V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Global Food Security and Hunger - Agricultural Viability

☑ 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
205	Plant Management Systems	25%		25%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		15%	
215	Biological Control of Pests Affecting Plants	30%		30%	
601	Economics of Agricultural Production and Farm Management	20%		20%	
604	Marketing and Distribution Practices	10%		10%	
	Total	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	65.0	0.0	36.0	0.0
Actual Paid Professional	36.5	0.0	18.9	0.0
Actual Volunteer	759.0	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**
1134363	0	1516021	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3386469	0	4951544	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
417322	0	2060578	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Identify critical programmatic foci/needs based on Extension and stakeholder assessment. These can be broadly defined under three areas:

- Production BMPs (nutrient, pest, waste/by-products management, water quality and quantity, energy)
- Financial BMPs (marketing, labor, risk management, policy e.g. farmland preservation)
- Ag Systems (sustainable ag, organic ag, new crops and use/alternative)

Develop an inventory of local (county based), regional and statewide programs designed to meet these needs; identify team members and their roles.

Create a multi-task effort to generate and share research-based information with clientele through demonstrations, educational meetings and workshops, certification programs, trainings, development of recommendation and decision making guides, etc.

2. Brief description of the target audience

Stakeholders (broadly defined to include producers, processors, marketers, end-users, policymakers, legislators).

Commercial agriculture producers and end-users (such as marketers, processors, consumers, etc.).

Municipalities and other governmental and non-governmental agencies, etc.

3. How was eXtension used?

Cover Crops
High Tunnels
Organic Farming
Faculty answered ask an expert questions and developed collaborative educational products.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	77819	38818	9829	0

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

Patent Applications Submitted

Year:	2012
Actual:	25

Patents listed
200800022
201200477
201200103
201200099
201200102
201200098
201100393
2012200022
20120026
201200019
201200123
201200444
201100363
201200445
201200446
201200020
200700168
200700266
200700267
200700371
200700185
200800167
200800034
61/631,543
PP22,541

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	38	104	142

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- A variety of strategies will be implemented to reach target audiences. This will include and not be limited to workshops, field visits, classes, newsletters, media releases, electronic communications,and publications.In addition a trained volunteer teaching base will be developed. Quantitative reports of participation will be collected.

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Short Term - Increases in knowledge and skills of agricultural and horticultural industry professionals will occur relating to: Nutrient management Pest management Waste/by-products management and utilization Improving water quality and conserving water Conserving energy Marketing skills Labor management Risk management Policy e.g. farmland preservation Sustainable ag and organic ag production methods New crops and use/alternative crops
2	Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
3	Long Term - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.
4	Farm Business Management for Female Operators:Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
5	Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
6	Nuances of Marketing Ethnic Specialty Vegetables & Herbs: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality

	will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
7	Epidemiology and Management of Stone Fruit Diseases: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
8	Conservation and Utilization of Plant Genetic Resources: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
9	Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries : Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
10	Turfgrass Breeding and Evaluation: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.
11	Genetic Improvement of Woody Plants (Tresst and Shrubs) for Ornamental Uses: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The

products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

Outcome #1

1. Outcome Measures

Short Term - Increases in knowledge and skills of agricultural and horticultural industry professionals will occur relating to: Nutrient management Pest management Waste/by-products management and utilization Improving water quality and conserving water Conserving energy Marketing skills Labor management Risk management Policy e.g. farmland preservation Sustainable ag and organic ag production methods New crops and use/alternative crops

2. Associated Institution Types

- 1862 Extension
- 1862 Research

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)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management

604 Marketing and Distribution Practices

Outcome #2

1. Outcome Measures

Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Agritourism Outreach and Education

The business of making farms travel destinations for education and recreational purposes is critical to ensuring the viability of agriculture in the state in the future.

