2014 Tennessee State University Research Plan of Work

Status: Accepted

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I. Plan Overview

1. Brief Summary about Plan Of Work

The College of Agriculture, Human and Natural Sciences at Tennessee State University is pleased to have the opportunity to collaborate with the United States Department of Agriculture, the National Institute of Food and Agriculture (NIFA), the State of Tennessee, various agricultural industries and other public sector entities to improve the quality of life for citizens of our state and country by performing research in the priority areas outlined by NIFA.

This Plan of Work represents our commitment to address the needs of our society, with particular emphasis on underserved populations and the NIFA priority areas. It is also a manifestation of our efforts to build strong, realistic, and mutually beneficial partnerships, to remain relevant to our stakeholders and to pursue new frontiers in agricultural research.

The Plan describes our research efforts in the five NIFA priority areas:

- In the Global Food Security and Hunger area we are performing basic and applied research on the means to improve production and marketing efficiencies of meat goats and guinea fowl. Additionally, we are working with agricultural producers to maximize their production in a sustainable, minimal-input manner. We are also performing basic research in farm distribution policy.
- To address issues of Sustainable Energy development, we have programs to enhance bioenergy production and sustainability by improving biomass feedstocks, developing alternative feedstocks and enhancing feedstock production on marginal lands.
- Research in Climate Change and Sustainability is focusing on the management of invasive insects and diseases and the utilization of low-impact alternatives to conventional control methods in the nursery and greenhouse industries. This program is also examining the use of alternative energy sources in greenhouse production practices, improving the quality of water that is discharged as runoff from agricultural production areas, and developing carbon sequestration strategies for small landowners.
- Our Food Safety research addresses the means to reduce biological contaminants on fresh produce, reducing the threats of antibiotic-resistant food contaminants and contamination in domestic food handling and storage practices .
- Research in Childhood Obesity is developing the means to increase consumption of fruits and vegetables by youth and reduce sedentary activities and fast-food consumption.

The research objectives outlined in our plan were created in cooperation with external stakeholders (private citizens and industry representatives) and internal stakeholders (faculty, researchers, students, staff, Cooperative Extension personnel, and administrators at Tennessee State University) to address the priority research goals identified by NIFA. In addition, the programs outlined in this Plan of Work reflect the coordinated efforts of our faculty to address the issues identified in our strategic planning processes while linking them to issues of importance to Tennessee small farmers, underrepresented groups, urban and rural families, as well as the NIFA priority areas. The products of the research outlined in this Plan of Work will make our food and environment safer, our families healthier, our energy more sustainable, provide economic opportunities for our citizens, and provide experiential training opportunities in high-demand areas for students at Tennessee State University.

Estimated Number of Professional FTEs/SYs total in the State.

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	63.0
2015	0.0	0.0	0.0	63.0
2016	0.0	0.0	0.0	63.0
2017	0.0	0.0	0.0	63.0
2018	0.0	0.0	0.0	63.0

II. Merit Review Process

1. The Merit Review Process that will be Employed during the 5-Year POW Cycle

- Internal University Panel
- Expert Peer Review

2. Brief Explanation

Each component of the planned programs in this Plan of Work was reviewed by internal research/extension scientist teams as well as research and extension administrators. Potential research projects were evaluated for relevance to NIFA goals, applicability to stakeholder needs, scientific soundness, and appropriateness of planned outcomes. In addition, select research plans were also reviewed by outside experts. Only those proposed projects that were approved by all parties were developed further for inclusion into our suite of planned programs.

A number of strategies were developed as a result of previous strategic planning processes to guarantee that approved programs are periodically reviewed to ensure they are meeting goals and remaining relevant. Prior to the initiation of research, researchers initiate contact with appropriate stakeholders, i.e., government agencies, community groups/representatives, professional organizations, extension personnel, or industry groups, to identify and prioritize critical needs. Periodically during the program, researchers communicate with appropriate stakeholders to evaluate the degree of program/project success. An administrator within the College of Agriculture, Human and Natural Sciences has been appointed to meet with every researcher at scheduled intervals to monitor the progress of the planned programs. If the program is not progressing as planned, appropriate remedial steps will be initiated. We feel that these procedures will contribute significantly to ensuring the planned programs will be executed completely and with maximum benefit to stakeholders.

III. Evaluation of Multis & Joint Activities

1. How will the planned programs address the critical issues of strategic importance, including those identified by the stakeholders?

Through review of national priorities and existing expertise at TSU, the College has been systematically adding new faculty to address specific areas of importance. This past year, new expertise was added in the areas of animal production, climate studies, environmental sciences and human nutrition.

All research programs in the TSU College of Agriculture, Human and Natural Sciences have an established record of soliciting, establishing, and maintaining direct input concerning research content and direction from stakeholders. The direct relationship we enjoy with our stakeholders and the feedback and oversight they provide to us ensures the research we perform addresses issues of strategic importance. For example, our research programs relating to antibiotic resistance of food pathogens work with individual stakeholders and stakeholder groups. These interactions have helped us determine that lack of knowledge about the causes of antibiotic resistance has led to potential over-use of antibiotics in animal production systems. Our research efforts now include educational components to target this knowledge gap. Another continuing example of stakeholder input guiding our research is in our ornamental plant pest management program. As a result of alerts generated through stakeholder interaction and communication, we are addressing new invasive pests in a timely manner. These insects, like the spotted-wing drosophila, have the potential to disrupt our local agricultural industries. Being able to react to these threats proactively, before the insects become fully established, is far more effective than trying to eradicate established infestations. Stakeholder involvement has directly led to our nursery scientists being able to address these problems early, before they become an economic burden.

Obviously, not every example of our stakeholder input process can be detailed here; however, the relationship we maintain with our stakeholders has proven to be extremely valuable and will continue. Examples of other means used by our scientific programs to identify critical issues include obtaining input through professional meetings, field days, research demonstrations, industry trade shows, consultations, and informal contacts. The involvement of extension colleagues (formal and informal) has further extended our outreach efforts to stakeholders. Input from all sources is discussed within the research groups and used to identify and assess research targets. Agricultural statistics published by the Tennessee Department of Agriculture, the National Agricultural Statistics Service, and the Tennessee Agricultural Statistics Service are also consulted to determine the economic importance of crops, pests, diseases, and other research issues.

2. How will the planned programs address the needs of under-served and under-represented populations of the State(s)?

As previously described, the research goals in this Plan of Work are the culmination of a review and prioritization process used to define the scope and direction of the agricultural research programs at Tennessee State University. By virtue of our history and research/extension culture, all of our programs focus on finding solutions to challenges faced by socially and/or economically disadvantaged groups, and contribute to the prosperity of the citizens of Tennessee and the nation.

Thus, each research goal, and subsequently each planned program, is based on a mandate to serve those members of our population that are traditionally classified as being underserved. In addition to focusing on socially and economically disadvantaged groups, our

planned research programs also target groups not usually served by mainstream agriculture, i.e., owners of small farms, producers of niche products, etc. Even though some of our programs may develop solutions to challenges faced by mainstream segments of our population, the core of our research emphasis is finding solutions that are acutely applicable to small producers, niche product producers, or persons who are economically or socially disadvantaged.

3. How will the planned programs describe the expected outcomes and impacts?

Outcomes and impacts for the Planned Programs are described within their respective logic models. Each Planned Program includes defined outcome goals that will generate quantifiable impacts.

4. How will the planned programs result in improved program effectiveness and/or

The objectives of the planned programs have been developed after a thorough planning and review process in which the strengths and weaknesses of the agricultural research enterprise at TSU were examined. This examination included tangible items such as equipment, staffing, laboratory space, field space and greenhouse space, as well as intangible items such as the scientific and technical expertise of the university staff, and relationships with, and priorities of, stakeholders. Each scientist has formulated research goals that best fit the strengths of the individual, the priorities of stakeholders, and the goals of NIFA. This procedure produced the best possible scenario for ensuring program effectiveness, i.e. building on known strengths in a synergistic research atmosphere, while addressing issues of concern to stakeholders and funding agencies. Because the planned programs were specifically developed with the end user (stakeholder) in mind, the overall effectiveness of the planned programs should be very high. This process has also led to planned programs that are utilizing space, equipment and expertise already in place in at Tennessee State University; only relatively small expenditures will be needed for new equipment. No unplanned additions of personnel are needed to complete the planned programs. Each individual researcher has defined output and outcome goals, providing a benchmark on which to measure progress. This scenario assures programmatic efficiency.

IV. Stakeholder Input

1. Actions taken to seek stakeholder input that encourages their participation

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey of traditional stakeholder groups
- Survey of traditional stakeholder individuals

Brief explanation.

A number of different avenues are utilized by researchers in the College of Agriculture, Human and Natural Sciences to seek stakeholder input. Discipline-specific stakeholder representation is included in almost all search committees for new research and extension faculty positions. Stakeholders have been some of our most enthusiastic members of said committees.

Most of the faculty in the College are active participants in the trade associations related to their research (i.e. Tennessee Urban Forestry Council, Tennessee Organic Growers Association,

Tennessee Nursery and Landscape Association, etc.), and regularly serve on association committees, attend association meetings, have research exhibits at association trade shows, and act as speakers at educational functions sponsored by the associations. This relationship permits a marked level of both formal and informal interaction with stakeholders. Another method of garnering stakeholder input is through formal meetings with distinct groups of stakeholders established specifically to provide input for a given area of research. An example of which is our Nursery Advisory Group, a group of established nursery producers from throughout the state who are regularly utilized for industry information, that meets to review the nursery related research activities of the College. Our scientists also serve on public advisory boards related to their areas of research; this service enables them to develop relationships with, and receive information from, a wide range of stakeholders.

2(A). A brief statement of the process that will be 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 Internal Focus Groups
- Needs Assessments
- Use Surveys
- Other (See explanation below.)

Brief explanation.

For the 'Other' category, a number of different methods are used: 1) meetings with regulatory officials, 2) discussions with other researchers performing research in the area, 3) meetings with trade group representatives, and 4) discussions with related stakeholder groups.

