

V(A). Planned Program (Summary)

Program # 18

1. Name of the Planned Program

Program in Sustainable Crop and Soil 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
101	Appraisal of Soil Resources			18%	
102	Soil, Plant, Water, Nutrient Relationships			2%	
104	Protect Soil from Harmful Effects of Natural Elements			5%	
111	Conservation and Efficient Use of Water			10%	
132	Weather and Climate			5%	
133	Pollution Prevention and Mitigation			3%	
141	Air Resource Protection and Management			5%	
205	Plant Management Systems			17%	
213	Weeds Affecting Plants			10%	
404	Instrumentation and Control Systems			2%	
405	Drainage and Irrigation Systems and Facilities			5%	
601	Economics of Agricultural Production and Farm Management			3%	
701	Nutrient Composition of Food			3%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins			5%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities			5%	
903	Communication, Education, and Information Delivery			2%	
	Total			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	39.9	0.0

Actual	0.0	0.0	36.6	0.0
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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	335253	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	335253	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3828050	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Faculty in the Department of Crop and Soil Sciences worked to develop bioproducts and bioenergy from crop residues; demonstrated high quality and safe food from organic and sustainable production systems; documented ecosystem services provided by sustainable cropping systems; improved the efficiency and safety of waste recycling systems in agricultural production; identified soil biological organisms important in crop production, residue decomposition and soil building; developed soil management programs for new crop species and cultivars of evolving cropping systems in collaboration with crop genetic and breeding teams; published peer-reviewed journal articles on unique findings related to the above topics; and disseminated information on the above systems to facilitate adoption and commercialization.

2. Brief description of the target audience

The target audience includes other soil scientists, cropping systems agronomists, economists, commodity commissions, policy makers, legislators, agribusiness, and farmers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	5000	5000	100	1000
Actual	15500	73500	225	550

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

Patent Applications Submitted

Year: 2010
 Plan: 0
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	10	25	
Actual	14	41	55

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer reviewed journal publications

Year	Target	Actual
2010	25	35

Output #2

Output Measure

- Graduate students supported by Agricultural Research Center and other external funds

Year	Target	Actual
2010	22	34

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Publications dealing with improved knowledge of crop rotations, nutrient cycling, soil building and carbon sequestration, fertility management, soil structure and soil water movement, and chemical movement in soils, tools for spatial monitoring and management.

Outcome #1

1. Outcome Measures

Publications dealing with improved knowledge of crop rotations, nutrient cycling, soil building and carbon sequestration, fertility management, soil structure and soil water movement, and chemical movement in soils, tools for spatial monitoring and management.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	25	35

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Publications on various aspects of sustainable crop and soil management affect the international community of agronomists and soil scientists. Expanded knowledge in these areas allows progress in understanding basic aspects of sustainable crop production practices, including the production of crops for food, fiber and energy. This, in turn, allows progress in developing best management practices, which directly benefits farmers and their success, and indirectly the greater public, as the environment improves and food production costs are kept low.

What has been done

Numerous experiments were conducted. Reports and presentations were delivered on weed ecology and control in crops; fertilization of crops to optimize nutrient use efficiency; fertilization effects on grain and residue composition, decomposition, and processing; organic crop production practices; crop rotation and direct seeding / reduced tillage methods and their effects on erosion, production and economics; improved methods of measuring soil physical, chemical, and microbial parameters; and the sociological effects of alternative farming practices.

Results

Better understanding has been gained of the ecology and control of weeds in Washington State and regional crops and environments. It was estimated that the adoption of one new herbicide alone saved farmers approximately \$13 million across the region, and reduce the chemical load in the environment by approximately 120,000 lbs. The cost of soil erosion in the Palouse region of eastern Washington alone has been >\$70 million/yr due to lowered crop yields, lost nutrients, and sediment cleanup. Adoption of reduced tillage methods has reduced erosion by 25-50% with a cost savings of up to \$35 million/yr. This has improved water and air quality in the region as well. Improved fertilizer application methods in cereals, vegetables, forages, oilseeds, grape, and turfgrass production systems has reduced production costs and nutrient runoff and leaching with

a cost savings of >\$5 million/yr and reduced nitrogen emissions into the atmosphere by 80,000 lbs annually. Organic agriculture production has risen dramatically in Washington partly due to increased demand and partly due to WSU's emphasis on education and production methods research.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management
205	Plant Management Systems
213	Weeds Affecting Plants
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Major factors affecting outcomes in 2010 include a cool, wet spring followed by localized drought, which impacted field research results and resulted in the compromise or loss of several field studies. The state and national economy have affected hiring and the ability to restaff key vacancies created by retirements and resignations. Higher crop prices and production input costs (= higher risk) have impacted farmer inclination to adopt new technologies, especially soil conservation measures. Increased costs of inputs affecting farmers also affect researchers.

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

1. Evaluation Studies Planned

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

Evaluation Results

Key Items of Evaluation