What has been done
NJAES research uncovered some of the success strategies farmers' markets/agri-tourism operators would initiate to sustain and expand capacity utilization. An Internet survey of consumers residing in Delaware, New Jersey, and Pennsylvania was conducted between June 21 to 29, 2010 to capture consumer purchasing behavior and other characteristics relating to visiting agri-tourism operations and shopping from direct (farmer-to-consumer) market outlets in the Northeast. Results from this study show that bundling of farmers' markets activities/site attributes is a workable business strategy.

Results

Segmentation/customer profiling stands out as a valuable piece of information that farmers' markets/agri-tourism business operators could use to position them better for the future. The business operators now know who their customers are and what it takes to attract them. The regression results show that a number of socioeconomic variables are related with the patronage experience. The study finds that there is potential for generating activity all year round by bundling attributes/activities to tap on a wider market beyond traditional fresh produce buyers.

Research conducted by Rutgers NJAES has shown that 1 out of every 5 New Jersey farms is engaged in agritourism, generating an estimated $57.5 million in annual revenue statewide. The work of the NJAES team is enhanced by its partnership in a multi-state initiative known as the East Coast Agritourism Working Group.

Agritourism helps to diversify product lines and markets; allows direct feedback from consumers about preference for products and services; and creates a ?culture of understanding? for what it takes to be a commercial farmer ? thus, reducing conflicts over farm practices and strengthening public support for the existence of farms.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #3

1. Outcome Measures

Long Term - New Jersey's agriculture will remain a viable and important industry. New Jersey residents will recognize the importance of agriculture's contributions to societal well being (open space, quality of life) and will support the agricultural industry socially, politically and economically.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

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)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #4

1. Outcome Measures

Farm Business Management for Female Operators:Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Farm Business Management for Female Operators

According to the 2007 Census of Agriculture, released in 2009, the average age of farmers in both NJ and nationwide is 57.1 and 30% of U.S. farm operators are women. Thus, a need exists to prepare farm families for retirement and later life farm business transitions and to enhance the business and financial management skills of female farmers. Female farm operators are a unique programming niche because they have increased in frequency (often as a result of widowhood) and may not have had as much experience or business management training as male farmers. Knowledge and skill-building are needed on business and personal financial statements, estate planning, product pricing and marketing, and more.

What has been done
Extension Specialists and Agents continued to maintain, promote, and provide content updates for two online courses that provide personal finance content targeted toward farm families: Rutgers Cooperative Extension's Later Life Farming course Web site http://laterlifefarming.rutgers.edu/ (almost 300 unique visitors in 2012) and the eXtension Investing for Farm Families course Web site http://www.extension.org/pages/23204/investing-for-farm-families. Annie's Project-NJ team members to deliver three seven-week series of the Annie?s Project farm business management program for women during 2012. The course used a combination of face-to-face and distance education programming to reach participants

In addition, the Women in Agriculture: Challenges and Opportunities conference delivered risk management educational opportunities to women in the mid-Atlantic region. This program focused on areas of risk and provided women the knowledge and tools to better manage their agribusinesses and their risk.

Results
Evaluation results of the Annie?s Project revealed that: 97% developed a mission statement, 92% developed their business description, 64% wrote a farm description to be used for marketing (or another purpose), 70% have developed a management plan, 68% have developed a production plan.

Women in Agriculture: Challenges and Opportunities conference participants gained knowledge of risk management, farm production, social media outlets, and business management through the use of educational seminars, motivational speakers, and networking.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #5

1. Outcome Measures

Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Resistance Management for Fresh-Market and Processing Vegetable Crops in New Jersey

In the mid-Atlantic region of the United States over 200,000 acres of fresh-market and processing vegetable crops are grown on an annual basis. The development of fungicide resistance to important fungicide chemistries used in vegetable production has been documented in New Jersey and the mid-Atlantic region in recent years. A number of these commonly-used chemistries have a high-risk for resistance development if they are overused or used improperly. Vegetable growers in NJ, as well as, the rest of the mid-Atlantic region need more information on fungicide chemistries (i.e. modes-of-action, FRAC codes) in order to manage fungicide resistance development properly.

