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

**Program # 1**

**1. Name of the Planned Program**

Global Food Security and Hunger

☑ Reporting on this Program

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

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | | | | 25% |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | | | | 20% |
| 205 | Plant Management Systems | | | | 25% |
| 216 | Integrated Pest Management Systems | | | | 10% |
| 701 | Nutrient Composition of Food | | | | 10% |
| 711 | Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources | | | | 5% |
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | | | | 5% |
| | **Total** | | | | 100% |

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

**1. Actual amount of FTE/SYs expended this Program**

| Year: 2014 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 0.0 | 0.0 | 0.0 | 6.0 |
| **Actual Paid** | 0.0 | 0.0 | 0.0 | 7.0 |
| **Actual Volunteer** | 0.0 | 0.0 | 0.0 | 0.0 |

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

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 0 | 0 | 0 | 437282 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 0 | 0 | 0 | 218641 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 0 | 0 | 0 | 0 |

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

### 1. Brief description of the Activity

Research conducted:

• Conventional breeding, evaluation and selection of hybrid vines for fresh fruit and wine.
• Embryo rescue, molecular, and mutagenic transformation to develop seedless muscadines.
• Identification, isolation, screening, characterization, and validation of genetic markers of viticulturally important genes.
• Identification, isolation, screening and validation of metabolities and proteins relating to growth function, fruit and wine quality, and disease tolerance.
• Stressed induced biochemical and molecular changes in grapes.
• Evaluation and understanding of antioxidant capacities of phytochemicals in grapes.
• Understanding the effects of grape phytochemicals in preventing diseases and obesity.
• Functional expression of flavonoid nutraceuticals in grapes.
• Identification of management practices for grapes and small fruits.
• Evaluation of non-traditional small fruits, including blackberries and raspberries.
• Evaluation, screening and production of 'clean vines' for industry.

Extension and outreach conducted:

• Vineyard visits and inspections.
• Workshops, field days, and seminars for grape growers, small farmers, processors and general public.
• Harvest festival for general public.
• Special presentations to high school and middle school students.
• Lab and field tours for farmers, students, public, and government officials.
• Promotional displays to promote program.

Student training and development:

• Graduate student training.
• Undergraduate experiential learning in viticulture and small fruit.
• Student recruitment.

Professional development:

- Faculty active in national and local professional associations.
- Conduct quality and innovative research for new discoveries.
- Professional collaboration with research institutions/universities will be encouraged.

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

The target audiences were grape growers, processors (wineries), hobbyists and persons who are interested in grapes, wines, and non-traditional small fruits. Small farmers, particularly, minorities and limited resource farmers were also be targeted to promote grape growing as an alternative crop.

**3. How was eXtension used?**

Farm visits, workshops, seminars and meetings were used to provide knowledge and information to grape growers and farmers to help them solve problems.
Presentations and demonstrations were conducted to stakeholder groups to expose them to new ideas and management practices in fruit and vegetable production.

Organized the Grape Harvest Festival that has attracted increasing number of attendees each year.
Conducted vineyard visits to assist grape growers solved problems.
Conducted workshops and seminars for grape growers, small farmers, and the local community.
Conducted tours for farmers, grape growers, students, FAMU alumni, and industry personnel.
Participated in undergraduate and graduate student training and development, and experiential training programs.
Participated in youth development training programs and summer programs.
Participated in collegiate activities relating to student recruitment.

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

**1. Standard output measures**

| 2014 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 4200 | 1100 | 240 | 120 |

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

**Patent Applications Submitted**

| | |
|---|---|
| Year: | 2014 |
| Actual: | 0 |

**Patents listed**

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

**Number of Peer Reviewed Publications**

| 2014 | Extension | Research | Total |
|---|---|---|---|
| Actual | 3 | 11 | 13 |

### V(F). State Defined Outputs

**Output Target**

**Output #1**

**Output Measure**

- Hybrid seedlings from breeding program.

| Year | Actual |
|---|---|
| 2014 | 1367 |

**Output #2**

**Output Measure**

- Advanced hybrid selection.

