacy of muscadine berry phytochemicals against a variety of cancers (liver, pulmonary and mammary) was determined and the elite varieties with potent anti-cancer activity against specific tumors have been identified. Developed various whole berry and juice-based food products to serve as nutraceutical functional foods and supplements for promoting consumer health. Some of these prototypes include Grape Honey, Musca Delights,	1

	Grapes (FAMU)	Flavored Beverages, Sweetener, Dessert Toppings, Jelly, Juice, Vinegar, Breakfast bars, Snacks, Popsicle, Grape nuts, Preserves, Musca Bites, etc. We are optimizing processing protocols to retain bioactive compounds content and properties to warrant product health values.	
16.	**Identification of Suitable small Fruits as Alternative Crops for Small Farmers in North Florida (FAMU)**	Diversifies production capacity, strengthens grower's economic vitality. Enriched the nutraceutical value of muscadine value added products to promote consumer health, increase industry market value and grower profit.	1
17.	**Identification of Best Management Practices for Grapes and Small Fruits (FAMU)**	Improves production efficiency and fruit quality and expands market opportunities by evaluating the impact of trellis systems and management practices such as pruning, spacing and rootstock performance on yield and fruit quality of southern grapes (muscadine and Florida hybrid varieties). Developing "Digital Reference Database of the Vinification and Healthy Qualities of Southern Wines" to serve as analytical service guide for the industry clientele.	1
18.	**Development of Feasible Preconditionin g Programs for Limited Resource Cow-Calf Producers in North Florida (FAMU)**	For a beef cow-calf producer the most important source of income is the weaned calf. So, finding the feed: pasture combination that provides the lowest Cost/lb. of Gain is crucial for increased profits. The main objective of our project was to find the most cost-effective way to feed beef calves to maximize weight gain during the 45-day preconditioning period. Calves were backgrounded on natural pastures that were predominantly Bahia grass and acclimated to the feeds for 2 weeks prior to the start of the actual trial. Calves were supplemented with corn-based or commercially available complete feed daily for 45 days. Supplementation rates for both groups were maintained at 1.0 lb./150 lb. calf BW equivalent to 2.0 lbs./calf/day.	1
19.	**Custom Heifer Development to Advance Onset of**	Age at puberty in heifers is controlled largely by genetic and environmental factors, among which nutrition has a major influence. Nutrient restriction during postnatal development delays puberty whereas feeding high-concentrate diets during the juvenile periods increases incidences of precocious puberty in heifers. The objective	1

	Puberty in Limited-resource Beef Cow-calf Operations (FAMU)	of this project was to develop a management strategy that optimizes attainment of puberty in heifers to maximize lifetime productivity of cows in a limited resource beef cow-calf system. Heifer-calves were weaned and maintained on Fall forages and 10 months of age. Thereafter, they were switched to graze cool season pastures until the beginning of breeding in late Spring. Growth and development was monitored by weight, body condition score and hormonal assays. Pregnancy way determined at the end of breeding using a transrectal ultrasound exam. Heifers benefited from compensatory gains while grazing cool season forages which accelerated their puberty onset as projected. Most heifers had regular ovarian cycles at 12 months of age and had obtained approximately 65% of their mature weights by then. Heifer also attained 92% percent pregnancy rates within 45-day breeding period. Six undergraduate research scholars have been trained in this project. Currently two undergraduate scholars and one masters student are being trained under the project.	
20.	**FAMU Beginning Farmers Training**	FAMU successfully developed a 4-tiered training curriculum that educate beginning farmers in horticultural, farm management, and risk management techniques. This year, about 50 percent of the instruction was done remotely. Post workshop evaluations show significant knowledge gain among the beginning farmers and ranchers. More than 70 percent of the participants have received certificates of completion in crop production techniques.	1
21.	**Statewide Soil Moisture Sensors Network Producing Useful Agricultural Water Savings Data**	The statewide soil moisture sensor (SMS) program is a major success because it has empowered county Extension faculty to install, remove and consult on soil moisture sensors and irrigation management. By using this technology, growers are now able to "see underground" and at a distance through cell phone transmission of data. This gives the faculty member more expertise to offer and helps them better serve their clientele. This program allowed agents access to sensors, giving them the tools to encourage BMP adoption with hands-on experience. Using electronic sensors at various depths, moisture readings are taken continuously throughout the day. The SMS program is impactful in its ability to increase grower knowledge, increase grower efficiency and reduce excess water pumping. One producer was able to reduce the amount of irrigation water use on his farm in 2018	2

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		by one-acre inch farm-wide resulting in over 100 million gallons of water saved. Through collaboration with St. Johns River Water Management District (SJRWMD) that same grower's water savings were verified using water meters and on the whole farm, 11,000 acres, 200 million gallons of water are being saved each year as a result of using soil moisture sensors for irrigation scheduling. Another producer was able to reduce his irrigation by two events of 0.3-inches on 500 acres, saving 8 million gallons of water. These water savings have continued each year on these farms and increasingly with new producer/agent partnerships. The more farms the statewide network reaches, the more water savings we have been able to document. With water use under more and more scrutiny from mounting water regulations producers continue to face more pressure to conserve water and reduce nutrient losses off farm. The statewide soil moisture sensor network is helping producers reduce water use, keep nutrients from being leached and increasing farm sustainability. Through our documentation efforts in 2021, this program will also have solid water saving numbers to report back to regulatory agencies. The use of precision agriculture technology such as SMS is on the rise in North Florida. UF/IFAS Extension, as part of the land grant system, typically works to find solutions to production problems in agriculture and seeks out technologies or methods to answer them. In the case of SMS, the Florida Department of Agriculture and Consumer Services (FDACS) and the Suwannee River Water Management District (SRWMD) have made cost-sharing (reimbursement) a high priority in promoting Best Management Practices. Now, many supporters of this technology are eager to get feedback on their use and benefit. One large watermelon farm (400 acres) made changes in their irrigation schedule after a Zoom meeting with Extension agents and reviewing their SMS live data. The adoption to going to a 3 event per day cycle instead of two leveled out the soil moisture and the grower noted how successful that change was at a critical crop stage. The recent evaluation of the Tri-county Crop and Pesticide Update held in Fanning Springs showed results that demonstrated the program's successful outreach and adoption. When asked, "Do you plan to adopt water conservation practice?" nearly four in five participants (79%) stated they had already adopted water conservation practices. This is a long-term adoption as a result of most recent years of programming by the Extension team in this region.	

22.	**Alachua County's Florida Friendly Landscaping Delivers Big Savings**	As a result of Alachua County's Florida Friendly LandscapingTM program (FFL) programming, 2020 water savings rates associated with irrigation totaled 516,228 gallons (McKenzie & Dukes, 2015) and an economic savings of $1,275.00 for water and $3,267 of wastewater charges, based on Gainesville Regional Utilities' 2020 residential rates. This is enough water to supply nearly 7 households with water, per year (based on the average of 88,000 gallons/household/year). Alachua County's updated Irrigation Efficiency Design and Maintenance Code will save 2403-5696 gal/1000 sq ft/year (Boyer & Dukes, 2018) for every irrigation system built or modified in Alachua County, starting October 2019, as compared to previous code language. The range is based on savings from deducting the rain sensor savings from the evapotranspiration and soil moisture sensor estimated savings since the rain sensors were part of the original code. The savings equates to $500 per 1000 sq ft per year. 407 new irrigation approvals were given in 2020, equating to an estimated savings of 4,206,468 gallons of water (Boyer & Dukes, 2018). Alachua County's FFL Code has resolved three separate conflicts between an HOA and a homeowner that were discussing litigation. Resolving the conflicts through the county's mitigation process has solved both the homeowners and HOAs an estimated $45,000 in litigation fees ($15,000/litigation case, Harris, 2015). Florida Department of Environmental Protection's (FDEP) Basin Management Action Plan (BMAP) attributes FFL programs and affiliated policies, ordinances, marketing campaigns for 6% reduction of total nitrogen (TN) and total phosphorous (TP) in the impaired waterways, as indicated by Florida Department of Environmental Protection. Overall, Alachua County's FFL program contributed to the **state's combined estimated water savings** of 320,061,934 gallons of water in 2020, based on Extension clients' reported behavior change. This is enough water to supply approximately 3,367 households with water per year [based on the average of 88,000 thousand gallons per household per year], and this water savings is valued annually at a combined total of $1,059,405 in water bill savings for participating households [based on the average statewide value of $3.31 per 1,000 gallons] and $832,161 in savings for utility companies on water preparation and delivery costs. Note that these gallons of water saved are conservative due to pandemic, with 2020 reported data nearly one-third lower than that reported in 2019. We have seen an increase in gallons of water saved every year since inception and assume this decline is due to the pandemic's impact on reduced contacts and data collection/evaluation (due to safety	2

