V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Global Food Security and Hunger: Sugar Beets & Minor Crops

☑ 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	10%		10%	
111	Conservation and Efficient Use of Water	5%		10%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
202	Plant Genetic Resources	10%		10%	
205	Plant Management Systems	20%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	15%		10%	
212	Pathogens and Nematodes Affecting Plants	15%		10%	
213	Weeds Affecting Plants	15%		10%	
215	Biological Control of Pests Affecting Plants	0%		10%	
216	Integrated Pest Management Systems	10%		5%	
402	Engineering Systems and Equipment	0%		5%	
511	New and Improved Non-Food Products and Processes	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	4.0	0.0	6.5	0.0
Actual Paid Professional	3.3	0.0	6.7	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**
89400	0	417015	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
89400	0	417015	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
243761	0	2918184	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The sugar beet and minor crops team integrated field research, demonstration, and outreach education primarily related to numerous crop pests and diseases, and to irrigation systems and soil moisture relationships. Field studies and tours were conducted in collaboration with growers and in UI Agricultural Experiment Station fields to study onions, sugar beets, dry beans, and sweet corn. Pest diagnostic services and treatment recommendations are provided for growers. Economically important pests studied and reported include onion thrip, Rhizoctonia, Aphanomyces, leaf minor and curly top. Significant efforts were devoted to weed management, pesticide registration, development and extension of knowledge about IPM tools, and soil moisture/irrigation protocols influencing pests and diseases. A survey was conducted to learn about IPM practices currently used by sugar beet growers.

New and practical information was shared through a dozen regional conferences and commodity schools. PNW pest management handbooks were updated and IR-4. Faculty prepared a host of Extension publications and research publications explaining their findings to end users and to other scientists.

2. Brief description of the target audience

Growers of minor crops in Idaho and western U.S., EPA, USDA, ISDA and other western departments of agriculture, regional land grant institutions, public interest groups, crop advisers and farm workers throughout Idaho are a targeted audience of this program. Other targeted audiences include sugar beet growers, growers of minor crops, and those who advise growers (i.e. sugar company fieldmen and agronomists, chemical companies, seed companies and consultants).

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	4781	130439	120	218

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

Patent Applications Submitted

Year: 2012

Actual: 1

Patents listed

201300085, Durola - Rape

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	30	31

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Presentations at grower conferences and other non-extension venues.

Year	Actual
2012	73

Output #2

Output Measure

- Workshops, schools and conferences.

Year	Actual
2012	34

Output #3

Output Measure

- Field tours and demonstration projects.

Year	Actual
2012	10

Output #4

Output Measure

- Applied and basic laboratory and field research experiments

Year	Actual
2012	41

Output #5

Output Measure

- Professional invited presentations.

Year	Actual
2012	4

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	O: growers use best practices in the production of sugar beets and minor crops. I: Percentage of Idaho growers indicating adoption of recommended practices (folloe-up survey data).
2	O: Producers are aware of issues and knowledgeable of practices that affect the environmental and economic sustainability of sugar beet and minor crop production. I: The percent of participants who report increased knowledge in pre/post-program surveys.
3	O: Development of new research information. I: Research publications (peer reviewed).
4	Plant Disease Identification and Management of Southwest Idaho
5	Biopesticide Co-products from Brassicaceae Seed Meals

Outcome #1

1. Outcome Measures

O: growers use best practices in the production of sugar beets and minor crops. I: Percentage of Idaho growers indicating adoption of recommended practices (folloe-up survey data).

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	266

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Glyphosate resistant weeds pose a threat to sugar beet growers in Idaho and eastern Oregon.

What has been done
Faculty members made four presentations at The Amalgamated Sugar Company Grower Meetings at Nyssa, OR, Nampa, Twin Falls, Burley and Aberdeen on the importance of glyphosate resistance management and strategies for resistance management.

Results
In a survey of the growers following this presentation, over 20% said they were using or would use herbicide tank mixtures as a glyphosate resistance management strategy.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
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 #2

1. Outcome Measures

O: Producers are aware of issues and knowledgeable of practices that affect the environmental and economic sustainability of sugar beet and minor crop production. I: The percent of participants who report increased knowledge in pre/post-program surveys.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	222

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As a result of stakeholder input, the OnePlan PAR and FMP was developed to help producers understand pesticide recordkeeping requirements and do a better job complying with federal and state regulations and label requirements.

What has been done
The OnePlan PAR and FMP was developed as an interactive website to assist with pest management decisions related to farm management planning.

Results
We have over 260 consistent users of the OnePlan PAR and FMP website. 100% of the users said the website tool was useful to them and their operation. 57% said they were more confident in their ability to supply worker protection information to their employees.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
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 #3

1. Outcome Measures

O: Development of new research information. I: Research publications (peer reviewed).

2. Associated Institution Types

- 1862 Extension

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)
{No Data Entered}

What has been done
{No Data Entered}

Results
{No Data Entered}

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #4

1. Outcome Measures

Plant Disease Identification and Management of Southwest Idaho

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)
Southwest Idaho is a diversified crop production region with a variety of seed and fruit crops, ornamental and nursery plants, which are subject to a variety of biotic and abiotic diseases. Accurate and timely identification of the cause is critical to prevent or minimize losses, and to promote rational use of pesticides. Characterization and documentation of new or re-emerging diseases and pathogens is critically important to the agriculture, green industry, and the plant protection personnel. Idaho accounts for over 80% of all the sweet corn seed produced in the U.S. Identification of efficient seed treatments to ensure superior field performance of the seed is critical to the sustainability of sweet corn seed industry in Idaho. Southwest Idaho is the third largest producer of summer storage type onions in the U.S. and, therefore, identifying cultivars less susceptible to the major diseases like Iris yellow spot and powdery mildew is important to minimize losses to the growers.

