V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Global Food Security and Hunger - Integrated Pest Management

☑ 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
133	Pollution Prevention and Mitigation	10%		10%	
202	Plant Genetic Resources	2%		5%	
205	Plant Management Systems	12%		10%	
211	Insects, Mites, and Other Arthropods Affecting Plants	14%		20%	
212	Pathogens and Nematodes Affecting Plants	6%		20%	
213	Weeds Affecting Plants	7%		5%	
215	Biological Control of Pests Affecting Plants	9%		5%	
216	Integrated Pest Management Systems	35%		20%	
601	Economics of Agricultural Production and Farm Management	4%		5%	
901	Program and Project Design, and Statistics	1%		0%	
	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	4.0	0.0	2.0	0.0
Actual Paid Professional	10.0	0.0	5.0	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**
265000	0	187544	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
265000	0	187544	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
957000	0	1037403	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct targeted research on pest status, suppression and IPM approaches
Develop and deliver IPM programs to stakeholders
Develop pesticide applicator education and pesticide information
Assess impact of educational activities on stakeholder IPM

2. Brief description of the target audience

Agricultural Producers, Agricultural Groups, Commercial Growers, Retailers, Agricultural Professionals (private, commercial and non-commercial), and landowners, nurseries, individual stakeholders, storers and handlers of grain

3. How was eXtension used?

NaWe contributed to school IPM eXtension

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4022	28401	0	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	13	14	27

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Stakeholder assessment

Year	Actual
2012	1

Output #2

Output Measure

- IPM schools, conferences and workshops

Year	Actual
2012	34

Output #3

Output Measure

- Pesticide applicator education schools and workshops

Year	Actual
2012	36

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

Peer reviewed research publications and extension publications

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	27

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Increased use of pest management approaches for targeted cropping system acres

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	87500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Winter wheat is grown on 5.5 million acres in Oklahoma for pasture, grain and dual purpose (pasture + grain). Hessian fly has become a prominent pest due to the widespread planting of fly-susceptible wheat varieties. Traditional "fly free" planting dates that were developed in the 1930's appear to be ineffective. Estimates of yield loss suffered by Hessian fly infestations can reach five bushels per acre, when a susceptible variety is infested with an average 1 fly per stem per acre.

What has been done
A Hessian fly screening program (lab and field) was instituted to evaluate new winter wheat releases through the Oklahoma State winter wheat breeding program. Two resistant varieties of winter wheat "Duster" and "Centerfield" were released in 2006. Additional varieties, "Billings" (released in 2009), "Ruby Lee" (released in 2011), and "Gallagher" (released in 2012), are also partially or fully resistant to Hessian fly. In addition, entomologists began evaluating the seasonal emergence of Hessian fly using a recently developed pheromone to better understand its interaction with winter wheat.

Results
Oklahoma wheat producers planted nearly 1.3 million acres to "Duster" and "Billings" in 2012. Duster has been rapidly adopted by Oklahoma wheat growers, changing from 0.3% of acres planted in 2008 to more than 22% of acres planted in 2012, becoming the most planted variety in Oklahoma. Billings was planted in 1.7% of Oklahoma wheat acres in 2012. Of that, a minimum of 5% or 65,000 acres were planted in areas where Hessian fly was documented to be a serious problem in the 2 years previous to 2012 resulting in an estimated $1.73 million in yield savings. In 2011-12, researchers were able to begin to characterize emergence patterns for Hessian fly in Oklahoma.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Number of trained certified pesticide applicators

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2476

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Urban pests are usually unwanted and uninvited house guests, Homeowners, schools and commercial businesses spend more than $255 million in pest control each year for general pest control in Oklahoma.

What has been done
The Oklahoma State Pesticide Safety Education Program offers educational programs targeted at pesticide applicators for certification in General, Structural, Stored Grain, and Ornamental and Turf pest control. Program content includes the use of IPM approaches for managing pests and applying pesticides in a responsible, safe and legal manner. Many programs are held at the Pinkston Educational Facility for Structural and Urban Pest Control. Programs include specific workshops related to pesticide application for initial certification or re-certification for licensure, as well as Extension programs that offer content qualified for Continuing Education Units (CEU's).