2(B). A brief statement of the process that will be 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

Brief explanation.

Most stakeholder input is collected either in face-to-face discussions or via survey instruments. Each of these methods is effective. The face-to-face discussions are often held in a group setting. This scenario permits questions and answers to direct and stimulate discussion of areas of importance to stakeholders. However, individual discussions are also an important source of input. We have found that some persons are not comfortable speaking out in a group, but are very wiling to email opinions and ideas, or to speak one-on-one with scientists. Survey instruments are a useful tool to assess information from broader groups of stakeholders. However, while some stakeholders prefer the anonymity and brevity of a survey instrument (resulting in increased participation), the survey instrument does not allow for discussion of previously unrecognized areas of concern.

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Research Programs
- To Set Priorities

Brief explanation.

The close involvement of Tennessee State University scientists with stakeholder groups and individuals provides an almost constant feedback about the utility and practicality of the research we conduct and the solutions we pursue. We engage our stakeholders in discussion of all aspects of our research, from planning, to execution, to dissemination of results. As discussed previously, stakeholders are now used in search committees, providing direct influence into the selection and hiring process.

Additionally, input at latter stages of the programs is used to ensure we are addressing issues of importance in a manner the stakeholders can readily utilize. The examples of our use of feedback that are presented here have also been cited in Section III-1 of this report.

One example is from our research programs relating to antibiotic resistance of food pathogens. Interaction with individual stakeholders and stakeholder groups have helped us determine that lack of knowledge about the causes of antibiotic resistance has led to potential over-use of antibiotics in animal production systems.

Our research efforts now include educational components to target this knowledge gap. Another continuing example of stakeholder input guiding our research is in our ornamental plant pest management program. As a result of alerts generated through stakeholder interaction and communication, we are addressing new invasive pests in a timely manner. These insects, like the spotted-wing drosophila, have the potential to disrupt our local agricultural industries. Being able to react to these threats proactively, before the insects become fully established, is far more effective than trying to eradicate established infestations. This feedback has permitted new treatment options to be considered for regulatory purposes, and provide maximum safety for the environment.

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Global Food Security and Hunger - improving animal production for small producers

2. Brief summary about Planned Program

The objective of this planned program is to improve efficiency of animal production by small and/or limited resource producers. Avenues to be explored include improvements in meat goat production systems and improvements to production systems for alternative poultry species.

Meat goat production in the Southeast will be improved by understanding how animal genetics can be managed to enhance lifetime doe reproductive output. Genetic influences will be assessed within an environment of low to moderate management inputs under southeastern pasture conditions. In addition, updated information about the economic viability of production and/or methods to enhance producer income will be delivered to goat producers and individuals contemplating goat production. Hands-on clinics and workshops for value-added products to diversify income streams and increase production management returns will be held.

Research will be conducted to enhance the production efficiency of Guinea fowl, and to enhance the adoption and profitability of the Guinea fowl as alternative poultry for small scale and limited resource farmers.

3. Program existence : Mature (More then five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals				20%
302	Nutrient Utilization in Animals				15%
303	Genetic Improvement of Animals				25%
307	Animal Management Systems				20%
601	Economics of Agricultural Production and Farm Management				10%
604	Marketing and Distribution Practices				10%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Alternative livestock and forage options will enhance the sustainability of small and limited resource producers in the southeast.

From 1987 to 2007, global meat goat production increased 92% and the US meat goat inventory increased 527%. Goat meat imports increased from 142 metric tons ($0.256 mil.) to 10,166 metric tons ($37.047 mil.) in the last 20 years. Demand for goat products in the US is increasing, in large part, because of increasing ethnic diversity.

The US goat production and marketing systems are rather haphazard. Lack of standardized processing techniques and unavailability of goat meat in local stores causes consumer difficulty in obtaining goat meat. Without relevant information, producers are disadvantaged in making informed decisions about production opportunities and marketing options. A need exists to educate the public about the health benefits and qualities associated with goat meat.

Stakeholders have recommended improved outreach activities to communicate marketing, materials/practices, and hands-on demonstrations for value added products.

Goat industry producers have problems maintaining healthy and productive does due to poor genetic-environment combinations, leading to increased production inputs, resulting in low profitability and compromised long-term sustainability. It will benefit producers to maintain herds of mature does that do not require intensive, resource-intense management. Stayability differences between breeds for mature does and indicators of reproductive potential in young doelings within genotypes requires further investigation.

Driven by consumers' pursuit for leaner animal protein sources, demand for guinea fowl as alternative poultry continues to increase. This animal is an alternative poultry crop for small scale producers who are unable to compete in the traditional poultry industry. Lack of nutrient requirement recommendations to guide formulation of least-cost rations hampers this industry. Genetic resource information to aid marker assisted selection for important traits is also lacking. Poor feed efficiency and a lack of optimum nutrient requirements results in poor performance, increased production costs, poor quality poultry and poultry products, and environmental pollution from excess nutrients in poultry manure. These constraints can be overcome by determining nutrient requirements of the guinea fowl and generating genetic resource information to aid guinea fowl breeding programs.

2. Scope of the Program

- In-State Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

There is an absence of industry structure for meat goat production in Tennessee, yet Tennessee remains the second largest producer of meat goats in the country. Stakeholders agree that additional information concerning goat production and marketing in Tennessee is needed.

Longevity in meat goat does has not been addressed in the literature. In traditional ruminant livestock sectors, female longevity and lifetime productivity are growing in importance and have been the focus of numerous studies. There are economic costs associated with purchasing or raising replacement females as well as biological costs associated with lower productivity in young females.

Management costs are not expected to decrease. Increased demand for chevon is expected to continue. Genetic fitness and longevity are of increased importance because there are few FDA approved pharmaceuticals for goats, and this number is not expected to increase; however, environmental conditions in the Southeast create obstacles to maintaining adequate goat health without elevated

management inputs. There are dramatic differences among young straightbred does for reproductive and fitness traits, including retention rates in the herd. Early work has been well received by producer stakeholders and the utilization of TSU-derived research findings and concepts are expected to continue. Stability of human and facility resources is anticipated throughout this project, facilities have been re-built following catastrophic flooding.

Optimum nutrient levels in rations of guinea fowl will improve bird performance. Environmental factors such as temperature and humidity will be controlled successfully and not confound the studies.

Experimental birds are readily available to initiate studies. Improved feeding programs for guinea fowl will minimize feeding cost and enhance success of the guinea fowl production enterprise. There will be adequate personnel to assist in collecting data. Guinea fowl producers will utilize the nutrient recommendations in formulating rations. Genetic resource information generated will be utilized for selection and maintenance of flocks progressing towards optimum fitness and production performance. Such information will be available globally to scientists and the larger poultry industry.

The College of Agriculture, Human and Natural Sciences has the facilities necessary to direct this program to a successful completion. The College's Research and Education Center located in Nashville, TN has over 80 acres of permanent pasture including fenced plots for grazing study complete with housing, feeding/watering and handling facilities capable of accommodating over 300 animals for experimental purposes. There is also a field lab and main lab equipped with equipment for storing animal tissues, conducting diagnostic procedures, and data processing. A state-of-the-art poultry research facility is also maintained by the College and contains all the necessary resources to successfully complete this program. The College's research analytical laboratories are fully equipped with the state-of-the-art equipment needed for nutritional analysis of feedstuffs and genomic assays. In addition, full-time farm crews and graduate and undergraduate student workers are available under the supervision of the principal investigators.

The project will be conducted in collaboration with the College's extension faculty for effective dissemination of the results to producers.

Other assumptions include: producers will benefit from goat meat marketing information, consumers will become aware of the health benefits of goat meat, non-traditional consumers will be willing to consume goat meat, and students will be capable of conducting goat research.

2. Ultimate goal(s) of this Program

The overall goal of this program is to improve the sustainability and profitability of the animal production enterprise for small and limited resource producers.

This goal will be accomplished by:

- Promotion of meat goat consumption among traditional and non traditional consumers Timely delivery of updated information to goat producers and individuals contemplating the economic viability of goat production.
- Provision of hands-on clinics and workshops for value-added products to diversify income streams and increase production management returns.
- Improved marketing of goats.
- Improved efficiency of commercial meat goat production by understanding how animal genetics can be managed to enhance lifetime doe reproductive output. Genetic influences will be assessed within an environment of low to moderate management inputs under Southeastern pasture conditions.
- Enhancement of production efficiency, adoption, and profitability of the Guinea fowl as alternative poultry for small scale and limited resource farmers.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	8.5
2015	0.0	0.0	0.0	8.5
2016	0.0	0.0	0.0	8.5
2017	0.0	0.0	0.0	8.5
2018	0.0	0.0	0.0	8.5

V(F). Planned Program (Activity)

1. Activity for the Program

Conduct seminars, conferences, hands-on clinics, provide written and hands-on training to producers, participate in industry events and develop industry-targeted publications based on research findings.
Conduct research on the longitudinal survival and reproductive output of meat goat does.
Conduct research on nutritional requirements for Guinea fowl.
Perform genome mapping of important production qualities in Guinea fowl.
Conduct literature review of available secondary information.
Conduct focus group meetings to collect information from producers and consumers.
Develop and administer surveys to selected producers and consumers.
Collect and analyze available marketing data.
Identify selected meat goat consumers/ethnic groups/communities.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Workshop ● Demonstrations	● Web sites other than eXtension

3. Description of targeted audience

Dairy and meat goat producers
National meat goat industry
Institutions of meat goat research
Ruminant livestock producers
Students
Public officials
Guinea fowl and poultry industries
Small farmers
Scientific community
Extension specialists

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Producer workshops to improve animal production in small farm and limited resource populations.
- Dietary recommendations for improved Guinea fowl production.

