

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

**Program # 9**

**1. Name of the Planned Program**

Program in Fruit and Vegetable Development, Production and Management

**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			8%	
202	Plant Genetic Resources			10%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			13%	
204	Plant Product Quality and Utility (Preharvest)			28%	
205	Plant Management Systems			23%	
206	Basic Plant Biology			7%	
212	Pathogens and Nematodes Affecting Plants			3%	
216	Integrated Pest Management Systems			1%	
404	Instrumentation and Control Systems			4%	
601	Economics of Agricultural Production and Farm Management			1%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources			2%	
	<b>Total</b>			100%	

**V(C). Planned Program (Inputs)**

**1. Actual amount of professional FTE/SYs expended this Program**

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	45.3	0.0
Actual	0.0	0.0	26.0	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
0	0	343832	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	343832	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3328604	0

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

### 1. Brief description of the Activity

Specific activities vary across a wide range, from molecular level inquiry to field based studies concerning the efficacy of horticultural production practices. These activities include: (1) basic research applying molecular biology, genetics, and biochemistry to the calcium/calmodulin-mediated signal network that influences plant response to environmental factors; (2) development of data mining tools and resources for genomics research on Rosaceae; (3) studies in fruit production and biology, with an emphasis on sustainability of fruit production systems; (4) breeding and genetic studies in apple, cherry, raspberry, and strawberry, including genomics approaches to identify functional genetic markers for crop improvement; (5) studies of the anatomy and structure of the grape berry during growth and development; (6) research that emphasizes the use of plant bioregulators for apple, pear, and sweet cherry; (7) studies related to the interaction of various environmental and production factors influencing yield and quality of potato tubers; (8) research focusing on environmental factors and management practices as they influence grape physiology; (9) studies of effects of deficit irrigation and partial root zone drying in apple, cherry, and grape; (10) research that focuses on understanding factors that cause skin disorders of apples; (11) evaluation of potato cultivars for introduction into the Washington potato industry; (12) studies focusing on practical means of achieving balanced cropping; (13) effects of new clonal rootstocks on scion productivity, growth, and fruit quality in cherry; (14) research focusing on novel management strategies for high density cherry production; (15) the potential for mechanical harvest of fresh-market quality, stemless sweet cherries; and (16) the development of automation, sensing, control, and information systems for precision agriculture. The outputs of these activities will include: patents, plant variety releases, scientific journal articles, conference publications and presentations, poster presentations, field day presentations, web sites, and knowledge about production and management practices that is passed along to users in other informal settings.

### 2. Brief description of the target audience

The audience for this program will be other scientists, economists, agribusiness, farmers, horticulturists and the tree fruit, small fruit, and potato industries.

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

### 1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
<b>Plan</b>	1250	600	0	0
<b>Actual</b>	4045	50612	20	0

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

**Patent Applications Submitted**

Year: 2010  
 Plan: 1  
 Actual: 3

**Patents listed**

Poovaiah B., L. Du. Poovaiah, B.W. and Du, L. Size and/or growth engineering by modulation of the interaction between calmodulin, and brassinosteroid biosynthetic enzymes and orthologs thereof. (Patent pending). submitted.

Poovaiah B. Poovaiah, B.W. and Du, L. Control of plant immunity using inducible promoter-driven anti-sense or RNAi construct of AtSR1 (2 patents pending ? cases A-1028 and A-1029)

Knowles N., L. Knowles. Enhancement of potato tuber sprouting inhibitors using various combinations of agents. submitted. Application for provisional patent filed September 2, 2010. Registration No. 45,922

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

**Number of Peer Reviewed Publications**

2010	Extension	Research	Total
<b>Plan</b>	3	23	
<b>Actual</b>	15	53	68

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

**Output Target**

**Output #1**

**Output Measure**

- Peer reviewed journal articles

Year	Target	Actual
2010	12	53

**Output #2**

**Output Measure**

- Variety Releases

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	3	5

**Output #3**

**Output Measure**

- Plant Patents

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	1	4

**Output #4**

**Output Measure**

- Number of graduate students supported by Agricultural Research Center and external funds

<b>Year</b>	<b>Target</b>	<b>Actual</b>
2010	7	9

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

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

O. No.	OUTCOME NAME
1	See below under Evaluation.

## **Outcome #1**

### **1. Outcome Measures**

See below under Evaluation.

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

- 1862 Research

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

Change in Condition Outcome Measure

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

<b>Year</b>	<b>Quantitative Target</b>	<b>Actual</b>
2010	0	0

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

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

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

#### **Results**

Breeding and development of potato varieties that are more efficient in nitrogen use (Pacific Northwest Potato Variety Development Program, PNWPVD) has reduced the use of nitrogen, resulting in less nitrate contamination of ground water. The potential economic savings to NW potato growers was estimated to be \$1.3 million or \$72 per acre in 2006. Varieties released by this collaborative program accounted for 26% and 32% of potato acreage in the Pacific Northwest and WA in 2007, respectively. Farm gate value of these new varieties in WA in 2007 is estimated to be \$160,000,000. It is estimated that the potato varieties developed by the PNWPVD program have returned \$39 for every dollar (research & institutional) invested.

Other researchers in this program have identified the process that causes sun burning in apples, and have developed a product that reduces this disorder significantly. This discovery has the potential to save fruit growers literally tens of millions of dollars annually. It is estimated that the patented apple sunburn protectant (RAYNOX<sup>®</sup>(r)) alone saved the industry several million dollars during the past three growing seasons. The invention of RainGard to aid in the protection of cherries from cracking/splitting is also expected to have tremendous positive economic impact on the industry.

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

<b>KA Code</b>	<b>Knowledge Area</b>
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources

203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
206	Basic Plant Biology

#### **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
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

##### **Brief Explanation**

External factors not anticipated when the Plan of Work was written include severe budget decreases at the state level and the implementation at the federal level of the Specialty Crop Research Initiative. Several research programs have benefited from competitive funding through the SCRI mechanism, especially those related to tree fruit.

#### **V(I). Planned Program (Evaluation Studies and Data Collection)**

##### **1. Evaluation Studies Planned**

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

##### **Evaluation Results**

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