		measures as well as hiring freeze) rather than any true decline in water savings [based on the average statewide value of $2.60 per 1,000 gallons].	
23.	**Case Study Demonstrates the Successful Creation of Important Economic Impact for Fertilizer Workshops by Leveraging the Research-Extension Relationship**	To estimate the environmental and economic impacts of fertilizer workshops delivered, an Extension agent from Seminole County worked with a UF/IFAS state specialist to develop a baseline for making comparisons. They used a mass balance based on literature values, IFAS recommendations, and commercially available fertilizer products to estimate the reduction in nitrogen (N) leaching from residential landscapes. They first calculated the annual application rates of various commercial products based on manufacturer recommendations, differentiating the total N application into the proportion that is applied as slow-release N (SRN) or quick-release N (QRN), also known as "water soluble N." We then performed a literature search to identify papers that compared N leaching from SRN and QRN sources. A variety of studies have been published on this topic, but we identified two papers published by UF/IFAS scientists to use as endmembers for our calculations. A study of SRN and QRN leaching when applied to sandy soil from central Florida devoid of vegetation was used as the 'worst-case' scenario in which N fertilizer was applied to bare soil (Wang and Alva 1996). A separate study that compared N leaching from SRN and QRN fertilizer applied to columns with well-maintained St. Augustinegrass (Floratam) was used as the 'best-case' scenario. In actuality, residential landscapes likely leached somewhere in between these worst- and best-case scenarios, but further data from in situ studies are not available (however, Reisinger et al. currently have ongoing studies looking at N leaching in real residential landscapes under a variety of management conditions, with data likely available by Fall 2021 or Spring 2022). The worst-case scenario study found that 30% of SRN applied to bare soil was captured as leachate, and 88% of QRN applied to bare soil was captured as leachate. In the best-case scenario, 4.2% of SRN and 9.6% of QRN (average of two QRN treatments) applied to well-maintained turfgrass columns was captured as leachate. We multiplied the proportion of annual N applied following commercial recommendations as SRN and QRN by the worst- and best-case leaching proportions to estimate an annual N leachate loss under all scenarios (lbs N / 1000 ft2 / yr). Next, we calculated the amount of total N, SRN, and QRN that is recommended for St. Augustinegrass at a high maintenance level for Central FL following IFAS recommendations found in EDIS documents and a 50% SRN	2

		composition of the fertilizer (Seminole County recommendation). We performed the same calculations to estimate annual N leaching from SRN + QRN if these recommendations are followed and calculated the benefits of following IFAS + Seminole County recommendations based on the difference between average N leachate (annual lbs N / 1000 ft2) from three different commercial products under best- and worst-case scenarios and the IFAS recommendation leachate results. These calculations provided an estimate of IFAS recommendations with 50% SRN in the product reducing annual N leachate by 0.05 (best case) to 0.60 (worst case) lbs N / 1000 sqft. The researcher and agent then took these numbers, and the average of best and worst-case scenarios, and calculated the impacts of using SRN based on participants the fertilizer workshops, assuming an average lawn size of 3,000 ft2, and a value of $500 per lb N removed from the environment. An individual who followed UF/IFAS recommendations and used 50% SRN would reduce N leaching by 0.15 (best case) to 1.79 (worst case) lbs N leached / year. Multiplying this by the 209 participants who attended workshops this year and stated they were using at least 50% SRN reduced annual N leaching by 31.9 (best case) to 374.6 (worst case) lbs/yr and provided an economic benefit of $15,967,600 to $101,642 based on the monetary value of removing N from the environment. These dollar amounts are based on the actual dollar amount Seminole County Watershed budgets for nutrient removal from waterbodies. They also calculated the N leaching reduction from participants following the summertime fertilizer ordinance of Seminole County. Seminole County has an annual June – Sept. restricted period. Based on IFAS fertilizer recommendations for medium to high maintenance St. Augustinegrass in Central Florida, there would be one recommended application of SRN (applied at no more than 2.0 lbs / 1000 ft2). We calculated how much N would leach from a 2.0 lb application of 100% SRN fertilizer following the same approach as above. One individual following the ordinance would reduce N leaching by 0.25 (best) to 1.8 (worst) lbs N /y. Based on the 211 individuals who when surveyed reported followed the restricted period requirements, this equates to a reduction of leaching by 53.2 (best) to 216.5 (worst) lbs N / year, with a monetary value estimated at $26,586 to $189,900. This approach does not consider changes in turf health and assumes that typical residential landscape turfgrass is somewhere in-between these best- and worst-case scenarios, therefore these estimates should be considered as upper and lower limits, rather than exact estimates.	

		Keep in mind, though this is significant, it only quantifies impacts from two of the many behaviors taught in the many FFL classes offered by the agent. It is difficult to quantify how much it is truly valued at for many reasons, including: • The state of the individual lawn- is there erosion? Is the grass healthy enough to absorb it? • If the user applies the fertilizer appropriately • The type of the soil • If the user applies a slow-release nitrogen product • If the waterbody has other sources of nutrients entering it, such as animal waste, septic tank leachate and/or wastewater lift station overflows • Where the waterbody is located and if remediation would be costly (i.e. in an urban area where space is limited) • The type of remediation that will be utilized by the Stormwater Engineer (Baffle Boxes can run $1,259 per pound of Total Nitrogen removed, where installing a stormwater pond can range from $145 to $885. When you are talking thousands of acres of water rich in not only nitrogen but phosphorous too, it adds up quickly. • As previously mentioned, the FDEP regulates the county and requires them to spend county funds to bring waterbodies back into compliance. If people are fertilizing per the laws and regulations of our county, the taxpayers would save a significant amount in water quality improvement dollars. By educating the public about FFL and getting them to adopt Best Management Practices (BMPs), we prevent the nitrogen from entering our waterways, which truly preserves the integrity of our water. This program has had compounding success that has been recognized at the local, state and national levels. Agent has received both state and national awards for this work and was an invited speaker to the Southwest Florida Water Management District Springs Coast meeting to present her work. She has also presented at countless conferences and shared her impacts among peers in several circles. This work is truly groundbreaking on many levels.	

24.	**Education is Key to Improving Stormwater Management in Florida Panhandle**	The Florida Panhandle has the highest average total rainfall in the state (65") and limited stormwater management has resulted in legacy water quality and flooding problems across the region. A need exists for local stakeholders, including city and county personnel, professional engineers, residents and extension faculty, to better understand the relationship between how development occurs, its impact on hydrology and water quality downstream, and available solutions to manage and mitigate these impacts. A team of researchers, specialists and Extension faculty collaborated to develop a regional stormwater education program to increase knowledge and build technical capacity among stakeholders to incorporate sustainable stormwater management practices on various scales, from individual residences to larger infrastructure projects. We gave one in-person stormwater management workshop in 2019 funded through an IFAS Extension grant, and a free 2-part webinar series in 2020. Topics covered included stormwater fundamentals (hydrology and pollutant load dynamics), green infrastructure and low impact development (LID) options, and local case studies. A presentation was given both years about funding opportunities for LID projects by a project manager from FDEP's Nonpoint Source Management Program, furthering the connection between funding sources and stakeholders, stormwater infrastructure maintenance, permitting requirements, and planning tools. Participation grew from 22 in 2019 to 83 in 2020. Attendees included state, county and municipal employees, extension faculty, professional engineers, and residents. In post program surveys for 2019 and 2020 combined, 40 of 43 respondents indicated they had gained knowledge in at least one of the topics covered in the training sessions. Nine people responded to a 6-month follow-up survey for the 2020 webinar series. All 9 (100%) indicated that the information they had received was valuable. Five participants (62%) had used the information in their line of work, 3 (60%) stated that decisions related to stormwater management that they had taken were altered as a result of the information presented and 7 (78%) had shared the information they learned with others. UF/IFAS Extension and Research faculty are providing needed stormwater management trainings to local stakeholders including city and county personnel, professional engineers, and residents to better understand the relationship between how development occurs, its impact on hydrology and water quality downstream, and available solutions to manage and mitigate these impacts in the Florida Panhandle.	2
25.	**Extension Helps Communities Become More**	Calusa Bay, a North Naples Community of 342 condominium residences sits on 54 acres with 7 lakes and 21 lake fountains to ensure water quality remains high. Several residents from the Calusa Bay Master HOA board attended our a Pinelllas County Florida Friendly Landscaping™ (FFL) program for Associations workshop in 2014. At that time, few communities had few good examples of walkable ground covers like perennial peanut	2

