

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

PLANT SCIENCES

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	15%		25%	
205	Plant Management Systems	8%		0%	
206	Basic Plant Biology	8%		26%	
211	Insects, Mites, and Other Arthropods Affecting Plants	47%		32%	
212	Pathogens and Nematodes Affecting Plants	18%		14%	
215	Biological Control of Pests Affecting Plants	4%		3%	
	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	8.0	0.0	30.0	0.0
Actual Paid Professional	8.5	0.0	11.9	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
323034	0	278983	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
323034	0	278983	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

Cotton IPM: A Quiet Revolution Reduces Costs, Losses and Risks for Arizona's Cotton Growers

Issue

During the mid-90s, insecticide applications in cotton typically accounted for about half of all insecticide use in the United States. In 1995, nearly 100 percent of Arizona's cotton acreage was sprayed multiple times for pink bollworm Lygus bug and silverleaf whitefly. New technologies have enabled cotton growers to reduce their spray applications significantly while achieving among highest cotton yields worldwide. Arizona now produces the highest-yielding cotton in the world, well over 1,500 pounds of fiber per acre, far exceeding the U.S. national average of about 750 pounds per acre. These technologies also help growers implement more ecologically-based, sustainable IPM programs and become less dependent on broadly toxic insecticides.

What has been done

An integrated pest management program (IPM) established in Arizona in 1996, refined in 2006 and continued through 2012 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.) Safe for humans, these tools kill only their target pests, allowing natural processes to play a larger role in the management of all other pest insects. Growers have been taught to deploy fully selective materials first and whenever possible. The UA College of Agriculture and Life Sciences initiated the program in collaboration with growers, USDA, Arizona Department of Agriculture, Arizona Cotton Growers' Association, Cotton Incorporated, Arizona Cotton Research & Protection Council, industry and others.

Impacts are reported in Report Overview

2. Brief description of the target audience

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

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	24863	25000	1343	15000

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

Patent Applications Submitted

Year: 2012
 Actual: 1

Patents listed

A Potential Vaccine against Coccidioidomycosis and a Drug Target for Treatment of Fungal Disease

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	33	194	227

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of individuals participating in educational programs

Year	Actual
2012	24863

Output #2

Output Measure

- Number of research projects conducted on all aspects of Plant Sciences, Animal Sciences, and Agriculture and Resource Economics

Year	Actual
2012	65

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 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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Major insect damage to crops in Arizona 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

UPDATE

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
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

Outcome #4

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
2012	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
205	Plant Management Systems
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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

All programs are currently still in the process of being evaluated internally for existing areas to preserve, protect, or enhance, as well as areas to discontinue or modify. We are planning to seek further input from stakeholders, advisory committees, and focus groups utilizing needs assessments with the assistance and expertise of an Evaluation Specialist [to be hired]. See State DefinedOutcomes.

Key Items of Evaluation