

**V(A). Planned Program (Summary)**

**Program # 2**

**1. Name of the Planned Program**

Global Food Security and Hunger

Reporting on this Program

**V(B). Program Knowledge Area(s)**

**1. Program Knowledge Areas and Percentage**

<b>KA Code</b>	<b>Knowledge Area</b>	<b>%1862 Extension</b>	<b>%1890 Extension</b>	<b>%1862 Research</b>	<b>%1890 Research</b>
101	Appraisal of Soil Resources	5%		3%	
102	Soil, Plant, Water, Nutrient Relationships	5%		5%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		3%	
111	Conservation and Efficient Use of Water	8%		7%	
112	Watershed Protection and Management	5%		3%	
121	Management of Range Resources	2%		3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%		10%	
202	Plant Genetic Resources	6%		8%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%		9%	
205	Plant Management Systems	5%		6%	
206	Basic Plant Biology	0%		5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	12%		7%	
212	Pathogens and Nematodes Affecting Plants	12%		9%	
213	Weeds Affecting Plants	10%		3%	
215	Biological Control of Pests Affecting Plants	8%		5%	
216	Integrated Pest Management Systems	10%		4%	
301	Reproductive Performance of Animals	2%		3%	
302	Nutrient Utilization in Animals	2%		3%	
303	Genetic Improvement of Animals	3%		2%	
304	Animal Genome	0%		2%	
	<b>Total</b>	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	76.0	0.0	260.0	0.0
Actual Paid Professional	101.0	0.0	340.0	0.0
Actual Volunteer	10.0	0.0	0.0	0.0

**2. Institution Name:** Washington State University

**Actual dollars expended in this Program (includes Carryover Funds from previous years)**

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1460730	0	3269433	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1460730	0	3269433	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
8845959	0	32268415	0

**V(D). Planned Program (Activity)**

**1. Brief description of the Activity**

Production agriculture is one of the primary Research and Extension areas of emphasis at Washington State University. We view the ability to maintain a safe, high quality, and growing food supply as our most diverse and active of the planned programs. Virtually everything that we do under the heading of production agriculture and farm to table programs has some component included in this program. This rationale is based on the idea that knowledge gained about plant and animal production systems contributes to the world food supply and often can be adapted to increase food availability and stability in areas far from Washington state. Thus material previously included in Departments like Crop Science, Horticulture, and Animal Science are included, as are research and extension programs in areas such as Entomology and Plant Pathology. Since having production systems that are economically viable is essential, we also include Agricultural Economics in this Planned Program and research and extension that is related to food processing and distribution. We also include efforts that directly relate to issues such as the availability of labor and the dynamics of communities that are not covered by other Planned Programs.

To accomplish the work included in this Planned Program, fundamental, translational, and applied research is conducted in laboratories on our main campus, at Research and Extension centers, and in collaboration with growers, ranchers, food processors, and other related individuals and entities. Extension programs serve many roles in this Program. Through the outreach and survey activities of Extension, many of the issues are defined and articulated in a form that allows us to take action. We strive to identify the scope of a problem, define and identify solutions, determine the resources available, and decide on a course of action, Action plans could range from an investigation of the literature to carrying out primary research that would identify and validate solutions. Extension is almost always involved in testing the

application of partial solutions and ultimately is charged with developing their mechanisms for implementing potential solutions if it appears that something suitable has been found to deal with the identified problem. Detailed information about the WSU projects is available through the CRIS reporting system. As an index of external grant funding competitiveness, the ARC obtained ~\$40 million in new award commitments in CY 2012, a large fraction of which was in areas covered in this Program.

As is implied in the above description, the dynamics of problem solving in this area is complex. There are many different targets for specific solutions but they can generally be characterized by the boundary conditions of trying to improve the efficiency or cost effectiveness of production, processing or distribution, trying to increase consumer and stakeholder satisfaction, and trying to anticipate issues that might arise in the future that would keep the new ideas from being sustainable, in the sense that they can be applied indefinitely without adverse consequences. This latter issue often leads to parts of a project being assigned to another Program. If, for example, a specific constraint on production is related to weather or changing climate, some fraction of the effort will be assigned to the Program on Climate Change.