What has been done
Since 2007, ~15,000 fungicide resistance management guidelines have been distributed in the mid-Atlantic and surrounding region representing over 100,000 acres of vegetable production. Approximately 1,800 of the guides were distributed to commercial vegetable growers, crop consultants, industry representatives, crop advisors, Extension agents and Extension specialists in 2012 in New Jersey and other states. The resistance management guides have become widely

adopted and used by many vegetable growers to help develop effective season-long fungicide spray programs while helping to reduce the chances for fungicide resistance development in the region. Recommendations guides are updated annually and available on-line through the Vegetable Crops On-line Resource Center hosted by the New Jersey Agricultural Experiment Station (www.njveg.rutgers.edu) and other state experiment station websites.

Results
Growers stated they were willing to use the fungicide resistance management guide in everyday decision making when applying fungicides for disease control and fungicide resistance management. Although no formal survey was done in 2012, demand for the FRAC guide remains high and each year the fungicide resistance management guide is distributed to more vegetable growers in the mid-Atlantic and surrounding region.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #6

1. Outcome Measures

Nuances of Marketing Ethnic Specialty Vegetables & Herbs: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Nuances of Marketing Ethnic Specialty Vegetables & Herbs

Census data predictions from 2005 and 2010 indicate, by 2050 non-Caucasian Americans may form 50% of the population within an American population of over 300 million residents. Growing ethnic populations of first- and second-generation immigrants in the Mid-Atlantic Region and along the East Coast, offer farmers marketing opportunities to provide fresh produce native to these groups? homelands. Asian and Hispanic populations are growing at rapid rates in the region, and specialty groceries and restaurants are increasing to serve ethnic foods to both the ethnic populations and the general public. Providing the fresh produce common in these cuisines is an additional niche for fresh produce growers.

What has been done
NJAES researchers studied ethnic communities and consumers, purchasing habits and food selections and identified potential crops that can be grown successfully and profitably in Mid-Atlantic and East Coast regions, evaluated specific crops and production systems suitable for local farms, and conducted field demonstration-research trials. Ethnic Crop summaries were presented at farmer twilight meetings and regional conferences (NJ, PA, NY), updated and increased resources available on worldcrops.org website.

Three new farms have been established in Atlantic County producing ethnic crops. Three existing Asian farmers have expanded their operations and markets based on opportunities presented through this program. Likewise, several existing vegetable growers in and around Atlantic County have adopted new ethnic crops and expanded their markets.

Results
Survey of 80 Central Jersey vegetable growers indicated an increase of ethnic specialty crop production over the past two years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #7

1. Outcome Measures

Epidemiology and Management of Stone Fruit Diseases: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Epidemiology and Management of Stone Fruit Diseases

To remain competitive in national and international markets, breeding programs must constantly provide growers with new and improved cultivars that are adapted to local growing conditions and markets. Climate conditions can seriously limit yields for growers, and contribute to many fungal and bacterial diseases. Control of diseases requires timely and costly application of pesticides, thereby increasing the environmental impact of the agricultural production system on the surrounding areas.

What has been done
NJAES researchers conducted studies on use of biorational materials for management of brown rot and on the importance of cover sprays for preharvest brown rot control; examined efficacy of improved reduced risk conventional fungicides against all peach diseases; evaluated and compared Japanese plum cultivars for resistance to bacterial spot; examined novel copper formulations for peach bacterial spot control. Published mathematical model describing the sporulation of Fusicladium carpophilium causal agent of peach scab.

All spray guides (peach, plum, cherry, apple, and pear) in the 2012 New Jersey Commercial Tree Fruit Production Guide (E002) were updated to include new information on fungicides and bactericides to control tree fruit diseases; included information on relative efficacies and application rates for each individual disease.

