

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Energy in Crop Agriculture

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	50%		0%	
402	Engineering Systems and Equipment	35%		0%	
404	Instrumentation and Control Systems	15%		0%	
	Total	100%		0%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2010	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	0.0	0.0
Actual	10.0	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
320000	0	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
480000	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

* Develop presentation materials and develop resource materials

* Develop and plan workshops, demonstrations and meetings

- * Transcribe scientific research into useable resources
- * Continuing education demonstrations - fuel use, tillage and N use
- * Cooperate with NDSU Research Extension Centers - conduct rate N calibrations and tillage fuel use studies

2. Brief description of the target audience

- * Extension staff
- * Crop consultants
- * Agricultural industry personnel
- * Agricultural finance people
- * Government workers
- * Growers

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	3000	8000	0	0
Actual	3250	15000	0	0

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

Patent Applications Submitted

Year: 2010
 Plan: 0
 Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Plan	1	0	
Actual	8	0	8

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- {No Data Entered}

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of farmers gaining knowledge on new tillage options
2	Number of farmers gaining knowledge of energy alternatives
3	Number of farmers gaining knowledge of energy potential and availability of different crops
4	Number of farmers that changed their tillage habits to no-till
5	Number of farmers that make greater use of soil testing for fertilizer needs
6	Number of acres under reduced tillage
7	Number of farmers using reduced energy technologies
8	Percent reduction in energy use for drying corn after growers adopted energy efficient corn grain drying practices.

Outcome #1

1. Outcome Measures

Number of farmers gaining knowledge on new tillage options

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Number of farmers gaining knowledge of energy alternatives

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of farmers gaining knowledge of energy potential and availability of different crops

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

Number of farmers that changed their tillage habits to no-till

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of farmers that make greater use of soil testing for fertilizer needs

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of acres under reduced tillage

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of farmers using reduced energy technologies

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Percent reduction in energy use for drying corn after growers adopted energy efficient corn grain drying practices.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

North Dakota corn production is about 248 million bushels from about 2 million acres. Farmers are seeking assistance in selecting grain dryers and drying methods that reduce the cost of drying corn. About 13,000 Btu are required to dry corn from a typical harvest moisture content of 21% to a typical storage/market moisture content of 14%. A savings of about 2600 BTUs per bushel, a 20% savings, is expected if energy efficient methods of drying are used rather than inefficient methods. This is an energy savings of about 8 million gallons of propane with a value of about \$12 million.

What has been done

Several grain drying seminars with a focus on energy efficiency were conducted. News releases, magazine articles, and media interviews were used to educate farmers and others purchasing and operating drying systems. Educational material was developed and placed on the web at <http://www.ag.ndsu.edu/extension-aben/post-harvest>. A 4-hour training session was presented for equipment retailers, utility personnel, professional engineers and others working with farmers on how to conduct a grain dryer energy audit. Individual education and assistance on selecting proper equipment to obtain an energy efficient drying system was provided to about 300 people through telephone and electronic consultations. In addition to grain drying, seven other farm energy efficiency guides from NDSU Extension Service were also contributed to the eXtension Farm Energy CoP at <http://www.extension.org/pages/31201/farm-energy-efficiency-checklist-and-tips>.

Results

Energy audits conducted for farmers applying for USDA REAP grants show a 25% to 30% reduction in energy cost for farmers changing to more efficient corn dryers and systems. Even farmers adopting more energy efficient practices using existing dryers experience a 10% to 20% decrease in energy consumption. Grain drying educational programs reached 950 growers and consultants in 2010. For farmers drying 200,000 bushels of corn, a 20% savings is equivalent to 7,850 gallons of propane with a value of \$11,775 at a propane price of \$1.50 per gallon.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy

Brief Explanation

Extremely wet and cool fall weather in 2009 greatly increased the need for corn drying and increased the interest for programming on grain drying. Increased fuel costs also increased the interest in high efficiency dryers.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

- After Only (post program)

Evaluation Results

Key Items of Evaluation