

# 2017 Central State University Combined Research and Extension Annual Report of Accomplishments and Results

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## **I. Report Overview**

### **1. Executive Summary**

This document provides a report of Central State University (CSU) combined research and extension annual report of accomplishments and results for Federal Fiscal Year 2017.

Central State University (CSU), the only state-assisted Historically Black College and University (HBCU) in Ohio, became an 1890 Land-Grant Institution on February 7, 2014. Although CSU only begin receiving capacity formula funding in FY 2016, the institution was made eligible to receive Facilities Grant and allowed to participate in the competitive Capacity Building Grants (CBG) in 2014. Starting in 2016, the Land Grant program began operating with Dr. Subramania I. Sritharan who was the Dean of the College of Science and Engineering as the Interim Director and Dr. Clarence Bunch as the Associate Director for Extension. As the newest 1890 Land Grant Program, in Fiscal Year 2016, CSU received 100 percent match support from the State of Ohio. Later, Extension hired 6 full time support staff persons, purchased several vehicles and supplies. On the other hand, the Evans Allen Program hired 3.5 full time researchers, 2.5 full time technicians and 2 farm foremen.

The Central State University (CSU) land-grant mission continues to focus on the delivery of research, teaching, and extension services to the people of the state of Ohio. In Fiscal Year 2017, CSU continues to receive 100 percent match support from the State of Ohio. With the 2017 appropriation, the University is structuring, organizing, building, purchasing equipment and additional vehicles, and extending its research and extension presence across the state. In addition, research has purchase new and upgraded existing laboratory equipment for the purpose of teaching and research related to sustainable agriculture including environmental parameters and water resources for agriculture.

Central State University (CSU) Land Grant System continues to align the structure and operation of its Land Grant Program with the mission of the Land Grant legislation to provide outreach and research-based information to Ohioans. After a national search, Dr. Alton B. Johnson was appointed as the new Dean and the Land Grant Program Director. Dr. Sritharan became the Associate Director for Research in the program. Dr. Johnson moved to set up the necessary structures for the college. On the research side he appointed 3 full time new researchers and an expert on health & nutrition on 50% extension and 50% research. Three technicians and two farm foremen were hired. Dr. Claudine Gee was chosen after a national search and appointed as the Director of Operations and Fiscal Affairs for the Land Grant Program. On the Extension side, he appointed 10 full time Extension personnel to build the professional staff to provide education and outreach in transferring knowledge to communities. We hired 4 Program Leaders (Agriculture and Natural Resources, Family and Consumer Science, 4-H Youth Development, and Community and Economic Development); 5 County Agents, and 1 support staff. In order to align the academic programs better with the new Land Grant Mission, CSU merged the Depart of Agricultural Sciences and Natural Sciences to form the Department of Agricultural and Life Sciences and renamed the College of Science and Engineering (CES) as the College of Engineering, Science, Technology and Agriculture (CESTA).

Both the Research and Extension arm of Central State University Land Grant program is in operation.

The Evans Allen Program at CSU is currently recognized as the Agricultural and Research Development Program (ARDP) by the State of Ohio and this connotation is expected until sufficient capacity is built and the program truly recognized as an experimental station project. Sizeable amount during 2016-2017 was spent on acquiring equipment for laboratory research, vehicles for the programs and extension related farm tractors and implements. The Evans Allen Program continued with the 3 research projects it initiated, which are: (a) Optimal Agronomic Practices to Reduce Nutrient Loading in Ohio's Water Bodies, (b) Enhancement of Farm Productivity; Conservation and Sustainable Utilization of Natural Products and (c) Enhanced Crop Production Efficiency through Mechanized Integrated Pest Management Strategies.

Whereas, the Cooperative Extension arm of CSU Land-grant system has attracted and collaborated with federal, state, and local entities. We have expanded our outreach capacity with community groups, industry organizations, specialty groups, and state organizations. The Extension Service has co-located staff in 5 Ohio Counties with Ohio State Extension. Extension has implement Extension programs focused on the needs of Ohioans and under-represented, limited resources, and socially disadvantaged individuals and families in rural and urban areas in Ohio. As a result, we have had direct and indirect contact to approximately 18,000 people in seven counties across the state of Ohio. We have developed over 20 Extension educational programs; created 2 4-H Youth Summer Camps, engaged communities through 33 Community Events; conducted 4 Small Farm Conferences and carried out 7 agriculture education workshops; completed 4 Ag tours; worked with over 30 schools and groups with In-School and After School 4-H Youth Development programming; participated in 13 Community Economic Development workshops; provided education to over 4000 Ohioans through Family and Consumer Science events; and formed partnerships with 8 different organizations (City of Trotwood, City of East Cleveland, Toledo's YWCA, Xenia's REACH, Montgomery Foodbank, RID-ALL Cooperation, (OEFFA), USDA Natural Resources Conservation Service) in order to help Ohioans improve their lives and sustain communities.

As Central State University (CSU) Land Grant Program continues to implement the 2016-2020 Joint Plan of Work, the role of both the research and extension programs will continue to focus on extending new knowledge and leverage opportunities in participating in multistate activities, expanding stakeholders, and collaborating with other institutions. This will continue to play a significant part in aligning the CSU land-grant system's strength, resources, and research programs with the needs of the citizens of the state. CSU Land Grant Research will provide the science for the integrated research, teaching, and extension, while CSU Extension will continue to provide relevant community- based outreach leadership and education to engage communities to transform Ohioans' lives.

**Total Actual Amount of professional FTEs/SYs for this State**

Year: 2017	Extension		Research	
	1862	1890	1862	1890
Plan	{No Data Entered}	21.0	{No Data Entered}	11.0
Actual	0.0	16.0	0.0	10.1

**II. Merit Review Process**

**1. The Merit Review Process that was Employed for this year**

- Internal University Panel
- Combined External and Internal University Panel
- Combined External and Internal University External Non-University Panel

## 2. Brief Explanation

The CSU merit review process includes the development of Internal University Panel and Combined Internal and External Non University Panels in FY 2017.

Internal University Panel- For the Evans Allen Research Program the Internal University Panel included the new researchers in the program - Drs. Prathibha Gupta, Hongmei Li-Byarlay, Marcus Nagle and Sakthi K. Subburayalu. The team was led by Dr. Subramania Sritharan and the group met monthly to review the project progress and to determine resource allocations. Likewise, Extension created an internal merit process panel that consist of CD, ANR, 4-H Youth Development, and FCS Program Leaders. The recommendations were implemented through the Dean/ Director's office.

Internal Universal Panel- Quarterly the researchers and Program Leaders meet to discuss the current research projects in the program. The panel meet to connect Extension and Research Program in communities to address specific Impact Areas and peer review experts on publications.

Combined Internal and External University Panel- Organized a joint CSU and OSU panel to review planned programs and serve as part of the Extension Joint Internal and External Council to evaluate multi & joint program activities.

