V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Global Food Security and Hunger: Cereals

☑ 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
102	Soil, Plant, Water, Nutrient Relationships	20%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	5%		15%	
202	Plant Genetic Resources	20%		15%	
205	Plant Management Systems	30%		20%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%		5%	
212	Pathogens and Nematodes Affecting Plants	5%		5%	
213	Weeds Affecting Plants	5%		10%	
216	Integrated Pest Management Systems	10%		10%	
501	New and Improved Food Processing Technologies	0%		5%	
502	New and Improved Food Products	0%		5%	
	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	5.5	0.0	10.0	0.0
Actual Paid Professional	4.0	0.0	8.0	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**
73345	0	407586	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
73345	0	407586	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
287063	0	4021343	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

- Breeding, testing, evaluating wheat and barley varieties throughout Idaho that will evaluate agronomic performance, end-use quality, adaptability to an area or type of production, suitability for specialty markets, and production of seed for moving the varieties into commercial production
- Conducting cereal schools to interact with growers and provide technology transfer for new varieties, pest management practices and problems, management decisions, and integration of cereals in cropping systems
- Conduct field tours and field days to transfer technology as in cereal schools
- Meet with advisory committees, commodity commissions, processors, ag-support industries for feedback and to inform them of work in cereal production in Idaho
- Conduct off campus credit and continuing ed classes, stakeholder seminars, and applicator training/testing for education and technology transfer about cereals
- Write and publish newsletters, Extension publications, progress reports, scientific publications, and general media articles
- Conduct research into cereal production problems as identified in the plan of work
- Interact with other professionals at meetings to transfer knowledge, form alliances, and implement projects
- Document and report progress and accomplishments

2. Brief description of the target audience

Cereal growers in Idaho - will be provided with technology to enhance cereal production and profitability and provide feedback and suggestions of needs and areas of concern for profitable cereal production. They will also provide resources for the project through direct use of facilities, and through checkoff contributions to commodity commissions.

Agribusiness and support workers - will provide resources for technology development and delivery, be targets for information delivery, provide feedback and suggestions for directions of the 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	0	0	0	0

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

Patent Applications Submitted

Year: 2012

Actual: 1

Patents listed

201200014, Bruneau, Wheat Common

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	8	26	34

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Idaho Cereal Schools.

Year	Actual
2012	9

Output #2

Output Measure

- Release and adoption of new cereal varieties.

Year	Actual
2012	1

Output #3

Output Measure

- Peer-reviewed Extension publication (CIS, Bulletins, PNW).

Year	Actual
2012	6

Output #4

Output Measure

- Develop pest control technology - project/experiments.

Year	Actual
2012	11

Output #5

Output Measure

- Research on management systems - projects/experiments.

Year	Actual
2012	14

Output #6

Output Measure

- Refereed publications (Journal & Book Chapters).

Year	Actual
2012	26

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	O: Producers gain knowledge about improved cereals management at cereal schools, field days, seminars, and re-certification events. I: Number of participants attending cereal schools, field days, etc.
2	O: Producers are aware of cereal resource publications. I: Number of cereal extension publications distributed.
3	O: Producers adopt new cereal varieties. I: Increase in number of acres of new varieties (released within 5 years; greater than previously grown).
4	O: Adoption of new crop production methods. I: Number of growers who report adoption through surveys at educational events and meetings.
5	O: An increase in the number of trained graduate students prepared to enter the workforce. I: Number of M.S. and Ph.D. candidates relevant to this topic team.
6	Ecology of Plant-Virus-Insect Interactions

Outcome #1

1. Outcome Measures

O: Producers gain knowledge about improved cereals management at cereal schools, field days, seminars, and re-certification events. I: Number of participants attending cereal schools, field days, etc.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2675

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The industry is concerned about management of new and resurgent insect pests. Interest is high about field scouting methods, economic injury levels, cultural and biological control, and judicious insecticide use.

What has been done
15 hours of IPM workshops were delivered at 20 local, state and regional workshops. Subject matter focus included pesticide safety, exotic insect pests, wireworm management, and aphid management in rotational crops. Multistate venues included the Tri-State Grain Growers Convention and the PNW Farm Forum; local venues included Dryland Producers Workshops (3 sites), Southeast Idaho Cereal Schools (5 sites), and N. Idaho Pesticide Applicator Training.

Results
Over 1215 commercial grain growers and ag professionals who advise grain growers about pest management learned about IPM practices for cereal insect pests by attending workshops at conferences, field days and recertification events during 2012. Overall gain-in-knowledge (measured by 6-question pre-test:post-test was 54%.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
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
502	New and Improved Food Products

Outcome #2

1. Outcome Measures

O: Producers are aware of cereal resource publications. I: Number of cereal extension publications distributed.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
502	New and Improved Food Products

Outcome #3

1. **Outcome Measures**

O: Producers adopt new cereal varieties. I: Increase in number of acres of new varieties (released within 5 years; greater than previously grown).