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Direct contact meat goat producers will have increased knowledge of altered doe selection techniques (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
2	Direct contact meat goat producers will practice altered doe selection techniques (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
3	Goat producer doe non-recorders will have knowledge of the advantages of doe record keeping (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
4	Goat producer doe non-recorders will practice doe record keeping (More sustainable, diverse, and resilient food systems across scales).
5	Guinea fowl producers will have knowledge of calcium and phosphorus recommendations for optimal nutrition (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
6	Guinea fowl producers will adopt calcium and phosphorus recommendations for optimal nutrition (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
7	Guinea fowl producers will adopt lysine recommendations for optimal nutrition (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
8	Guinea fowl producers will have knowledge of lysine recommendations for optimal nutrition.
9	Guinea fowl producers will experience increased profitability of production (More sustainable, diverse, and resilient food systems across scales).
10	Goat producers will have an increased knowledge of meat goat marketing channels.
11	Goat researchers will have an increased understanding of the constraints and prospects of the meat goat industry.
12	Goat producers will expand their marketing to identified channels and markets.
13	Consumers will be aware of the healthy benefits of goat meat consumption.
14	Meat goat producers will be aware of consumer preferences for meat goat products.
15	Percentage of meat goat producers and researchers with a better understanding of how maternal genetics can affect meat goat carcass yield (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).
16	Meat goat producers will have increased income by marketing through new channels (More sustainable, diverse, and resilient food systems across scales).

Outcome # 1

1. Outcome Target

Direct contact meat goat producers will have increased knowledge of altered doe selection techniques (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Direct contact meat goat producers will practice altered doe selection techniques (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

Goat producer doe non-recorders will have knowledge of the advantages of doe record keeping (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

Goat producer doe non-recorders will practice doe record keeping (More sustainable, diverse, and resilient food systems across scales).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 301 - Reproductive Performance of Animals
- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Guinea fowl producers will have knowledge of calcium and phosphorus recommendations for optimal nutrition (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

Guinea fowl producers will adopt calcium and phosphorus recommendations for optimal nutrition (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1890 Research

Outcome # 7

1. Outcome Target

Guinea fowl producers will adopt lysine recommendations for optimal nutrition (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1890 Research

Outcome # 8

1. Outcome Target

Guinea fowl producers will have knowledge of lysine recommendations for optimal nutrition.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1890 Research

Outcome # 9

1. Outcome Target

Guinea fowl producers will experience increased profitability of production (More sustainable, diverse, and resilient food systems across scales).

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 302 - Nutrient Utilization in Animals

4. Associated Institute Type(s)

- 1890 Research

Outcome # 10

1. Outcome Target

Goat producers will have an increased knowledge of meat goat marketing channels.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1890 Research

Outcome # 11

1. Outcome Target

Goat researchers will have an increased understanding of the constraints and prospects of the meat goat industry.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 307 - Animal Management Systems
- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1890 Research

Outcome # 12

1. Outcome Target

Goat producers will expand their marketing to identified channels and markets.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1890 Research

Outcome # 13

1. Outcome Target

Consumers will be aware of the healthy benefits of goat meat consumption.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1890 Research

Outcome # 14

1. Outcome Target

Meat goat producers will be aware of consumer preferences for meat goat products.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1890 Research

Outcome # 15

1. Outcome Target

Percentage of meat goat producers and researchers with a better understanding of how maternal genetics can affect meat goat carcass yield (Enhanced capacity of a sustainable global food system including new/improved plants, animals, technologies and management systems).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 303 - Genetic Improvement of Animals
- 307 - Animal Management Systems

4. Associated Institute Type(s)

- 1890 Research

Outcome # 16

1. Outcome Target

Meat goat producers will have increased income by marketing through new channels (More sustainable, diverse, and resilient food systems across scales).

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management
- 604 - Marketing and Distribution Practices

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Appropriations changes
- Government Regulations
- Competing Programmatic Challenges

Description

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The following items will be measured to assess success of the program while the program is underway:
Percentage of direct contact meat goat producers practicing altered doe selection techniques.
Percentage of goat producer doe non-recorders participating in doe record keeping.
Percentage of guinea fowl producers adopting calcium and phosphorus recommendations for optimal nutrition.
Percentage of guinea fowl producers adopting lysine recommendations for optimal nutrition.
Percentage of guinea fowl producers with increased profitability of production.
Number of producers expanding their marketing to identified channels and markets.
Increase in number of consumers aware of the healthy benefits of meat goat consumption.
Number of producers with increased income by marketing through new channels.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger - enhancing sustainability of agricultural plant production

2. Brief summary about Planned Program

As input resources become more limiting, it is important to develop the knowledge and techniques that will enable agricultural producers to maximize their production in a sustainable, minimal-input manner. This program addresses this issue from a variety of directions: sustainably through reduced inputs in the manner of organic production, sustainability by developing plants genetically pre-determined to perform better, sustainability through precision application of irrigation and fertilizer, sustainability through reduction in greenhouse gasses produced from over-fertilization, and sustainability via multifunction land management.

Alternative sustainable methods of sequestering carbon through agricultural practices will improve sustainability.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships				30%
111	Conservation and Efficient Use of Water				25%
131	Alternative Uses of Land				10%
132	Weather and Climate				5%
133	Pollution Prevention and Mitigation				15%
204	Plant Product Quality and Utility (Preharvest)				5%
212	Pathogens and Nematodes Affecting Plants				5%
601	Economics of Agricultural Production and Farm Management				5%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Improved sustainability of agricultural production and enhanced productivity will be obtained by decreasing the amount of inputs required in traditional, organic, and urban agriculture. The increased use of chemicals in agriculture challenges the sustainability of many agricultural enterprises by increasing production costs, polluting the environment and, in many instances, lowering plant quality. Developing systems to reduce chemical inputs, minimize pollutants, and improve nutritive value of food crops by extending shelf life of fruits, enhancing nutritive content of foods, lowering harmful minerals in foods, reducing the inputs needed to control disease, and developing crops with a greater threshold for stress will improve sustainability.

New, low input techniques for yield improvement need to be explored to increase sustainability. Novel approaches in genetic characterization of gametes will be explored to increase desirable characteristics in model plants. Advances in genetic techniques will produce improved yields with reduced inputs. Nitrogen and water use efficiency in row crops can be improved, and greenhouse gas production can be reduced by precision application of water and nutrients.

Increases in the atmospheric concentration of greenhouse gases contribute to global warming and destruction of atmospheric ozone layer. One greenhouse gas associated with agriculture production systems is nitrous oxide. Nitrous oxide is the principal non -carbon dioxide greenhouse gas emitted from soils; primarily as a result of nitrification and denitrification processes. Nitrogen fertilizer inputs, coupled with irrigation, generally increase nitrous oxide emissions. Therefore, efficient use of nitrogen fertilizer and water use in row crops production systems is important. If nitrogen and water use efficiency in row crops such as corn is improved, greenhouse gas production can be reduced.

Range management sciences can be used to determine the best approaches for long-term carbon storage in soils of tree-based managed ecosystems. Agroforestry research will focus on the mechanisms responsible for soil carbon storage and loss, and test promising management approaches for increased plant productivity and long-term soil carbon sequestration. Carbon markets can provide incentives for limited resource small farmers and forest woodland owners of Tennessee to modify or diversify their management activities by offsetting initial costs of implementation.

2. Scope of the Program

- In-State Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The current trend in government and industry is towards the greening of products and processes. A clear example is the current administration's efforts to create green industries and green jobs. This trend has wide ripple effects. The assumption is that this movement towards increased sustainability will become increasingly prevalent in all social, economic, and environmental aspects of our day-to-day life. This project assumes:

• Reduced inputs in traditional agriculture will continue to be important in agricultural production
• Reduced inputs will lead to increased sustainability
• Inputs can be reduced via research on novel production practices for crops
• Sustainability will be enhanced if the crops produced have increased nutritive value and decreased possible toxicity
• Range management and agroforestry systems for carbon storage and timber and ecosystems services will improve sustainability of small land owners

2. Ultimate goal(s) of this Program

Improve sustainability of agricultural production.
Improved crop production and biofortification of plants through precision use of macro and micro nutrients through organic and conventional fertility management program by the under represented population.
Increase efficiency of water and nutrient uptake.
Decrease greenhouse gas produced by over fertilization.
Provide economically and ecologically sound solutions to global climate change and create small limited resource farmers and forest land owners and managers who will be champions of soil carbon sequestration.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	9.5
2015	0.0	0.0	0.0	9.5
2016	0.0	0.0	0.0	9.5
2017	0.0	0.0	0.0	9.5
2018	0.0	0.0	0.0	9.5

V(F). Planned Program (Activity)

1. Activity for the Program

Conduct workshops and stakeholder meetings.
Provide training.
Conduct research experiments.
Set up a soil carbon laboratory.
Develop a course description and course material pertinent to the program.
Conduct research experiments on nutrient uptake, translocation, accumulation and partitioning in plants using various elements using organic and mineral fertilizers.
Explore the potentials of plug transplanting and grafting technology for organic transplants.
Conduct hands-on training and workshops on visual nutrient deficiency symptoms of food crops and ornamentals.
Train and educate students and extension agents in plant mineral nutrition management.
Develop alley cropping agroforestry systems for carbon storage.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop ● Demonstrations	● Web sites other than eXtension

3. Description of targeted audience

Organic and conventional growers of food crops and ornamentals
Professional design practitioners
Community stakeholders
Farmers, forest landowners, environmental and conservation conscious individuals
Undergraduate and graduate students
Scientific community, extension agents

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of venues to inform stakeholders about characteristics, trends, and significant changes in supply distribution of produce commodities in the U.S.
- Number of workshops held on use of specialized fertilizer formulations to reduce environmental nutrient contamination.
- Number of workshops held to educate landowners on carbon sequestration strategies.
- Number of workshops held addressing agricultural sustainability.
- Number of venues to inform stakeholders about current issues on fruit and vegetable consumption/demand and its impact on overweight/obesity.