In vitro studies were performed to quantitatively characterize the ability of three organic / biorational fungicides to control the growth and spore germination of Monilinia fructicola, causal agent of brown rot on stone fruit. This disease can cause 100% fruit loss if not properly managed.

Results
During spring of 2012, a single peach tree in a commercial NJ orchard was observed to have unusual symptoms that resembled Peach Mosaic Virus. During the 1950s, this contagious disease caused significant yield loss and removal of tens of thousands of trees from southern CA and throughout the southwest. Fortunately, specimens sent to the USDA-ARS for identification confirmed that the malady was not peach mosaic virus. A major crisis was averted; no further action required. To date, the symptoms were believed to be caused by a chimera (a natural mutation); the afflicted tree was removed.

Outbreaks of resistant pathogens have been and continue to be reported in many other peach growing regions. New Jersey growers adjusted fungicide usage to maintain brown rot disease control and simultaneously prevent or delay further resistance development. Although 2012 was a record year for blossom blight development, grower awareness of the resistance threat allowed them to take pre-emptive action in their disease control programs; no commercial economic losses were observed.

Second year of data of bacterial spot indicated some newer products do provide better control; however, phytotoxicity to tree foliage needs to be addressed further before recommendations can be made to growers.

Growers can use announced peach rusty spot findings to select new cultivars for planting that have a higher degree of disease resistance (therefore reducing amount of fungicide spraying in future years).

Production guide ? grower feedback continues to be good; many new products were added to the latest guide; online publication has broadened its use considerably.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #8

1. Outcome Measures

Conservation and Utilization of Plant Genetic Resources: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Conservation and Utilization of Plant Genetic Resources

To remain competitive in national and international markets, breeding programs must constantly provide the growers with new and improved cultivars that are adapted to local growing conditions and markets. Weather related factors, such as severe cold outbreaks in the winter and late frosts in the spring, can seriously limit yields for growers. Furthermore, the warm and humid summers in the eastern US are conducive to many fungal and bacterial diseases on peach, apricot and apple. Control of these diseases requires the timely and costly application of pesticides, thereby increasing the environmental impact of the agricultural production system on the surrounding areas.

What has been done
NJAES researchers and Extension agents continue to develop peach, apricot, and apple cultivars with improved disease resistance and adaptation to their growing environment. The major objective of the apricot (Prunus armeniaca L.) breeding program is to develop apricots with improved eating quality and broader range of adaption. This spring we made 15 apricot crosses in the greenhouse using Central Asian and Chinese germplasm, yielding 403 seeds. The focus of

our peach and nectarine [Prunus persica (L.) Batsch] crosses this year was to develop early ripening cultivars with large, firm fruit that soften slowly, and are tolerant to bacterial spot (Xanthomonas campestris pv. pruni). Seven hundred thirteen apricot and 3,500 peach seedlings were transplanted to the field in 2012. The major objective of the apple (Malus Xdomestica Borkh.) breeding program is to develop high quality desert apples with durable resistance to apple scab (Venturia inaequalis). Fourteen crosses yield a total of 2,139 seeds. Seedlings produced from these crosses will be screened for resistance to apple scab in the greenhouse.

Results
Over the course of this work, many peach, apricot, and apple selections have been distributed to researchers, growers, and nurseryman for further testing. During this reporting period, a patent application was filed for one apricot selection that is being propagated for release to fruit growers. Information about this and other new varieties is disseminated by presentations at grower meetings, variety showcases, newspaper articles, publications in professional journals, and published patents. Many new cultivars have been released commercially to the public.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #9

1. Outcome Measures

Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries : Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Breeding and Germplasm Enhancement for New Jersey Cranberry and Blueberry Industries

Alternative strategies for management of human and agricultural crop diseases is a high priority in research because resistance to standard chemical controls (antibiotics for humans and pesticides for crops) is increasing at an alarming rate, and cost of implementing these control procedures (both in terms of human health care and crop management) is skyrocketing.

