

**V(A). Planned Program (Summary)**

**Program # 7**

**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
201	Plant Genome, Genetics, and Genetic Mechanisms		0%		100%
	<b>Total</b>		0%		100%

**V(C). Planned Program (Inputs)**

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	0.1
Actual Paid Professional	0.0	0.0	0.0	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
0	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	0	0

**V(D). Planned Program (Activity)**

1. Brief description of the Activity

- Developed gene silencing vectors for the genes expressed during lignin pathway
- Performed rice transformation

- Performed preliminary molecular analyses of putative transgenic plants.

**2. Brief description of the target audience**

- rice farmers
- alternate energy users

**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	0	0	0	0

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

**Patent Applications Submitted**

Year: 2012  
 Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

2012	Extension	Research	Total
Actual	0	0	0

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- - Two peer reviewed publications - Two abstracts in conference

Year	Actual
2012	1

**V(G). State Defined Outcomes**

**V. State Defined Outcomes Table of Content**

O. No.	OUTCOME NAME
1	Generation of rice plants with reduced lignin concentration for efficient conversion to biofuel

## **Outcome #1**

### **1. Outcome Measures**

Generation of rice plants with reduced lignin concentration for efficient conversion to biofuel

### **2. Associated Institution Types**

- 1890 Research

### **3a. Outcome Type:**

Change in Knowledge Outcome Measure

### **3b. Quantitative Outcome**

<b>Year</b>	<b>Actual</b>
2012	0

### **3c. Qualitative Outcome or Impact Statement**

#### **Issue (Who cares and Why)**

Rice, the world's third largest crop, holds great potential for biofuel production. Currently, rice farmers leave rice straw in the fields, burn it or thrown away. But, if it is converted into a biofuel, it could provide an affordable, renewable energy resource.

#### **What has been done**

Gene silencing vectors for lignin biosynthetic genes, cinnamate 4-hydroxylase (C4H), hydroxycinnamoyl CoA: shikimate hydroxycinnamoyl transferase (HCT) and coumarate 3-hydroxylase (C3'H), were developed. These vectors were used for generating transgenic lines in rice.

#### **Results**

Several PCR-positive transgenic lines containing cinnamate 4-hydroxylase (C4H), hydroxycinnamoyl CoA: shikimate hydroxycinnamoyl transferase (HCT) and coumarate 3-hydroxylase (C3'H) genes were identified.

### **4. Associated Knowledge Areas**

<b>KA Code</b>	<b>Knowledge Area</b>
201	Plant Genome, Genetics, and Genetic Mechanisms

### **V(H). Planned Program (External Factors)**

#### **External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Government Regulations

#### **Brief Explanation**

### **V(I). Planned Program (Evaluation Studies)**

#### **Evaluation Results**

- Developed gene vectors for transformation
- Developed PCR-positive putative transgenic rice lines.

#### **Key Items of Evaluation**

- Developed 4 terminator-less (TL) constructs for down-regulation of lignin biosynthetic genes in rice
- Generated at least 8-10 PCR positive putative transgenic lines of lignin biosynthetic genes, cinnamate 4-hydroxylase (C4H), hydroxycinnamoyl CoA: shikimate hydroxycinnamoyl transferase (HCT) and coumarate 3-hydroxylase (C3'H) to decrease lignin content in rice.