

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Agricultural, Natural Resource, and Biological Engineering

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
401	Structures, Facilities, and General Purpose Farm Supplies	0%		9%	
402	Engineering Systems and Equipment	0%		9%	
403	Waste Disposal, Recycling, and Reuse	0%		61%	
404	Instrumentation and Control Systems	0%		11%	
405	Drainage and Irrigation Systems and Facilities	100%		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
Actual Paid Professional	3.6	0.0	2.5	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
279543	0	77802	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
279543	0	77802	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

- Conduct Research to Create New Sources of Biomass
- Conduct Drainage and Water Management Design Workshops

2. Brief description of the target audience

- Biofuel Industry
- Scientists
- Farmers
- Landowners
- Drainage Contractors

3. How was eXtension used?

eXtension is not part of this Planned Program.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	1079	77445	745	2622

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	10	39	49

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Percentage of all Hatch Research Projects in Agricultural, Natural Resource, and Biological Engineering

Year	Actual
2012	2

Output #2

Output Measure

- Number of Drainage and Water Management Design Workshops

Year	Actual
2012	5

Output #3

Output Measure

- Number of Articles Posted on igrow Website

Year	Actual
2012	49

Output #4

Output Measure

- Number of Podcasts Posted on igrow Website

Year	Actual
2012	14

Output #5

Output Measure

- Number of Radio Programs Posted on igrow Website

Year	Actual
2012	15

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of Agricultural, Natural Resource, and Biological Engineering Hatch Research Projects
2	Number of Drainage and Water Management Design Participants

Outcome #1

1. Outcome Measures

Number of Agricultural, Natural Resource, and Biological Engineering Hatch Research Projects

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Research in biomass technology is needed to enhance the energy security of the United States.

What has been done

Within the College of Agricultural and Biological Sciences, there is one Hatch project that is categorized in the Planned Program of Agricultural, Natural Resource, and Biological Engineering. The research activities in this program are primarily supported by our Department of Agricultural and Biosystems Engineering. Projects are limited to research studies involving the development of a sustainable nonfood/non-feed biomass for biodiesel.

Results

Through research, our Department of Agricultural and Biosystems Engineering has continued to build its knowledge base to improve and understand biomass technology with the design and development of the photobioreactor system. The photobioreactor system may enhance conventional biomass to ethanol production by increasing profitability. Profitability will be enhanced by using the carbon dioxide produced during ethanol production to create a new source of biomass, namely algae. Research is ongoing. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

4. Associated Knowledge Areas

KA Code	Knowledge Area
401	Structures, Facilities, and General Purpose Farm Supplies
402	Engineering Systems and Equipment
403	Waste Disposal, Recycling, and Reuse

- 404 Instrumentation and Control Systems
- 405 Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of Drainage and Water Management Design Participants

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	240

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Land prices, weather patterns, and new technologies are all reasons that there is an increased interest in drainage tiling to help solve moisture problems. Before tiling land that is enrolled in farm programs, a wetland determination needs to be done. There are technical, environmental, and legal concerns that must be considered, and without the proper knowledge, a lot can go wrong.

What has been done

A multistate effort with SDSU Extension, North Dakota State University and the University of Minnesota, along with industry partners, conducted workshops that included topics on drainage design fundamentals, managed drainage design, soil principles, lift stations, design tools, agronomic considerations, and legal and wetlands issues. The workshops concluded with participants working in small groups to design a drainage system for one of their own fields or an example field.

Results

More than 75% of the participants found the workshops overall to be useful or very useful. Four of the 11 training sessions were on the design of agricultural tile drainage, which rated highest for usefulness of knowledge gained at the workshops. Many participants reported that what they learned at the workshops will help them make better, more thoughtful decisions that will give them confidence in doing the tiling themselves.

4. Associated Knowledge Areas

KA Code **Knowledge Area**
405 Drainage and Irrigation Systems and Facilities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Other (N/A)

Brief Explanation

There are no external factors that hindered the efforts of this Planned Program.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Due to continued budget constraints, a full-time evaluator has not been hired. However, we are diligent in our efforts to teach staff how to collect and report meaningful, useful programming data. This includes establishing baseline data, templates that correspond to NIFA reporting, and writing impacts that show strong results.

Drainage and Water Management Design

Post workshop surveys with 61 respondents to all questions.

Respondents reporting that workshops were useful or very useful:

- 91% - Soil & Drainage Principles
- 65% - Using Yield Maps to Identify
- 76% -Legal Considerations of Drainage
- 94% - Wetland Delineations
- 88% - Lift Station Design
- 73% - Safety
- 72% - Producer/Tiler Panel Discussion
- 92% - Design Session I
- 93% - Design Session II
- 100% - Design Session III

100% - Design Session IV

Key Items of Evaluation

Nothing significant to report.