What has been done
In 2012, 35 blueberry crosses were made to transfer aphid resistance found in the evergreen Florida blueberry into the northern highbush blueberry, and 38 crosses were made among our best selections focusing primarily on machine harvestability traits. Over 1,400 advanced selections were evaluated for early and late season, machine harvestability, and fruit quality.

NJAES results were presented at the American Society for Horticultural Science regional and national meetings, and to several hundred growers at Workshops and Field Days in New Jersey, Washington, Oregon, Quebec and British Columbia. Outreach activities included providing cultivar information to numerous blueberry and/or cranberry growers including Atlantic Blueberry Co., Variety Farms, Pine Island Cranberry Co., Makepeace Cranberry, Cutler Cranberry, Lee Brothers, J.J. White, and Integrity Propagation.

Results
New propagation methods developed by this work have optimized the production of healthy, disease-free, true-to-type cranberry stolons, providing for the first time virus-indexed and DNA fingerprinted cranberry varieties for the cranberry grower. Over 1,900 acres of the Crimson Queen, Demoranville, and Mullica Queen varieties have now been planted in five states (MA, NJ, OR, WA, WI), and four provinces in Canada. Fact sheets on each of the varieties have been written and are being distributed to cranberry growers. The higher yield and fruit quality of the new cranberry varieties will contribute to higher productivity in food provision. The greater productivity of these varieties will increase the efficiency of US cranberry growers, enhancing US agricultural sustainability. The development of varieties with increased disease and insect resistance will reduce requirements for pesticides, resulting in reduced environmental impact, and safer food and water supply. US Plant Patent PP22,541, Cranberry variety CNJ95-20-20 (Scarlet Knight), was issued Mar 6, 2012.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management

604 Marketing and Distribution Practices

Outcome #10

1. Outcome Measures

Turfgrass Breeding and Evaluation: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Turfgrass Breeding and Evaluation

Turfgrass is a valuable and rapidly expanding component of our urban and rural landscape. Turfgrass is used to stabilize soil and enhance our environment, offer recreation and enjoyment for millions of Americans as well as green space in urban environments.

What has been done
During 2012, there were 9,746 new turfgrass plots established with over 74,070 spaced plants in nurseries and over 8,000 mowed single-clone selections established. In 2012, there were 246,000 seedlings from intra and inter-specific crosses of Kentucky bluegrass screened under winter greenhouse conditions and the superior plants were planted in the field in the spring of 2012. In the winter of 2011-2012, screening was conducted on single plants of 20,000 tall fescues, 10,000 Chewings fescues, 18,000 hard fescues, 50,000 perennial ryegrasses and 10,000 bentgrasses under winter greenhouses conditions. The superior plants of all these species were put into spaced-plant nurseries. Over 250 new intra and inter-specific Kentucky bluegrasses were harvested in 2012. Six graduate students have been involved in this breeding

project. There were over 800 stakeholders attending 2 field days with over 10 different cool-season species of turfgrasses being displayed with over 1,300 individual variety turf plots labeled. Over 21 lectures were presented by the authors in 2012. Eight refereed journal articles and 11 non-refereed articles were published or in press in 2012.

Results
There were over 1,500 new germplasm sources of cool-season germplasm collected in Europe and North Africa in 2012 that were sent as seed to New Jersey. These new germplasm sources continue to contribute new sources for resistance to stem and crown rust and gray leaf spot in perennial ryegrass. New bentgrass and tall fescue germplasm has contributed new sources of brown patch resistance. A new Kentucky bluegrass from Romania has shown excellent resistance to rust and summer patch. These should all require less fungicides to provide persistent turf cover. The development work from selecting new wear tolerant turfgrasses should provide safer playing fields and playgrounds. Perennial ryegrasses and tall fescues are now being widely used on golf courses and landscapes.