Combined Internal and External and External Non University Panel - Created a steering Extension committee between Ohio State Extension and Central State Extension. The group meet monthly to discuss joint program development and discuss multi and joint program activities; to provide guidance on internal policy development and operations policy and provide advice on addressing stakeholders' feedback with co-located counties.

## III. Stakeholder Input

### 1. Actions taken to seek stakeholder input that encouraged their participation

- Use of media to announce public meetings and listening sessions
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Survey of traditional stakeholder groups
- Survey of the general public
- Survey of selected individuals from the general public
- Other (focus groups, public information booths at local gatherings)

#### **Brief explanation.**

Stakeholders' participation is encouraged through surveys, focus groups, public information booths, and targeted invitation to traditional stakeholders, individuals and groups in several ways.

The Evan Allen Program Researchers interacted with different stakeholders as they attended different meetings:

Project I - Optimal Agronomic Practices to Reduce Nutrient Loading In Ohio's Water Bodies

We held meetings with Community Solutions for Collaborative Research Work on their farm fields.

The project provided an opportunity to discuss partnership with Arthur Morgan Institute for community solutions at Yellow Springs, Ohio to research and extend sustainable solutions to the farming community in the region with a particular emphasis on soil and water quality.

Project II: Enhancement Of Farm Productivity; Conservation And Sustainable Utilization Of Natural Products:

- Networks and collaborations were fostered with 12 small farms and businesses in Ohio for development of the natural products program. Cooperation was established with the National Cancer Institute for obtaining and evaluating samples for their repositories for antibiotic and anticancer properties. Local organizations were advised on land restoration projects. We developed an on line form to report feral bees. Developed online survey form for reporting feral bees in state of Ohio (<https://goo.gl/forms/jJPqTxfDPiuSq2Lg1>).
- Index of Biological Integrity (IBI) for Reptiles in herbaceous wetlands of Ohio. These indices for amphibians and vegetation are developed by the state conservation agency. A IBI for reptiles in herbaceous wetlands is not available. These indices help conservation agencies and researchers a basis to work on the ecological status and to develop management plans. A conservation protocol involving land owners, NRCS and CSU is developed where all the parties win and achieve total conservation of wetlands in Ohio.

Project III - Enhanced Crop Production Efficiency through Mechanized Integrated Pest Management Strategies.

- All involved faculty, students and technicians attended CULTIVATE 17, a trade show, education series and networking event in Columbus, OH that brings together all interested in horticulture in Ohio to observe and interact with new products, ideas and innovation trends. The researchers attended the Ohio State Legislature Land Grant Day at the Ohio State House, Columbus, OH to apprise the Ohio legislators to show progress and obtain feedback.
- All Evans Allen researchers Attended Farm Science Review in London, Ohio. in September 2017 Every year The Ohio State University organizes a two-day event in London, Ohio that is attended by approximately 140,000visi tors and 600 exhibitors to learn and share about the recent trends in agricultural production. The project personnel were able to attend Farm Science Review and gain useful insights in agricultural research. The event also facilitated meeting with famers, researchers and stakeholders in the project area and strengthened partnerships with them to carry out the objectives of the research projects.

Extension actions to seek stakeholder input was fostered through surveys with general public, non-traditional stakeholder groups, and focus groups.

- The Co-located Extension offices with OSU Extension work with advisory councils to gather stakeholder's input for programming to address issues and concerns expressed within the community.
- Surveys were issued during two conferences and at 5 Extension tours to gather stakeholder input from the general public.
- Stakeholder input was encouraged through sharing and listening at seven public information booths across the state.
- Extension issued surveys to traditional stakeholder groups to seek stakeholder input and

participation.

- Government Relations conducted focus groups across the state to encourage stakeholder's input.

**2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

**1. Method to identify individuals and groups**

- Use Advisory Committees
- Use External Focus Groups
- Open Listening Sessions
- Use Surveys
- Other (one on one with existing and stakeholder)

**Brief explanation.**

Multiple methods were used to identify individuals and groups to seek stakeholder input. The Evans Allen researchers in the different projects identified the stake holders through the different meeting such as the Farm Science Review, Web search and with assistance from Extension specialists. Whereas, Cooperative Extension utilized advisory committees, surveys, focus groups, and face-to-face meetings.

**2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

**1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey of the general public
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Survey specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public
- Other (focus groups interviews, qualitative data, )

**Brief explanation.**

The Evans Allen Researchers used individual contacts, advice from Extension specialists, web search and their prior experiences to obtain stake holder input. The process employed through Extension to seek stakeholder input included having the Extension county agents to reach out to local federal, state, local, civic, and community based organizations to identify individuals and

groups that are stakeholder's and partner with the organization to conduct host events to meet and issue surveys to them. These efforts were made to ensure that the stakeholders involved included representatives of the limited resource households in terms of geographic location, family status, income level, race, age, gender, disability status, and users or non-users of existing educational programs.

### **3. A statement of how the input will be considered**

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities
- Other (to collect data and conduct research)

#### **Brief explanation.**

For both Research and Extension, the stakeholders' input is critical to the development of relevant research focus and Extension programs development. The Evans Allen researchers, the input was used to collect data and conduct research. For Project I, the farms to be selected for collection of field runoff data will be through a survey and with assistance from the NRCS conservationists in the area. For Extension, the inputs were used to create Extension programs based on community needs. It was essential to focus and affirm program locations and priorities. The stakeholders' input helped CSU be adaptive to societal needs and identify emerging issues. In addition, the input helped CSU shift direction in staffing arrangement and budgetary consideration based on the greatest needs of the population.

#### **Brief Explanation of what you learned from your Stakeholders**

There are two significant things that were brought to our attention from stakeholders: 1) the importance of research and 2) the impact of our community-based programming approach. For the research projects under the Evans Allen Research Program, the groups we met informed us that the research projects would bring meaningful impacts. With regard to Project I, the farmers have come forward for field data collection on agricultural runoff. For project II, the Levin Foundation, a philanthropic organization and an interest group has continued to support for the project on pollinators. Area bee keepers have donated beehives and bees for research. Research has appeared to be an important consideration for stakeholders. Based on survey responses and meetings conducted by Extension through more than 30 events, many stakeholders across the state have expressed how effective CSU community-based program delivery approach has been in terms of outcomes-related to increased awareness and inclusion; and they have expressed how they have been impacted in terms of improve conditions and being better informed. What we have learned is that when we listen, meet with, and work directly with the people it has a more profound impact on behavioral changes and knowledge gain and addressing group and individual needs.

#### IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{No Data Entered}	{No Data Entered}	{No Data Entered}	{No Data Entered}

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
<b>Actual Formula</b>	0	740612	0	1127087
<b>Actual Matching</b>	0	829697	0	1132705
<b>Actual All Other</b>	0	0	0	0
<b>Total Actual Expended</b>	0	1570309	0	2259792

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
<b>Carryover</b>	0	230000	0	879813

## V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Improving Agriculture, Plant Pathology, and Economics
2	Developing Better Social Economic Sustainable Communities
3	Building Families and Communities
4	Creating Youth Pathways to Success



**V(A). Planned Program (Summary)**

**Program # 1**

**1. Name of the Planned Program**

Improving Agriculture, Plant Pathology, and Economics

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources		0%		5%
102	Soil, Plant, Water, Nutrient Relationships		10%		10%
111	Conservation and Efficient Use of Water		0%		5%
112	Watershed Protection and Management		0%		10%
133	Pollution Prevention and Mitigation		0%		10%
135	Aquatic and Terrestrial Wildlife		15%		5%
136	Conservation of Biological Diversity		0%		10%
201	Plant Genome, Genetics, and Genetic Mechanisms		0%		5%
206	Basic Plant Biology		5%		0%
216	Integrated Pest Management Systems		0%		20%
402	Engineering Systems and Equipment		0%		10%
405	Drainage and Irrigation Systems and Facilities		0%		5%
605	Natural Resource and Environmental Economics		20%		5%
608	Community Resource Planning and Development		50%		0%
	<b>Total</b>		100%		100%

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	5.5	0.0	2.0
<b>Actual Paid</b>	0.0	5.5	0.0	10.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	10.0

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	148602	0	1127087
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	165939	0	1132705
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Evans Allen Research Program

**Project I: Optimal Agronomic Practices To Reduce Nutrient Loading In Ohio's Water Bodies Non Technical Summary.**

The Great Miami River basin is characterized by non-point source pollution due to runoff from agricultural runoff and urbanization. The river basin is also home for two lakes - Indian Lake and Lake Loramie. These lakes are heavily used for recreation. Toxic algal blooms in the watershed has caused serious problems for users of River (upper) in Logan, Shelby, Mercer, Auglaize, Darke, Champaign, Hardin and Miami counties watershed in western Ohio. Land use in the Great Miami River (upper) watershed is comprised of 71% cultivated crops, 8 percent pasture and hay, 9 percent forest and 9% developed land. The project aims at developing solutions for reducing Nitrogen (N) and Phosphorous (P) in the runoff from, primarily the agricultural areas in the watershed by recommending appropriate agronomic practices for the farmers considering the climate and hydrological conditions in the watershed. Farmers are expected to benefit by the recommendations on optimal agronomic practices along appropriate timelines that will consider the effects runoff producing events under conditions of climate change. Water quality in the streams and lakes is expected to improve with the adoption of these practices which in turn will lead to better conditions for humans using the streams and lakes and the aquatic life in the system.

**Accomplishments:**

- A soil scientist was hired after a national search. Dr. Sakthi K. Subburayalu with a PhD in Soil Science from the Ohio State University was hired.
- A laboratory technician was hired after a search. Ms. Adelyn Reeves was hired as a technician (0.5 time).
- Geodatabase for the GMR watershed has been assembled.
- Instrumentation for continual flow monitoring at one on farm site has been procured.
- Purchase of lab instruments required for soil and water analysis and set up of these instruments in the lab is complete for ICP-MS and CN analyzer.
- Literature review for creating a farmer's survey instrument has been completed.

- Meetings with Community Solutions for Collaborative Research Work on their farm fields

The project provided an opportunity to discuss partnership with Arthur Morgan Institute for community solutions at Yellow Springs, Ohio to research and extend sustainable solutions to the farming community in the region with a particular emphasis on soil and water quality.

- Attended training on UV-VIS and Near Infrared spectroscopy sponsored by Agilent UV-Visible and Near Infrared spectroscopic measurements on soil for assessing soil properties is fast becoming a rapid soil analysis tool. The projects' focus on the impact of soil management on water quality will require methods that are cost and time effective. UV-VIS NIR spectroscopic measurement provides a viable alternative to the traditional wet soil chemistry. The project facilitated a training for the project personnel in the use of these technologies that fosters professional growth. The training was sponsored by Agilent Technologies.

- Attended a workshop on Unmanned Aerial Systems at Sinclair Community College  
The use of drones in agriculture is gaining momentum because of its efficiency in mapping management zones in farm fields effectively. Finding innovative ways to integrate this technology into the objective of identifying optimal agronomic practices that would reduce the problem of nutrient loading could become beneficial.

- Attended Farm Science Review in London, Ohio. Every year The Ohio State University organizes a two-day event in London, Ohio that is attended by approximately 140,000 visitors and 600 exhibitors to learn and share about the recent trends in agricultural production. The project personnel were able to attend Farm Science Review and gain useful insights in agricultural research. The event also facilitated meeting with farmers, researchers and stakeholders in the project area and strengthened partnerships with them to carry out the objectives of this project.

- Attended installation and training sessions for ICP-MS, GC-MS, GPR, and CN Analyzer  
To carry out nutrient analysis in soil and water the above mentioned equipment were purchased. Each equipment was installed according to the guidelines provided by the vendors including Agilent Technologies (ICP-MS, GC-MS), US-Radar(GPR), and CE Elantech (CN Analyzer). Vendor provided training for each these equipment was attended by the project personnel. The training lasted 4 days for each of these equipment except for the GPR training which was completed in a day. Trial runs using soil and water samples were carried out to familiarize with the various components of the instrument system including hardware and software.

## **Project II - Enhancement of Farm Productivity; Conservation And Sustainable Utilization Of Natural Products**

### **Non-Technical Summary**

Growing a diverse selection of crops can expand the small farmer's markets and offset commodity price swings. Profits will not depend exclusively on any one market example; such as corn or soy beans. Therefore, strategic diversification improves the overall economic picture of the small farmer. However, help is needed to determine which alternative crop would be the best. The project aims to identify and test novel native and exotic plants which have non-conventional uses like medicinal plants, anti-bacterial and anti-allergic properties. Apiary could be a multi-pronged benefit to the small farmer and aid the diversification. It not only produces honey wax and propolis, but also enhances pollination and increases fruit tree production. Small animals for fiber production could also add to the diversification, such as the fiber yielding English Angora rabbit. The Ohio climate is ideal for Angora rabbits and the ease with which it is grown makes it an ideal product for diversification on an animal farm. In order to make the small farmer sustainable, it is essential to conserve natural prairies and wetland in the area. Ninety percent

(90%) of the native prairies and wetlands are lost to land-use pattern changes in Ohio; therefore, what remains has to be carefully conserved and managed in order for them to play a role in the environment. Natural wetlands, apart from cleaning up the water and providing a stock of underground water, also harbor rare plants and animals that aid in the sustainability of the farmer. This project proposes to develop methods to measure the biological integrity of the wetlands through long-term monitoring. It is envisaged to expand the research capability of CSU in order to 1) develop novel plant-based products and suggest alternative crops for small farmers. 2) identify varieties of rabbits for fiber and 3) develop winter-hardy, mite-resistant honey bees. It is the small farmer, federal and state agencies, that manage prairies and wetlands that will most benefit from this research project.