	Sustainable Over Years of Education and Outreach	replacing high maintenance turf. The community subsequently replaced turf with perennial peanut on parking lot islands. At the same time the extension office added perennial peanut plants for the demonstration orchard and approached some local growers to become the first suppliers in the region. Extension added similar groundcover installations of Mimosa strigilosa and Asiatic jasmine to Extension display gardens. Along with Perennial peanut, demonstrations of all three have made promoting low maintenance groundcovers more acceptable to communities doing lawn renovations and add to new communities. Follow-up visits to the Calusa Bay in 2014 led to one other major change. They added a wide littoral zone to the lakes to reduce blue-green algae. In 2020, residents continued to work with pollution control and extension to conserve water and improve water quality.	
26.	**Invasive Species Predictive Tool Can Reduce Plant Losses and Spending on Control Measures**	The Florida Fish and Wildlife Conservation Commission (FWC) participates in the management of approximately 5 million acres of natural resource land in Florida. This includes both private property and those under the jurisdiction of various government agencies. Nonnative invasive plant species pose a significant threat to the ecological wellbeing of Florida's natural areas. Once established, invasive species are very expensive to manage and cause substantial impacts to recreational areas, resulting in economic losses. A recent evaluation of long-term invasive plant management expenditures on conservation areas in Florida determined that average spending for managing invaders exceeded $45 million annually, with $41 million provided by the state (FWC), and over 60% of funding allocated to the management of ten species (Hiatt et al., 2019). The highest aquatic spending was approximately $10 million per year on controlling Hydrilla verticillata and highest terrestrial spending was $4 million per year on Melaleuca quinquenervia. If the scientific community could identify the next big invasive plant before introduction, establishment, and spread, the estimated net annual savings would be substantial. The UF/IFAS Assessment of Non-native Plants in Florida's Natural Areas uses literature-based assessment tools to evaluate the invasion risk of non-native species that occur in the state, new species proposed for introduction, and novel agricultural and horticultural selections, hybrids, and cultivars. Our overarching goal is to protect natural and agricultural areas by reducing non-native plant invasions in Florida and throughout the Southeast U.S. Our program is unique in that we are the only state group that focuses on the prevention of plant invasions before they are introduced.	3

		The UF/IFAS Assessment conducts risk assessments with the Predictive Tool, a risk assessment protocol consisting of 49 questions with three possible conclusions: high risk, evaluate further, or low risk. We currently have 172 risk assessments available on our website with 100 of those resulting in a high-risk conclusion. If we estimate conservatively that just one out of those 100 species might become the next Hydrilla verticillata or Melaleuca quinquenervia, then over ten years we can potentially save an estimated $40-100 million in invasive plant control spending. When we consider the fact that major invaders are rarely eradicated and management is required for decades, the projected value of risk assessment over 100 years could reach the $100s of millions! In addition, prevention would also result in significant savings resulting from avoided losses to recreation and other ecosystem services. In summation, the cumulative savings that prevention can provide allows FWC to focus additional efforts on controlling invasive plants currently impacting Florida's natural areas and allocate funding to other efforts such as Early Detection and Rapid Response and continued monitoring for new invasions in Florida's precious natural areas.	
27.	**Guidance on Responsible Herbicide Use Saves Money and Labor for Gilchrist County Roads Department**	The Gilchrist County Road Department historically relied on inmate-labor for their road right-of-way vegetation control program. This labor force typically worked year-round removing overgrown vegetation from road rights-of-ways using mechanical methods. During the COVID-19 pandemic this labor source was eliminated. The Road Department contacted the agent for guidance on use of herbicides and the development of a comprehensive herbicide plan to replace this program. The Road Department required several things in its comprehensive plan: cost-effectiveness, a publicly defensible documentation system, a safe application protocol, public/private property protection, and personnel safety. The agent developed a comprehensive herbicide plan for County Commission approval. This plan included a protocol that ensure the proper selection and use of herbicides that protected public and private property (i.e., road-side crops) and required safety measures for county personnel applying herbicides (i.e., proper PPE and equipment calibrations). Additionally, a cost analysis of the comprehensive plan indicated a cost-savings of $113,250.76 annually while still maintaining right-of-way vegetation on over 400 miles of county roads. The agent also developed an online database for document occurrences and locations of herbicide applications by the county and combined this data base with a thorough protocol that ensured safety, minimized the risk of herbicide drift and maintained compliance with all state and local regulations.	3

28.	**Extension Education Helps Residents Improve Land and Save Money**	In December of 2019 a multi-agency effort was coordinated to implement a Learn & Burn: Invasive Species workshop, which was followed by a guided prescribe burn in January of 2020. One Baker county resident attended the program to learn about invasive species control in timberlands in order to control those present on his property before conducting a prescribed burn. Utilizing a follow up survey and individual contact teaching opportunity the client indicated he had controlled 2 invasive species on his land since the program. The client conducted a prescribed burn on the 80 acres of timberland in 2020. According to FWC Biologist, a private consultant would charge approximately $75/acre for control of a medium level infestation with the use of herbicides. The client was then able to complete a prescribed burn himself and utilizing resources he connected with during the extension program such as the North Florida Prescribed Burn Association. Professionals with the Florida Forest Service estimate a cost of $45/acre to hire a professional prescribed burner. The cost savings of being able to complete the spraying and prescribed burn himself and with volunteer manpower saved the client a total of $9,600. In addition to the cost savings for the client, the control of invasive species on his property and reduction of infestation before burning helped support positive ecosystem management and reduce the potential spread of invasive plants to surrounding natural areas.	3
29.	**Florida Master Naturalist Program Has Been Building An Army of Environmental Volunteers for 20 Years**	The Florida Master Naturalist Program (FMNP) celebrated its 20th anniversary at the beginning of 2021. Between 2000 and 2020, it has graduated about 20,000 Floridians. The program offers 10 courses on core principles, land stewardship, and restoration with differing levels of certification based on which courses they take. Those who take all three sections attain the highest level of Advanced Master Naturalist. One retired UF/IFAS Extension agent still teaches FMNP classes because "he's seen past students use their education to make real, positive change by influencing local elections and government decisions to be more eco-conscious with their votes and supporting regional wildlife through state park programs and conservation of the Florida wildlife corridor." (Gainesville Sun, 2/27/21). Some highlights from 2020 FMNP include: • Paddling to success: In the Florida Master Naturalist Program, students must complete a final project in order to graduate from each core course. Most students do short projects like fact sheets, videos, or signage kiosks for a local park, but not David. He decided that for his project he would start a service in the Nature Coast that offers free kayak ecotours to visitors. And not just for the duration of the course, but for the foreseeable future! He partnered with a local kayak rental business to get the word out about the free service. This has, in turn, supported and enhanced the rental business, as well as added an	3

		educational component that was previously lacking. David said that he had been thinking about starting this service for a while, but that the Florida Master Naturalist Program gave him the motivation and the confidence to follow through with his aspirations. David uses the skills and information he learned during the Florida Master Naturalist Program to add educational and interpretive information to the kayak paddle tour. If clients wish to pay or tip David, he does not accept the money on behalf of himself but rather donates the proceeds to the UF/IFAS Nature Coast Biological Station. So far, this volunteer has guided numerous tours that have generated $1,640 in donations to UF/IFAS and more than 1,000 educational contacts. • The intensive nature of the Florida Master Naturalist Program allows students to gain a deeper understanding and connection with Florida habitats. This connection can, in turn, be leveraged by the instructor to engage participants in more impactful volunteer programs, such as citizen science monitoring and habitat restoration. In Nassau County, the Extension agent has been very successful at recruiting volunteers from the pool of Master Naturalist students in the region. These volunteers turn out to be some of the most committed and enthusiastic and are typically willing to take on leadership roles and educate others, greatly increasing the stability and relevance of volunteer programs. For 2020, these volunteers contributed 697 hours (economic value of $18,958) with various UF/IFAS Extension programs such as the Florida Horseshoe Crab Watch and the Invader Raiders, invasive species removal efforts. • At least 6 Martin County students in the FMNP Coastal Shoreline Restoration course reported working in occupations related to the IRL economy, such as eco-tourism, natural resource management and environmental consultants/contractors. Several students indicated they were taking the course to directly apply the knowledge gained towards their profession, including performing or evaluating restoration projects. With 12/13 (92%) respondents reporting an annual household income of >$80,000 increased knowledge from this course contributes to these 6 students' professional development. One professional is involved in coordinating taxpayer-funded IRL-improvement projects (including current shoreline restoration projects) in Brevard county (Save Our Indian River Lagoon). This initiative may potentially result in a $484 million economic impact to the IRL economy by reducing excess nitrogen and phosphorus from the IRL (http://www.brevardfl.gov/SaveOurLagoon/Home).	