During 2012, there were 16 US Plant Variety Protection (PVP) applications made and 8 PVP's were issued. There were 4 new Kentucky bluegrasses, 3 new tall fescues, 11 new perennial ryegrass, 3 new strong creeping red fescues, 2 new hard fescues and 3 Chewings fescue named and increased in 2012.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

Outcome #11

1. Outcome Measures

Genetic Improvement of Woody Plants (Tresst and Shrubs) for Ornamental Uses: Medium Term - Productive agricultural land is stabilized to meet the needs of the agricultural industry and the needs of people of NJ. Agriculture remains a relevant and viable economic sector as profits increase (through reduced costs and/or increased or new sales or revenue streams). Measurable reductions in environmental impact (clear and adequate sources of water, reduced waste, reduced soil losses, reductions in non-point source pollution, etc.) will occur through the adoption of improved and sound management practices. Overall state environmental quality will be enhanced by agriculture, such as through the utilization and recycling of biowastes generated by the non-ag sector or the enhancement of air quality. The products of NJ agriculture will add to the nutritional quality of New Jerseyans food supply.

2. Associated Institution Types

- 1862 Extension
- 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)
Genetic Improvement of Woody Plants (Tresst and Shrubs) for Ornamental Uses

The Nursery industry is in need of new plants for ornament purposes that are adapted to the specific climate and conditions of the U.S. These plants need to be disease and pest resistant as well as attractive and hardy to meet consumer demands and enhance our environment.

What has been done
Efforts were made to evaluate and maintain the interspecific Ilex collection held at Rutgers without increasing its size or scope. Significant expansions were made in the breeding and selection of large-bracted dogwoods, focusing on the development of advanced generation hybrids of Cornus kousa, C. florida, and C. nuttallii expressing excellent plant health and vigor, improved leaf characteristics and color, resistance to the disease powdery mildew, and dark-pink floral bracts. Ten select hybrid seedlings were propagated by grafting and cuttings for further evaluation in field plantings. The development of eastern filbert blight (EFB)-resistant ornamental hazelnuts was also continued with new populations of seedlings segregating for ornamental traits and disease resistance in field and greenhouse trials at Rutgers. Five of our best green-leaf, EFB-resistant, contorted hazelnut selections have been propagated and established in several locations in central NJ for additional testing prior to being considered for patenting and release. Efforts were begun to assess the large Cornus germplasm collection with microsatellite (SSR) markers to help characterize the collection, assess genetic diversity, and track specific lineages of interest. The use of tissue culture is being explored as a means to efficiently ramp up production of new breeding selections of Cornus and Corylus in the development pipeline for larger-scale testing and subsequent release. Presentations on the Rutgers woody ornamental breeding program were made at the 2nd International Symposium on Woody Ornamentals of the Temperate Zone, in Gent, Belgium, and the South Jersey Nursery Meeting held at the Rutgers Cooperative Extension of Cumberland County Extension Education Center, Millville, NJ.

Results
New disease-resistant cultivars in the development pipeline at Rutgers will have a positive impact on the U.S. nursery industry and on property values and quality of life where they are grown. Their resistance to their primary insect and disease pests will reduce the need for harsh pesticide sprays and will add to plant longevity in the landscape. The program to develop ornamental hazelnuts (Corylus spp.) is showing considerable progress. Since very few eastern filbert blight

resistant hazelnuts are available, incorporating disease resistance into the ornamental germplasm will provide for the development of novel cultivars, leading to an increase in the diversity of plant species options (including native species) available for use in the landscape. Many of these also produce edible nuts which may allow them to double as components of edible ornamental landscapes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
601	Economics of Agricultural Production and Farm Management
604	Marketing and Distribution Practices

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
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Ag Viability was impacted by natural disasters, hurricanes Irene and Sandy, drought and flooding.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

See Qualitative Outcomes

Key Items of Evaluation

See Qualitative Outcomes