V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

PLANT 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
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		30%	
205	Plant Management Systems	25%		15%	
206	Basic Plant Biology	25%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	20%		20%	
212	Diseases and Nematodes Affecting Plants	20%		15%	
215	Biological Control of Pests Affecting Plants	10%		10%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	11.0	0.0	35.0	0.0
Actual Paid	3.3	0.0	6.8	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**
289194	0	666163	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
289194	0	666163	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

Incorporating Key Pest IPM into Horizontal Contexts of Multiple-Pest IPM
Issue
Pesticides are powerful tools for controlling pests within agriculture - both food and fiber. However, some pesticides pose a greater risk than others to human health and the environment. Today's farmers are under constant pressure to develop new ways to combat pests while keeping the yields safe and healthy. Recently, various insect and pest outbreaks have prompted further understanding and research of additional, more integrative, IPMs and their impact to field crops. The Brown Stink Bug posed special problems from 2012-2014, especially in identifying practices compatible with key pest IPM. Aflatoxin levels were at decade's high levels in 2013 and widely present again in 2014. And Arizonans are always on the lookout for other outbreaks and ways to combat them.
What has been done
Through this program, faculty have put together material through research to make those within the agriculture community aware of Multiple-Pest IPM methods. Many people have been reached through publications, presentation, and workshops. Researchers have consulted on various publications and articles on the role of GM technology in our food system and delivered training on this topic to Master Gardener groups to help provide them with evidence-based information to share with others. In addition, a 20-year database has been made available for reference and a major effort was made to supply growers with key natural enemy information from 2011-2014.
Improving Desert Agricultural Production and Produce Safety
Issue
Commercial agricultural production within western Arizona (Yuma County) is represented with approximately 120,000 multi-cropped acres (of 270,000 acres total) exceeding $2.8 billion in 2014 (Frisvold, 2014). Since 2005, the specific needs of agricultural producers in the region have been assessed on an annual basis at the conclusion of field day events, meetings, workshops and interactions with grower groups. In 2012, this countywide appraisal, in collaboration with the Arizona Department of Agriculture, resulted in a statewide Extension and outreach, research-based effort whose focus covers all field production and handling aspects of fresh produce safety.
What has been done?
The "Enhancing Desert Crop Production and Produce Safety" program identifies current problems and issues facing agricultural producers in the region, and develops new and appropriate technologies, tools and cropping schemes for greater crop uniformity, quality and production. It coordinates Extension efforts with departmental collaboration in the UA College of Agriculture and Life Sciences, state regulatory agencies and industry representatives to deliver information through various avenues to benefit Arizona

producers. In 2014 the program disseminated university-, extension- and agent-developed curricula, publications and other information to more than 1,200 clients within the state via meetings/workshops and one-on-one contacts. By adopting innovative agricultural schemes and technologies into current management practices, growers will be better prepared for a future of changing agricultural landscapes with improved farm profitability and minimized adverse effects to the environment.

Impacts reported in Report Overview

2. Brief description of the target audience

Commodity groups, state agencies, pest management advisors, pesticide applicators, youth, ag-ventures programs.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	6154	18000	3679	12000

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	46	125	171

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in educational programs

Year	Actual
2014	9833

Output #2

Output Measure

- Number of research projects conducted on all aspects of Plant Sciences, Animal Sciences, and Agriculture and Resource Economics
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of research projects conducted on all aspects of Plant Sciences, Entomology

Year	Actual
2014	254

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Adoption of better management practices for crop and animal production
2	Adoption of alternative crop and animal technologies
3	Adoption of more cost effective means for controlling plant and animal diseases along with insect issues
4	Adoption of more cost effective means for controlling plant diseases, including insect issues
5	Adoption of alternative crop technologies.

Outcome #1

1. **Outcome Measures**

   Adoption of better management practices for crop and animal production

   Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

   Adoption of alternative crop and animal technologies

   Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

   Adoption of more cost effective means for controlling plant and animal diseases along with insect issues

   Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

   Adoption of more cost effective means for controlling plant diseases, including insect issues

2. **Associated Institution Types**

   - 1862 Extension
   - 1862 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)
New pests and diseases are appearing each year as they become more resistant to pesticides. Major insect damage to crops costing significant dollars and utilizing major amounts of pesticides.

What has been done
An integrated pest management program (IPM) established in Arizona in 1996, refined in 2006 and continued through today uses insect growth regulators (IGRs) effective against whiteflies, transgenic cotton (with Bt (Bacillus thuringiensis) effective against pink bollworms, and a reduced-risk feeding inhibitor (effective against Lygus bugs.)

Results
Statewide averages for cotton insecticide use patterns in Arizona from 1979 through 2010 show that insecticide use on cotton for all insects combined?including whiteflies, pink bollworm, Lygus bug and others reached a 32-year low over the last 5 years, while also reducing costs to all-time lows. The estimated cumulative savings in control costs and yield (from reduced losses to insects) from 1996 through 2010 was more than $223 million.
Growers applied 4.15 pounds of active insecticide ingredient per acre of cotton in 1995. In 2009 and also in 2010 the amount of active ingredient applied per acre was reduced by 3.66 pounds, or 88.3 percent, to just 0.48 pounds per acre. This is the equivalent of applying less than a can of soda on an area the size of a football field just once over the cotton season (March to October).

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Diseases and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants

Outcome #5

1. Outcome Measures

Adoption of alternative crop technologies.

2. Associated Institution Types

- 1862 Extension
- 1862 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)
Control of Pink Bollworm in cotton plants

What has been done
Adoption of BT Cotton

Results
More than 95% of cotton farmers in AZ have adopted BT cotton. This resulted from the availability of the genetic material and demonstration by the UA that this technology is effective and economical.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
206	Basic Plant Biology
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants

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

All programs are currently in the process of being evaluated externally for existing areas to preserve, protect, or enhance, as well as areas to discontinue or modify. We will continue to seek further input from stakeholders, advisory committees, and focus groups utilizing needs assessments with the assistance and expertise of an Evaluation Specialist [hire pending]. See State Defined Outcomes.

Key Items of Evaluation