

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Sustainable Energy

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
131	Alternative Uses of Land	25%		10%	
402	Engineering Systems and Equipment	0%		10%	
403	Waste Disposal, Recycling, and Reuse	50%		10%	
404	Instrumentation and Control Systems	0%		10%	
511	New and Improved Non-Food Products and Processes	0%		50%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	25%		10%	
	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	4.0	0.0	5.0	0.0
Actual Paid Professional	0.3	0.0	7.9	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
4931	0	104714	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
4931	0	104714	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
17364	0	2018571	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Research and extension efforts regarding biofuel development focused on using Louisiana-produced crops and/or crop residues to produce and utilize fuels such as ethanol, biodiesel, and other next generation alternative fuels.

2. Brief description of the target audience

Agricultural producers in Louisiana and southeast United States; consumers; renewable and natural resource energy production industries, LSU AgCenter faculty

3. How was eXtension used?

Where appropriate, eXtension resources were used to enhance educational experiences, provide a source of reference information for problem-solving and identify research gaps.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	840	300	211	0

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

Patent Applications Submitted

Year: 2012
 Actual: 1

Patents listed

Device for Solid-Liquid Separation

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	5	5

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of ag producers providing biomass as feedstock for fuels
Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of workshops conducted
Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of Web page visits

Year	Actual
2012	91872

Output #4

Output Measure

- Number of Web page views

Year	Actual
2012	117597

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Increased knowledge regarding the use of agricultural feedstocks to generate biofuels.
2	Identification of crops and cropping systems capable of producing biomass.
3	Farmers, processors and potential feedstock producers increase their knowledge regarding the use of agricultural feedstocks to generate biofuels.

Outcome #1

1. Outcome Measures

Increased knowledge regarding the use of agricultural feedstocks to generate biofuels.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The technical hurdles that impair biofuel production in Louisiana include identifying feedstocks for year round delivery, creating tools for producers and processors to determine the value of these crops, developing processing technologies for biofuel production and evaluating supplemental high value products to improve the economics of biofuel production. Formation of a regional multidisciplinary consortium of agricultural scientists, biotechnologists, engineers, economists and educators has facilitated the conversion of these regionally appropriate crops into a portfolio of bio-based fuels and chemicals.

What has been done

The Louisiana Institute for Biofuels and Bioprocessing (LIBBi) was created to foster collaboration on the conversion of agricultural feedstock into biofuels and chemicals. Most laboratory and pilot scale research on biofuels and biochemicals has been conducted by the Audubon Sugar Institute (ASI) and the W.A. Callegari Environmental Center. ASI has researched pretreatment options for multiple crop feedstocks. Callegari has developed and offered workshops on the conversion of waste cooking oil into biodiesel. In 2011, the LSU AgCenter was awarded an AFRI-CAP grant that vastly increased the research, education, and extension efforts for bioenergy production.

Results

The joint efforts of LIBBi resulted in the procurement of NIFA AFRI-CAP funding for "A Regional Program for Production of Multiple Agricultural Feedstocks and Processing to Biofuels and Biobased Chemicals". The objectives of the grant are broad in scope. Breeding and crop production research was initiated at north Louisiana research stations to expand the range of energy cane variety selection and low-input sustainable crop production systems. Demonstration areas were planted at these northern locations to augment education efforts to a new clientele base. Modifications to existing pilot biorefinery facilities have been completed. The pilot plant will

process multiple feedstock crops and pursue cutting edge processing technologies to demonstrate conversion of monomeric sugars to butanol, gasoline, and isoprene. The W.A. Callegari Environmental Center continues to offer multiple training sessions per year on the conversion of waste cooking oil to biodiesel production for use by small businesses and farmers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes
512	Quality Maintenance in Storing and Marketing Non-Food Products

Outcome #2

1. Outcome Measures

Identification of crops and cropping systems capable of producing biomass.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The federally mandated pursuit of energy independence calls for the development of sustainable biomass feedstock systems. Louisiana is ideally suited for the production of a diverse range of biomass feedstocks. A competitive advantage for Louisiana is that infrastructures for woody and high biomass crop feedstock industries currently exist. Results of a recent survey indicated state-wide interest in using biomass as an energy source that could have significant economic impact.

What has been done

Biomass research addresses feedstock identification, sustainable production practices, geographic adaptation, integrated pest management and potential biofuel yield. Emphasis is being directed toward energy cane, sweet sorghum, woody biomass, and algae. Partnerships between LSU AgCenter researchers and industries for biofuel development have been strengthened. Personnel involved in the AFRI-CAP project "A Regional Program for Production of Multiple Agricultural Feedstocks and Processing to Biofuels and Biobased Chemicals" completed year 1 research, education, and extension objectives. Several research scientists are involved in DoE Sun Grant projects. Louisiana is a leader in the development of sustainable feedstock systems for biofuel production.

Results

Identification of sustainable production practices for sweet sorghum has been featured in state-wide studies on fertility, varieties and cultural practices and showcased at field days. Partnership with a biorefinery has resulted in the discovery of sweet sorghum planting/harvesting scenarios for providing a sustainable supply of feedstock for biorefinery viability. High-fiber energy cane varieties are being used by the industry to demonstrate cellulosic ethanol production. This energy cane is the primary feedstock being researched in federally funded biofuel projects in Louisiana. Energy cane trials were established in north Louisiana locations to expand the range of biomass production. Analytical efforts established Near infrared spectroscopy (NIR) calibrations for biomass quality analyses. In another project, a novel, multi-stage technique has been developed to harvest microalgae. The relationship between switchgrass cultivation and soil nutrient cycling, carbon emissions and carbon life cycle issues are primary research questions under investigation at research centers on retired agricultural lands.

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Outcome #3

1. Outcome Measures

Farmers, processors and potential feedstock producers increase their knowledge regarding the use of agricultural feedstocks to generate biofuels.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The concepts for biofuel production in Louisiana are relatively new to most agricultural producers in Louisiana and the surrounding region. In order for this initiative to be successful, growers will need to understand and appreciate not only the importance of biofuel production to the country's future but also their role in providing agricultural feedstock for conversion into biofuels and chemicals.

What has been done

An electronic survey was conducted to establish baseline data regarding the current levels of knowledge, attitudes and opinions of farmers, processors and potential feedstock producers regarding bioenergy production and processing in Louisiana. These data from this survey were combined with that of a similar previous mail-out survey to yielded input from 601 respondents representing 36 parishes and six of the state's key field crops: rice, sugarcane, soybeans, corn, forage, cotton and sweet potatoes. This information was shared at a recent Sustainable Bioproducts Initiative Summit and will be used to further develop educational programs and identify research needs to move this statewide initiative forward.

Results

Key findings of the study include the following: 75% of respondents believe that biomass used for energy production can help supplement the state's energy needs while 67% believed that agricultural biomass is a viable energy alternative to fossil fuels. Slightly over one-half of the respondents recognize that harvesting biomass does not negatively impact wildlife, water quality or soil quality. 86% indicated they would be willing to participate in management activities for biomass production such as short rotation crops and 62% indicated they would be willing to participate in a biomass to bioenergy market. The majority of respondents believe that tax credits, government subsidies, grants, secured loans and other incentives should be provided for this effort. There is a deficit in knowledge regarding actual practices such as labor, equipment and storage required for biomass production. Overall, there appears to be interest in producing feedstock for biofuel generation among Louisiana farmers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
131	Alternative Uses of Land
403	Waste Disposal, Recycling, and Reuse
511	New and Improved Non-Food Products and Processes

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

See qualitative impact report results section in this report.

Key Items of Evaluation