

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Horticultural Systems

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
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	4%	
202	Plant Genetic Resources	0%	0%	3%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	7%	
204	Plant Product Quality and Utility (Preharvest)	0%	0%	3%	
205	Plant Management Systems	60%	60%	8%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	10%	4%	
212	Pathogens and Nematodes Affecting Plants	0%	0%	31%	
213	Weeds Affecting Plants	10%	10%	12%	
215	Biological Control of Pests Affecting Plants	0%	0%	5%	
216	Integrated Pest Management Systems	10%	10%	12%	
312	External Parasites and Pests of Animals	10%	10%	0%	
607	Consumer Economics	0%	0%	2%	
701	Nutrient Composition of Food	0%	0%	4%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	36.0	3.0	26.0	0.0
Actual Paid Professional	36.0	5.0	36.7	0.0
Actual Volunteer	12.0	1.0	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
786926	224147	1098260	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2775326	224147	4453566	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	754001	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Variety evaluation of several different vegetable crops will be conducted to determine suitability to climate, soils and cultural practices for state producers. Yields, quality and market potential will be evaluated to assess potential production by growers seeking additional crops or alternative crops. Crops suitable for greenhouse production will be evaluated for profitability and product quality with respect to local and state markets.

UT AgResearch efforts determine the effectiveness of various control technologies, develop new genetic cultivars of plants from in-house breeding programs or, in some cases, find naturally resistant populations of plants by searching the southeast U.S. (i.e. for anthracnose resistant dogwoods).

Research is conducted at selected Research and Education Centers across Tennessee, and at several farmer-cooperator locations in key areas of horticultural production in Tennessee. Substantial investments have just been made in construction and renovation of greenhouse facilities on campus and at certain Research and Education Centers. These will be utilized extensively in the conduct of our research.

2. Brief description of the target audience

- Farmers/producers who have traditional livestock and tobacco operations, but are looking to improve income through the Green Industry.
- Master Gardeners who volunteer to provide community service through horticulture.
- Business owners who need research-based information to start, maintain or expand their greenhouse, landscaping, or nursery business.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Horticultural Systems Planned Program was enhanced through the service of 14 Tennessee Extension personnel on the "Consumer Horticulture" CoP. Tennessee Extension personnel shared

implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	258233	10945368	8605	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	39	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Horticultural workshops and conferences.

Year	Actual
2012	0

Output #2

Output Measure

- Number of exhibits displayed to teach best practices in horticultural systems.

Year	Actual
2012	130

Output #3

Output Measure

- Number of research-based publications distributed as part of this program.

Year	Actual
2012	33868

Output #4

Output Measure

- The impact of our work on two popular fungicide modes of action will allow turfgrass managers to appropriately use these products and better understand their abilities to manage abiotic stress in addition to the diseases they help manage. (Horvath)

Year	Actual
2012	0

Output #5

Output Measure

- Developed a high quality reference genome for the vegetable pathogen *Phytophthora capsici* that is freely available online. This provides a valuable resource for researchers worldwide. (Lamour)

Year	Actual
2012	0

Output #6

Output Measure

- We continue to improve trap designs and are successfully monitoring seasonal flights of the walnut twig beetle, which vectors Thousand Cankers Disease in walnut trees. (Klingeman)

Year	Actual
2012	0

Output #7

Output Measure

- Soil incorporation of mustard seed meal (biofumigation) or dried molasses (anaerobic soil disinfestation), followed by irrigation and covering with plastic can reduce some soilborne pathogens and improve strawberry yield compared to plant yields on untreated soil. (Deyton)

Year	Actual
2012	0

Output #8

Output Measure

- Discovered and implemented of several new molecular markers critically important for successful completion of insect phylogenetic studies. (Moulton)

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Projected licenses for dogwood cultivars (M. Windham).
2	Annual Tennessee economic contribution of Encore azaleas based on TAES research, dollars (M. Windham).
3	Consumer Horticulture: Number of consumers who applied fewer fertilizers and pesticides due to a better understanding of landscape best management practices.
4	Consumer Horticulture: Number of consumers who learned about plant selection and proper planting to save money and time in the landscape.
5	Controlling Insect and Mite Pests of Ornamental Landscape Plants and Commercial Ornamental Horticultural Crops
6	Extension Commercial Ornamental Horticulture Program in Tennessee
7	TSU Extension's Sustainable Landscapes Program Promotes Natural Playgrounds
8	Beauveria bassiana Against Insect, Plant Pathogens (Gwinn)

Outcome #1

1. Outcome Measures

Projected licenses for dogwood cultivars (M. Windham).

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Annual Tennessee economic contribution of Encore azaleas based on TAES research, dollars (M. Windham).