**2. Brief description of the target audience**

Target audiences include farmers and ranchers, agricultural consultants, scientists, commodity commissions, educators, state and federal agency professionals, elected officials, food processors, transporters, agricultural chemical producers and applicators, and the general public.

**3. How was eXtension used?**

Eight faculty members were engaged in Communities of Practice to advance collaborative efforts and facilitate research-based information sharing through the eXtension system.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Actual</b>	541396	616096	2417	6926

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 3

**Patents listed**

Suppression of Foliar and Soilborne Pathogens. Baley, G., K. Kidwell, T. Paulitz. Disclosed herein is a method for increasing the production of crops, particularly wheat and soybean, using herbicide resistant cultivars. In one aspect, this method increases crop yield by diminishing the impact of the root diseases caused by Gaeumannomyces and Rhizoctonia species by treating the crop with an herbicide, in particular glyphosate. In another aspect, the method for treating crops reduces the effects of foliar pathogens and diseases, particularly fungal pathogens, such as rusts, including soybean rust, stem rust, stripe rust, and leaf rust. Patent # 8,361,928.

Use of C3 and C14 aliphatic aldehydes, ketones and primary and secondary C3 to C7 Aliphatic alcohols to inhibit sprouting of potato tubers. Knowles, R. N. and L. Knowles. Compositions and methods for inhibiting the sprouting of potato tubers are provided. The compositions comprise C3 to C14 aliphatic aldehydes and ketones, and /or C3 or C7 primary and secondary aliphatic alcohols. Patent # 8,258,081.

Puget Crimson. P. Moore. This invention relates to a new and distinct cultivar of strawberry plant named Puget Crimson. Puget Crimson is distinguished by its longer than wide high yields of very late season production and an excellent strong strawberry flavor. Patent # PP22,781.

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	33	410	443

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of workshops, demonstrations, and field days conducted annually

Year	Actual
2012	531

**Output #2**

**Output Measure**

- Number of peer reviewed (official) WSU Extension publications published

Year	Actual
2012	26

**Output #3**

**Output Measure**

- Number of graduate students with a significant professional orientation in the area of Global

Food Security.

<b>Year</b>	<b>Actual</b>
2012	202

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.
2	Percentage of participants evaluated who applied acquired knowledge
3	Percentage increase in yield realized among program participants as a result of application of WSU-recommended practices.
4	Increase in profitability resulting from practices developed by or recommended by WSU Extension personnel and/or ARC scientists.
5	Increased number of acres managed with "Best Management Practices" designed to yield improved environmental quality.

## **Outcome #1**

### **1. Outcome Measures**

Percentage of evaluated participants who demonstrated increased knowledge and skills relative to key learning objectives.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	80

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

By taking advantage of Washington State's diverse microclimates, we produce over 300 crops commercially, including small grains, vegetables, fruits, legumes, and livestock. Washington State University (WSU) conducts research and extension programs focused on increasing the productivity and efficiency of our farms and ranches by reducing plant and animal pests and diseases, developing new genetic resources, and optimizing overall food production practices and strategies.

#### **What has been done**

Program implementation utilized local, regional, state-wide, and multistate efforts in a coordinated effort that involved workshops, clinics, seminars, field days, field demonstrations, print and electronic publications, mass media, social networks, and other methods to disseminate research-based knowledge and other relevant information to targeted audiences.