		• Before participating in the FMNP Freshwater Wetlands course Bob had spent a good deal of time in the outdoors. He would enjoy running, cycling, boating, golfing and other various outdoors activities but stated he "new little about my natural surroundings". At this time, he enrolled in the FMNP course not knowing what to expect. During this course he tour Volusia County learning about the area's ecology. One of the items that seemed so interesting to him was the focus on epiphytes. Like many he was familiar with Spanish moss and Ball moss but was "unaware of how many other cool epiphytes adorned our local trees". With his new-found knowledge and his Nikon camera he started wandering the streets and natural areas of New Smyrna Beach. During this wandering he noticed epiphytes everywhere – parks, coastal areas, wetlands, restaurants, and retail establishments. Realizing the number of epiphytes he had found, Bob decided to create a guide for others to learn and become aware. This quick guide became Bob's final FMNP project and highlights over 20 hours of "wandering" and includes 20 photos of local epiphytes. The blog can be found at this link: https://nsbguide.com/2020/11/epiphytic-epiphany. Bob also stated that through this journey he had the added benefit of viewing many more birds than he would normally spot. He recommends "exploring with open eyes and ears". As a result of completing this course Bob has "slowed his roll and looks up at the canopy much more frequently." Another FMNP Freshwater Wetlands participant, Andy, also spent a great deal of time outdoors especially on Lake Kell located in his Hillsborough backyard. Upon completing the course Andy's eyes were open to the importance of preserve the lake that he and his family thoroughly enjoys. He is active communicating with his Homeowner's Association to educate them on the importance lake preservation, the control of invasive species, and fertilizer use. He is also becoming an active member of his HOA (which he was not previously) and is running to become chair of the HOA. He also is becoming a LAKEWATCH volunteer. Being so passionate about the lake, Andy created a YouTube video and song about the lake and being outdoors. The video can be found at this link: https://www.youtube.com/watch?v=1t5HWtgME0k. Bob and Andy were just two of the eight participants of the Freshwater Wetlands hybrid course. Participants of the course had a 25% gain in knowledge and all successfully completed the course. Two of them completed the course becoming certified Florida Master Naturalists.	
30.	**Research and Extension**	The Sarasota County Comprehensive Plan includes the following policy objectives: "Protect and enhance tree canopy through proper tree management, education programs, incentives, and enforcement of regulations; Monitor trends in tree canopy coverage within the Urban Service Boundary and use adaptive management	3

	Helps Rebuild Tree Canopy	strategies to maintain or increase tree canopy coverage." In 2013, a tree canopy study in Sarasota County indicated 35% vegetation coverage in the Urban Service Area but since then, there has been considerable tree removal due to urban development. To mitigate canopy loss, promote awareness of urban forestry benefits, and increase the number of trees planted in Sarasota County, a Sarasota County Extension agent launched the Treejuvenation© Florida urban forestry Extension program in 2020. Two hundred and ninety-nine (299) Sarasota county residents participated in 13 urban forestry and tree-planting Extension seminars and adopted 115 native trees. Ninety percent of participants reported that they improved their tree identification skills and their awareness of urban tree benefits. In a follow-up survey, 40% of respondents indicated that they had implemented at least one urban forestry Extension recommendation such as researching and identifying trees in their community. A survey will be done to measure how many of the 115 adopted trees survived 1-yr. post-planting. Community trees provide many benefits including improved air quality, reduced heat-island effects, and positive physical and mental health impacts. Also, a mature native tree has the lifetime capacity to sequester more than 3000 lbs. of carbon dioxide as carbon. Because Sarasota County re-forestation tree permit funds are approved only for planting trees on public property, an urban forestry Extension program designed to increase the number of residents adopting and planting trees can play a significant role in urban re-forestation and ultimately climate change mitigation. Trees do way more than just beautify your neighborhood. Learn more at: http://blogs.ifas.ufl.edu/sarasotaco/2020/03/02/treejuvenation-florida/ Recently the state of Florida passed legislature which removed local government oversight of trees on private residential property. This created concern among Florida communities regarding the future of their urban forest canopy. Rather than speculate on the impact of this change in policy, UF/IFAS researchers set out to do a urban forest canopy analysis for the 300 largest cities in Florida. We now have baseline canopy data for comparison over time (so we can compare canopy change for cities with and without historic tree protections). This will allow policy makers to make more informed decision regarding the costs and benefits of the current legislature. Beyond this, we used this data to calculate the ecosystem services associated with each city's urban trees - estimating the stormwater abated, carbon sequestered, and pollutants filtered. All 300 cities in the state will be given an estimate of the monetary value of their urban trees given these calculations. They also get to see where they fall compared to peer cities. We held two workshops to highlight these results. City stakeholders were quite	

		happy with this work and are sharing their canopy values and calculated benefits with their city councils and other policy makers.	
31.	**Pond Management Testing and Education Saves Clients Money**	There are many commercial, recreational and aesthetic ponds in Florida. Pond ecosystems are ever-changing and understanding the water quality parameters of a pond requires testing. Extension is well-suited to provide testing and education to pond owners, saving them money. One Alachua County agent responded to a site visit request for a homeowner that was going to stock his pond with an estimated $500 worth of various fish species. Upon testing the water with his portable Hach® water quality testing kit, the agent revealed that the pond had very low dissolved oxygen (~2ppm) and low pH of 4.5. Adding fish to this environment would have resulted in a fish kill and the client would have lost $500. Because of the consultation of the agent, the client is now making corrective steps to fix the pond water quality and will stock the fish when the conditions are conducive to growth. In Union County, two fish stock pond owners were assisted in matters of pond water quality management, aquatic weed control and fish kill prevention recommendations. Using agent's recommendation, one producer was prevented from having total fish loss and restocking their ponds. Based on UF/IFAS recommended stocking rates (Cichra, C., 2018) and local stocker prices, it could cost $300 per acre to restock fish. With the pond being 2 acres in size, the recommendations prevented the owner from restocking the 2 acres, providing a combined cost savings of $600.	3
32.	**Informing Citizens through FAMU Landscape Extension Programming**	FAMU's outreach program to provide specialized arboricultural and horticultural consultations to citizens and communities in their service area is still a busy and viable community service. Despite pandemic closures, consultations were provided on landscape and tree concern inquiries.	3
33.	**New Walking Program Helped Residents Stay Active During Pandemic**	Out of the top ten most preventable chronic diseases, seven of them can be impacted in a positive way from regular physical activity. About half of the U.S. adult population has one or more of these diseases. The Let's Walk Florida Program, offered in Lake County guided individuals in developing healthier lifestyle behaviors. These behaviors have a direct impact on chronic disease conditions. Let's Walk Florida! is a 10-week physical activity promotion program designed to promote physical wellness among Floridians. Education is provided via E-guides that contain information on the benefits of exercise, nutrition, and detailed directions for adopting	4

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		flexibility, strength, and aerobic exercises. Participants may choose from three tracks, according to their goals and exercise background – health, fitness, or performance. Teams or solo walkers are welcome to participate and each participant receives weekly reminders to log their minutes spent doing any type of physical activity. According to the Florida Department of Health, Community Health Assessment Tool (CHARTS) in 2018, In Gadsden County, 35.8% of adults are sedentary compared to the state rate of 29.8%. Twenty-three percent of Gadsden County residents have been told that they had Diabetes, compared to the state rate of 11.8%. Managing diabetes can be difficult, but with diabetes education and increased physical activity people can better understand the disease and learn ways to help manage their diabetes and improve their overall health. A total of 520 weekly participant reports were collected. At the end of the ten-week program, 520 respondents submitted a follow-up evaluation of the program. Of the 520 respondents, 88% (458/520) reported at least moderate to vigorous physical activity intensity level each week. 75% (389/520) reported meeting their physical activity goals most or all of the time. 68% 353/520 reported meeting healthy eating goals most or all of the time. 77% (401/520) reported meeting hydration goals most or all of the time and 17% (88/520) reported meeting stress management goals most or all of the time. 176,362 total minutes of physical activity were reported. As a result of participating in the Let's Walk Florida Gadsden program, participants reported a gain in the knowledge and skills necessary to improve one or more healthy lifestyle habit as measured by the follow up evaluation. In Lake County, 36 participants walked or exercised 93,930 minutes during the program. On average the participants walked roughly 11,000 steps each week for the first 7 weeks. At the end of the program 11 participants reported increasing the number of days they were active and trying at least one new type of physical activity. Of the participants, 5 reported lowering their blood pressure and 2 improved their diabetes. In Hamilton County, 46% of participants who completed the 10-week Let's Walk Florida program (12) reported a continued exercise pattern of thirty minutes per day for five days per week at three months following the completion of the program.	