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Producers will adopt use of specialized fertilizer formulations to reduce environmental nutrient contamination (Enhanced capacity of a sustainable global food system including new/improved plans, animals, technologies and management systems).
2	Producers will realize reduction in crop loss through the use of specialized fertilizer formulations to reduce environmental nutrient contamination.
3	Producers will realize increases in crop yield and income as a result of the use of specialized fertilizer formulations.
4	Producers and businesses in the produce industry and policy makers will have increased knowledge of characteristics, trends, and significant changes in supply distribution of produce commodities in the U.S. (more sustainable, diverse, and resilient food systems across scales).
5	Students will have increased knowledge of characteristics, trends, and significant changes in supply distribution of produce commodities in the U.S. (more sustainable, diverse, and resilient food systems across scales).
6	Farm/forest landowners will have an increased knowledge of multi-function land management techniques(Improve climate mitigation strategies and their adoption).
7	Farm/forest landowners will adopt multi-function land management techniques(Improve climate mitigation strategies and their adoption).
8	Farm/forest landowners will realize increased income as a result of multi-function land management techniques (Improve climate mitigation strategies and their adoption).
9	Educators (i.e. Extension agents, state forestry officials) will have increased knowledge of multi-function land management techniques
10	Producers and businesses in the produce industry, consumers, educators, researchers, and policy makers will have increased knowledge about current issues on fruit and vegetable consumption/demand and its relationship with overweight/obesity in the U.S.
11	Students will have increased knowledge about current issues on fruit and vegetable consumption/demand and its relationship with overweight/obesity in the U.S.
12	Number of crops producing pathogen-inducer chemicals that can be used to screen germplasm.
13	Producers informed about greenhouse gases (GHG) emission as a result of fertilizer application in corn production systems.
14	Producers informed about optimizing fertilizer inputs and water use efficiency to mitigating greenhouse gases emission in row crop production.
15	Students trained in greenhouse gas monitoring

Outcome # 1

1. Outcome Target

Producers will adopt use of specialized fertilizer formulations to reduce environmental nutrient contamination (Enhanced capacity of a sustainable global food system including new/improved plans, animals, technologies and management systems).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Producers will realize reduction in crop loss through the use of specialized fertilizer formulations to reduce environmental nutrient contamination.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

Producers will realize increases in crop yield and income as a result of the use of specialized fertilizer formulations.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

Producers and businesses in the produce industry and policy makers will have increased knowledge of characteristics, trends, and significant changes in supply distribution of produce commodities in the U.S. (more sustainable, diverse, and resilient food systems across scales).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Students will have increased knowledge of characteristics, trends, and significant changes in supply distribution of produce commodities in the U.S. (more sustainable, diverse, and resilient food systems across scales).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

Farm/forest landowners will have an increased knowledge of multi-function land management techniques(Improve climate mitigation strategies and their adoption).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land

4. Associated Institute Type(s)

- 1890 Research

Outcome # 7

1. Outcome Target

Farm/forest landowners will adopt multi-function land management techniques(Improve climate mitigation strategies and their adoption).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land

4. Associated Institute Type(s)

- 1890 Research

Outcome # 8

1. Outcome Target

Farm/forest landowners will realize increased income as a result of multi-function land management techniques (Improve climate mitigation strategies and their adoption).

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land

4. Associated Institute Type(s)

- 1890 Research

Outcome # 9

1. Outcome Target

Educators (i.e. Extension agents, state forestry officials) will have increased knowledge of multi-function land management techniques

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 131 - Alternative Uses of Land

4. Associated Institute Type(s)

- 1890 Research

Outcome # 10

1. Outcome Target

Producers and businesses in the produce industry, consumers, educators, researchers, and policy makers will have increased knowledge about current issues on fruit and vegetable consumption/demand and its relationship with overweight/obesity in the U.S.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1890 Research

Outcome # 11

1. Outcome Target

Students will have increased knowledge about current issues on fruit and vegetable consumption/demand and its relationship with overweight/obesity in the U.S.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 601 - Economics of Agricultural Production and Farm Management

4. Associated Institute Type(s)

- 1890 Research

Outcome # 12

1. Outcome Target

Number of crops producing pathogen-inducer chemicals that can be used to screen germplasm.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 212 - Pathogens and Nematodes Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 13

1. Outcome Target

Producers informed about greenhouse gases (GHG) emission as a result of fertilizer application in corn production systems.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 132 - Weather and Climate

4. Associated Institute Type(s)

- 1890 Research

Outcome # 14

1. Outcome Target

Producers informed about optimizing fertilizer inputs and water use efficiency to mitigating greenhouse gases emission in row crop production.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 111 - Conservation and Efficient Use of Water
- 132 - Weather and Climate

4. Associated Institute Type(s)

- 1890 Research

Outcome # 15

1. Outcome Target

Students trained in greenhouse gas monitoring

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 102 - Soil, Plant, Water, Nutrient Relationships
- 132 - Weather and Climate

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations

Description

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

To evaluate the success of the project, we will use a twin-track measuring impact approach to measuring impact. A quantitative survey program will be used to estimate the program's impact on change in knowledge of landowners before and after workshops. Data will be collected through a questionnaire from workshop participants. Additional questionnaires will be used to obtain farmers' assessments of program objectives and subprograms. Systematic client consultation will be used to elicit feedback from the intended beneficiaries on the effectiveness of the design of project subcomponents and adoption of best multifunction land management practices.

Also measured will be:

Number of producers realizing reduction in crop loss through the use of specialized fertilizer formulations to reduce environmental nutrient contamination.

Number of producers realizing increases in crop yield and income as a result of the use of specialized fertilizer formulations.

Number of students with increased knowledge about characteristics, trends, and significant changes in farm distribution and supply of produce commodities in selected states in the U.S.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Sustainable Energy - new feedstocks and improved feedstock production

2. Brief summary about Planned Program

Dependence upon crude oil has become risky due to volatility in price and potential for disruption in its supply. The use of agricultural crops such as corn and soybeans for biofuel production can result in shortages of animal feeds and human food products. Increased use of biofuels can adversely affect food prices worldwide. The increase in biofuel use is contributing to various food shortages because agricultural land on which food crops were formerly grown is increasingly being converted to biofuel crop production. This program will focus on the development and improvement of alternative, non-food crop feedstocks for biofuel production and the improvement of the efficiency of alternative energy feedstock production.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
202	Plant Genetic Resources				25%
204	Plant Product Quality and Utility (Preharvest)				15%
213	Weeds Affecting Plants				10%
511	New and Improved Non-Food Products and Processes				50%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Bioenergy crop production is part of the solution to the global problems of energy security, economic uncertainty and environmental degradation. However, production can be limited by the availability of suitable land that does not compete with land otherwise used for growing food, feed and fiber. At present, corn accounts for 95% of the bioenergy produced in the US; however, it is recognized that inputs required for large-scale bioenergy production from corn are not economically or environmentally sustainable. The Energy Independence and Security Act mandates the production of 21 billion gallons of renewable fuels from non-corn sources by 2022. Those goals have been undergoing major revisions in face of realities of

technological challenges. Still, work continues on alternative bioenergy feedstocks and production schemes to meet the need of diversification and production on marginal lands. Complementary alternatives to switchgrass are eastern gamagrass, big bluestem and Indian grass. A major appeal of cellulosic herbaceous perennials (CHPs) as bioenergy feedstock stems from their ability to be produced on marginal and degraded land, thus moderating food-energy debates.

One form of land degradation we continue to investigate is soil acidity, which renders up to 30-40% of the world's arable land unproductive. Another form of land degradation that we have just begun to investigate is due to soil and water pollution from coal-fired power plants. Disposal and management of coal combustion wastes (CCW), in particular fly ash (FA) is major environmental concern for all coal-based energy producing countries of which the US is third behind India and China. The traditional method for disposal of FA is storage in massive wet ponds or in landfills. Such approaches have become increasingly environmentally and economically unacceptable.

Another area of improved bioenergy availability is in feedstock production. The ability to produce feedstock on marginal lands will improve feedstock availability. Selection for variants/mutants capable of prospering on marginal lands and/or tolerant of herbicides will increase biofuel availability. Once the bioenergy industry becomes more established, feedstock quality will become of great importance and may influence the feedstock price. Therefore, it is important to identify factors that can influence quality, such as harvest timing, for an important feedstock like switchgrass.

Assessment of economic viability for feedstock production under Tennessee growing conditions and assessing energy balance is another area under investigation.

2. Scope of the Program

- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Fuel consumption will continue to increase and supplies of foreign oil will continue to be a constraint until the US can become self-sufficient in fuel production. Biofuels will remain a viable and important component in the suite of alternative energy options available to fuel producers. Agricultural producers will continue to have a financial incentive to pursue feedstock production; alternatives to current standard feedstocks will increase available acreage for feedstock production and decrease competition for food production acreage. Improved feedstock production efficiency will enhance sustainability of biofuel production.

2. Ultimate goal(s) of this Program

Enhancing bioenergy production and sustainability through improvement of biomass feedstocks, development of alternative feedstocks and enhanced feedstock production on marginal lands.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	9.5
2015	0.0	0.0	0.0	9.5
2016	0.0	0.0	0.0	9.5
2017	0.0	0.0	0.0	9.5
2018	0.0	0.0	0.0	9.5

V(F). Planned Program (Activity)

1. Activity for the Program

Disseminate research findings to the scientific community, stakeholders, agricultural, environmental, life science industries.
Conduct agronomic and economic analysis.
Recruit and train students, incorporating research training into teaching and extension curricula.
Design and implement field and laboratory research.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class	● Web sites other than eXtension

3. Description of targeted audience

State, local and federal agencies, small and limited-resource farmers, researchers, educators, policy makers, consumers and bioenergy companies.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of workshops and presentations concerning new or alternative biofuel feedstocks.