### **Accomplishments**

Capacity building has been accomplished for Objectives 1, and 3. Research faculty has been hired to realize Objectives 1 & 3. Equipment has been procured in order to proceed with research on Goals I and III. Foremen /technicians for laboratory and experimental station (research farm) have been hired to assist and support in the realization of all the objectives. A researcher with 50% extension function with background in health, nutrition and food science was engaged to complement the research on natural products as an interdisciplinary effort. This component was added to the initial three different components - Conservation of prairies and wetlands, Alternate Crops & Honey bee cultivation. These tracks had different levels of accomplishments as described below.

**Conservation of prairies and wetlands:** After initial survey of the natural areas and wetlands in south western Ohio three sites for immediate study and two for later study were identified within reach of CSU campus aiding easy sampling namely Prairie Road Fen (Clark County), Spring Valley (Greene County) and Cedar Bog (Urbana County). The future study areas are Beaver Creek Wetland and Beaver Creek Land Trust.

Successfully initiated acquiring 12 acres of farmland to add to the Prairie Road Fen natural wetlands in Clark County OH for conservation purpose. This was achieved by persuasive meetings and discussions initiated by the Co-PI with land owner, NRCS, Army Corp of engineers, ODNR and USFWS. Valuable field data on the snakes, vegetation and pollinators populations were collected. Population data on state endangered species *Massasauga rattlesnake* was documented.

Specific Objectives met: Achieved conservation of 12 acres of wetland. Established a database for endangered species of rattlesnake and other reptiles of the wetlands.

Significant Results achieved

Data on Reptile population in the herbaceous wetlands of Ohio.

Data toward developing an IBI for reptiles in herbaceous wetland and a management plan for endangered reptiles of wetlands in Ohio.

As part of the activities of this study two students were trained in the methods of field study design and data collection for reptile species. Cover boards, drift fences and pitfall traps for ground snakes, funnel and floating traps for turtles and visual encounter studies for lizards were developed as part of student training. The new horticultural researcher, Dr. Marcus Nagle was trained in conducting surveys for vegetation in the herbaceous wetlands of Ohio.

convolutional neural networks such as Google Net (Inception), Inception-v3, and Mobile Net. We currently achieved above 98% accuracy in real life test. Details in this work are to be published.

Robotics: As an outgrowth of a capacity building grant, robot parts and a drone were purchased for this Agriculture Technology project. The drone currently is being used for: 1) aerial monitoring of weed densities; and 2) promotional videos to showcase research to different audiences. The robot parts were assembled to pull up to 500 lbs. The goal is to automate a directed energy weed system that can go through a field, identify and kill weeds without an operator.

#### Organic Weed Control --

Since the directed energy is non-ionizing radiation and non-chemical, it is organic. We established a 0.7-acre soybean test plots to compare directed energy with herbicide (glyphosate), mechanical till and no treatment. Directed energy was comparable with mechanical till and did not damage the soybean plants as did the herbicide treatment. A series of experiments also were established to gather preliminary data on: 1) weed control of Japanese Knotweed, an invasive species in local wetlands; 2) killing leaf bacteria without killing the host plant; 3) sterilizing wood; 4) evaluation of root damage following a directed energy treatment in dandelion; 5) killing a cover crop during crimping and drilling in the crop.

#### Specific objectives met

- Completed one-year soybean trial using directed energy to control weeds.
- Initiated multiple preliminary trials to kill bacteria in living and dead plant systems, controlling cover crops and researching any root damage to a weed following directed energy treatment.
- Making progress on integrating robotics and computer visualization to complete a working, automated machine to kill weeds in a field.

#### Significant results achieved include the following:

- A transfer learning algorithm was developed and tested to distinguish various weeds from crops. It has up to 98% accuracy in real life test.
- Separate soybean and weed image databases were built with more than 30,000 raw images. Six different varieties of soybeans were used for the soybean database.
- Demonstrated that directed energy from a tractor pulled device has similar weed killing capacity to mechanical till compared to herbicide and no treatment controls.

#### Other accomplishments realized

- Engaged six students in undergraduate student activities related to killing weeds with directed energy and engineering design.
- Presented 2 research posters and 1 invited talk at scientific conferences.
- Developed one manuscript

For 2017, Extension conducted a number of activities to implement programs involving community resources and planning, natural resources and environmental economics, aquatic and terrestrial wildlife in the following areas:

- We hired five County Agents with ten percent ANR responsibility.
- We sponsored six meetings on urban agriculture - statewide conference track.
- Held four Ohio Sustainable Farm Tours in five Ohio counties.
- Conducted 3 outreach education workshop during Ohio States' three-day Farm Science Review.
- Participated and provided outreach education in five-five-day county fairs in five different counties.
- Provided outreach education in Ohio's five5-day State Fair.
- Held 4 Ag education workshops.

## 2. Brief description of the target audience

The targeted audiences are farmers, small farmers, general public, new beginning farmers, limited resource growers and families, and women and minority farmers from rural and urban communities. AFWRC and CEP information will be shared with fellow scientists from STEAM programs, fellow agencies such as USDA, ODA, Ohio DNR, and EPA, political entities, K-12 administrators and counselors and fellow scientists and students in the fields of sustainable agriculture, water resources management, environmental engineering, manufacturing engineering, and agricultural education and food science.

**Specific:**

**Project I:**

The primary target audiences are farmers, crop advisors, extension personnel and other stakeholders who make management decisions on farm fields. The project goal of identifying optimal agronomic practices that will reduce nutrient loading in the Great Miami River (GMR) Watershed through establishment of edge-of-field water quality monitoring at farmer's fields was communicated to stakeholders that are actively pursuing agricultural sustainability and environmental quality in the GMR watershed and other areas of the state. Specifically, through personnel meetings the goals were communicated to Miami Conservancy District (MCD), Community Solutions, Tecumseh Land Trust, and County soil and water conservation districts in the GMR watershed. The goals were also communicated to other on-farm researchers and extension personnel in the state during the annual Farm Science Review hosted by The Ohio State University and at the annual Crop, Agronomy and Soil Science society of America meeting.

**Project II:**

Small farmers and under-represented farmers of the area.

