V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Plants Systems (OARDC Led)

☑ 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	0%		15%	
202	Plant Genetic Resources	0%		10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		15%	
204	Plant Product Quality and Utility (Preharvest)	0%		10%	
205	Plant Management Systems	0%		15%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%		5%	
212	Pathogens and Nematodes Affecting Plants	0%		5%	
213	Weeds Affecting Plants	0%		5%	
214	Vertebrates, Mollusks, and Other Pests Affecting Plants	0%		5%	
216	Integrated Pest Management Systems	0%		10%	
	Total	0%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	30.5	0.0
Actual Paid Professional	0.0	0.0	24.1	0.0
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	2892233	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
0	0	3417680	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

On -going research activities to advance plant systems goals include both basic and applied research. Both laboratory and multiple field sites/research stations are available throughout state to permit data gathering and to continue long - term experiments, such as commodity yields. On-farm research takes place as do national and international studies. All functional laboratories and sites are improved over time as program need resources available warrant. OARDC faculty and staff engage in appropriate levels of outreach, engagement, and consultation, with both internal stakeholders, such as fellow extension personnel, and with external stakeholders.

2. Brief description of the target audience

Targeted audiences include, but are not limited to: specific individuals or groups who have expressed a need for plant systems information that is to be derived through new research, extracted from on-going research, or is derived from scientific literature. Often those requests are communicated to OARDC by an intermediary such as a staffer at a USDA office, NRCS, or a county extension agent; fellow agencies or support organizations who will not only use the information but will also be brokers of that information, including embedding it into groups to encourage change; populations who have not requested the information but will likely benefit from that information, e.g. home gardeners; other scientists and scientific groups; political entities; extension personnel; students for pre-school to post doctorate studies; and news organizations.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	0	0	0	0

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

Patent Applications Submitted

Year:	2012
Actual:	2

Patents listed

- Reference # 2009-048; Issue # 8,241,889; Prothioconazole Tolerant Cryptococcus Flavescens Strains for Biological Control of Fusarium Head Blight
- Reference # 2008-116; Issue # 8,227,186; CLAVIBACTER MICHIGANENSIS SUBSP. MICHIGANENSIS BIOLUMINESCENT MUTANTS AND APPLICATIONS

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	110	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of graduate students completed
  Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Meet or exceed the demand of fellow scientists and stakeholders within the next ten years for materials relating to plant genetics and plant breeding technologies, including identification of molecular markers for elite germplasms.
2	Provide new contributions to the body of literature that will positively advance plant genetics, e.g. molecular techniques and materials to aid in low temperature plant tolerance research.
3	Advance germplasm science over the next ten years to the extent that the genetic resources targeted for acquisition are preserved and can be considered secure in terms of systems preservation, e.g. short season crops or for studying rice pathogens.
4	Enrich the gene pool, and knowledge thereof, to meet identified stakeholder turf needs for nutrient uptake efficient materials, turf with greater traction, etc.
5	Enrich the gene pool and knowledge thereof in disease/pest resistance, and gene recombination and interaction studies.
6	Enrich the gene pool and knowledge thereof in disease resistance of rootstocks such as for apple trees and green industry, and for resistance to plant stresses, e.g. discoloration in products such as tomatoes reducing a $60 million loss annually in tomato industry.
7	Enrich the gene pool and knowledge thereof in the areas of molecular studies to better understand how immune systems in plants in inhibit diseases and how bacteria perturb the immune system.
8	Annually provide adequate preharvest research findings, including field trial data, to support Ohio's status as a top soybean and corn producer
9	Release or support release by others of special cultivars to enhance Ohio agriculture, e.g. grapes to replace tobacco in southeastern Ohio, low maintenance turf grass, nitrogen uptake efficient crops including foliar based fertilization, field crop cultivars.
10	Continually participate in and promote the development and timely release of modeling/forecasting programs that are cost effective and cost efficient for producers, e.g. WEEDCAST.
11	Annually contribute to and report a basic or applied understanding of IPM, including all physical, biological, and chemical components of the plant system, to reduce environmental stresses, improve production, and lower costs when employed.

Outcome #1

1. Outcome Measures

Meet or exceed the demand of fellow scientists and stakeholders within the next ten years for materials relating to plant genetics and plant breeding technologies, including identification of molecular markers for elite germplasms.

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)
Tomatoes represent a $2 billion market in the United States. USDA estimates that Americans consume, on average, more than 72 pounds of tomato products annually. To take full advantage of the tomato as a food crop, scientists and the tomato industry need to understand the genetic code of the plant and the traits governed by this code.

What has been done
OARDC scientists, working as part of a 14 - nation effort, have helped to sequence the tomato genes for the Heinz 1706 genome. An impact reported in an earlier OSU ROA reported OSU discovery of SUN gene that controls tomato shape.