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Producers will have increased knowledge of production options available for growing bioenergy feedstocks (Increased knowledge and understanding of the biofuels supply chain).
2	An increasing number of producers will adopt production of bioenergy feedstocks (Implementation of sustainable biofuels systems).
3	Students will receive training in bioenergy production (Develop a diverse and educated workforce for a biofuels industry).
4	Protocols will be developed for mutagenesis and selection of herbicide resistant biofuel feedstock varieties (Increased knowledge and understanding of the biofuels supply chain).
5	Desirable biofuel feedstock varietal mutants will be recovered (Increased knowledge and understanding of the biofuels supply chain).
6	New varieties of biofuel feedstocks will be developed (Increased knowledge and understanding of the biofuels supply chain).
7	Producers will have knowledge of benefits:costs of production (from land preparation to final ethanol production) for two biofuel crops (Miscanthus and switchgrass) through the construction of benfit:cost analysis sheets.
8	Stakeholders will have knowledge of the energy efficiency of biofuel production from switchgrass and Miscanthus through the calculation of energy balance sheets for these crops, providing indicators of sustainability for biofuel production.
9	Farm specific factors responsible for improving technical efficiency of biofuel production will be determined to minimize inefficiency in current production.
10	Optimization of biofuel crop, i.e. switchgrass yields, to changing climatic conditions.

Outcome # 1

1. Outcome Target

Producers will have increased knowledge of production options available for growing bioenergy feedstocks (Increased knowledge and understanding of the biofuels supply chain).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

An increasing number of producers will adopt production of bioenergy feedstocks (Implementation of sustainable biofuels systems).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

Students will receive training in bioenergy production (Develop a diverse and educated workforce for a biofuels industry).

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

Protocols will be developed for mutagenesis and selection of herbicide resistant biofuel feedstock varieties (Increased knowledge and understanding of the biofuels supply chain).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Desirable biofuel feedstock varietal mutants will be recovered (Increased knowledge and understanding of the biofuels supply chain).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

New varieties of biofuel feedstocks will be developed (Increased knowledge and understanding of the biofuels supply chain).

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 213 - Weeds Affecting Plants
- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 7

1. Outcome Target

Producers will have knowledge of benefits:costs of production (from land preparation to final ethanol production) for two biofuel crops (Miscanthus and switchgrass) through the construction of benfit:cost analysis sheets.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 8

1. Outcome Target

Stakeholders will have knowledge of the energy efficiency of biofuel production from switchgrass and Miscanthus through the calculation of energy balance sheets for these crops, providing indicators of sustainability for biofuel production.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 9

1. Outcome Target

Farm specific factors responsible for improving technical efficiency of biofuel production will be determined to minimize inefficiency in current production.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 511 - New and Improved Non-Food Products and Processes

4. Associated Institute Type(s)

- 1890 Research

Outcome # 10

1. Outcome Target

Optimization of biofuel crop, i.e. switchgrass yields, to changing climatic conditions.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 202 - Plant Genetic Resources

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Description

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The following items are measured to assess the success of this program:
Increase in number of producers adopting production of bioenergy feedstocks.
Number of students receiving training in bioenergy production.
Number of new varieties of biofuel feedstocks developed.
Feedback from individuals outside the program related to the educational materials produced or presented.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Climate Change- low-impact alternatives for ornamental crop production

2. Brief summary about Planned Program

This program addresses disease, insect and energy problems in Tennessee nursery production systems for woody plants.

Applied research on the etiology of new disease threats to nursery production are required to develop plant disease treatment alternatives and disease management strategies. Studies on disease resistance, fungicide efficacies and identification of biopesticides, including biological agents, will be performed using conventional methods and molecular techniques.

In the area of insect control, the development of nursery plant treatments that will meet certification requirements for Japanese beetle and imported fire ants will be addressed. These treatments will be cost effective, integrate into current nursery production systems, be environmentally safe, be less hazardous to workers, and reduce the utilization of synthetic petroleum-based insecticides.

In the area of energy consumption and alternative energy, energy used in ornamental plant production will be determined, alternative sources of energy will be identified and growers educated about the alternatives that are available.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
133	Pollution Prevention and Mitigation				20%
211	Insects, Mites, and Other Arthropods Affecting Plants				30%
212	Pathogens and Nematodes Affecting Plants				30%
605	Natural Resource and Environmental Economics				20%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Chemical fungicides are routinely used to control diseases in nursery production systems. However, disease management of new emerging problems may fail because of lack of guidance to growers. Good

management of new emerging disease problems requires research on disease etiology and control strategies. Effective pesticides may provide immediate remedy to disease problems, but this practice increases production costs and the potential for environmental contamination. Routine pesticide application continues to be the main method to control disease in commercial nurseries. Extensive fungicide applications tend to increase development of fungicide resistance, destroy or disrupt non-target beneficial microflora in the phylloplane, and potentially lead to the development of new disease problems. There is a need to find alternatives to conventional fungicides, such as host resistance and biopesticides derived from plant extracts and biological agents. Host resistance is the best method for disease control, but it takes time to develop and its durability often requires integration with other methods of disease management.

To improve the profitability of the nursery industry, research is necessary to develop efficient and cost-effective trapping and control technologies for both quarantine and non-quarantine pests. The nursery industry in Tennessee is greatly impacted by the federal imported fire ant (IFA) quarantine and the Japanese beetle (JB) harmonization plan. These insects are problematic due to easy transport in soil and limited control options that are too expensive, impractical, or non-efficacious. In Tennessee, ~95% of the nursery industry is now included in the Federal IFA quarantine. Field-grown nurseries have 3 IFA options, but they are impractical, costly, environmentally damaging, hazardous, and have unfeasible certification periods. The existing research focus has been low cost and rapidly applied band treatments to eliminate IFA or JB from the harvest zone. Numerous treatments have been identified for JB, so current work will focus on reduced-risk biopesticides and treatments requiring more support data.
Wood boring beetles are of particular concern in Tennessee due to the difficulties of controlling them with conventional pesticides. These beetles require both basic and applied research programs in order to understand their impact on crop health and to develop new control techniques. New invasive species arriving in nursery production areas also require immediate attention in order to minimize economic impacts on nursery production.

Rising energy costs affect the profit margin of greenhouse nursery producers and continued growth of the industry. To counter this trend, producers need to actively seek viable approaches to avoid decline. Developing strategies that will promote efficient use of energy and support alternative energy sources. The ability to use the above strategies and their efficacy in practice can vary.

2. Scope of the Program

- In-State Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Efficient disease management requires information on the etiology and biology of the pathogen, its winter survival and primary source of infection. In addition to chemical spray programs, there is accumulating evidence that antagonist microorganisms can be as effective as chemicals in repressing fungal pathogens. Components of integrated disease management may include host resistance, biological agents and chemical fungicides. Our previous studies have identified fungi, bacteria and yeasts that are effective against powdery mildew, but more research is needed before these antagonists can be used in disease management. Additionally, superior lines of mildew-resistant Dogwoods were selected.

Imported fire ants (IFA) and Japanese beetle (JB) are serious regulatory issues for the nursery industry. The relevance of IFA and JB to the nursery industry has been determined by: 1) interactions with Tennessee State University (TSU) Nursery Advisory Stakeholder Group (NASG) and nursery growers

at workshops, field days, and one-on-one, 2) market destinations of Tennessee nursery plants, which indicate ~85% of plants sold need treatment, 3) cost assessment of current JB and IFA treatments, and 4) lack of suitable alternatives. The NASG identified IFA as the primary pest issue in the Tennessee nursery industry. Personnel at TSU have over 10 years of experience addressing JB and IFA related issues. In addition to TSU personnel and facility resources, we have an established network of USDA collaborators that further ensures our ability to address issues. This project will reduce JB and IFA impacts. Research will support external changes in regulations and insecticide labels. Research from this program has already supported Marathon 60WP, Discus, and Flagship pre-harvest treatments in the U.S. Domestic Japanese Beetle Harmonization Plan (JBHP), an Onyx Pro dip label for JB and IFA, a new JBHP Onyx Pro insecticide dip regulatory treatment, and an 8 times reduction in chlorpyrifos rate in JBHP. IFA data collected in the past 5 years will eliminate ineffective research directions and allow focus on methods likely to succeed. The idea that IFA and JB regulations will be improved is supported by past treatment approvals, our close interaction with regulatory agencies, and PI service as a science advisor to the JBHP Treatments Review Committee.

Other, non-quarantine invasive pests (ambrosia beetles, spotted wing drosophila, etc.) also pose significant threats to the sustainability of the nursery industry. Timely and effective responses to these and other newly introduced pest introductions will reduce the economic impact of new pests on the industry. Alternative energy research assumes access to a database of greenhouse and nursery businesses from which to draw a sample of those to be surveyed, a willingness by businesses to participate in focus group meetings, and a willingness by producers and buyers to fill out mail surveys.

2. Ultimate goal(s) of this Program

Enhance the sustainability of the nursery industry by developing environmentally friendly and cost effective procedures for the nursery industry that will achieve increased alternative energy use, control disease, and meet certification requirements for Japanese beetle and imported fire ants. These new procedures will be cost effective, integrate into current nursery production systems, be environmentally safe, less hazardous to workers, and reduce the utilization of synthetic petroleum-based pesticides and energy sources.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	14.2
2015	0.0	0.0	0.0	14.2
2016	0.0	0.0	0.0	14.2
2017	0.0	0.0	0.0	14.2
2018	0.0	0.0	0.0	14.2

V(F). Planned Program (Activity)

1. Activity for the Program

Identify new pesticide, biopesticide, and treatment methodologies for container and field-grown nursery stock to manage disease and insect problems.

