

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Climate Change

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
102	Soil, Plant, Water, Nutrient Relationships	10%		10%	
103	Management of Saline and Sodic Soils and Salinity	15%		15%	
205	Plant Management Systems	7%		7%	
211	Insects, Mites, and Other Arthropods Affecting Plants	8%		8%	
212	Pathogens and Nematodes Affecting Plants	15%		15%	
213	Weeds Affecting Plants	15%		15%	
216	Integrated Pest Management Systems	10%		10%	
405	Drainage and Irrigation Systems and Facilities	20%		20%	
	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	22.0	0.0	24.0	0.0
Actual Paid Professional	19.8	0.0	24.5	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
541809	0	627676	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
541809	0	627676	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
538477	0	1183615	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

1. Establish best water management practices for North Dakota
2. Create systems to reclaim saline and sodic areas within farm fields
3. Calibrate fertilizer application under higher moisture environments
4. Adjust disease management for all the major crops due to increased rainfall and higher humidity
5. Survey and improve management recommendations for insect pests on the major crops
6. Adapt weed management strategies to changing cropping systems, including resistance management
7. Investigate agronomic systems that are adapted to the change in rainfall and longer growing season
8. Translate scientific findings into practical producer applications and provide transformational education through workshops, field days and conferences, and resource materials

2. Brief description of the target audience

1. Crop producers in both North Dakota and adjacent states
2. Crop consultants and agricultural advisors
3. County Extension personnel
4. Agribusiness and agricultural finance personnel
5. Government agency staff

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	12537	37500	155	640

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	37	34	71

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 adopting new practices to achieve highly productive crops in a changing environment.
2	Number of farmers adopting new practices to improve pest management in a changing environment.
3	Number of farmers adopting improved soil and water management practices in response to a changing environment.

Outcome #1

1. Outcome Measures

Number of farmers adopting new practices to achieve highly productive crops in a changing environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	1000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Greater farm input efficiency is desirable for both conventional and organic systems in order to increase grower profitability and decrease loss of inputs into the environment. Failure to consider soil sodium may contribute to plugged tile lines and lower productivity in some soils after tiling. High clay soils and coarse-textured soils experience large losses of nitrogen (N) due to denitrification and leaching in some years, resulting in lower profitability for farmers and increases in atmospheric nitrous oxides and increases in surface and ground water nitrates. Indiscriminant use of fungicides results in lower grower profit and wasteful applications. Herbicide resistant weeds are expanding in acreage and threaten to destroy the productivity of millions of acres of farm land if current practices are used. Grower adoption of integrated pest management (IPM) practices are necessary to increase grower profitability and avoid unnecessary pesticide application.

What has been done

Grower meetings, presentations to agriculture industry representatives, grower production consultants, field days, field tours, media presentations, news releases and web-based information has resulted in grower and industry movement towards more efficient input application practices.

Results

The number of growers that consider soil chemistry in planning drainage projects has increased. The number of growers that understand sources and possible alleviation of soil salinity and sodicity has increased. The adoption of side-dress, split-N applications to increase N efficiency has increased. The number of growers using weather modeling to schedule fungicide applications has increased. Growers are slowly increasing their use of pre-emergence soil-applied herbicides to overcome post-emergence herbicide weed resistance. Grower adoption of improved agronomic

and IPM practices is increasing due to transformational education.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of farmers adopting new practices to improve pest management in a changing environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	2800

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Each year, there are numerous plant pest and agronomic problems (early frost, drought, flooding and other situations) that can negatively impact North Dakota's crop production. Producers, agronomists of fertilizer/chemical/seed companies, crop consultants, state and federal agencies, field scouts and university extension and research workers need the latest information on plant pests, agronomy and weather problems to maximize crop yields and quality.

What has been done

The NDSU Extension Crop & Pest Report is a weekly newsletter which includes many articles on plant pests (insects, diseases and weeds) of field crops, and agronomic updates on crops and soil conditions. These articles are written by NDSU extension specialists and county extension agents. Valuable and timely information is described in pest alerts, integrated pest management strategies, pesticide updates, agronomy, soil and fertility issues, reports from the NDSU Plant Diagnostic Laboratory, important Extension meetings/Field Days and weather outlooks. Any audience group can easily access it via internet or weekly electronic mail list.

Results

Readers of the Crop & Pest Report were mainly comprised of producers, agronomists of fertilizer/chemical/seed companies, university extension/research workers and crop consultants. The number of readers has increased 10 times to more than 2,800 readers today. Highlights include:

- Provides easy to read and understand articles with objective opinions on the "best" strategies for pest management and crop production.
- Provides early pest alerts of important plant pests of agricultural field crops.
- More than 90% of readers reported sharing information from the newsletter with other professionals.
- About 88% of readers used additional information in articles to further research topics, such as internet links. Some examples listed were: pesticide labels, NDAWN, disease forecasting models, annual crop pest management guides, and extension publications.
- More than 67% of readers said that there were subjects covered in Crop & Pest Report that influenced their crop production practices.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Number of farmers adopting improved soil and water management practices in response to a changing environment.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	130

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Since 1993, above average annual precipitation has created excess water on the landscape and this has impacted crop production significantly in North Dakota. Millions of acres could not be seeded in 2013 due to excess moisture in the spring.

What has been done

During 2013 presentations about tile drainage were given at over 20 meetings throughout North Dakota and the Red River basin area of Minnesota. Thirteen different counties conducted tile drainage seminars. Seminars were given to several businesses and industries such as Agassiz Drain Tile. Subsurface drainage educational presentations were given at "state" events such as the Best of the Best in crop production workshops. Also, NDSU Extension cooperated with SDSU Extension and the University of Minnesota Extension to organize three, 2-day tile drainage design workshops. One was held in North Dakota, one in South Dakota and one in Minnesota. Total attendance for the 3 workshops was over 180 persons.

Results

Tile drainage education was provided to over 1,450 persons in 2013. Each of the three tile design workshops was evaluated with an "end of the course" survey. One of the questions we asked was "If you were to place a dollar value on the information you received (when you apply the knowledge you learned in your business and not the price you paid today) what would it be?" When the responses from participants were tallied, they indicated the perceived value was well over 3.5 million dollars.

In October, 600 copies of Extension bulletin AE1690 Frequently Asked Questions About Subsurface (Tile) Drainage was published, by December another 500 copies had to be printed to satisfy the demand.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
103	Management of Saline and Sodic Soils and Salinity
405	Drainage and Irrigation Systems and Facilities

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

2013 was a good year for producers in ND. Weather extremes occurred at times that had minimal impact on research and Extension programs. Public policy changes were minimal and government regulations were stable.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluations were received from meetings and tours from numerous events, including the SHARE farm field tours, Soil Health Team presentations, Advanced Crop Advisor workshop, Eastern and Western Crop Scout schools, Soil and Soil Water Workshop, IPM surveys, dry bean survey, wide world of weeds survey, sugar beet survey. Survey results indicated grower adoption of concepts and methods to improve their input efficiency.

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Key Items of Evaluation