Results
Scientists can now pinpoint the differences that lead to changes in color, taste, texture, size, and shape. The genome is also important in that the tomato is very different from its genetic relatives in the nightshade family. Scientists can now learn more about how genes have changed giving each of these species their distinct flavor and look. In addition to having the ability to improve product attributes such as shape, color, and firmness, the new gene sequence will advance studies in disease resistance, root development, nutritional qualities, and similar.

4. Associated Knowledge Areas

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

202	Plant Genetic Resources
206	Basic Plant Biology

Outcome #2

1. **Outcome Measures**

Provide new contributions to the body of literature that will positively advance plant genetics, e.g. molecular techniques and materials to aid in low temperature plant tolerance research.

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

Advance germplasm science over the next ten years to the extent that the genetic resources targeted for acquisition are preserved and can be considered secure in terms of systems preservation, e.g. short season crops or for studying rice pathogens.

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

Enrich the gene pool, and knowledge thereof, to meet identified stakeholder turf needs for nutrient uptake efficient materials, turf with greater traction, etc.

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

Enrich the gene pool and knowledge thereof in disease/pest resistance, and gene recombination and interaction studies.

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

Enrich the gene pool and knowledge thereof in disease resistance of rootstocks such as for apple trees and green industry, and for resistance to plant stresses, e.g. discoloration in products such as tomatoes reducing a $60 million loss annually in tomato industry.

Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

   Enrich the gene pool and knowledge thereof in the areas of molecular studies to better understand how immune systems in plants in inhibit diseases and how bacteria perturb the immune system.

   Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

   Annually provide adequate preharvest research findings, including field trial data, to support Ohio's status as a top soybean and corn producer

   Not Reporting on this Outcome Measure

Outcome #9

1. **Outcome Measures**

   Release or support release by others of special cultivars to enhance Ohio agriculture, e.g. grapes to replace tobacco in southeastern Ohio, low maintenance turf grass, nitrogen uptake efficient crops including foliar based fertilization, field crop cultivars.

   Not Reporting on this Outcome Measure

Outcome #10

1. **Outcome Measures**

   Continually participate in and promote the development and timely release of modeling/forecasting programs that are cost effective and cost efficient for producers, e.g. WEEDCAST.

   Not Reporting on this Outcome Measure

Outcome #11

1. **Outcome Measures**

   Annually contribute to and report a basic or applied understanding of IPM, including all physical, biological, and chemical components of the plant system, to reduce environmental stresses, improve production, and lower costs when employed.

   Not Reporting on this Outcome Measure

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

Perhaps the greatest limiting factor within this program is funding for personnel.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In a statement summing up the contribution of OARDC to Ohio's wine industry the following assessment was offered by Andy Troutman, co--owner of The Winery at Wolf Creek near Akron, Ohio.

Troutman assessment was that OARDC's long--established grape and wine research program, which is credited, among other things, with almost single--handedly saving Ohio's wine industry in the '60s, "has not only allowed us to plant varieties and develop products that we think will have long--term viability in Ohio, but having that resource essentially in our backyard has been vitally important to the long--term success of our business'.

A group of OSU Extension/OARDC faculty members working in Integrated Pest Management reported:

During the Indiana Flower Growers Association presentation 96% of growers understood that using a systemic insecticide as a drench was better than a spray. 2) During the Tri State Expo, 100% of growers understood that using a systemic insecticide as a drench was better than a spray; 75% of growers learned that poinsettias with light green leaves are more susceptible to whitefly attack and 86% learned that fungus gnats can be managed appropriately by controlling soil moisture. 3) Through the Pesticide Education Training Program a couple of short publications produced to provide recommendations to manage insects in the greenhouse. 4) During the OFA program, 92% of audience learned that biological control programs against thrips work better when used as prevention tools. We also saw changes in action, for example: 1) Very good results were obtained when the fungi Beauveria bassiana (BotaniGard) was used in combination with the nematode Steinernema feltia (Nemasys) to control thrips in a commercial greenhouse. The information is already being used by the largest commercial facility in Ohio to manage thrips. 2) Recommendations from efficacy tests are being used by industry to develop products that will be introduced on the ornamental market in the next few years. 3) Growers in Ohio have increased the use of biological control agents and prevention methods because of the information provided about insect management.

Key Items of Evaluation

One key stakeholder reported in OARDC's 2012 Annual Report:

"Many of the trees that the Asian Longhorned beetle and thousands of cankers disease affect staple landscape trees in our area. If we lose them, it will devastate Ohio's nursery and landscape industry. The research that Dan Herms and his colleagues (referencing both OARDC and OSU Extension personnel) are doing is paramount in preventing another loss like that of the ash tree.'

-Wm. Kyle Natorp, President and CEO, Natorp's Inc. and Wm. A. Natorp Company, Mason, Ohio