

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Sustainable Energy - Biofuels and Biobased Products

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
101	Appraisal of Soil Resources	0%		9%	
102	Soil, Plant, Water, Nutrient Relationships	8%		18%	
111	Conservation and Efficient Use of Water	8%		0%	
125	Agroforestry	8%		0%	
131	Alternative Uses of Land	10%		0%	
136	Conservation of Biological Diversity	8%		0%	
205	Plant Management Systems	5%		20%	
302	Nutrient Utilization in Animals	5%		1%	
402	Engineering Systems and Equipment	8%		15%	
403	Waste Disposal, Recycling, and Reuse	8%		0%	
404	Instrumentation and Control Systems	0%		23%	
511	New and Improved Non-Food Products and Processes	7%		14%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	3%		0%	
601	Economics of Agricultural Production and Farm Management	10%		0%	
602	Business Management, Finance, and Taxation	12%		0%	
	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	7.0	0.0	9.8	0.0
Actual Paid Professional	1.9	0.0	5.5	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
193935	0	731222	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
193935	0	731222	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	3714763	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

We will focus our resources and efforts on developing improved crops and plant materials for use as feed stocks to produce biofuels and bio-based products while still producing adequate food and feed supplies; developing agronomic practices to produce these feed stocks in sustainable ways to mitigate environmental risks; developing new harvesting, storing and transporting systems for these new feedstocks; and adopting new conversion processes that are more efficient, use less energy and water, and produce value-added co-products. These technologies will be integrated so that they work as a complete system and the ISU BioCentury Research Farm will play a key role. We will develop educational programming for farmers and landowners addressing agronomic and economic topics regarding biomass harvest, storage and handling.

Faculty participate in the following associated multistate research committees: NC213, NC1178, NC1183, NC1194, NE1042, S1041, SERA38, and W2128.

2. Brief description of the target audience

This project focuses on basic human needs for environmentally sustainable energy and consumer goods (e.g. building construction materials, plastics and adhesives) and, therefore, we all benefit -- producers with more efficient crops and production systems, rural communities with new employment opportunities and economic development, processing companies with advanced conversion technologies, and all of us because we all need inexpensive and environmentally acceptable forms of energy.

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	2200	1250	0	0

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

Patent Applications Submitted

Year: 2012
Actual: 7

Patents listed

Peptide Domains that Bind Small Molecules of Industrial Significance: Application of Phage Display for Identifying Peptide Ligands Binding to Target Molecules. Inventors: Binder, Thomas; Yamamoto, Yasufumi; Rao, Aragula Gururaj; Hanke, Paul. Filed: 10/13/2011.

Depolymerization of Polylactic Acid: Methoxide Chemistry (Potassium and Sodium Compounds) Based Depolymerization of Polylactic Acid. Inventors: Grewell, David; Srinivasan, Gowrishankar. Filed 10/13/2011.

Methods for Treating Lignocellulosic Biomass: Pretreatment of Lignocellulosic Biomass Using Low-Moisture Anhydrous Ammonia (LMAA) Process for Improved Enzyme Saccharification and Fermentation Yields. Inventors: Hicks, Kevin; Nghiem, Nhuan; Taylor, Frank; Kim, Tae Hyun. Filed 10/28/2011.

Depolymerization of Polylactic Acid: Methoxide Chemistry (Potassium and Sodium Compounds) Based Depolymerization of Polylactic Acid. Inventors: Srinivasan, Gowrishankar; Grewell, David. Filed: 1/24/2012.

Crop Residue Spreading: Combination Residue Spreader and Transition Pathway from Combine Chopper to Blower. Inventors: Birrell, Stuart; Dilts, Mark; Schlessner, Benjamin. Filed 2/6/2012. Patent #8,177,610 issued 5/15/12.

Oil Extraction from Microalgae: Oil Extraction from Microalgae. Inventor: Wang, Tong. Filed: 3/13/2012.