		Comprehensive and engaging healthy lifestyle education can help participants develop the skills needed to lead healthier lifestyles and reduce the effects of chronic diseases such as obesity, diabetes, sedentary lifestyles, and their associated conditions.	
34.	**Canning Saves Money for Families Affected by COVID-19**	Preserving produce from their family garden made a big difference in one local family's financial budget during the pandemic. After reading an Extension agent's blog on Canning 101, a Florida resident called Alachua County FCS agent whose job had been eliminated due to COVID-19. She explained her family of six had always raised a garden, but she had never canned or frozen any of the harvests because she was scared of a pressure canner and the only freezer the family had was a small refrigerator freezer. She wanted to know the cost of canning equipment and what she would need and would I help her. The agent explained the canning process and safety measures in using pressure cooking and assured her a pressure canner was safe to use as long as you follow all safety guidelines. Client decided her family would preserve their own food to save money on their grocery bill. Agent provided her with a UF/IFAS EDIS publication on food preservation, one-on-one training, along with the So Easy to Preserve book from the National Center for Home Food Preservation. Client kept excellent records to document savings. She saved $2,100 over seven months on her grocery bill by canning and freezing her own vegetables. Brenda plans to continue raising and preserving her own food. She feels her family not only benefited financially but spent quality family time together while teaching her children important life skills.	4
35.	**FAMU 4-H Agri-STEM**	The main goal of FAMU 4-H AgriSTEM is to provide open avenues for interdisciplinary communication, education, and enthusiasm among students ranging from K-12 grades as it relates to science and math. Through experiential learning, following state standards, students increase their understanding of information related to topics in entomology, food sciences and natural resources.	4
36.	**Established Master Gardener Program Relationships Help Address Food Insecurity During Pandemic**	Master Gardener Volunteers, the agent, and City of Gainesville's Food System Coalition members, Alachua County's Farm to School Program leaders, and other community members identified fresh food access limitations impacting many Alachua County citizens. In 2019, to help fill a gap in supply and demand for fresh produce, the Extension agent and MGVs began a food initiative to help supply excess food to a local food bank from community gardens, school gardens, and the MGVs' gardens. A local food bank has coolers and freezers, allowing for donations of perishable items. During the COVID-19 pandemic, many individuals lost jobs or had reduced wages, which increase food insecurity among some Alachua County residents – which made the MGV Food Initiative more important. Although many of the programs, including school gardens and community	4,1

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		gardens, had a significant decrease in production, many MGVs still gardened from home to donate food for this initiative. In 2020, MGVs donated 1,066 pounds of fresh produce to the food bank.	
37.	**Teachers Report Healthy Changes in Student Behavior After FNP Classes**	Franklin County is a sparsely populated rural county where 100% of its school children qualify for the free or reduced lunch program and 21% of the families in the county live below the poverty line. Healthy eating habits by young and old are often lacking in these situations. The rural nature of Franklin County typifies many communities with limited professional resources in the areas of health and nutrition programs. The Family Nutrition Program (FNP) funded through a USDA Grant to UF has been active in the county now for six years. Professionally written curricula are taught by a full-time FNP Program Assistant to both youth and adult audiences. This program not only teaches in the classroom but has engaged youth in developing vegetable gardens on campus to grow, harvest, and prepare their own food. This year, the Franklin County FNP Assistant, along with a regional FNP Specialist, established a new container garden at the First Baptist School in Apalachicola. Obesity has reached epidemic proportions in the United States and children bear the majority of this burden proportionally. The highest rates of obesity incidence are in limited-resource populations. Changing dietary behavior of these audiences through FNP and other youth nutrition programs assists in slowing or reversing this trend. Reaching families in Franklin County with hands-on nutrition, food safety and preparation experiences allowed them the opportunity to implement healthier practices in their homes. This will lead to Franklin County citizens becoming more nutritionally sound with their food choices, and safer with food preparation practices. Youth who participated in FNP classes during the 2020 school year reported the following information in post-program surveys done by teachers: • 69% are more likely to play or exercise hard for 60 minutes a day. • 31% stated that they eat more than one kind of fruit more often. • 25% are more likely to eat more than one kind of vegetable now. New "Bucket Garden" at local school teaching youth how to grow, harvest, and prepare healthy food to improve nutrition habits.	4,6

		Statewide, the FNP program reached nearly 740,000 people in 2020 through nutrition classes and policy, systems and environmental (PSE) changes. Forty counties (out of 67) participate in FNP, with 1,025 partner sites. [Infographic]	
38.	**FAMU's recidivism reduction activities becoming the standard for job enhancing inmate training**	FAMU's involvement in recidivism reduction activities has resulted in our becoming a leader in the roll of providing recidivism seminars and inmate training courses in FAMU's multi-county service area in the panhandle of North Florida. The model we have developed is becoming the standard for the Florida Depart of Corrections in their desire to go statewide with this type of job enhancing inmate training. Additionally, we are among the first Extension Program to provide Green Industry training in the North Florida area for both male and female inmates in county jails, which are much more difficult to have successful training due to the shorter terms of incarceration. Unfortunately, the COVID-19 pandemic resulted in a general shut-down of all in-prison training. Because of this, the DOC and FAMU personnel involved in "Recidivism Reduction" training program development have had to shift the focus onto securing a method of "Distance Delivery' with a monitored or inter-active system method of quick response to student questions.	5
39.	**FAMU Homebuyers Training Program builds net worth for families.**	FAMU Extension provided education and guidance that leads to home ownership and or increase wealth through real estate. It does not only come through workshop participation, but also through observations in the community and more often through trusted relationships with clientele. From negotiations to inspections, to insurances, to re-negotiations to closing, a participating family have increased net worth from $40,000 to approximately $300,000 through new home ownership.	5
40.	**Participants Use Extension Training and Education to Improve their Financial Status**	In Citrus County, 122 residents participated in the Economic and Material Well-Being program. After attending Extension Improving Economic and Material Well-being programs, most attendees (~97%) learned and used effective financial management and consumer economic practices, thus increased their financial capability. Spending plans submitted by participants showed that most (97%) started tracked their income and spending. Additionally, a large percentage of attendees (97%) increased their savings, each saving approximately $1,000 per year. A high percentage of attendees (96%) requested their credit report, checked for, corrected or disputed errors saw their credit score increase by an average of 40 points. Improved credit scores positively affect many	5

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		subsequent consumer goals from insurance to investment access, employment, and borrowing for a home or business. For example, homebuyers who improve their credit scores by 40 points save $30 to $100 /month, or $10,800 to $36,000 over the life of the loan, through lower interest rates. 101 individuals adopted an effective financial management and/or consumer economic practice as evidenced by self-reports, post-evaluations, or submission of financial management records. The financial change impact of this program for participants, 68 participants reported savings of approximately $75 per month ($900 annually). This potentially resulted in $61,200 of annual savings for this group of participants collectively. Additionally, of the participants that purchased an affordable home, 11 (61%) qualified for $45,000 in down payment assistance ($495,000 collectively) and impact fees of $3,500 were waived ($38,850 collectively).	
41.	**Agent's Expertise in Training Helps County Distribute CARES Act Funds**	Volusia County is a service-based economy which relies heavily on tourism. The pandemic had a significant impact on our citizens. Thus, the county council designated CARES Act funds to provide rental and mortgage assistance to the community. However, the county did not have a sufficient work force to manage the program and review applications. As a result, many county employees from across the government were assigned to the program. The problem with this approach was the lack of expertise to train these newly assigned employees. The UF/IFAS Extension agent's expertise in training was sought out by our department director to develop training programs for these employees. He coordinated with multiple divisions to develop a comprehensive program for both the rental and mortgage assistance program that included four training sessions for each program and the development of standard operating procedures and case processing checklist to be used by the team. These trainings were recorded and viewed 1,124 times by new employees assigned to the program to help them learn how to process assistance applications. As a result of the Extension training programs, county employees were able to process 8,615 applications for mortgage and rental assistance and provide $16.6 million to help these community members.	5
42.	**New Business Ideas Leverage Extension and Research to Their Benefit**	A budding entrepreneur from Southwest Florida contacted Collier County Extension following an agent's interview on local media about vanilla orchid. They wanted to learn more about vanilla orchid resources and seek more information. Ultimately, the agent connected him with the with the tropical fruit breeder at Tropical Research Education Center, who is the lead of the vanilla orchid project. This scientist provided the entrepreneur with more details regarding growing vanilla orchids to produce vanilla beans. This entrepreneur is	5