- Ohio Department of Natural Resources
- US Fish and Wildlife Services
- US Army Corp of Engineers
- Industry Partners will benefit from accelerating product integration and market access, while reducing risks and costs.
- Growers (farmers, community gardeners, land managers, others) will benefit from the development of new, economically viable agricultural products.
- Undergraduate students directly involved in the research
- Beekeepers/queen breeders in Ohio
- Small farms/natural product businesses
- Local organizations in Yellow Springs OH working on land conservation
- Sustainable Agriculture Undergraduate students at CSU
- Local farms, businesses and communities in southwestern Ohio

**Project III:**

The target audience included organic farmers and gardeners, scientists and undergraduate students. The directed energy technology is non-ionizing and therefore, organic. Directed energy is an integrated pest management strategy. Any farmer, conventional to organic, interested in methods to reduce herbicides is the target of this technology. Machinery built to house directed energy with selective computer visualization to kill weeds focused on farmers in organic farm fields such as soybeans. Information was shared in a variety of venues that included organic farmers, Ohio state legislators, and fellow scientists. Impacted target audiences are listed below.

Individual and Institutional Researchers (university or industry) Industry Partners

Growers (farmers, community gardeners, land managers, others) CSU Faculty and Research Faculty

CSU Undergraduate Students

Prospective CSU Undergraduate Students

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	500	1000	150	900

**2. Number of Patent Applications Submitted (Standard Research Output)**  
**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	0	1	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of Educational demonstrations for farmers in general and small, limited-resource, and minority farm families in particular on best management practices and best available technologies on sustainable agriculture.

Year	Actual
2017	15

**Output #2**

**Output Measure**

- Number of Educational programs, activities, or events on ecosystem services and sustainable agriculture

Year	Actual
2017	3

**Output #3**

**Output Measure**

- Research publications related to different components of sustainable agriculture

<b>Year</b>	<b>Actual</b>
2017	5

**Output #4**

**Output Measure**

- Research-based, reader-friendly pamphlets, and fact sheets on sustainable agriculture and farm economics

<b>Year</b>	<b>Actual</b>
2017	1

**Output #5**

**Output Measure**

- In each output measure, we will take inventory on total number of participants.

<b>Year</b>	<b>Actual</b>
2017	1700



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	To identify new knowledge, techniques and improved hypothesis on questions related to Natural Resources and Environment
2	To identify research activities Plant Health, Plant production and Products as to generate new knowledge, information, techniques, and tools.
3	To identify research activities related to Agricultural Systems and Technology such as new knowledge, techniques, improved hypothesis on questions.
4	To identify research activities such as new knowledge, techniques and improved hypothesis on questions related to Agricultural Economic and Rural Communities

**Outcome #1**

**1. Outcome Measures**

To identify new knowledge, techniques and improved hypothesis on questions related to Natural Resources and Environment

**2. Associated Institution Types**

- 1890 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	150

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Many of the social disadvantage participants which has attended our workshops or events have gained new fundamental knowledge.

**What has been done**

We have conducted educational workshops.

**Results**

They have described that through our community-base approach they have learned and improved their knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
605	Natural Resource and Environmental Economics

**Outcome #2**

**1. Outcome Measures**

To identify research activities Plant Health, Plant production and Products as to generate new knowledge, information, techniques, and tools.

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

To identify research activities related to Agricultural Systems and Technology such as new knowledge, techniques, improved hypothesis on questions.

#### **2. Associated Institution Types**

- 1890 Research

#### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

#### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	3

#### **3c. Qualitative Outcome or Impact Statement**

##### **Issue (Who cares and Why)**

Farmers are interested in eliminating weeds in agricultural weeds without applying chemicals. There is a growing demand for organic agricultural produce.

##### **What has been done**

Researchers from CSU have been engaged in applying directed energy in eliminating weeds in agricultural fields.

##### **Results**

Significant results achieved include the following:

A transfer learning algorithm was developed and tested to distinguish various weeds from crops. It has up to 98% accuracy in real life test.

1. Separate soybean and weed image databases were built with more than 30,000 raw images. Six different varieties of soybeans were used for the soybean database.

2. Demonstrated that directed energy from a tractor pulled device has similar weed killing capacity to mechanical till compared to herbicide and no treatment controls.

#### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation

201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
216	Integrated Pest Management Systems
402	Engineering Systems and Equipment
405	Drainage and Irrigation Systems and Facilities

#### **Outcome #4**

##### **1. Outcome Measures**

To identify research activities such as new knowledge, techniques and improved hypothesis on questions related to Agricultural Economic and Rural Communities

Not Reporting on this Outcome Measure

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

- Appropriations changes
- Government Regulations
- Competing Programmatic Challenges
- Other (support in school for programs)

##### **Brief Explanation**

CSU is a new 1890 institution and relies totally on the appropriations of Federal funding to conduct its Land Grant activities. There have been government regulations and uncertainties in the level of funding CSU is expected for its capacity grants. There are competing programmatic changes when the state releases its match after seeing the Federal allocation. The delays in the arrival of funds from the Federal side slows down the project activities and ability to hire staff. Funding is a significant external factor affecting outcomes.

#### **V(I). Planned Program (Evaluation Studies)**

##### **Evaluation Results**

CSU is a new 1890 Land Grant program and the evaluation of the research activities has not begun since we are still setting up instruments and the research faculty are getting trained in the use of the new equipment. Field research components are being just set up. We could engage in evaluation only after achieving some maturity in the research activities.

CSU Extension was able to conduct 12 educational workshops to educate Ohioans, socially disadvantaged, limited-resourced, under-served and under-represented farmers, groups in rural and urban communities. Participants' responses from these events were that they received new knowledge. In addition, the evaluation from the population surveyed resulted in behavioral changes as they learned about specific program for new and beginning urban clients interested in farming.

#### **Key Items of Evaluation**

The need to develop specialized evaluations instruments to capture cognitive social changes for the planned program is a key item of evaluation. However, timely allocation of funding for the research and extension land-grant programs would be most helpful for having the financial ability to hire specialized staff that can prepare, distribute, and retrieve better evaluation instruments for the planned program.

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**V(A). Planned Program (Summary)**

**Program # 2**

**1. Name of the Planned Program**

Developing Better Social Economic Sustainable Communities

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
602	Business Management, Finance, and Taxation		30%		0%
607	Consumer Economics		20%		0%
608	Community Resource Planning and Development		50%		0%
	<b>Total</b>		100%		0%

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	5.5	0.0	3.0
<b>Actual Paid</b>	0.0	5.5	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	148002	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	165940	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

## 1. Brief description of the Activity

The development of the CSU Land Grant planned program Developing Better Socially Economically Sustainable Communities has been a four-phase approach with the goal of transcending social, economic, political, and academic boundaries, all in the interest of assembling wide-ranging expertise in the delivery of services to vulnerable and under-served communities in the state of Ohio. In this four phase approach: 1) we identified each major city where CSU Land Grant Program is located, 2) engaged in community discussions with city majors, city managers, and community leaders, 3) recognized specific community and economic developments, and 4) garnered letters and commitments of support to jointly address some of the prevailing issues surrounding workforce development, job creation, neighbor restoration, and community revitalization projects. We are still building our planned program for "Developing Better Socially and Economically Sustainable Communities. Below is the timeline that reflects what we have done:

### Suggested timeline:

Spring 2016

- Research and gather data on urban areas with under-served communities as evidenced by indicators such as obesity rates, infant mortality, food stamp recipients, distance to supermarkets and other sources of healthy foods, abandoned and distressed acreage.
- Identify the area most appropriate for the initial seminar/conference.

