V(A). Planned Program (Summary)

Program # 8

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%		13%	
102	Soil, Plant, Water, Nutrient Relationships	8%		25%	
111	Conservation and Efficient Use of Water	8%		0%	
125	Agroforestry	8%		0%	
131	Alternative Uses of Land	8%		0%	
136	Conservation of Biological Diversity	8%		0%	
202	Plant Genetic Resources	0%		5%	
205	Plant Management Systems	5%		12%	
302	Nutrient Utilization in Animals	8%		0%	
401	Structures, Facilities, and General Purpose Farm Supplies	0%		6%	
402	Engineering Systems and Equipment	8%		1%	
403	Waste Disposal, Recycling, and Reuse	8%		0%	
511	New and Improved Non-Food Products and Processes	8%		38%	
601	Economics of Agricultural Production and Farm Management	8%		0%	
602	Business Management, Finance, and Taxation	8%		0%	
605	Natural Resource and Environmental Economics	7%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	5.6	0.0	10.4	0.0

Actual Paid Professional	1.9	0.0	3.5	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**
210392	0	476480	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
210392	0	476480	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
24154	0	2194842	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension programming will focus on advising farmers interested in biomass production on the risks and potential for crops as biofuels. Extension has formed a 'Corn Stover' team to explore possibilities. The team is made up of multiple partners with interests in biomass. Iowa State University will focus resources and efforts on developing improved crops and plant materials for use as feedstocks to produce biofuels and biobased products while still producing adequate food and feed supplies; developing agronomic practices to produce these feedstocks 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.

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

Efforts in this program focus on basic human needs for environmentally sustainable energy and consumer goods (e.g. building construction materials, plastics and adhesives), 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 Iowans because of the need for inexpensive and environmentally acceptable forms of energy. Producers and landowners need to know the opportunities and risks associated with biomass production and harvest.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	4321	135	0	0

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

Patent Applications Submitted

Year: 2013

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
Actual	0	11	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of acres of biomass harvested.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of people who attend an educational activity to learn about producing biomass.

Year	Actual
2013	2650

Output #3

Output Measure

- Number of producers who increase their awareness of crop production strategies appropriate for bioenergy production.

Year	Actual
2013	116

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of producers who increase their awareness of crop production strategies appropriate for bioenergy production.
2	Number of individuals who increase their knowledge in production/harvesting systems related to biomass crops.

Outcome #1

1. Outcome Measures

Number of producers who increase their awareness of crop production strategies appropriate for bioenergy production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	116

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Corn stover has typically been used in Iowa for livestock bedding and/or feed. Emerging markets for corn stover include ethanol production and agri-fiber board manufacturing. Biomass from corn stover can be used as a renewable source for cellulosic ethanol production. Cellulosic ethanol developers seek land owners to sign contracts for removing a predetermined quantity of corn stover annually from their farmland. This annual harvest can only be maintained if such harvest is managed in a sustainable manner.

What has been done
There are new opportunities to harvest corn stover in three regions of Iowa -- near Nevada in central Iowa, near Emmetsburg in North Central Iowa, and near Dubuque in eastern Iowa. Iowa State University Extension and Outreach held meetings in these regions to address emerging opportunities related to stover harvesting for the biomass feedstock needs of local industries. A total of 227 participants attended these meetings on the emerging practice of corn stover harvest and 116 completed end-of-meeting evaluations were received.

Results
Participants completing evaluations represented over 174,000 acres or an average of over 1500 acres per participant. Participants were asked to evaluate their level of knowledge on different topics both at the beginning and at the end of the meetings. On a scale of 1 to 5, participants increased their knowledge by

* 62% on harvest logistics and stover quality
* 65% on soil quality and soil carbon
* 56% on nutrient considerations for stover harvest
* 86% on the topic of economics of stover harvest.

Participants, on-average, doubled their level of knowledge about the industry specific programs being implemented in a 30-mile radius around the manufacturing plants. Panel discussions with producers already engaged in stover harvest increased participant understanding of practices being used in this harvest by 86%.

Through these programs, farmers have a better understanding of how they can sustainably harvest corn stover for bioenergy and industrial production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
131	Alternative Uses of Land
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Number of individuals who increase their knowledge in production/harvesting systems related to biomass crops.

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

A market for biomass may not be readily available to farmers.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The results in participants' gaining knowledge regarding emerging opportunities related to corn stover harvesting for biomass feedstockwere evaluated through a pre- and post-meeting evaluation.

Key Items of Evaluation

On a scale of 1 to 5, participants increased their knowledge on corn stover economics, harvest logistics, effect on soil quality, soil carbon, and nutrient considerations by 56 to 86%.