| Year | Actual |
|---|---|
| 2014 | 11 |

**Output #3**

**Output Measure**

- Genetic markers identified and cloned

| Year | Actual |
|---|---|
| 2014 | 6 |

**Output #4**

**Output Measure**

- Conventional crosses from breeding program

| Year | Actual |
|---|---|
| 2014 | 12 |

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

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Continued industry growth - increased in new vineyards and wine production in the state. |
| 2 | Release of new cultivars (change in knowledge). |
| 3 | Release of new cultivars (change in action). |
| 4 | Release of new cultivars (change in condition). |
| 5 | Public and stakeholder participation at workshops, field days, seminars and harvest festival (change in action). |
| 6 | Public and stakeholder participation at workshops, field days, seminars and harvest festival (change in condition). |
| 7 | Increased cultivation of fruits and vegetables |

**Outcome #1**

**1. Outcome Measures**

Continued industry growth - increased in new vineyards and wine production in the state.

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 24 |

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

**Issue (Who cares and Why)**
Throughout its 37 years of existence the FAMU?s Center for Viticulture has administered the ?Grape Growing Incentive Program?; Grape Demonstration Project and now is leading ?Florida Vine Improvement and Distribution Program? and participate together with the FDACS in the Florida Increase Acreage Program. The Center?s research and extension work had great impact on the development of viticulture in Florida and neighboring southeastern states.

**What has been done**
New knowledge and expertise has been generated and information has been shared with stakeholders to help them improve their operations.

**Results**
Increased in vineyard acreage, Florida Farm Wineries and total wine production in the state.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 205 | Plant Management Systems |

**Outcome #2**

**1. Outcome Measures**

Release of new cultivars (change in knowledge).

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 0 |

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

**Issue (Who cares and Why)**
The southern grape industry is seeking high quality stable red color red wine varieties: bunch grapes and muscadines as well.

**What has been done**
Several advanced breeding lines of both bunch and muscadine grapes have showed promising outcomes. These bunch advanced selections were resulted from hybridization of American species originated from the southeastern sates, Vitis vinifera wine grapes, and the backcrossing of those advanced selections. Their parentage involved major V. vinifera wine grapes, including Merlot, Cabernet Sauvignon, Zinfandel, and Syrah. Some of these hybrids are highly vigorous and disease resistant. The muscadine advanced selections are the hybrids of wine oriented crosses among muscadine grapes. During last few seasons, we have been evaluating these hybrids with information on both horticultural and wine characteristics, such as disease resistance, productivity, and wine traits.

**Results**
With the help from industry, we are gaining more experience and feel comfortable to make an initial wine selection, judged from both viticulture characteristics and wine quality. However, in order for us to fully evaluate their commercial potentials of these hybrids, we need support to evaluate them in different locations throughout the state under commercial cultural and processing standards. The perception of the commercial wineries and public acceptance would be the key criteria for us to determine if they will be released as new varieties to the industry.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|

| | |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 205 | Plant Management Systems |

**Outcome #3**

**1. Outcome Measures**

Release of new cultivars (change in action).

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 0 |

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

**Issue (Who cares and Why)**
Grape cultivar improvement is one of the most important projects for the continuous and dynamic growth of Florida grape and wine industries.

**What has been done**
More newly selected breeding lines will be added to the advance breeding lines pool.

**Results**
The program also has been collecting, evaluating, and maintaining grape germplasm for both bunch and muscadine germplasm and it is the part of the National Germpasm Repository for southern grapes. Currently, there are 56 muscadine cultivars, all Florida hybrid grapes, and 100 other bunch grapes that have potentials for southern grape industry.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 205 | Plant Management Systems |

**Outcome #4**

**1. Outcome Measures**

Release of new cultivars (change in condition).

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 0 |

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

**Issue (Who cares and Why)**
No new cultivars has been released in 2014

**What has been done**
In cooperation with industry partners (FGGA members and our stakeholders in neighboring states) has been deployed a fast 3 years evaluation trial to deliver novel, disease-resistant varieties with desired wine aroma and flavor characteristics, seedlesness and attractive large berry appearance for fresh fruit grape consumption respectively.