Summer 2017

- Define conference focus and short-term goals.
- Plan conference date, events, logistics/equipment.
- Identify prospective collaborators; assess budget impact of their participation.
- Preliminary discussion with collaborators on short- and long-term goals,
- Establish relationships with county and state community development organizations.
- Secured endorsements, support, and commitment from collaborators for conference participation.
- Held 9 agribusiness and business education workshops.
- Participated in 3 conferences.
- We have identified and communicated with individuals and groups with expertise and interest in curriculum development in their areas, with the goal of establishing a group, tentatively named School-to-Community Education I, with overall responsibility for reviewing, approving and finalizing proposals.
- We have developed 7 CD education programs.

## 2. Brief description of the target audience

More than 340,000 poor families live in Ohio; this represents 11.6 percent of the families in the state. 16.0 percent of the population or 1,797,000 people who fall below the poverty line. Much of the cause of this poverty is lack of opportunities in the local communities for jobs. According to the 2015 Ohio Poverty Report, families with children ranging from 7.3% among married couples to 55.3% for those headed by female single parent experienced poverty during the last year. Our target remains to be all Ohioans, but especially those who are socially disadvantaged.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	150	1000	150	500

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
<b>Actual</b>	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Demonstrate how consumer behavior affects purchasing decisions. Conduct seminars on family economics and spending and their effect on local markets  
 Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- Conduct and evaluate seminars on poverty, welfare, and economic discrimination

<b>Year</b>	<b>Actual</b>
2017	0



**Output #3**

**Output Measure**

- Conduct training for small, minority, farmers, and participate in small business development training with local partners (DDC, TEC, etc.)

<b>Year</b>	<b>Actual</b>
2017	9

**Output #4**

**Output Measure**

- Conduct and evaluate seminars on poverty, welfare, and economic discrimination

<b>Year</b>	<b>Actual</b>
2017	0

**Output #5**

**Output Measure**

- Establish urban farms within local (Greene and Montgomery County) municipalities.  
Not reporting on this Output for this Annual Report

**Output #6**

**Output Measure**

- Conduct Personal Finance Seminars, Retirement Seminars  
Not reporting on this Output for this Annual Report

**Output #7**

**Output Measure**

- Conduct Seminars in predatory lending and protecting the consumer.  
Not reporting on this Output for this Annual Report

**Output #8**

**Output Measure**

- Conduct seminars in building better relationships and reducing household stress.  
Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Demonstrate how consumer behavior affects purchasing decisions. Conduct seminars on family economics and spending and thier effect on local markets. The Planned Program will interface with local and regional relief agencies in order to sponsor seminars on selected topics including shopping in your neighborhood, consuming products grown and raised by local farmers, making better economic decisions, and leveraging the distribution of labor in the family.
2	Conduct and evaluate seminars on poverty, welfare, and economic discrimination in underserved and economically at-risk communities. These seminars will cover a variety of topics including fair housing, economic discrimination, equal pay in the workplace, job availability, and the availability of economic opportunities in the geographic area. Seminars will also be used to teach participants to dress for interviews, interviewing skills, completing employment applications, and career planning.
3	Engage economic development & entrepreneurial partners in Greene & Montgomery counties to conduct quarterly education workshops to promote sustainable agriculture development in urban areas Partner with Dayton Development Coalition & Dayton Entrepreneur Center to provide information on sustainable business formation by embedding agriculture specific business development with standard financial business management skills. Collaborate with the Greene County & Montgomery County Small Business Development Centers to provide group discussions to urban farm entrepreneurs to learn about funding sources and small business loans. Conduct yearly one-day seminar with County stakeholders with breakout sessions to include the following: entrepreneurial urban farming workshops with case studies, commercial food marketing, managing a startup business, and how to successfully transition from farm to market in an urban setting.
4	Programs in this area will develop business educational workshops to engage minority farmers in Ohio over a five year period resulting in effective farm to table management practices to benefit urban communities. Engage with municipality stakeholders to target green spaces in targeted food desert areas to develop community urban farming plots. Conduct group discussions in faith based locations to educate individuals how to raise their own gardens in urban settings and promote healthier food choices Conduct train-the-trainer demonstrations with agriculture partners on the most effective urban gardening techniques on an on-going basis.
5	Conduct Personal Finance Seminars teaching participants how to develop household budgets. Conduct seminars on retirement planning. Teach participants the benefit of having good credit ratings and how to develop banking habits that will result in having good credit.
6	Conduct seminars in building better relationships and reducing household stress and in relationship management focused on keeping children in functional households. Plan activities with the child support advocate groups. This outcome can also benefit from teen parenting seminars, alcohol and drug abuse resistance, and attending college.

### **Outcome #1**

#### **1. Outcome Measures**

Demonstrate how consumer behavior affects purchasing decisions. Conduct seminars on family economics and spending and their effect on local markets. The Planned Program will interface with local and regional relief agencies in order to sponsor seminars on selected topics including shopping in your neighborhood, consuming products grown and raised by local farmers, making better economic decisions, and leveraging the distribution of labor in the family.

Not Reporting on this Outcome Measure

### **Outcome #2**

#### **1. Outcome Measures**

Conduct and evaluate seminars on poverty, welfare, and economic discrimination in underserved and economically at-risk communities. These seminars will cover a variety of topics including fair housing, economic discrimination, equal pay in the workplace, job availability, and the availability of economic opportunities in the geographic area. Seminars will also be used to teach participants to dress for interviews, interviewing skills, completing employment applications, and career planning.

Not Reporting on this Outcome Measure

### **Outcome #3**

#### **1. Outcome Measures**

Engage economic development & entrepreneurial partners in Greene & Montgomery counties to conduct quarterly education workshops to promote sustainable agriculture development in urban areas Partner with Dayton Development Coalition & Dayton Entrepreneur Center to provide information on sustainable business formation by embedding agriculture specific business development with standard financial business management skills. Collaborate with the Greene County & Montgomery County Small Business Development Centers to provide group discussions to urban farm entrepreneurs to learn about funding sources and small business loans. Conduct yearly one-day seminar with County stakeholders with breakout sessions to include the following: entrepreneurial urban farming workshops with case studies, commercial food marketing, managing a startup business, and how to successfully transition from farm to market in an urban setting.