		now in the process of moving forward with planning, planting and growing Vanilla planifolia for commercial purposes, potentially a very lucrative business. A pound of vanilla beans is valued at $600 per kilogram (2.2 lbs.).	
43.	**Economic Development Continues Despite Pandemic**	At the onset of the Covid-19 pandemic, dozens of businesses closed in Pasco County. Some of those losing jobs in the economic downturn found new hope in the commercial incubator kitchen and SmartStart partnership offered by UF/IFAS Extension Pasco County. The program consists of entrepreneurial training through Pasco Economic Development Council's business curriculum, potential startup scholarships, business planning, marketing outreach and space to develop and operate a cottage food business out of Pasco Extension's One Stop Shop building in Dade City. With commercial kitchen equipment available, entrepreneurial training offered by Pasco EDC, food safety training and certification and nutrition information provided by UF/IFAS Extension, 8 new businesses have opened since October 2019 with three of those opening since the start of the Covid-19 pandemic. Cottage food businesses are selling a variety of products both in person and online, most with a health-food twist. Two new businesses are scheduled to begin in fall 2020, out of the commercial incubator kitchen, with more entrepreneurs being trained for new business in 2021. One new business owner stated "I lost due job due to COVID-19. But, with Pasco Extension, I was able to take my dream and turn it into reality."	5
44.	**Environmental Education Class Pivoted to Virtual with Great Success**	In Sarasota County, the demand for educational programs for youth only increased with the pandemic shut down. Teachers and families needed engaging content they could share virtually. LIFE (Learning in Florida's Environment) is a multi-agency environmental education program. In Sarasota County, LIFE takes 3rd-5th grade students on three field trips a year to different Florida ecosystems. LIFE models scientific careers and supports standardized test success. During the 2019-2020 school year, the in-person modules of the LIFE program reached 356 students, which was a 54% increase from the previous year, with 45% of students from federally-funded, diverse Title 1 schools. Pre and post-test assessments indicated a 18.2% knowledge gain after participating in the Freshwater module and a 35.4% knowledge gain after participating in the Uplands module. This exceeded the knowledge gains in the previous year of 8.9% and 20.1% respectively. Covid-19 cancelled their last trip. Quickly, Sarasota Extension staff filmed the final trip for remote learners before school ended and they were viewed by hundreds of students. Ninety-seven (97) students completed the pre and post-test assessments which indicated a knowledge gain of 17.4%, which is comparable to the knowledge gained during the in-person modules. Knowledge gain in the previous year for the coastal module	6,3

		was 16.1%, indicating that this year's virtual module is comparable to in-person learning. So, despite COVID 19, we were able to achieve our mission of educating the children and increasing their knowledge on Florida ecosystems. Eighteen (18) LIFE Science Shorts have since been filmed and are publicly available on YouTube. Videos are aligned to Florida State science standards, feature guest experts, and demonstrations or activities that can be done at home or school. A Sarasota County teacher remarked "This program is remarkable. It is hard to mirror virtually, because of the vast knowledge the instructors have. For example, when students have questions, the instructors immediately know the answer and probe for more understanding. The virtual is extremely good too, but just want you to know what a valuable program this is to our students!!" One of our students remarked "I liked learning about the invasive and native species... I think I should go to the University of Florida to learn more."	
45.	**AgVenture Program Sustains Interest and Participation I Virtual Environment**	Fall AgVenture is a 2-week, agriculture education program for Hillsborough County 3rd graders, held at the Florida State Fairgrounds. AgVenture's popularity among schools has made it a special field trip opportunity for several years. This program relies strongly on public – private partnerships, which include the Hillsborough County Farm Bureau, Florida State Fair, UF/IFAS Extension Hillsborough County, Hillsborough County Schools, and nurseries, small businesses, and beekeepers to name a few. Each day, a new group of students arrive at the fairgrounds and rotate between five stations, learning about agriculture, horticulture, the economy, and agriculture and allied industry careers. But this year, AgVenture's traditional format faced challenges due to COVID-19 and school safety plans. The AgVenture planning team quickly pivoted and developed an alternative: AgVenture in a Box. The idea was to create a virtual learning experience modeled after the AgVenture that teachers have come to love. Speakers would pre-record their presentations – often taking place in the field and providing real-world context. Support materials, such as teacher training packets and hands-on youth activities, would be provided by speakers and compiled by the team for consistent messaging and AgVenture branding. For the first time, the entire AgVenture program and supporting curriculum materials were created and packaged for virtual use by local teachers.	6

		The UF/IFAS Extension team helped with this project significantly, investing staff time to film and edit videos and print materials. The Extension team helped produce six videos and 36,181 educational materials. To date, 97 AgVenture in Box kits have been purchased by teachers ($25/box) to teach approximately 2,000 students. This program has raised $2,425 dollars to sustain youth agriculture education. Because of this cooperative effort, an educational product – AgVenture in a Box – was newly created. The AgVenture program was able to continue, despite safety concerns posed by COVID-19. When it's safe to resume in-person group learning, AgVenture in a Box may be offered as a new option for teachers. This choice would provide teachers and students the opportunity to participate if they are unable to attend in person. Over the next few years, teacher and student feedback will enable the Florida Farm Bureau, Extension, and other partners to improve and update curriculum components. Results: As a result of AgVenture in a Box, youth increased awareness of agriculture and agriculture-related jobs. They also utilized technology for learning, while completing the activities in a safer learning environment. One unique feature of AgVenture is the shared expertise among public and private partners, which enriches the learning experience for students. Public and private partnerships, along with the school district, enhance youth education and the community. Long-term, agriculture remains relevant in Hillsborough County.	
46.	**Youth Mental Health at the Forefront in Pinellas County During 2020**	In 2020, COVID-19 upended many plans, including those of the Pinellas Youth Advisory Committee (YAC). YAC is an advisory committee that consists of high school aged youth in Pinellas. YAC is housed under and appointed by the Pinellas Board of County Commissioners (with one Commissioner assigned to lead the youth committee), in partnership with 4-H and UF/IFAS Pinellas Extension. In the past YAC offered youth perspective to projects when asked, learned about a variety of county and local government departments, and completed service projects. This year, however, proved to be a very historic one for Pinellas YAC, including when 32 members were appointed for the largest committee since its inception. Almost immediately, YAC members began discussing the problem with the required mental health sessions that were being presented at their schools. Teachers did not have the credentials or time to deliver the material effectively, and youth that were struggling felt brushed off. Because of this, they took on the ambitious goal of hosting a youth mental health fair. Just as planning began to get off the ground and event committees formed, COVID-19 locked everything down. Luckily, the adult advisors for YAC, the Pinellas 4-H Agent and a Pinellas Commissioner's aide, had a plan!	6

		Once the Governor gave the go ahead for Sunshine Committees to meet virtually, plans were made to meet on Zoom weekly instead of monthly to ensure completion of their service project. In another historical move for YAC, the group voted to continue their appointments into the summer, when traditionally the appointments ended with the school year. After the meetings were set, the youth members got to work. They decided to move their mental health fair to an online format, featuring a weekly webinar on different mental health topics including COVID-19 mental health, LGBTQ+ youth, suicide prevention, and substance use disorder. The members managed the webinars' promotions, led all meetings, solicited the speakers, and facilitated questions for their webinars. For the first time the YAC was a true youth-adult-partnership. A Proclamation by the Board of County Commissioners officially kicked off the Youth Mental Health Month and the Mental Health Monday Webinars in August. These webinars were a resounding success and have been shared on various social media avenues, as well as being featured on Bay News 9. In a survey about their YAC experience these 32-youth indicated they built many life skills, including leadership, managing stress, caring for their community, and resiliency. Not only did they increase their own skills, but they also helped bring awareness and insight to the incredibly important topic of youth mental health. Partnerships between county government, municipalities, and other community nonprofits are critical to 4-H's success, particularly in an urban county. It expands 4-H's reach to new and more diverse audiences, while also building credibility in the community. Youth that participate in 4-H programs like YAC learn valuable life skills that will help them thrive as successful adults and citizens for the rest of their lives. Mental health is an issue at the forefront of today's younger generations. In a 2020 survey by 4-H and the Harris Poll, 81% of teens say mental health is a significant issue for young people in the U.S., and 64% of teens believe that the experience of COVID-19 will have a lasting impact on their generation's mental health. Seven out of ten teens surveyed have struggled with mental health as well. This data shows how critically important this issue is to youth in the US. Positive Youth Development programs like YAC and 4-H have been shown to build resiliency and provide protective factors against negative outcomes (Lerner & Learner, 2012). By centering youth voices, adults can be sure that the topics and programs will be timely and beneficial to the youth involved and their greater community.	