2. **Associated Institution Types**

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	200

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources

Outcome #4

1. **Outcome Measures**

O: Adoption of new crop production methods. I: Number of growers who report adoption through surveys at educational events and meetings.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	427

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The University of Idaho Extension IPM Program periodically conducts statewide grower IPM adoption surveys to assess program impacts and to identify future extension and research. Survey focus is three-fold: (1) measure current use of IPM practices for insects, plant diseases, weeds and other pests; (2) identify grower perceptions of key pest problems; (3) quantitatively document changes in grower use of IPM practices since the prior survey.

What has been done
Faculty conducted surveys during 2012 to compare current use of IPM practices against the baseline data collected a decade ago. Commercial wheat and barley producers attending the UI Dryland Producers Winter Workshops (3 sites) and the UI Southeast Idaho Cereal Schools (5 sites)responded to on-site surveys.

Results
All 283 commercial barley and wheat producers surveyed are practicing certain elements of integrated pest management. Multiple pest control practices, rather than reliance on pesticides, is the norm among these growers. Surveys indicate that approximately 75% of Idaho wheat and barley producers follow an IPM program that combines cultural controls with regular pest scouting and thresholds on at least half their acreage.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
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

Outcome #5

1. Outcome Measures

O: An increase in the number of trained graduate students prepared to enter the workforce. I: Number of M.S. and Ph.D. candidates relevant to this topic team.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
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
501	New and Improved Food Processing Technologies
502	New and Improved Food Products

Outcome #6

1. Outcome Measures

Ecology of Plant-Virus-Insect Interactions

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Virus diseases seriously affect wheat, potato and pea crops in the Pacific Northwest. The most serious of these are vectored by aphids and management focuses on aphid control. Better understanding of aphid behavior and patterns of infection could improve effectiveness of these control methods. This research aims to understand better the effects of virus infection on the behavior of the aphids that are the required vectors for these viruses. The research focuses on Barley yellow dwarf virus (BYDV),Potato leaf roll virus in potato and Bean leaf roll virus and Pea enation mosaic virus in pea. We know that virus infection influences aphid development and behavior. The research will better describe and understand the basis of these responses and use the information to model their effects on virus spread. In pea, we will conduct parallel research assessing spatial and temporal patterns of infection of pea by Pea enation mosaic virus and Bean leaf roll virus as a basis for forecasting risks of virus infection that producers can use to make treatment decisions.

What has been done
The basis of volatile production from Potato leaf roll virus (PLVR) infected potato and Nicotiana benthamiana, and potato and Barley yellow dwarf virus (BYDV) infection in wheat was studied. Behavior of viruliferous and nonviruliferous bird-cherry oat aphids to BYDV-infected wheat was compared adn this work was continued by using aphids that acquired virus through artificial media. Shifts in aphid responses and volatile production associated with the age of the plant at first infection was confirmed.

Results
Growers that have access to the website report improved understanding of aphid virus risk patterns. A survey of growers indicated respondents who reported having great understanding of legume viruses, their aphid vector, and crop damage caused increased from 19% to 29% during the period of this research. The students working on the system have become proficient in GIS

software, economic threshold development and modeling pertaining to aphid landscape scale dynamics. Legume producers are monitoring the information to help them make decisions concerning treatment of pea aphids to control viruses. 55% of respondents in a grower survey planned to use them regularly and 34% would use them sometimes. According to this information 55% of the acreage of peas and lentils (110,500 acres) will be sprayed in the future according to economic thresholds - which is double what respondents indicated they did in the past (27%).

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy

Brief Explanation

grain prices continue to cause changes in land use: more acres planted to cereals.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Idaho Cereal Schools conducted across the State in 2012 were all evaluated using a terminal survey to gather information about knowledge gained and about those topics that were most important for growers to adopt into their own enterprises.

Among the most useful topics where growers also gained the greatest knowledge increases were: Crop insurance, Wireworm and insect issues, Wheat end use quality ,Integrated Pest management, Variety Update, Resistance to Fusarium Head Blight, and Current Economics and Management Decisions.

When asked how the information would be incorporated into management practices, learners responded that they would:

Pay more attention to seeding rate and variety, consider the importance of fungicide for disease prevention, consider how to incorporate seed treatment, use new knowledge in the selection of chemicals, adopt stripe rust resistance best practices, follow variety trials more closely, modify insect management, purchase crop insurance, conduct A & G, wireworm scouting, be conscientious of nematode populations, and focus on end use quality.

Key Items of Evaluation