Not Reporting on this Outcome Measure

### **Outcome #4**

#### **1. Outcome Measures**

Programs in this area will develop business educational workshops to engage minority farmers in Ohio over a five year period resulting in effective farm to table management practices to benefit urban communities. Engage with municipality stakeholders to target green spaces in targeted food desert areas to develop community urban farming plots. Conduct group discussions in faith based locations to educate individuals how to raise their own gardens in urban settings and promote

healthier food choices Conduct train-the-trainer demonstrations with agriculture partners on the most effective urban gardening techniques on an on-going basis.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	200

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Many of the social disadvantage participants which has attended our workshops or events have gained new fundamental knowledge.

**What has been done**

We have conducted educational workshops.

**Results**

They have described that through our community-base approach they have learned and improved their knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

**Outcome #5**

**1. Outcome Measures**

Conduct Personal Finance Seminars teaching participants how to develop household budgets. Conduct seminars on retirement planning. Teach participants the benefit of having good credit ratings and how to develop banking habits that will result in having good credit.

Not Reporting on this Outcome Measure

## **Outcome #6**

### **1. Outcome Measures**

Conduct seminars in building better relationships and reducing household stress and in relationship management focused on keeping children in functional households. Plan activities with the child support advocate groups. This outcome can also benefit from teen parenting seminars, alcohol and drug abuse resistance, and attending college.

Not Reporting on this Outcome Measure

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

- Appropriations changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

#### **Brief Explanation**

The CSU Land Grant Program did not receive federal or state funding until February of 2016. As a result, CSU Land Grant Program was unable to hire staff for the Developing Better Social and Economic Sustainable Communities program until October 2017. Funding was a significant external factor affecting outcomes.

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

The CSU Land Grant was able to conduct 9 educational conferences to educate socially disadvantaged, limited-resourced, under-served and under-represented groups. Participants' responses from these events were that they received new knowledge. In addition, the evaluation from the population surveyed resulted in behavioral changes as they learned about specific program for new and beginning urban clients interested in farming.

#### **Key Items of Evaluation**

The need to develop specialized evaluations instruments to capture cognitive social changes for the planned program is a key item of evaluation. Timely allocation of funding for the research and extension land-grant programs would be most helpful for having specialized staff prepare, distribute, and retrieve better evaluation instruments for the planned program.

**V(A). Planned Program (Summary)**

**Program # 3**

**1. Name of the Planned Program**

Building Families and Communities

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
701	Nutrient Composition of Food		20%		0%
702	Requirements and Function of Nutrients and Other Food Components		15%		0%
703	Nutrition Education and Behavior		30%		0%
704	Nutrition and Hunger in the Population		20%		0%
724	Healthy Lifestyle		5%		0%
801	Individual and Family Resource Management		10%		0%
	<b>Total</b>		100%		0%

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	5.0	0.0	3.0
<b>Actual Paid</b>	0.0	5.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	222004	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	248909	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Centers for Disease Control (CDC's) Division of Nutrition, Physical Activity, and Obesity (DNPAO) utilizes a public health approach to address the role of nutrition and physical activity in improving the public's health and preventing and controlling chronic diseases. Given the complex nature of addressing families and communities needs as a subject, the areas are broadly supported in scientific areas ranging from nutrition education and behavior, healthy lifestyle, to individual and family resource management, and human development and family well-being. As a result, the Cooperative Extension Program (CEP) hired a Family and Consumer Science Program Leader, EFNEP Program Coordinator, 2 County Agents, and EFNEP Paraprofessional to provide guidance for families and communities to make informed decisions regarding nutrition education, healthy living, family well-being, family resource management, and nutrition component of food. We developed a total of seven family and consumer science and EFNEP education programs. We have created more than 14 programs in communities and economic development. All programs have been made affordable and accessible to Ohioans located within the CSU Extension co-located counties. The programs are sessions which last more than 6 weeks long. These programs have been done in communities with under-represented and social disadvantage single parent families, youth, and seniors. In addition, we have developed 3 MOU's with partners to provide family resource and nutrition education.

**2. Brief description of the target audience**

According to the 2015 Ohio Poverty Report, families with children ranging from 7.3% among married couples to 55.3% for those headed by a female single parent experienced poverty during the last year. Poverty appears to have a strong correlation to poor health in families. Therefore, single parents will continue to be one of the top audiences that our planned program Building Families and Communities will target. In addition, partners in the medical field have also identify elderly, women, and men who are also a part of our target audience.

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	800	1200	500	1500

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of educational sessions held. Total number of participants in this event/project who are defined as under-represented individuals (e.g. women, minorities, individuals with disabilities, small farm owners, etc.) Total number of participants in this event/project who are defined as under-served individuals (i.e. individuals whose needs have not been addressed in past events)

Year	Actual
2017	13



**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Participants will identify influences on food intake and dietary patterns specifically in relation to decision making
2	Participants will describe and identify elements of a healthy lifestyle
3	Participants will describe elements of individual and family resource management
4	Participants will identify characteristics of human development related to social, cognitive, emotional, and physical development of individuals and families over the human lifespan

**Outcome #1**

**1. Outcome Measures**

Participants will identify influences on food intake and dietary patterns specifically in relation to decision making

**2. Associated Institution Types**

- 1890 Extension
- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	80

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Many of the social disadvantage participants which has attended our workshops or events have gained new fundamental knowledge.

**What has been done**

We have conducted educational workshops.

**Results**

They have described that through our community-base approach they have learned and improved their knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
701	Nutrient Composition of Food
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #2**

**1. Outcome Measures**

Participants will describe and identify elements of a healthy lifestyle

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	100

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Many of the social disadvantage participants which has attended our workshops or events have gained new fundamental knowledge.

**What has been done**

We have conducted educational workshops.

**Results**

They have described that through our community-base approach they have learned and improved their knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
703	Nutrition Education and Behavior
724	Healthy Lifestyle

**Outcome #3**

**1. Outcome Measures**

Participants will describe elements of individual and family resource management

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	30

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Many of the social disadvantage participants which has attended our workshops or events have gained new fundamental knowledge.

**What has been done**

We have conducted educational workshops.

**Results**

They have described that through our community-base approach they have learned and improved their knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
801	Individual and Family Resource Management

**Outcome #4**

**1. Outcome Measures**

Participants will identify characteristics of human development related to social, cognitive, emotional, and physical development of individuals and families over the human lifespan

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
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### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Many of the social disadvantage participants which has attended our workshops or events have gained new fundamental knowledge.

#### What has been done

We have conducted educational workshops.

#### Results

They have described that through our community-base approach they have learned and improved their knowledge.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

### V(H). Planned Program (External Factors)

#### External factors which affected outcomes

- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

#### Brief Explanation

CSU is a new 1890 institution and relies totally on the appropriations of Federal funding to conduct its Land Grant activities. There have been uncertainties in the level of funding CSU is expected for its capacity grants. However, there are competing public priorities for participants with seeking education assistance. But, funding is a significant external factor affecting outcomes because a lack of funding enables CSU to hire additional staff.