What has been done
More than 200 plant samples were analyzed for diseases and the results, along with disease management options were conveyed to the clients. Reports of new disease occurrence relating to blight of yellow nutsedge, powdery mildew of lilac, bacterial spot of plum and pluot have been submitted for publication.

Results
Home owners, master gardeners, nursery operators, county extension agents, commercial growers (fruit, onion, potato, poinsetta, lillies, etc.) were able to adopt appropriate disease management strategies based on the disease identification and management information provided. Onion growers were able to utilize the real-time pest and disease information posted on the website.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants

Outcome #5

1. Outcome Measures

Biopesticide Co-products from Brassicaceae Seed Meals

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)
Brassicaceae oilseed crops including rapeseed (Brassica napus), mustard (Brassica juncea and Sinapis alba), and camelina (Camelina sativa) exhibit rotational and environmental quality benefits making them excellent choices as rotational crops for the production of advanced liquid biofuel feedstocks. Substituting a mustard crop for a pulse crop can significantly reduce the amount of herbicide used in the cropping system. Brassicaceae crops are extremely competitive with most common annual weed species, reducing the need for chemical weed control in the crop. Natural chemicals produced by Brassicaceae plant tissues also appear to provide pest control benefits that exceed those expected from an average break crop. Including Brassicaceae crops in a rotation has a number of other advantages. Increased plant available N has been measured in soils following mustard crops equal to that typically measured after a legume. Brassicaceae crops are highly drought tolerant and require less water than small grains. Although Brassicaceae species afford the aforementioned benefits with respect to agroecosystem sustainability and produce excellent quality oils for advanced biofuel feedstocks, acreages are limited by low financial returns to growers. An increased financial incentive to grow Brassicaceae oilseed crops will only occur if the oils and associated co-products command higher prices. Given the competing price of petroleum feedstocks, the value of oils produced from Brassicaceae species is unlikely to increase in the foreseeable future. Thus, the only way to develop an economically viable, regionally significant liquid biofuels industry based on oilseeds is to increase co-product value.

What has been done
Multiple value-added products from various Brassicaceae meals including those from mustards and rapeseed were isolated. Procedures were developed for analysis of glucosinolates in

Brassicaceae seed meals using time-of-flight (TOF) mass spectrometry (MS) combined with high performance liquid chromatography (HPLC) and compared to a traditional method involving glucosinolate analysis using HPLC combined with UV detection. Reproducibility, detection limits, accuracy, and precision were determined for the new HPLC-TOF method. Experimentation related to large-scale glucosinolate extraction was also conducted using water and alcohols as solvents. We are in the process of optimizing extraction efficiency for that can be scaled up for industrial purposes.

Results
The newly developed method of glucosinolate analysis allows for decreased time of analysis and decreased cost. Glucosinolate analysis as accomplished with the new HPLC-TOF method does not require desulfation, thus saving the cost of several reagents. The overall result is that glucosinolates can now be quantified in 3 h and compared to nearly 24 h. This will greatly improve our ability to determine the effectiveness of glucosinolate isolation from mustard seed meals.

4. Associated Knowledge Areas

KA Code	Knowledge Area
215	Biological Control of Pests Affecting Plants
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes
- Economy
- Other (climate)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Idaho One Plan; Pesticide Applicator Reporting Program
As a result of stakeholder input from a Canyon County crops advisory committee, the Pesticide Applicator Recordkeeping tool (PAR) was developed in 2009-2010 and fine-tuned for further promotion to producers and applicators. We added the Soil Fumigant Management Planner (FMP) to the PAR computerized tool, this year. The FMP was developed as a result of a competitive grant we received from the US EPA two years earlier. We have provided the new US EPA regulatory requirements, checklists, and GAPs as dictated by the label revisions. These soil fumigant changes are a result of a major federal re-registration effort by EPA and it is mandatory that all applicators have a fumigant management plan with signed documentation.

Our new FMP tool fulfills all federal and state re-registration requirements. I have

continued working with the collaborative team consisting of UI Extension (Hirnyck and Neufeld), Idaho Association of Soil Conservation Districts and USDA-NRCS. We gave 11 presentations in 2011-2012 to continue promoting the program, in addition to handing out promotional flyers and pens with the logo and website. We obtained grants from three commodity commissions in order to pay for additional programming development and maintenance and promotional supplies. We have seen the number of users gradually increase as a result of our PAR presentations during 2011-2012, now up to 260 consistent users.

A survey was conducted at the end of 2011, and 100% of those surveyed said the PAR was useful to them and 85% said this program helped ensure they were in compliance with federal and state worker protection regulation. Of those surveyed 22% used the new soil fumigant management plan feature and 40% of those said it was helpful to them. We have more PAR presentations planned for 2013 in order to educate pesticide applicators on the usefulness of the program and the addition of the soil fumigant management planner, which a new label requirement for soil fumigant applications. We plan to solicit funding through the commodity commission grant process for website maintenance and updates/additions, and promotional materials and handouts. We plan to continue to measure program impacts with an end of the year survey on the website.

Key Items of Evaluation