#### **Results**

Greater than 80% of individuals that participated in one of the programs indicate that they increased their knowledge relative to one or more of the knowledge areas selected for this program effort. This impact represents an average across over 531 educational events that were assessed for this measure. The overall assessment validates that program participants gained new knowledge and skills important to enhancing agricultural efficiency and productivity to add to the world food supply, while protecting the environment and resource base.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
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101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals

## **Outcome #2**

### **1. Outcome Measures**

Percentage of participants evaluated who applied acquired knowledge

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### **3a. Outcome Type:**

Change in Action Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	67

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Washington State's diverse microclimates produce over 300 crops, including small grains, vegetables, fruits, legumes, and livestock. Washington State University (WSU) conducts research and extension programs focused on increasing the productivity and efficiency of our farms and ranches by reducing plant and animal pests and diseases, developing new genetic resources, and optimizing overall food production practices and strategies.

### **What has been done**

Program implementation utilized local, regional, state-wide, and multistate efforts in a coordinated effort that involved 531 workshops, clinics, seminars, field days, field demonstrations, and educational events. These events were supplemented with print and electronic publications, mass media, social networks, and other methods to disseminate research-based knowledge and other relevant information to targeted audiences.

### **Results**

Some 67% of program participants across 531 program events reported utilizing the research-based information and training received to positively enhance food production and agricultural productivity across multiple crops and agricultural enterprises. This result is based on the calculated mean of participant responses collected on individual events. This impact represents an average across over 531 educational events that were assessed for this program area. The overall assessment validates program participants gained new knowledge and skills important to enhance agricultural efficiency and productivity to add to the world's food supply, while protecting the environment and resource base.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals

## **Outcome #3**

### **1. Outcome Measures**

Percentage increase in yield realized among program participants as a result of application of WSU-recommended practices.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### 3a. Outcome Type:

Change in Condition Outcome Measure

### 3b. Quantitative Outcome

Year	Actual
2012	5

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Washington State's diverse microclimates produce over 300 crops, including small grains, vegetables, fruits, legumes, and livestock. Washington State University (WSU) conducts research and extension programs focused on increasing the productivity and efficiency of our farms and ranches by reducing plant and animal pests and diseases, developing new genetic resources, and optimizing overall food production practices and strategies.

#### What has been done

Program implementation utilized local, regional, state-wide, and multistate efforts in a coordinated effort that involved workshops, clinics, seminars, field days, field demonstrations, print and electronic publications, mass media, social networks, and other methods to disseminate research-based knowledge and other relevant information to targeted audiences.

#### Results

Program evaluation reports from across the state indicated a wide variety of productivity benefits linked to our WSU Research and Extension work in this planned program area. The attribution of a 5% increase in agricultural productivity among program participants is calculated based on overall adoption and application of research-based information or practices extended through 531 educational events. This result represents an average from data collected across events and projects associated with a variety of crops and agricultural enterprises. While weather and many other variables can obscure single-year gains on a local scale or even state-wide; this result indicates a perceived benefit as reported by program participants.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
121	Management of Range Resources
201	Plant Genome, Genetics, and Genetic Mechanisms

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
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals

#### **Outcome #4**

##### **1. Outcome Measures**

Increase in profitability resulting from practices developed by or recommended by WSU Extension personnel and/or ARC scientists.

##### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

##### **3a. Outcome Type:**

Change in Condition Outcome Measure

##### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	45650500

##### **3c. Qualitative Outcome or Impact Statement**

###### **Issue (Who cares and Why)**

Washington State's diverse microclimates produce over 300 crops, including small grains, vegetables, fruits, legumes, and livestock. Washington State University (WSU) conducts research and extension programs focused on increasing the productivity and efficiency of our farms and ranches by reducing plant and animal pests and diseases, developing new genetic resources, and optimizing overall food production practices and strategies.

###### **What has been done**

Work including basic and applied research, was linked with outreach programs that utilized local, regional, state-wide, and multistate efforts. The outreach methods included workshops, clinics, seminars, field days, field demonstrations, print and electronic publications, mass media, social networks, and other methods to disseminate research-based knowledge and other relevant information to targeted audiences.