### V(I). Planned Program (Evaluation Studies)

#### Evaluation Results

Parents are learning the benefits of regular meal planning skills, how to save more money on groceries and how to prepare simple yet healthy meals for their families. Parents are also having an enjoyable time while learning. After the program some have had attitude changes by expressing their willingness to help their spouse more and not put all of the responsibility of them.

#### Key Items of Evaluation

The need to develop specialized evaluations instruments to capture cognitive social

changes for the planned program is a key item of evaluation. Timely allocation of funding for the research and extension land-grant programs would be most helpful for having specialized staff prepare, distribute, and retrieve better evaluation instruments for the planned program.

**V(A). Planned Program (Summary)**

**Program # 4**

**1. Name of the Planned Program**

Creating Youth Pathways to Success

Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
801	Individual and Family Resource Management		10%		0%
806	Youth Development		90%		0%
	<b>Total</b>		100%		0%

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2017	Extension		Research	
	1862	1890	1862	1890
<b>Plan</b>	0.0	5.0	0.0	3.0
<b>Actual Paid</b>	0.0	5.0	0.0	0.0
<b>Actual Volunteer</b>	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	222004	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	248909	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

The CSU Land Grant Program Creating Youth Pathways to Success planned program is a 4-H STEAM Youth After School Program designed as a hands-on inquiry-based fun, but relevant experiential youth program. It is a youth leadership development program designed to incorporate a traditional 4-H program into a community-based approach. The CSU Land Grant Program Creating Youth Pathways to Success planned program has done the following youth programs:

- Partnered with The State Ohio Baptist General Assembly to conduct a three-day agricultural education workshop for their 6-11 grade youth from across the state. The program integrates a 4-H STEAM program to introduce agricultural and terrestrial wildlife and provide for agriculture learning opportunities.
- Held a 2-week residential Seed to Bloom summer camp program to educate 6th, 7th and 8th grade youth about soil, plant, and water nutrient relationships, and appraisal of soil resources.
- AG STEM Camp. Thirty (25) rising 6th, 7th and 8th grade students to participate in the program. During the day they will be exposed to all major areas of STEAM courses and their interconnectivity to Agriculture in addition to the Youth Professional Development courses in alignment with nationally recognized 4-H programs. All STEAM courses are focused on Agricultural based projects.
- We have a one month Discover Day Youth Camp, a 4-H STEAM program
- We have completed more than 30 4-H in School and After School 4-H Programs with schools, organizations, and faith based Institutions.

**2. Brief description of the target audience**

We are targeting underserved and socially disadvantaged communities in urban communities. This targeted audience includes:

- Groups from public and private schools, FFA, and 4H clubs
- K-5 & Rising 6th, 7th, 8th grades and High school 9th, 10th, and 11th grades
- Elementary School (K-5) discovery of science and its importance to everyday life.
- Middle Schools: (6-8): exploring science (building skills) and leadership development
- High Schools (9-11): skills applications and leadership development

**3. How was eXtension used?**

eXtension was not used in this program

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2017	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	1500	2500	1000	1000



**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2017  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2017	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Technical skills development (STEM): Discovery , exploration and application of STEM ( Ag-STEM connectivity)  
 Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- How to obtain and use available resources of time, money, and human capital to achieve and improve quality of life.  
 Not reporting on this Output for this Annual Report

**Output #3**

**Output Measure**

- Understand the factors that affect decision making processes such as availability of resources, life events, living patterns, values, goals, interests, and external issues such as public issues, policies and programs.  
 Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Get an understanding of the social, cognitive and emotional development of individuals  
 Not reporting on this Output for this Annual Report

**Output #5**

**Output Measure**

- Promotion of positive youth development

<b>Year</b>	<b>Actual</b>
2017	0

**Output #6**

**Output Measure**

- Promotion of positive youth development

<b>Year</b>	<b>Actual</b>
2017	0

**Output #7**

**Output Measure**

- Understanding Civic, public and academic structures. Civic engagement  
Not reporting on this Output for this Annual Report

**Output #8**

**Output Measure**

- Community service/ Volunteerism

<b>Year</b>	<b>Actual</b>
2017	0

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Technical skills development Science, Technology, Engineering, Agriculture, and Math (STEAM): Discovery , Exploration, and Application of STEM (Ag-STEM connectivity)

**Outcome #1**

**1. Outcome Measures**

Technical skills development Science, Technology, Engineering, Agriculture, and Math (STEAM):  
Discovery , Exploration, and Application of STEM (Ag-STEM connectivity)

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2017	100

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Many of the social disadvantage participants which has attended our camps or afterschool 4-H program have expressed excitement as they have learned new STEAM knowledge.

**What has been done**

We have conducted camps and afterschool programs.

**Results**

They have described that through our community-base approach they have learned and improved their STEAM knowledge.

**4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
806	Youth Development

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Appropriations changes
- Public Policy changes
- Competing Public priorities

### **Brief Explanation**

CSU is a new 1890 institution and relies totally on the appropriations of Federal funding to conduct its Land Grant activities. There have been public policy changes and uncertainties in the level of funding CSU is expected for its capacity grants. However, there are competing public priorities for participants in engaging with our program. But, funding is a significant external factor affecting outcomes because a lack of funding enables CSU to hire additional staff.

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

Students have expressed a behavioral change as a result of their learning of leadership skills and STEAM science education while learning.

#### **Key Items of Evaluation**

The need to develop specialized evaluations instruments to capture cognitive social changes for the planned program is a key item of evaluation. Timely allocation of funding for the research and extension land-grant programs would be most helpful for having specialized staff prepare, distribute, and retrieve better evaluation instruments for the planned program.

## VI. National Outcomes and Indicators

### 1. NIFA Selected Outcomes and Indicators

<b>Childhood Obesity (Outcome 1, Indicator 1.c)</b>	
150	Number of children and youth who reported eating more of healthy foods.
<b>Climate Change (Outcome 1, Indicator 4)</b>	
0	Number of new crop varieties, animal breeds, and genotypes with climate adaptive traits.
<b>Global Food Security and Hunger (Outcome 1, Indicator 4.a)</b>	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
<b>Global Food Security and Hunger (Outcome 2, Indicator 1)</b>	
0	Number of new or improved innovations developed for food enterprises.
<b>Food Safety (Outcome 1, Indicator 1)</b>	
0	Number of viable technologies developed or modified for the detection and
<b>Sustainable Energy (Outcome 3, Indicator 2)</b>	
0	Number of farmers who adopted a dedicated bioenergy crop
<b>Sustainable Energy (Outcome 3, Indicator 4)</b>	
0	Tons of feedstocks delivered.