47.	**Duval County FFA Successfully Pivots to Virtual, Sees Growth in Club**	When in-person programs were postponed due to COVID-19, Duval County 4-H began offering "FriYAYs" with 4-H. Friday afternoons, Alex logged into Zoom with other 4-H Juniors, 4-H Intermediates, and the Duval County 4-H Agents. Youth had the opportunity to play games, chat with friends, and complete arts, STEM, and culinary challenges. Most importantly, youth were given time to engage with their peers and experience "normal" time with friends during COVID-19. Soon, Alex began participating in more virtual 4-H opportunities including the statewide 4-H@4 Program and the 4-H Summer Adventures. This fall, he also registered for many of the Duval County Virtual 4-H At Large Club meetings focused on Arts and Sciences. In fact, Alex enjoyed his virtual experience with 4-H so much, that his mom decided to run a fundraiser for Duval County 4-H through her jewelry business. Through 19 virtual workshops at the county level and 14 virtual workshops at the state level, the Duval County 4-H agent engaged 439 youth participants in 2020. While FryYAYs with 4-H have ended, 4-H@4 has become a monthly program, and Duval County 4-H At Large Club has seen a jump in participation. Prior to COVID-19, the At Large Club was averaging 0-3 youth per meeting. Since moving to a virtual platform, each At Large Club meeting has had 20-30 pre-registrations. Youth reported feeling supported during these virtual workshops. Participants were also able to articulate something new they learned and how they planned to share the information with others. All participants have been able to complete the group projects form home and they have spent time engaging with their peers via the chat box and microphone features during Zoom meetings. Watching 4-H professionals lead virtual programs has also helped participants develop their own virtual leadership skills. Youth participating in these programs have been able to take ideas back to their virtual 4-H club meeting such as activities, games, and icebreakers.	6
48.	**FAMU 4-H Agri-STEM**	The main goal of FAMU 4-H AgriSTEM is to provide open avenues for interdisciplinary communication, education, and enthusiasm among students ranging from K-12 grades as it relates to science and math. Through experiential learning, following state standards, students increase their understanding of information related to topics in entomology, food sciences and natural resources.	6
49.	**Meeting the Needs of Local Youth by**	Because DeSoto County is a small rural town, the current volunteer's area of expertise consists of animal sciences and agriculture related topics. Although these are vital to the community, there are many youths that are not interested in raising livestock or learning about production agriculture. The DeSoto 4-H agent decided to	6

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	Diversifying Volunteer Expertise and Focus	recruit more volunteers with diverse interests. Volunteer recruitment is vital to expanding the reach in the county and was exemplified by a new community club that was formed in 2019. This volunteer opened the door and exposed a new, diverse, populations to 4-H, and 4-H above the county level. She got her youth excited about and exposed to opportunities that they never had heard about before. Not only does this volunteer serve as a role model to the youth in her club, but she also impacts a wider reach through teaching the agent and other adults about state level 4-H actives through past experience. Because of volunteers like this, 79% of DeSoto county 4-H officers reported that they feel welcome at 4-H activities, in a survey conducted. Expanding the reach of the positive youth development programs into the entire county through 4-H clubs, school enrichment, residential and day camps, and other events is not possible without the collaboration of volunteers. Not only did the club start the year with a large group of 20 youth, only 8 had past 4-H experience and those experiences were linked to livestock projects. Although those youth continued to raise and show their livestock, they focused on leadership and citizenship in their club. This was a foreign concept in DeSoto County and not only did the newly established community club gain new 4-H families, but those families also expanded their 4-H involvement to the district and state level. Four of the community club members began attending regular District X Council Meetings, supported by their volunteer club leader. Along with attending district council meetings, the new families were able to experience for themselves that 4-H is for everyone. The volunteer leader encouraged 7 members and their families to attend 4-H Day at the Capitol in Tallahassee, FL in January of 2020. While attending 4-H Day at the Capitol, the new club members were able to see firsthand that 4-H is open to all youth, regardless their race, ethnicity, gender, or beliefs. This quickly changed the family's mindset on who is welcome into the organization. The new community club has continued to reach more youth in DeSoto County by community awareness and has to put a limit on their club membership to accommodate for COVID restrictions but looks forward to opening back up to more new members in the future and making a positive impact.	
50.	**Studies on the Invasive Rice Stink Bugs Oebalus**	Arkansas, Texas, Louisiana, Mississippi, Missouri, California, and Florida produce most of the commercially grown rice in the U.S. which is the 4th largest exporter of rice in the world accounting for 12% of the global rice trade. Estimates for the 2015 rice production in the U.S. were $1.88 billion, about half of which was exported. The majority of domestic utilization of U.S. rice is direct food use (~58%), processed foods (~16%), beer (~16%),	7

	ypsilongriseus and Oebalus insularis (Hemiptera: Pentatomidae) : Potential Invasive Pests for U.S. Rice Grower	and pet food (~10%). Historically, the top insect pests in U.S. rice production have been the rice water weevil Lissorhoptrus oryzophilus (Coleoptera: Curculionidae) and the rice stink bug Oebalus pugnax (Heteroptera: Pentatomidae) which have been managed with cultural and chemical practices. In the past 20 years, two invasive stink bug pests of rice Oebalus ypsilongriseus and O. insularis have been introduced into South Florida. Thus, the first goal was to determine the origin of these 2 invasive species. The second goal was to delineate potential range expansion into other rice growing areas of the U.S. This project has provided genetic evidence that 2 invasive species in south Florida rice have their origins in Cuba. This is important due to the lack of interception records of the 2 species at ports of entry. The lack of genetic variation between the Florida and Cuba O. insularis and O. ypsilongriseus samples provides evidence that Cuba could be the source of these two invasive rice stink bug species to Florida. The native rice stink bug, O. pugnax, had high levels of genetic diversity for the mtDNA COI genetic marker relative to the two invasive species. There is support for migration of O. pugnax in southeastern USA with several haplotypes of O. pugnax being shared between Florida and Arkansas. Several haplotypes of O. pugnax being found only in Arkansas, Mississippi, or Florida, there may be locally adapted regional populations of O. pugnax. High levels of genetic variation in O. pugnax have also been observed in an unpublished series of mtDNA 5' region of the COI gene sequences submitted to GenBank (accession numbers KC007420 to KC007429) by Greenstone et al. in 2013. Of the 10 haplotypes they submitted to GenBank from O. pugnax samples collected near Tifton, Georgia in 2012 they observed up to 2.4% variation between haplotypes. This high level of genetic variation within a population of O. pugnax in Georgia supports what we observed from our samples collected from Arkansas and Florida. These species seem to be as or more numerous than the native O. pugnax at present in Florida rice. These species should be considered as a whole, when determining the pest management decisions regarding rice stink bug control. Information from the project has been shared with grower groups in South Florida and central Arkansas.	
51.	**Monitoring and Management of the Spotted Wing Drosophila,**	The spotted-wing drosophila (SWD), Drosophila suzukii is native species in the Southeast Asia. For over a decade, this invasive pest has been globally expanding. The economic losses to soft fruits and stoned fruits in the United States are increasing every year. Presently the only viable tool to reduce the SWD population is the continued use of broad-spectrum insecticides. Pesticide resistance is appearing in the populations for the SWD. Organic farmers have limited options to control this pest in the open fields. The major goal of this study was to develop cost-effective pest management strategies to manage the SWD using three type of mulches (two plant- based	7