Determine the lowest effective rates for synthetic petroleum-based pesticides and develop new reduced rate insecticide / biopesticide combinations.
Identify new biopesticides that can substitute for synthetic petroleum-based pesticides and reduce worker exposure risk and environmental impact.
Release phorid-decapitating flies in Tennessee to provide imported fire ant biological control.
Provide extension training and literature to producers on imported fire ant and Japanese beetle management and train students in pest management and research techniques.
Provide data to support new treatments in the Domestic Japanese Beetle Harmonization Plan and the Federal Imported Fire Ant Quarantine, as well as data to support new insecticide label amendments.
Conduct assessment of current and future energy use by greenhouse and nursery businesses.
Identify alternative energy sources for the greenhouse and nursery industry.
Hold focus group meetings with greenhouse and nursery business owners.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop ● Demonstrations	● Web sites other than eXtension

3. Description of targeted audience

Nursery growers, extension specialists, consumers and policy makers.
Regulatory agencies (e.g., U.S. Environmental Protection Agency, USDA-APHIS, Tennessee Department of Agriculture).
Agrochemical manufacturers.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Workshops to inform producers about alternative insect control methodologies.
- Disease resistant cultivars developed.
- Extension factsheets about alternative methods to control disease and insects in nursery production.
- Workshops held to inform/encourage nursery producers about alternative energy use.
- Extension publications to inform nursery and greenhouse growers about alternative energy options.

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Producers educated on proper management of invasive pests through presentations and workshops.
2	Producers educated on proper management of invasive pests through publications and factsheets.
3	New treatments for invasive pests.
4	New treatments for invasive pests approved by quarantine regulatory agencies.
5	Confirmed establishments of new invasive pest parasites.
6	Producers are informed about new or emerging diseases.
7	Producers are informed about new biological control treatments.
8	Producers that are informed about new sources of host resistance.
9	New cultivars exhibiting disease resistance available to growers.
10	Nursery/greenhouse operators utilizing alternative energy.
11	New alternative controls for insect pests.

Outcome # 1

1. Outcome Target

Producers educated on proper management of invasive pests through presentations and workshops.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Producers educated on proper management of invasive pests through publications and factsheets.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

New treatments for invasive pests.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

New treatments for invasive pests approved by quarantine regulatory agencies.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Confirmed establishments of new invasive pest parasites.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

Producers are informed about new or emerging diseases.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 212 - Pathogens and Nematodes Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 7

1. Outcome Target

Producers are informed about new biological control treatments.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 212 - Pathogens and Nematodes Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 8

1. Outcome Target

Producers that are informed about new sources of host resistance.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 212 - Pathogens and Nematodes Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 9

1. Outcome Target

New cultivars exhibiting disease resistance available to growers.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 133 - Pollution Prevention and Mitigation
- 212 - Pathogens and Nematodes Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

Outcome # 10

1. Outcome Target

Nursery/greenhouse operators utilizing alternative energy.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 605 - Natural Resource and Environmental Economics

4. Associated Institute Type(s)

- 1890 Research

Outcome # 11

1. Outcome Target

New alternative controls for insect pests.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 211 - Insects, Mites, and Other Arthropods Affecting Plants

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations

Description

As this program emphasizes applied agricultural research, adverse climate condition can influence the outcome of research studies. Changing economic conditions can change the priorities of producers. Changes in government regulations, particularly quarantine regulations, can significantly change the scope of this research.

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

To evaluate the success of the project, data is collected from the growers using a mail survey and other means on profitability of their operations; recognition of the impact of input prices and economic downturn; access to new ideas, information and their use. Post-survey, focus group meeting of selected nursery and greenhouse business operators are held. The focus group meeting inquire the extent to which the growers' knowledge about the above issues are enhanced and adoption of innovative strategies in their business operations as well as evaluate success of the project in impacting the lives of the growers. Results of the focus group meeting are summarized and disseminated to stakeholders at different forums.

Surveys have been conducted to determine the effectiveness of workshops to inform growers about new or emerging diseases, powdery mildew resistance and alternative products in powdery mildew management in dogwood. Results are used to improved effectiveness of subsequent workshops.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change- improving the quality of water runoff from agricultural production

2. Brief summary about Planned Program

Clean water is of fundamental importance for all facets of life. Unfortunately, many agricultural enterprises produce situations that may lead to contamination of surface and ground water with excess nutrients, agricultural chemicals and sediments. This program will address the issue of runoff from agricultural production. Research will be conducted to improve quality of agricultural run-off and agricultural sites by identification and modification of contaminant-producing nursery crop production procedures.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management				50%
133	Pollution Prevention and Mitigation				50%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

Many state regulatory agencies are promulgating laws to ensure that non-point source pollutants are assessed and regulated. Agricultural production contributes to non-point source pollution. Therefore, the assessment of creeks, streams, lakes and rivers requires sound monitoring strategies at the watershed scale. Large concentrations of nursery crop production operations exist In Middle Tennessee, especially in Warren, Dekalb and Grundy counties. The Collins River sub-watershed spans these counties. Therefore, there is a potential for sediments and nutrient loading by overland and subsurface flow to the Collins River. During storm events, large volumes of sediments can be added to streams from surface runoff, especially in areas where the landscape has been disturbed. Plowing, liming and fertilization of nursery fields can result in the runoff of tons of soil and essential crop nutrients. There is a dearth of research on the impact of nursery crop production systems on surface water quality. It is expected that the data collected will be used to define a special emphasis on watershed quality for specialty crops with specific conservation and management techniques for field nursery production systems. Traditionally, the environmental impact of high-input row crop (eg. corn and soybean) production systems on water quality

have received major attention. Conversely, nursery crops, especially field grown ornamental crops, have received minimal focus.

2. Scope of the Program

- In-State Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

Recent global climate changes have led to increased interest by agricultural producers and others in safe, reliable water sources and has increased attention to the vulnerability of surface water to contamination. Degraded waters pose threats to human health through impaired drinking water supplies and water availability for production of food and fiber. On a watershed scale, land-use is cited as one of the leading causes of sediment loading. Sediment problems are exacerbated during storm events because large volumes of sediments can be added to streams from surface runoff, especially in areas where the surface soil has been disturbed. It is expected that growers will adopt specific conservation and management techniques for field nursery crop production systems that minimize sediments load to water bodies.

2. Ultimate goal(s) of this Program

Improve water quality from agricultural production or contaminated sites.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	6.6
2015	0.0	0.0	0.0	6.6
2016	0.0	0.0	0.0	6.6
2017	0.0	0.0	0.0	6.6
2018	0.0	0.0	0.0	6.6

V(F). Planned Program (Activity)

1. Activity for the Program

Conduct research in water quality monitoring.
Develop outreach materials.
Communicate findings to producers/end users.
Train students.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop	● Web sites other than eXtension

3. Description of targeted audience

Agricultural producers, environmental scientists, environmental regulatory agencies.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Workshops to communicate research findings to stakeholders.
- Workshops to educate producers in the target population on how to reduce sediment load to surface water.

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Nursery producers in the target population will be aware of non-point source pollution from field production of specialty crops.
2	Students will be trained in water quality monitoring.
3	Producers in the target population will have increased knowledge of the relationship between land cultivation practices and sediment load to surface water.
4	Graduate students will have increased knowledge regarding advanced large-scale environmental modeling techniques that would identify significant changes in the variability explained in Southeast total phosphorus SPARROW models.
5	Local, state, and/or federal agencies will have increased knowledge regarding non-point source and land-to-water linkages between land cover, riparian stream buffers, and climate to predict and monitor phosphorus at the southeast regional scale.
6	Stakeholders will adopt use of new data gained from the identification of non-point source and land-to-water linkages between land cover, riparian stream buffers, and climate to reduce the quantity of total phosphorus loadings in watersheds at the southeast regional scale.

Outcome # 1

1. Outcome Target

Nursery producers in the target population will be aware of non-point source pollution from field production of specialty crops.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Students will be trained in water quality monitoring.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

Producers in the target population will have increased knowledge of the relationship between land cultivation practices and sediment load to surface water.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

Graduate students will have increased knowledge regarding advanced large-scale environmental modeling techniques that would identify significant changes in the variability explained in Southeast total phosphorus SPARROW models.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Local, state, and/or federal agencies will have increased knowledge regarding non-point source and land-to-water linkages between land cover, riparian stream buffers, and climate to predict and monitor phosphorus at the southeast regional scale.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

Stakeholders will adopt use of new data gained from the identification of non-point source and land-to-water linkages between land cover, riparian stream buffers, and climate to reduce the quantity of total phosphorus loadings in watersheds at the southeast regional scale.

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 112 - Watershed Protection and Management
- 133 - Pollution Prevention and Mitigation

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities

Description

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The effectiveness (success) of the project is being measured by a) workshops in forums such as field days and nursery association expos that educate growers and increase their awareness of surface water quality problems and solutions associated with field nursery crop production; b) heightened local awareness of surface water quality problems and solutions; c) best management practices (BMPs) adopted by growers for individual nursery fields; d) demand by growers for better and more efficient fertilizers that are not prone to excessive surface runoff during storm events and e) better trained students in the environmental protection and enhancement area. As a result, the metrics for evaluating the aforementioned outcomes may include but are not limited to two components: a) formative assessment throughout the project and b) summative assessment at the conclusion of the project. The purpose of the formative assessment is to track a) project planning and implementations to ensure that the project activities are being conducted as intended; b) conduct random surveys of nursery crop growers at field day(s) or at nursery trade show(s) to ascertain the knowledge gained by growers as a result of the project, the type and effectiveness of BMPs adopted by growers in the sub-watershed, and the number of growers demanding better and efficient fertilizer formulations, and c) engage both undergraduate and graduate students in the project to gain research experiential training in surface water resources.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Food Safety - contaminant-free, healthier foods

2. Brief summary about Planned Program

Home refrigerators can harbor pathogenic bacteria that pose a potential to contaminate stored foods. Consumers should be informed about safe handling of refrigerated foods and proper cleaning of home refrigerators to reduce the risk of food contamination. The role of storage conditions of refrigerated foods in the home on consumer health remains to be fully assessed. This program will quantify the risks associated with mishandling of foods and cross contamination of foods, the dynamics of microbial survival and growth, as well as factors that affect bacterial transfer efficiency during refrigerator storage. In response to the findings, risk communication messages appropriate for consumers will be developed and disseminated to the public to minimize the risk of food-borne illnesses associated with improper handling and storage of refrigerated foods in the home.

