NREC 2016 Final Report

Analysis of Farmers' Nitrogen Management Practices Using Farmer Survey Data and the SSI KIC Fertilizer Reporting System in the Lake Bloomington Watershed

Investigators:

Principle Investigator: Dr. Aslihan D. Spaulding, Professor of Agribusiness, Department of Agriculture, Illinois State University.

Co- Principle Investigator: Dr. Shalamar Armstrong, Assistant Professor of Agronomy, Agronomy Department, Purdue University.

Experimental Location
Lake Bloomington and Evergreen Lake watersheds, Central IL

Objectives

1. To execute a yearly survey in the Lake Bloomington and Evergreen Lake watersheds that describes the nitrogen fertilizer management practices of grain farmers.

2. To determine the change in farmer nitrogen management practices within the Lake Bloomington and Evergreen Lake watersheds by contrasting farm level nitrogen management practice data from surveys collected in 1993 and 2014.

Accomplishments:

Critical nitrogen management questions answered using the 2014 -2016 Farmer Survey Data.

- **How well did the data from the survey represent the land are within the Lake Bloomington and Evergreen watersheds?**
  Average acres represented in the survey over a three year period was ***52,951 acres***, which is ***77%*** of the Lake Bloomington and Evergreen Lake drainage area.

- **What is the percentage of farmers that apply fertilizer nitrogen in the spring and fall ?**

  The survey data suggested that on average across three years (2014-2016) and crop rotation 35.5% of farmers fall apply N and 50% of farmers spring apply N to achieve optimum corn yield.

- **Does the percentage of farmers who fall and spring apply N change when crop rotation is considered during the survey period (2014-2016)?**

  Yes, on average in a corn-corn rotation 27% of farmers apply N in the fall and 73% in the spring. However, in a soybean-corn rotation 45% of farmers apply N in the fall and 55% in the spring.

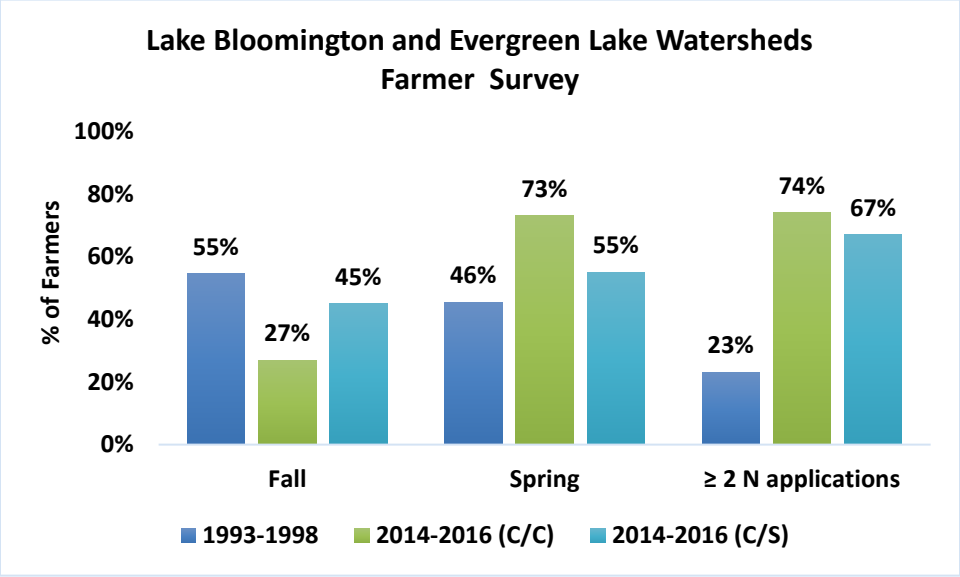
- **Has the percentage of farmers that fall or spring apply nitrogen change over time in the Lake Bloomington Watershed and Lake Evergreen watershed farming communities?**

  One of the primary functions of this NREC funded survey was to serve as a follow-up evaluation of farmer nitrogen management decisions. Thus, we designed the survey to compare results to the surveys conducted in the Lake Bloomington Watershed during the years of 1993-1998 (Smiciklas et. al, 2008). When we compared our survey results to the results of the survey conducted in the same watershed and region 24 years ago, we found some interesting trends in nitrogen management over time.

  - *Averaged results from the 1993-1998 survey indicated that 54.5% of farmers fall applied N and 45.5% of farmers spring applied N. Twenty-four years later, our data suggest that when averaged across years and crop rotation 36% of farmers fall apply N and 64% of farmers spring apply N. This change over time in nitrogen management in the same region indicates a voluntary shift in nitrogen applications to the spring from the fall.*

  - *We also noted that over a 24 year period that there has been a change in the number of farmers that conduct split applications of nitrogen fertilizer. Averaged results from the 1993-1998 survey indicate that 23% of farmers conducted split applications of nitrogen fertilizer. Our data suggest that on average across years (2014-2016), in a corn-corn rotation 74% of farmers conducted ≥ 2 nitrogen applications during the growing season of corn and for corn following soybeans 67% conducted ≥ 2 nitrogen applications during the corn growing season. This finding again suggest a voluntary change in nitrogen management practices that reflect the 4R systematic approach to nitrogen management.*

Comparison of farmer nitrogen management survey results within the Lake Bloomington and Lake Evergreen watersheds over a 24-year period.



