

V(A). Planned Program (Summary)

Program # 21

1. Name of the Planned Program

Sustainable Energy

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			5%	
123	Management and Sustainability of Forest Resources			5%	
131	Alternative Uses of Land			5%	
133	Pollution Prevention and Mitigation			2%	
141	Air Resource Protection and Management			3%	
201	Plant Genome, Genetics, and Genetic Mechanisms			5%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants			15%	
204	Plant Product Quality and Utility (Preharvest)			15%	
205	Plant Management Systems			5%	
206	Basic Plant Biology			5%	
211	Insects, Mites, and Other Arthropods Affecting Plants			5%	
402	Engineering Systems and Equipment			5%	
403	Waste Disposal, Recycling, and Reuse			10%	
511	New and Improved Non-Food Products and Processes			5%	
601	Economics of Agricultural Production and Farm Management			5%	
603	Market Economics			2%	
605	Natural Resource and Environmental Economics			3%	
	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

Actual	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
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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
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	1890 Matching	1862 Matching	1890 Matching
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	1890 All Other	1862 All Other	1890 All Other
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

Because the work reported for 2010 in the annual review of the older Planned Programs includes effort that will be duplicated by also reporting under the newly mandated goals, quantitation of effort is not included under Inputs. However, we estimate that about 11% of Hatch expenditures were in this area.

The primary impacts of our research programs in the area of sustainable energy are: (1) Exploring the potential for altering cropping systems in the Pacific Northwest to include more options for incorporating plants that can be used as energy sources; (2) Altering current agricultural processes to require less energy input; (3) Understanding the basic properties of plant production of potential energy feedstocks with the goal of adding value to biological energy production; (4) Developing methods for using plant derived products as energy sources, including waste wood and landfill materials; and (5) Developing usable models that include energy costs associated with production so that producers can estimate the economic consequences of various production alternatives.

We have projects looking at the regional potential of new "energy crops" like algae, camelina, switchgrass and giant reed, the possibility of using rapidly growing plants like poplar, prickly lettuce and other weeds for their biomass or specialty chemical production and especially to develop methods for using waste wood products and biomaterials from landfills as energy sources. Camelina looks like a promising oilseed crop for inclusion into dry area rotations in what would otherwise be a fallow season. These efforts sometimes include work to increase production by altering cropping practices or by genetic improvement through traditional breeding. Work is also underway to understand how photosynthesis is controlled and to alter the flow of photosynthate to useful energy products, like starch and lipids. The more reduced compounds could lead to potentially higher value fuels than ethanol. Research into reshaping plant allocation strategies is coupled to physiological studies examining the potential consequences for the growth of the whole plant, including properties, such as stress and disease resistance, that would be important in growing crops able to generate biofuels and bioproducts at a competitive price. Because of the diversity of plants grown in the state and the relatively lignified state of the tree biomass identified as a major potential source of energy, pyrolysis is a major conversion option that is being explored, especially small scale pyrolysis that would allow high temperature conversion to be tailored to individual biomass inputs. The cropping research that accompanies some of these projects includes further analysis of low-input farming techniques, like no-till farming in the eastern part of the state, and designed studies of the long-term impact of various farming practices. There is considerable

investment in organic farming programs, many of which are associated with the WSU Center for Sustaining Agriculture and Natural Resources, which is investigating various alternatives for growing crops. Issues that are central include establishing and maintaining the productivity of biofuel crops, many of which are judged by their ability to be productive while minimizing external inputs, including energy and farm chemicals. This research also supported by WSU economists who have been investigating the potential profitability of production alternatives.

2. Brief description of the target audience

Because the implications of sustainable energy development are diverse, there is a similar diversity in the audience for this research. A study carried out by WSU economists that was commissioned by the Washington legislature and released in late 2008, has helped shape state energy policy and defined where our production might fit in the energy market. Some of this is reflected in the research priorities described above. More generally, the research has found several target audiences, from farmers considering long-term strategies with regard to cropping and production practices, to the US Department of Energy, which funds several of our investigators, especially in the basic science areas. The audiences include other scientists working in similar areas, industry scientists, and decision makers at several levels.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA}	{NO DATA}	{NO DATA}	{NO DATA}
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010
 Plan:
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

Outcome #1

1. Outcome Measures

{No Data Entered}

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Changes in funding patterns have affected all research programs at the university but especially worrying is the serious decline in state funding that can be reallocated at the level of the Agricultural Research Center. This trend is likely to continue for at least another two years and will have significant consequences for the strength of our research programs. While or faculty have been working hard to obtain external funding to substitute for some of this state support, contraction at the federal level presents us with what has been described as a Perfect Storm, which has the potential to severely impact the land grant mission of supporting agricultural industries in the state and region. Special state allocations in the Biomass area and programs at the federal level have helped buffer the research funding in this target area but, partly because of our short growing season, there are some fundamental constraints on development of large scale bioenergy crops in the region.

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