Outbreaks of food borne illness linked with fresh produce present challenges to public health as well as to the fresh produce industry. Global use of antibiotics and antimicrobial agents in agriculture has contributed to antibiotic resistant bacteria in the food chain. There is concern about development of antibiotic resistance in food borne pathogens and subsequent transfer to humans through contaminated food. Increased antimicrobial resistance of pathogens and changes in food production practices continues to be a threat to consumers and the food industry. Given that fresh produce is ready to eat, and is not usually subject to procedures to kill potential microbial contaminants, only a comprehensive food safety system, public awareness and commitment by growers will help to ensure that fresh fruits and vegetables are safe. Fresh produce can be contaminated by resistant bacteria through soil, irrigation water and/or animal manure. Therefore, the goal of this project is to determine the prevalence of antibiotic resistant food borne pathogens in the farm environment and retail fresh produce, and to deliver educational programs on safe fresh produce handling practices and judicious use of antibiotics in agriculture.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources				50%
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins				50%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

The US food supply is among the safest in the world, yet each year millions of Americans become sick and thousands die from eating food contaminated with foodborne pathogens. The nation faces a continuing challenge to further reduce food borne risks to human health. It has been suggested that food borne illnesses are initiated in private homes more frequently than in commercial operations. Many of these cases, perhaps up to 50%, are attributable to inappropriate food storage, including ineffective chill storage and improper refrigerator management. Refrigerators form an important link in the wider chain of cross-contamination, and are a significant factor in 28% of outbreaks of domestic food borne disease. Bacteria introduced into domestic refrigerators from unwashed raw foods and leaking packages may directly contaminate other stored foods, or attach to and persist on the internal surface of the refrigerator, posing risks of indirect longer-term contamination during subsequent food preparation activities. In previous projects we have measured consumer knowledge and have obtained some consumer practice data. However, the potential for these practices to cause food borne illness has not been fully assessed. Findings from that study indicate potential differences between subpopulation groups. In a study conducted at our institution, the prevalence of pathogens was higher in the refrigerators of low income households. Additionally, conditions such as open meat packages and other foods stored in the meat compartment with raw meats were found in many of the homes, conditions that can cause cross-contamination.

Recently, there has been alarming increase of food borne illnesses associated with fresh produce. This increase becomes a significant issue when coupled with the trend of increased consumption of vegetables and fruits for health and nutritional benefit. Consequently, the topic of food borne pathogens in fresh produce has been cited as an emerging issue in food safety and one of the most pressing public health needs. Food borne pathogens in fresh produce indicate a weakness in the nation's fresh produce production system as was demonstrated by recent multi-state outbreaks in produce, including the E. coli OH7:H7 outbreak from spinach that lead to 183 cases of illness, 29 cases of Hemolytic Uremic Syndrome, 95 hospitalizations, and one death. Increasing applications of antimicrobial agents in production systems have resulted in multiple antibiotic-resistant pathogenic and commensal bacteria in human and animal habitats. Research is needed to determine all major sources of food borne pathogens, especially those associated with antibiotic resistance.

Research that addresses critical issues throughout the fresh produce sector significantly enhances the ability to mitigate the contamination of fresh produce. The research findings on the occurrence, profiles, and patterns of antibiotic-resistant food borne pathogens in fresh produce and educational programs in this

program will provide useful information needed in mitigation efforts.

2. Scope of the Program

- In-State Extension
- In-State Research

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

The problem of cross-contamination is generally recognized to be complex, involving consumer behaviors and the dynamics of microbial survival and growth, as well as factors that affect bacterial transfer efficiency. Existing research has examined each of these factors independently, but generally fails to examine the problem holistically. It is essential to understand the interaction of specific observed consumer food preparation behaviors with subsequent levels of contamination. Intervention strategies targeting potentially unsafe consumer practices will reduce foodborne illnesses associated with home-prepared foods. Investigating storage practices of refrigerated foods and the likelihood and mechanisms of cross contamination will provide essential information to develop effective intervention strategies.

By improving food handling and storage practices in the home, this project should reduce the risk of foodborne illness. In another avenue of possible food contamination, the application of raw animal manure as fertilizer can increase the threat of contamination on fruits and vegetables and possibly pass antibiotic-resistant bacteria to humans who consume the contaminated fresh produce. Consumer handling practices and storage of food determines the degree of microbial contamination and the possibility of causing food contamination.

This program will characterize, analyze, and identify pathogenic profiles and patterns of pathogenic microorganisms in fresh produce and farm environments and deliver educational programs to producers and consumers on hygienic agricultural and food handling practices that are needed to improve fresh produce safety. In addition, the program will reduce antibiotic-resistant bacteria in fresh produce and the farm environment; change the behaviors of consumers and farmers to produce safer fresh produce handling practices and judicious use of antibiotics; and train competitive students with relevant skills for employment opportunities in food safety.

2. Ultimate goal(s) of this Program

Improve consumer and producer food safety knowledge and practices. Minimize the risk of food borne illnesses associated with improper handling and storage of refrigerated foods. Reduce the prevalence of antibiotic resistant foodborne pathogens. Educate students in appropriate techniques.

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	8.6
2015	0.0	0.0	0.0	8.6
2016	0.0	0.0	0.0	8.6

Year	Extension		Research	
	1862	1890	1862	1890
2017	0.0	0.0	0.0	8.6
2018	0.0	0.0	0.0	8.6

V(F). Planned Program (Activity)

1. Activity for the Program

Identify risk factors for cross contamination by investigating storage practices of refrigerated foods.
Determine the likelihood and mechanisms of cross contamination by mapping the genetic fingerprints of bacteria strains from the same refrigerator.
Change potentially unsafe consumer practices through effective intervention strategies.
Characterize, analyze, and identify antibiotic-resistant bacteria in the farm environment (animal manure, soil) and irrigation water.
Train students on isolation and characterization techniques for foodborne pathogens in fresh produce and the farm environment.
Develop and deliver educational materials on hygienic agricultural practices needed to reduce the use of antibiotics and safe fresh produce handling practices.
The development, maintenance, and revision of an educational website and brochure on safe fresh produce handling practices and judicious use of antibiotic in agriculture.

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Workshop	● Web sites other than eXtension

3. Description of targeted audience

Fresh produce farmers, consumers, food scientists, food production industry, households in the metropolitan Nashville area.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Website developed to educate consumers on antibiotic resistant pathogens on fresh produce.
- Database of characterized antibiotic resistant microorganisms isolated from animal manure.
- Database of characterized antibiotic resistant microorganisms isolated from irrigation water and watersheds.
- Factsheets on improvement of kitchen cleanliness and prevention of cross-contamination.

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Consumers will be educated via booklets on the occurrence and prevention of antibiotic resistant pathogens on fresh produce (Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels.)
2	Producers will practice judicious use of antibiotics on farms through improved agricultural practices (Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels).
3	Consumers will practice safe fresh produce handling practices via food safety education (Increase adoption of recommended safe food handling practices at the individual, family,community, production, and supply system levels).
4	Consumers will have increased knowledge of improved kitchen cleanliness (Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels).
5	Consumers will have increased knowledge of means to reduce the chance of cross contamination (Increase adoption of recommended safe food handling practices at the individual, family,community, production, and supply system levels).
6	Consumers will adopt safer food storage practices (Increase adoption of recommended safe food handling practices at the individual, family,community, production, and supply system levels).
7	Consumers will adopt improved cleaning skills (Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels).

Outcome # 1

1. Outcome Target

Consumers will be educated via booklets on the occurrence and prevention of antibiotic resistant pathogens on fresh produce (Increase adoption of recommended safe food handling practices at the individual, family,
community, production, and supply system levels.)

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Producers will practice judicious use of antibiotics on farms through improved agricultural practices (Increase adoption of recommended safe food handling practices at the individual, family, community, production, and supply system levels).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

Consumers will practice safe fresh produce handling practices via food safety education (Increase adoption of recommended safe food handling practices at the individual, family,community, production, and supply system levels).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

Consumers will have increased knowledge of improved kitchen cleanliness (Increase adoption of recommended safe food handling practices at the individual, family,
community, production, and supply system levels).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Consumers will have increased knowledge of means to reduce the chance of cross contamination (Increase adoption of recommended safe food handling practices at the individual, family,community, production, and supply system levels).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

Consumers will adopt safer food storage practices (Increase adoption of recommended safe food handling practices at the individual, family,community, production, and supply system levels).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

Outcome # 7

1. Outcome Target

Consumers will adopt improved cleaning skills (Increase adoption of recommended safe food handling practices at the individual, family,
community, production, and supply system levels).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 711 - Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources
- 712 - Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Description

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

The following items are measured to assess the success of this program:
Consumers educated on the occurrence and prevention of antibiotic resistant pathogens on fresh produce. Number of producers practicing judicious use of antibiotics on farms through improved agricultural practices. Increase in number of consumers practicing safe fresh produce handling practices via food safety education. Number of target consumers adopting safer food storage practices. Number of target consumers adopting improved cleaning skills.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Childhood Obesity - youth active and media savvy

2. Brief summary about Planned Program

The Youth Active and Media Savvy (YAMS) program is intended to encourage healthier lifestyles by promoting cultural empowerment to teach weight management skills to African American youth at risk for adult obesity. This research incorporates cultural empowering techniques with media literacy education. Media literacy is an effective strategy because it teaches individuals to deconstruct media messages and identify the sponsor's motives in representing the intended audience's point of view. Exploring and integrating relevant attitudes, values, goals, and practices of the African American experience and African traditions will help build cultural empowerment. This project supports the USDA-NIFA strategic goal of preventing childhood obesity and the priority areas of human health and obesity as it relates to nutrition and youth and families development by developing and delivering a culturally empowering intervention that promotes healthy dietary habits, physical activity, and media literacy to historically disadvantaged youth.