## **Results**

Assessment of program participants revealed an aggregate increase in profitability of \$45,650,500 across all program participants. This outcome metric was computed from an array of reported monetary increases to farm profitability associated with production or efficiency improvements from the application of new knowledge and research. A secure food system is linked to the underlying profitability of food producers to remain viable enterprises.

## **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
205	Plant Management Systems
206	Basic Plant Biology
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
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
304	Animal Genome

## **Outcome #5**

### **1. Outcome Measures**

Increased number of acres managed with "Best Management Practices" designed to yield improved environmental quality.

### **2. Associated Institution Types**

- 1862 Extension
- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

Year	Actual
2012	2533688

### 3c. Qualitative Outcome or Impact Statement

#### Issue (Who cares and Why)

Washington State's agricultural and resource-use productivity is highly dependent upon the application of appropriate technologies for irrigation, farming of lands with high erosion potential, effective control of existing and invasive pests and diseases, and effective transport of agricultural products to distant markets. This outcome measure seeks to quantify the application of new knowledge gained from research to farm and ranch lands.

#### What has been done

Work including basic and applied research, linked with outreach programs that utilized local, regional, state-wide, and multistate efforts. The outreach methods included workshops, clinics, seminars, field days, field demonstrations, print and electronic publications, mass media, social networks, and other methods to disseminate research-based knowledge and other relevant information to targeted audiences.

#### Results

State-wide work on this program was assessed in terms of acres managed with "Best Management Practices" as informed by our research, and designed to improve agricultural productivity while sustaining environmental quality. Aggregated reports for 2012 indicate that the management of 2,533,688 acres was impacted.

### 4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
121	Management of Range Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
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

#### **V(H). Planned Program (External Factors)**

##### **External factors which affected outcomes**

- Economy
- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

##### **Brief Explanation**

State funding support for the university budget, including Extension, continued to be stretched in 2012, and uncertainty of future funding levels continue to impact our hiring and deployment of human and financial resources. The uncertainty of future state policy and funding for higher education clearly impacts our ability to take bold initiatives, given contingencies required for additional budget cuts from state and local governments, as well as reductions in federal capacity funds. Our work in research and extension is increasingly dependent on securing competitive grants to support our system and drive our programs forward. Competing priorities for limited funds and financial resources continue to be our most limiting factor.

#### **V(I). Planned Program (Evaluation Studies)**

##### **Evaluation Results**

This program encompassed a wide array agricultural enterprises including irrigated and dry-land agronomic crops, high value horticultural crops, fruit orchards, vine crops, grazing lands, livestock operations, and dairy farms. The overall program evaluation for all events and projects under this program theme was evaluated in terms of "knowledge gained by participants", "application of this knowledge", and "productivity increases associated with the application of research-based information". We attempted to further evaluate results in terms of "increased profitability of food producers and processors", and as well as increases in the acreage of agricultural land managed with the application of new practices. Collectively, the results indicate positive impacts to agricultural productivity through the dissemination of research-based information and the application of this knowledge for sustaining agricultural enterprises and food production. Results were collected through a variety of methods including pre and post event evaluations, surveys, agricultural statistics, feedback from stakeholder groups, and other assessments of program participants. The analysis provided the aggregate results indicated below under key items of evaluation.

##### **Key Items of Evaluation**

Our planned program under Global Food and Hunger focused on enhancing agricultural productivity and efficiency while protecting the environment through focused research and extension work across the diverse agricultural enterprises and crops common in the state.

Our assessment indicated that 80% of program participants responding to evaluations increased their knowledge relative to the knowledge areas covered in this program. 67% of

this audience indicated application of one or more principles or practices learned from their participation.

Additionally, participants provided responses that indicated an average productivity increase of 5% was realized by the application of the knowledge extended. Surveys also indicated increased profitability of \$45,650,688 was associated with the application of this knowledge, and that the management of 2,533,688 acres was directly influenced by this research and extension program.