Effective Oil Separation from Microalgae with Isopropyl Alcohol (IPA) and Efficient Oil Recovery by Temperature Differential: Oil Separation from Microalgae. Inventors: Wang, Tong; Yao, Linxing. Filed 4/24/2012.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	4	30	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Biorenewable companies and agricultural producers attending on-site educational activities: workshops, conferences, industry roundtable discussions, field events, and professional development.

Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of individuals who subscribe to newsletters and access web-based resources that address biorenewable issues.

Year	Actual
2012	174633

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of producers and service providers who increase their awareness of new crop opportunities and varieties appropriate for bioenergy production.
2	Number of Iowa feedlots that regularly feed DGS to reduce cost of grain.
3	Number of individuals agricultural producers who learn new technologies related to biomass production, harvest, storage, and transportation.
4	Number of individuals who increase their knowledge in production/harvesting/storage systems.
5	Number of individuals who increase their knowledge in understanding business systems.
6	Number of businesses that increase renewable fuels production.

Outcome #1

1. Outcome Measures

Number of producers and service providers who increase their awareness of new crop opportunities and varieties appropriate for bioenergy production.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of Iowa feedlots that regularly feed DGS to reduce cost of grain.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of individuals agricultural producers who learn new technologies related to biomass production, harvest, storage, and transportation.

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of individuals who increase their knowledge in production/harvesting/storage systems.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of individuals who increase their knowledge in understanding business systems.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In the highly volatile renewable energy industry, access to information is a critical element in maintaining profitability. Information for the general public and direct technical assistance is provided to help sustain the industries growth.

What has been done

Working with a network of land-grant universities and experts around the country including the Livestock Information Center at CSU, subscribers receive a newsletter that keeps stakeholders informed about trends and current issues in the renewable energy industry sector that can impact the profitability of renewable energy production facilities and livestock producers who depend on feedstocks and by-products used by or produced by these facilities.

Results

Information from the newsletter was reprinted or used by permission in over 20 other publications or reports. Email correspondence from the subscribers continues to validate this newsletter as a valuable resource for current and relevant information. Six media interviews were generated from these newsletters.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
602	Business Management, Finance, and Taxation

Outcome #6

1. Outcome Measures

Number of businesses that increase renewable fuels production.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Growth in new renewable energy production plants has slowed dramatically. However, there is continued interest in improving efficiencies of existing plants and for introducing the next generation of renewable fuel feed stocks to the industry sector.

What has been done

Technical assistance was provided to 2 existing renewable fuels companies that were restructuring their financing. Additionally, a full feasibility study was conducted for a large facility that is generating ethanol from a non-traditional feed stock.

Results

The technical assistance provided by Value-Added Ag Extension to a new production facility assisted in the launch of a plant that had a 52 million dollar investment and created 38 new jobs when at full capacity. Two additional plants were able to restructure their debt portfolio to improve profitability and remain in operation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Future demand and supply of traditional energy sources will significantly impact outcomes of energy programs. Price volatility in petroleum and farm commodities also adds complexity, financial risk and business uncertainty. The current economic climate does not provide much profitability. Prolonged low margins could damage investor confidence. Feedstock commodities must be produced at attractive prices; drought and other natural disasters could be devastating to these new ventures. Government support and regulatory

programs are important in the early stages to compete against well-established industries and gain market footholds. The public needs to be better educated regarding the economics of renewable fuels, which will require investment in education and extension outreach. Most of all, funding for research and outreach activities is critical.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Technical assistance provided by Value-Added Ag Extension to a new renewable fuel production facility assisted in the launch of a plant that had a \$52M investment and created 38 new jobs when at full capacity. Two additional plants were able to restructure their debt portfolio to improve profitability and remain in operation.

Key Items of Evaluation

Assisting renewable fuel production plants in maximizing their efficiency helps them continue to operate effectively and provide jobs in a local market.