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Consumer Horticulture: Number of consumers who applied fewer fertilizers and pesticides due to a better understanding of landscape best management practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2749

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

Consumer Horticulture: Number of consumers who learned about plant selection and proper planting to save money and time in the landscape.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	8203

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

Controlling Insect and Mite Pests of Ornamental Landscape Plants and Commercial Ornamental Horticultural Crops

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Insect and mite pests cause millions of dollars of damage to turfgrass and ornamental plants in Tennessee each year. New insect or mite associated threats to ornamental plants include: rose rosette disease, thousand cankers disease, granulate ambrosia beetle, camphor shot borer, emerald ash borer, etc.

What has been done

Extension agents and area specialists in 36 counties conducted educational programs in consumer and commercial horticulture reaching over 177,000 direct contacts during 2012. Pest management practices were taught by Extension educators at over 700 group meetings and during 2,000 plus site visits.

Results

Educational activities across the state were evaluated to determine the following commercial and consumer horticulture impacts:

*1602 green industry personnel adopted an integrated pest management approach to insect, mite, and disease control in turfgrass and/or ornamental plants.

*876 green industry personnel increased business profitability and sustainability through improved insect, mite and disease control in turfgrass and/or ornamental plants.

*2686 green industry personnel learned to correctly identify pest insects, mites and diseases of turfgrass and/or ornamental plants.

*1094 Master Gardeners have used the knowledge and skills they learned in this program to assist 4983 people to identify pests and/or the damage they cause.

*1045 Master Gardeners have used the knowledge and skills they learned in this program to assist 5424 people to identify symptoms of plant disease.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

Extension Commercial Ornamental Horticulture Program in Tennessee

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Challenges facing the commercial horticulture industry include marketing, integrated pest management, sustainable cultural practices, environmental and human health risks, invasive species, regulations, and profitability.

What has been done

Extension agents and area Extension specialists conducted commercial nursery and landscape educational programs reaching over 104,500 direct contacts during 2010. Best production and landscape management practices were taught at approximately 175 group meetings and over 400 on-site visits. Over 50 newspaper articles supported the direct contacts.

Results

The total economic impact of Extension's commercial ornamental and landscape horticulture programming was estimated at \$ 663,385 in increased savings, increased income, and one-time capital purchases. Other impacts included:

*1209 professionals added additional services and/or marketing practices.

*502 professionals developed or made adjustment to their business plans.

*1298 professionals implemented recommended cultural practices: fertilization, soil sampling, propagation, irrigation, etc.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #7

1. Outcome Measures

TSU Extension's Sustainable Landscapes Program Promotes Natural Playgrounds

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable landscapes benefit the health and wellbeing of, and provide environmental educational opportunities for people who live in rural and urban communities across Tennessee. Urbanization (building on farmlands and natural areas) has economic and social benefits, but it also causes environmental degradation, habitat destruction, and loss of productive agricultural land. Issues include water pollution due to pesticide use by residential home owners and the landscape industry, and increased flooding due to removal of natural vegetation associated with waterways. These issues impact the health and welfare of farm operators and residents of rural and urban communities.

What has been done

The Sustainable Landscapes Extension Program was established to address issues of urbanization by providing environmental education opportunities to children and adults in Tennessee. During 2012 Sustainable Landscapes delivered 9 workshops on natural playgrounds to parents and early childhood educators in Nashville, Memphis, Chattanooga, Clarksville, and Knoxville.

Results

A total of 154 people were directly provided information on building and managing natural playgrounds through their participation in Natural Playgrounds Workshops. Of those, approximately 10% (17 people) reported being more prepared to develop a natural playground at their early childhood education location. All of these individuals indicated that they would appreciate further information on designing, construction, and management natural playgrounds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #8

1. Outcome Measures

Beauveria bassiana Against Insect, Plant Pathogens (Gwinn)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Beauveria bassiana, a fungus known for its ability to parasitize various crop insect pests, can also reduce losses due to fungal pathogens that attack plant roots.

What has been done

Colonization of plants by B. bassiana was only slightly reduced by planting in monarda herbage. There was no effect on seed germination for four of the five herbages tested.

Results

Both seed application of Beauveria bassiana and soil amendment with bioactive monarda herbages are sustainable approaches that can play a role in suppressing damping-off of tomato seedlings. Combining or 'stacking' these treatments is a promising strategy for protecting tomato seedlings from disease and insects damage.

4. Associated Knowledge Areas

KA Code	Knowledge Area
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204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The total economic impact of Extension's 2012 commercial ornamental and landscape horticulture programming was estimated at \$1.1 million in increased savings, increased income, and one-time capital purchases.

Key Items of Evaluation

The total economic impact of Extension's 2012 commercial ornamental and landscape horticulture programming was estimated at \$1.1 million in increased savings, increased income, and one-time capital purchases.