	Drosophila suzukii (Diptera: Drosophilidae) in Florida	and one fabric-based) to reduce fly population and damage in open blueberry fields in north Florida. The study was conducted in two fruiting seasons. The study results demonstrated that the fly trap catches shortleaf pine needle mulch had much higher populations (about 2.5 folds) of the SWD than all other treatments. The fine texture of the mulch (pine needles) can easily facilitate the emergence of the SWD if the mulch is not thick enough. Although the pine needles covered the soil surface, it may have been too thin and thus allowed the SWD adults to emerge from the soil without much hindrance. In general, the fly population reduced within the use of pine bark and black weed fabric mulches. This is the first study that reports effects of three mulches in controlling the SWD populations which could benefit the conventional and organic blueberry growers. A field day on the blueberry production and protection was organized for the stakeholder and clientele. Several Master gardener, students, and growers participated. The following sessions were presented in this early summer field day: o Role of healthy pollinators in blueberry production, o Monitoring and trapping of the Drosophila suzukii, o Management of the spotted-wing Drosophila, o Blueberry crop productivity and profitability, o Breeding and grafting blueberries for the Florida Panhandle, and o Blueberry fruit tasting and cultivar evaluation.	
52.	**Digital Identification Tools for the Identification of Invasive Species**	In Florida, most of the shipments (> 85%) of economically important crops (tomatoes, peppers, strawberries, oranges, and nursery/ornamentals) entering the United States use Miami International Airport as their major transit point. These, along with shipments of other kinds of cargo that arrive by air, sea and land have been and continue to be the main pathways of introduction of Florida's most serious invasive pest insects. The Caribbean countries are considered the second most important region with respect to pest insect interceptions. The five leading insect orders are Coleoptera, Hemiptera, Homoptera, Lepidoptera, and Diptera. Due to its climate and geographic location, Florida is particularly vulnerable and at high risk for the introduction, establishment, and spread of invasive pests. The major goal of this project was to train graduate students to build digital identification keys based on the Lucid platform to support regulatory pest management. This year, five graduate students were trained to develop digital tools on the invasive pest insects.	7

53.	**Biological Control of Major Pests Affecting Food Crops**	Economic losses due to the introduction of invasive species in the United States were estimated at almost $120 billion each year (Pimentel et al. 2005). Invasive alien species pose a serious threat to agriculture, natural resources, and human health. Florida had at least 12,500 native insect species and more than 949 species accidentally and successfully established in the state as of 1995 (Frank & McCoy 1995). Since 1971, exotic insects are becoming established on Florida's shores at a rate of about 10 species per year. Fruit and vegetable production is a major industry in Florida. Nationally, Florida ranks second in the value of vegetable and melon production and fifth in all crops. Florida has approximately 9.25 million acres in commercial production on 47,500 farms producing food products not only for residents of Florida, but for consumers in other states and countries. At least one new invasive species of insect enters the state each month, potentially threatening agricultural crops and native species (Azore 2016). Thrips, whiteflies, aphids, and mites are major invasive pests that threaten vegetable and small fruit production in Florida, and there is a need for innovative strategies to mitigate such invasive species. The study focused on conservation biological control strategy which uses a combination of practices that create an environment conducive to preventing pest buildup and enhancing the availability of natural enemies that aid in controlling pest populations. It improves availability of resources such as food for adult natural enemies, alternative prey or hosts, and shelter from adverse conditions required for optimal performance by natural enemies (Landis et al. 2000). The trap crops for used include marigold, basil and bidens. Refuge crops include sunflower sweet alyssum and sorghum. The trap and refuge crops were planted in August 2020 as a border cropping to surround the main cash crops (eggplant, tomato, cabbage, bell pepper and okra). The beneficial arthropods released every two weeks included the mirid pirate bug, Orius insidiosus, the parasitoid wasp of whiteflies, Encarsia Formosa, the predatory mite, Phytoseiulus persimilis and the predatory mirid, Nesidiocorus tenuis. To evaluate pest infestations, ten percent (10%) of the plants in the experimental plot was randomly chosen for each sampling date and infestation levels of invasive species such as thrips, whiteflies, aphids, mites were recorded twice a week.	7

		Data indicated that three weeks after the release of E. formosa, the population of whiteflies declined from 75 % to 60%, then 48% after five weeks, 20% after eight weeks and down to 13% ten weeks post-treatments. Thus, E. formosa was successful in reducing whitefly populations in vegetable crops. Thrip populations under O. insidiosus pressure declined from 22% to 5% four weeks after treatments and down to 2% ten weeks post-treatments. Similarly, O. insidiosus was very effective in managing thrips populations in open field vegetable production. Mite populations were successfully controlled by P. persimulus as mite population densities declined from 30% to 1% after six weeks. The combined action of N. tenuis and O insidiosus have decreased the populations of aphids from 50% to 47% after two weeks and to 38% after five weeks and down to 1% after eight weeks. Overall, environmentally sound management of destructive invasive pests should significantly improve vegetable competitiveness on the market. The ability of farmers to produce chemical free vegetables should offer new avenues to increased profitability and food safety.	
54.	**Strategies for the Identification, Prevention and Management of Invasive Species**	The fall armyworm, Spodoptera frugiperda (J.E. Smith) (Lepidoptera: Noctuidae) is a serious maize pest in the world. Global trade assisted in its invasion of the eastern hemisphere due to imported plant materials. It feeds on a host range of more than 350 plant species and is the primary insect pest attacking sweet maize in Florida. Consistent pesticide use facilitated resistance in the species; therefore, there is an urgent need for alternative pest management strategies. Augmentative biological control provides the opportunity to strategically release biocontrol agents. This study was designed to investigate the integration of three biocontrol agents which occupied the same guild. Specific investigations targeted predator, parasitoid, interactions, and the influence of temperature. The study included several experiments conducted under laboratory conditions. Podisus maculiventris, Euthyrhynchus floridanus and Cotesia marginiventris are natural enemies of Lepidopteran pests. These three biocontrol agents could potentially be used for augmentative control of fall armyworm, depending on their interactions as expressed in the same guild. The study concluded that integrating these biological control agents is possible. Results from this study contribute to knowledge on the use of augmentative control for the integrated pest management of the fall armyworm.	7
55.	**Integrated Pest Management**	Several vegetables in raised beds and rows Cole crops (cabbage, cauliflower, kale, turnips & broccoli) and summer crops (tomato, pepper, okra, egg plants, and cucumber) were cultivated in integrated pest management (IPM) demonstration site in Florida A&M University to evaluate and demonstrate effective pest management	7

	(IPM) Approaches Adopted by Farmers Leading to Greater Profitability	strategies to small scale growers, students, consumers, pesticide applicators, extension agents, etc. These included growing of traps crops (sorghum, sunflower) and refuge crops (sweet alyssum, buckwheat, cilantro, marigold) for push and pull preventive strategy to manage serious pests including, stink bugs, western flower thrips, aphids, and whiteflies. Two undergraduate, two graduate and one summer intern were trained to properly identify, monitor, and manage these serious pests. IPM based training to pesticide applicators (3CEUs) and small farm growers were provided. Also, one session on conservation of biological control agents was delivered to small farm growers. In case of fruits, focus of activities was on plum curculio on plums & peaches and the spotted-wing Drosophila on blueberries & strawberries in north Florida. Monitoring of plum curculio was accomplished using tedder traps. While for Drosophila we used baited traps. Grower can monitor these serious pests effectively by using these traps. We have evaluated three types of mulches (pine needle, pine bark, & weed fabric) to control Drosophila in blueberries. The following field days, workshops, and extension & outreach activities were carried out to accomplish extension IPM: The project's team has provided training and professional learning opportunities to individual students and groups (growers and extension agents) to produce vegetable and small fruits using effectively and efficiently IPM strategies. The focus of these opportunities was on identification, monitoring and management of serious insect pests and diseases regularly occurring in vegetable and fruit crops in north Florida. Specifically, the stakeholders and clientele were provided the following major opportunities to support extension IPM: o Annual Vineyard Management, IPM, and Pesticide Safety Workshop - 10 February 2020 (25 participated). o Brown Marmorated Stink Bug's Parasitoids Workshop, Organized by Florida Department of Agriculture and Consumers Services - 3-4 March 2020 (15 Participated). Due to Covid-19 concern planned workshops and field days were cancelled for stakeholders. However, several students were trained to identify and monitor brown marmorated stink bug, a new pest of specialty crops in Florida. Also, the following two articles were published in the local newspaper for the small-scale growers and public outreach: Publications:	

		1). Haseeb, M. 2020. Brown marmorated stink bug, a new invasive pest in Florida. Newspaper article for extension and public outreach, Tallahassee Democrat, 28 August 2020. 2). Haseeb, M. and Lambert Kanga. 2020. Conserving healthy species for healthy gardens. Newspaper article for extension and public outreach, Tallahassee Democrat, 8 September 2020.	