3. Program existence : Intermediate (One to five years)

4. Program duration : Medium Term (One to five years)

5. Expending formula funds or state-matching funds : Yes

6. Expending other than formula funds or state-matching funds : Yes

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
703	Nutrition Education and Behavior				50%
724	Healthy Lifestyle				25%
806	Youth Development				25%
	Total				100%

V(C). Planned Program (Situation and Scope)

1. Situation and priorities

While obesity is a nationwide epidemic, obesity rates of adults and youths (ages 10-17) in Tennessee are among the top 5 in the nation. Being overweight and obese increases a persons' risk of chronic diseases and premature death, leading to decreases in quality of life. More immediately, many obese children suffer from Type 2 diabetes. Many factors can contribute to obesity including food choice, physical activity level, and economic status. High rates of obesity also correlate with poverty and race in Tennessee. Excess Risk of Obesity for African American Children trend analyses revealed family poverty

status and obesity rates were highly correlated to youth ages 15 to 17 years of age but not for those 12 to 14 years of age. While lower-income children have higher rates of obesity than children from more affluent families regardless of their ethnicity, when ethnicity is included, African American girls are at a higher risk for obesity at the lowest and highest income levels. This dichotomy signifies the reason for higher obesity among African Americans may be substantially influenced by culture.

It is estimated that every day, 11- to 14-year-old children spend about 7 hours involved with media including television, video games, and computers. A report by the Institute of Medicine found television advertising influences children's purchase requests, food preferences and diets. Another study estimates that for every hour of television watched, children consume 167 unneeded calories. Since African American households are reported to watch more television than other Americans, food and beverage marketing may contribute considerably to their disproportionately higher rates of obesity. In fact, research suggests targeted marketing of low-cost, energy dense, low nutrient food and beverage products does influence the food purchases of African Americans, but this evidence has not been derived from observation or experiment. To increase media literacy among African American children and youth, culturally appropriate media educational material is warranted. Findings from this research will add to the literature. Conducting applied research to decrease obesity in Tennessee aligns with TSU's institutional goal of improving the overall well-being of the general public's mental, physical, social and educational needs. This integrated research has implications for contributing to the body of knowledge of: (1) Childhood Obesity Prevention & Treatment; (2) Participatory Action Research; and (3) Adaptive Experimental Design benefiting stakeholders across the nation.

2. Scope of the Program

- In-State Extension
- In-State Research
- Integrated Research and Extension

V(D). Planned Program (Assumptions and Goals)

1. Assumptions made for the Program

This research project is based on the rationale that the culture in which one is raised greatly influences attitudes, beliefs, values, and behaviors. If a lack of appreciation of one's own racial identity/heritage negatively influences lifestyle behaviors, then raising awareness and appreciation of the positive cultural values of that racial heritage will mediate positive lifestyle behaviors. Using an integrated approach, the goal of the project is to promote weight management behaviors by counteracting the harmful effects of negative cultural values on African American youth. We assert that teaching an appreciation of African culture and reinforcing it on multiple levels (individual, interpersonal, organizational, and community) will empower African American children ages 8 to 14 years to improve their dietary behaviors and practices regarding (1) media literacy knowledge; (2) healthy cooking and food preparation skills; and (3) daily physical activity. We hypothesize that after the intervention, outcome scores of participants will increase for:

· Intent to limit leisure media usage (television, internet, computer & video games)
· Intent to eat more fruits, vegetables & whole grains,
· Intent to increase physical activity
· Intent to eat less fast food
· Self-esteem and self-efficacy
· Knowledge, skill and ability to understand and analyze media

2. Ultimate goal(s) of this Program

Among 8-14 year old African-American children:
Increase physical activity
Limit leisurely TV viewing, internet surfing, and video gaming activities
Improve dietary practices

V(E). Planned Program (Inputs)

1. Estimated Number of professional FTE/SYs to be budgeted for this Program

Year	Extension		Research	
	1862	1890	1862	1890
2014	0.0	0.0	0.0	6.1
2015	0.0	0.0	0.0	6.1
2016	0.0	0.0	0.0	6.1
2017	0.0	0.0	0.0	6.1
2018	0.0	0.0	0.0	6.1

V(F). Planned Program (Activity)

1. Activity for the Program

Media literacy research and education
Nutrition education
Nutrition perception research
Physical activity programs
Field trips

2. Type(s) of methods to be used to reach direct and indirect contacts

Extension

Direct Methods	Indirect Methods
● Education Class ● Demonstrations ● Other 1 (Camps)	● Other 1 (Focus Groups)

3. Description of targeted audience

African American children, ages 8 to 14 years, living in Davidson County, Tennessee.

V(G). Planned Program (Outputs)

NIFA no longer requires you to report target numbers for standard output measures in the Plan of Work. However, all institutions will report actual numbers for standard output measures in the Annual Report of Accomplishments and Results. The standard outputs for which you must continue to collect data are:

- Number of contacts
  - Direct Adult Contacts
  - Indirect Adult Contacts
  - Direct Youth Contacts
  - Indirect Youth Contact
- Number of patents submitted
- Number of peer reviewed publications

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(H). State Defined Outputs

1. Output Measure

- Number of focus groups held to determine perceived benefits, value and needs for relationships by probing habits, needs, preferences, values and lifestyles associated with food and media
- Number of summer camp sessions held to collect data and educate youth in healthy eating and physical activities

☐ Clicking this box affirms you will continue to collect data on these items and report the data in the Annual Report of Accomplishments and Results.

V(I). State Defined Outcome

O. No	Outcome Name
1	Target youth attending summer camp sessions (Children Engage in Healthy Levels of Physical Activity).
2	Following intervention, youth will intend to limit television viewing, internet surfing and video games to less than one hour per day each (Children Engaging in Healthy Levels of Physical Activity).
3	Target youth will intend to increase fruit and vegetable intake (Children Practicing Healthy Eating).
4	Target youth will intend to increase level of daily physical activity (Children Engaging in Healthy Levels of Physical Activity).
5	Youth will intend to limit fast food meals to fewer than four per month (Children Practicing Healthy Eating).
6	Target youth will increase self-efficacy and self-esteem.
7	Target youth will maintain healthy behaviors 12 months post-intervention (Children Engaging in Healthy Levels of Physical Activity, Children Practicing Healthy Eating).
8	Increase in daily fiber intake by through the development of soy-fortified breads and incorporation of soy bread into diets.

Outcome # 1

1. Outcome Target

Target youth attending summer camp sessions (Children Engage in Healthy Levels of Physical Activity).

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1890 Research

Outcome # 2

1. Outcome Target

Following intervention, youth will intend to limit television viewing, internet surfing and video games to less than one hour per day each (Children Engaging in Healthy Levels of Physical Activity).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1890 Research

Outcome # 3

1. Outcome Target

Target youth will intend to increase fruit and vegetable intake (Children Practicing Healthy Eating).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1890 Research

Outcome # 4

1. Outcome Target

Target youth will intend to increase level of daily physical activity (Children Engaging in Healthy Levels of Physical Activity).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1890 Research

Outcome # 5

1. Outcome Target

Youth will intend to limit fast food meals to fewer than four per month (Children Practicing Healthy Eating).

2. Outcome Type : Change in Action Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1890 Research

Outcome # 6

1. Outcome Target

Target youth will increase self-efficacy and self-esteem.

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 806 - Youth Development

4. Associated Institute Type(s)

- 1890 Research

Outcome # 7

1. Outcome Target

Target youth will maintain healthy behaviors 12 months post-intervention (Children Engaging in Healthy Levels of Physical Activity, Children Practicing Healthy Eating).

2. Outcome Type : Change in Condition Outcome Measure

3. Associated Knowledge Area(s)

- 703 - Nutrition Education and Behavior
- 724 - Healthy Lifestyle
- 806 - Youth Development

4. Associated Institute Type(s)

- 1890 Research

Outcome # 8

1. Outcome Target

Increase in daily fiber intake by through the development of soy-fortified breads and incorporation of soy bread into diets.

2. Outcome Type : Change in Knowledge Outcome Measure

3. Associated Knowledge Area(s)

- 724 - Healthy Lifestyle

4. Associated Institute Type(s)

- 1890 Research

V(J). Planned Program (External Factors)

1. External Factors which may affect Outcomes

- Economy
- Appropriations changes

Description

V(K). Planned Program - Planned Evaluation Studies

Description of Planned Evaluation Studies

A process evaluation conducted of the pilot summer camp 2011 provided feedback on the camp materials and procedures. Seven key process evaluation components (context, reach, dose delivered, dose received, fidelity, implementation, and recruitment) were evaluated. Data management problems, blind spots and oversights were also assessed as part of the process evaluation. The pilot campers completed pre and post surveys measuring their intent to: 1) limit TV viewing, video games and computer/internet usage, 2) limit intake of high energy foods/low nutrient density foods and, 3) increase daily physical activity. Surveys and evaluations of camp components provided information on the likeability and difficulty of daily camp activities, lessons, and meals and snacks provided and prepared by campers. FFQ completed by parents provided information on the current dietary, physical activity and media usage behaviors. This information allowed us to determine which health-related attitudes and behaviors to target, personalizing each camp lesson to the needs of the youth.

Media Literacy
Data Collection: Media Smart Youth Pre-test
When Collected: First day of camp
Evaluation Component: Current Knowledge, Skills, Behaviors, Diet
Data Collection: YAMS Daily Evaluation Form
When Collected: End of each day
Evaluation Component: Barriers, Dose, Fidelity and Reach
Data Collection: Facilitator Notes and Debriefing
When Collected: End of each day
Evaluation Component: Resources, Barriers, Dose, Fidelity and Reach

Nutrition
Data Collection: Completed Activity Worksheets
When Collected: Daily
Evaluation Component: Reach, Exposure, and Initial Use
Data Collection: Parental Children's Nutrition Questionnaire
When Collected: Before the last day of camp
Evaluation Component: Health practices, Diet Assessment
Data Collection: CATCH Kids Club After-School Questionnaire
When Collected: First day of camp
Evaluation Component: Knowledge, Skills, Behaviors, FFQ

Physical Activity
Data Collection: Attendance Log
When Collected: Daily sign-in
Evaluation Component: Reach
Data Collection: Media Smart Youth Post-test
When Collected: Last day of camp

Evaluation Component: Change in Knowledge, Skills, Behaviors, Diet