The data from our survey work potentially capture a voluntary change in farmer nitrogen management practices over the last 24 years. Additionally, when comparing the sampling variables, our data agree with the recent 2015 USDA-NASS Producer Survey. This is an indication that farmer education, industry training, and the availability of innovative equipment could be affecting farmer behavior in a manner that could lead to greater stewardship of nitrogen and the possibility of wide voluntary change in row crop nitrogen management toward the 4R concepts. Several studies have proven that implementation of the 4R nitrogen management reduces N loading, while maintaining or increasing agronomic measures such as plant N uptake and yield. Results from this study could be used to evaluate the farmer's perception and willingness to adopt the Nutrient Loss Reduction Strategy.

Message to Farmers:

- In central IL, we have had a decrease in fall applied N and an increase in spring applied N over a 24 year period from 1993 to 2016, but a large portion of farmer still fall apply N.
- In addition to the reduction in fall applied N, there has been a significant increase in the number of farmers that make greater than two N application within a corn season.

Outreach:

Farmer Outreach/ Education Activities and Invited Presentations 2014-2016

2015

1. Illinois Fertilizer and Chemical Association Convention Peoria, IL
2. Illinois Conservation Cropping Seminar, Sycamore, IL
3. Illinois Conservation Cropping Seminar, Mattoon, IL
4. Iowa Cover Crops Conference
5. Illinois Commodity Conference, Normal, IL
6. Illinois Conservation Cropping Seminar, Normal, IL
7. Indian Creek Watershed Project Tour, Lexington, IL
8. Soy Capital Field Day, Towanda, IL
9. Vermilion Headwaters Kickoff Meeting, Vermilion County, IL

2016

10. Webinar for Illinois NREC, Bloomington, IL
11. Midwest Cover Crop Council, Madison, WI
12. International AgroEnviron conference, West Lafayette, IN
13. Advanced Soil Health Training for Illinois Ag Professionals: Adaptive Nutrient Management for Soil Health, Sangamon, IL
14. Parkland Junior College, Champaign, IL
15. Illinois Conservation Cropping Seminar, Lexington, IL
16. McLean County Farm Bureau Agronomy Day, Lexington, IL
17. Indiana Certified Crop Adviser Day at the Purdue University SWPAC Diagnostic Training and Research Center, Vincennes, IN
18. Davis Purdue Ag Center Field day, Farmland, IN (4 presentations)
19. Indiana Certified Crop Adviser Day at the Purdue University ACRE Diagnostic Training and Research Center, Tippecanoe, IN (3 different dates)

20. 2016 Kentuckiana Crop Production Seminar, French Lick, IN
21. 2016 Corn Showcase at ACRE, West Lafayette, IN
22. Soil and Water Conservation Tour, Lexington, IL
23. Soil and Water Conservation Workshop for Chinese visiting Scientist, West Lafayette, IN
24. Illinois Fertilizer and Chemical Association Annual Convention, Peoria, IL
25. Growmark Agronomy Annual Agronomy Conference, Normal, IL
26. Proharvest Annual Cover Crop Training, Normal, IL

BUDGET UPDATE

Categories	**Items, Names or Activity**	**Amount**	**Used Amount**
A. Personnel		*Year 3*	
1. Faculty PI	Dr. Aslihan D. Spaulding (1 month summer salary)	$9,039	$9,039
2. Faculty Co-PI	Dr. Shalamar Armstrong (1 month summer salary)	$9,722	$9,722
3. Student research assistant	3 months summer salary	$3,600	$1,098.80
Subtotal		$22,361	$19,859.80
B. Fringe Benefits			
1. Faculty PI	Dr. Aslihan D. Spaulding (39%)	$3,525	
2. Faculty Co-PI	Dr. Shalamar Armstrong (Retirement 8%, no fringe)	$778	
3. Student research assistant	(at 7.65%)	$275	
Subtotal		$4,578	$4,562.34
C. Travel			
1. Faculty Travel	Travel to conference (such as AAEA, ASA)	$2,880	
Subtotal		$2,880	$0
D. Equipment	Not Applicable		
E. Supplies			
1. Paper, Envelopes, Labels, etc.	Survey materials	$299	$109.06
Subtotal		$299	$109.06
F. Contractual Services			
1. Printing	Survey and postcard printing	$1,063	$1,012.95
2. Mailing	Survey and postcard mailing	$992	$355.05
3. Online survey	Online survey subscription	$331	$0
Subtotal		$2,386	$1,368.00
G. Other			
1. Publication	Page charges for publications	$2,000	
Subtotal		$2,000	$0
SUBTOTAL		$34,504	$25,899.20
H. Indirect Charges	10% indirect rate	$3,450	$2,605.38
I. TOTAL COST		$37,954	$28,504.58