These programs allow certified applicators to continually improve their knowledge of IPM and safe use of pesticides.

Results
As of December 2012, 2476 applicators from Oklahoma, Kansas, Missouri Colorado, New Mexico and Texas were certified in General Pest Control and other pest management sub-specialties.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
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
901	Program and Project Design, and Statistics

Outcome #4

1. Outcome Measures

Increase in percent of growers with knowledge of and adoption of Glance n Go aphid sampling procedure in wheat

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Wheat is grown on more than 19,000,000 acres each year in Colorado, Kansas, Nebraska, Oklahoma and Texas. Annual losses from greenbug vary from $500,000 to $130 million and annual losses from Russian wheat aphid range from $400,000 to $10 million. Various Web 2.0 technologies are available to provide up-to-the-minute advice to producers for management of wheat production and pest management.

What has been done

We surveyed 339 growers from these Great Plains states as a pre-survey. Of these, 83% were comfortable using a computer, 65% use Internet farming websites and only 25% use Web 2.0 applications to learn more about wheat production. Less than 14% had ever heard of the iWheat website. In 2012, more than 140 producers and agricultural professionals were introduced to the iWheat website. The demonstration helped them access the site using their smart phones, and showed them how they could scout their fields for green bugs, and get an instantaneous recommendation for treatment decisions. Efforts will continue to provide education on the use of iWheat with follow-up surveys that document the adoption of iWheat tools by Oklahoma stakeholders and the impacts of that adoption to stakeholder's wheat production.

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Integrated Pest Management Saves Money for Oklahoma Winter Canola Growers

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	877000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Canola is a potentially valuable rotation crop for Oklahoma wheat growers. It allows them opportunities to manage difficult grassy weeds such as Italian ryegrass, and cheat while providing them with an additional cash crop. Harvested acreage in Oklahoma has grown from 41 acres in 2002 to over 150,000 acres in 2011-2012 worth ca. $55.8 million. However, insect pests (aphids and caterpillars) regularly infest winter canola throughout winter and spring causing economic damage. In 2012, approximately 15% of the canola acres in Oklahoma were infested with variegated cutworms threating yield losses of nearly 675,000 bushels.

What has been done
Entomologists developed a workable treatment threshold for control for variegated cutworms, and provided it to producers and crop consultants through various media outlets, including the Plant and Soil Science newsletter. Through field scouting and timely sprays, Oklahoma canola producers prevented an estimated 10% yield loss in infested acres.

Results
The timely extension recommendations helped producers save an average of $39 per acre in yield potential. This resulted in $877,000 in potential yield savings in the 2011-2012 canola crop.

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

Oklahoma Ranchers Get Help With Horn Fly Management

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)

Oklahoma beef cattle production is worth annually $2 billion. Horn flies can cause an estimated $8.5 million loss of production each year. Horn flies are managed primarily by the use of ear tags that are impregnated with an insecticide. In recent years, Horn flies have developed resistance to several of the commonly used insecticides used in ear tags.

What has been done

OSU researchers and extension personnel conducted a result demonstration over 2 years evaluating the combination of patch-burn grazing and rotation of insecticide active ingredients in ear tags for management of horn flies. Ear tags were deployed only after the economic threshold of 200 flies per animal had been reached.

Results

OSU researchers demonstrated that the combination of patch-burn grazing, combined with rotation of insecticide in ear tags can delay buildup of horn fly populations from reaching the economic threshold of 200 horn flies per animal. This strategy allows producers to deploy ear tags at a later time using less chemical inputs. Research has shown a net savings of $5.03/head is likely from this system. It seems reasonable that this system is applicable and feasible for use on operations representing approximately at least 25% of the 1.7 million head of cattle in Oklahoma. The benefits from this system thus could be over $2.1 million per year to Oklahoma producers and a diminished use of chemical inputs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
216	Integrated Pest Management Systems

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}