**Results**
Eleven advanced breeding lines including two seedless bunch grape hybrids, three seedless and three seeded muscadine for fresh consumption, and two bunch and one muscadine for wine-making are aggressively tested in the University?s experimental vineyard at the Center for Viticulture and Small Fruit Research and commercial vineyards in FL, GA, AL and TX.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 205 | Plant Management Systems |

**Outcome #5**

**1. Outcome Measures**

Public and stakeholder participation at workshops, field days, seminars and harvest festival (change in action).

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 4200 |

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

**Issue (Who cares and Why)**
Grape growers and small farmers were seeking and has been able to see the results of different research projects and benefited greatly by the ?Florida Muscadine Production Guide? www.famu.edu/cafs/Viticulture

**What has been done**
New information and educational materials provided to the growers.

**Results**
Lower disease incidence in the vineyards and cost of production. More households interested in grape, vegetable and small fruit production.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 205 | Plant Management Systems |

**Outcome #6**

**1. Outcome Measures**

Public and stakeholder participation at workshops, field days, seminars and harvest festival (change in condition).

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 4200 |

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

**Issue (Who cares and Why)**
Sothern growers are in constant need of new knowledge generated and applicable to the unique growing demands and specifics of the warm climate grapes (muscadines and Amarican native bunch hybrid grapes).

**What has been done**
?Florida Muscadine Production Guide? has been released.

**Results**
Vineyard visits and inspections.
Workshops, field days, and seminars for grape growers, small farmers, processors and general public.
Harvest festival for general public.
Special presentations to high school and middle school students.
Lab and field tours for farmers, students, public, and government officials.
Promotional displays to promote program.
Student training and development:

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |

205 Plant Management Systems

**Outcome #7**

**1. Outcome Measures**

Increased cultivation of fruits and vegetables

**2. Associated Institution Types**

- 1890 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 0 |

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

**Issue (Who cares and Why)**
The fruit and vegetable production in North Florida specifically for small farmer has not achieved its full potential due to a lack of research on the interaction of location, environment, soil, cultural and management practices as they relate to chemical composition of different fruit varieties and dissemination of new and improved farm technology including the availability of new and improved cultivars. These growers and schools have sought FAMU?s assistance in helping them to expand their knowledge by conducting research, trainings and demonstrations that address common problems experienced. Similarly, the lack of interest in agriculture, particularly in fresh fruit and vegetable in K12 schools causes a makes it difficult for precollege youth to accept and benefit from the consumption of fresh fruits and vegetables.

**What has been done**
In an effort to address this problem(s): 1) we evaluated the nutraceutical values and recommend improved fruit and vegetable cultivars for adaptability to North Florida growing conditions that are more appealing to our youth and young adults; 2) trained small farmer, extension agent and students in horticultural best management practices through workshops and field days; 3) conducted On-Farm demonstrations of improved technology and profitability; and 4) provided experiential learning to K12 campuses through horticultural demonstrations to create interest in and appreciation for fresh fruits and vegetables.

**Results**
Demonstration trial study has been initiated on the effect of location, environment, soil, cultural and management practices on chemical composition and characteristics of selected small fruits using minimal pesticides and chemicals.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |

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

### External factors which affected outcomes

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

### Brief Explanation

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

### Evaluation Results

The evaluation results indicated that the program achieved satisfactory progress towards meeting the goals in the plan of work. Program faculty have been very productive in terms of publishing their research in reputable journals and participating in relevant scientific meetings. They have also been successful in procuring external grants from various agencies to further support the program. The breeding program continued to evaluate several advanced lines that are being prepared for release in the near future. Several important genetic markers, genes, proteins and metabolites were identified and these are expected to greatly facilitate the breeding and biotechnology efforts. A patent application on the production of in-vitro strains of sub-epidermal cells of muscadine grapevine pericarp for use as a source of flavonoid compounds is pending. However, several cosmetic products incorporating the sub-epidermal cells have been developed and are under evaluation. Research on value-added products yielded encouraging results as evidenced by the submission of four patent applications for the production of nutraceuticals. The small fruit program continued to evaluate non-traditional small fruits, including raspberries and blackberries. The
results from these evaluations will be used to make appropriate recommendations for small and limited resource farmers. Extension and outreach activities have been very successful

and effective.
Stakeholder and public participation in events such as workshops, grape field days, IPM field day, seminars and grape harvest festival has been high.

**Key Items of Evaluation**