Fertilizer and Manure Selection and Management Practices Associated with Minnesota's 2010 Corn and Wheat Production

Minnesota Department of Agriculture
USDA, NASS, Minnesota Field Office

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Introduction

Abstract

The Minnesota Department of Agriculture (MDA) is responsible for the development and promotion of nitrogen Best Management Practices (BMPs) which optimize production and profitability while protecting the state's water resources. The MDA is also responsible for monitoring nitrogen use and for promoting the adoption of associated BMPs. This survey was designed and conducted in partnership with the National Agricultural Statistics Service (NASS) to specifically assess the status of BMP awareness and adoption in relation to the use of nitrogen on corn and wheat acres though the use of commercial nitrogen and manure.

In Minnesota, nitrate is detected frequently in groundwater and surface water resources. Nitrates may exceed the drinking water standards in groundwater in some areas, and sometimes exceeds the surface water standard. The MDA has invested considerable staff time in water monitoring, development of BMP education programs, and BMP assessment. Commercial fertilizer containing nitrogen and manure management in regards to nitrogen is the main focus of this survey. Phone enumerators located at NASS contacted over 9,000 producers (7,000 corn farmers and 2,000 wheat farmers) in early 2011. From this pool, approximately 5,500

farmers who raised corn or wheat during the 2010 growing season, or applied manure on corn acres, shared valuable information on commercial nitrogen applications, manure rates and management practices associated with both manure and commercial nitrogen.

Farmers were randomly selected by county across Minnesota for the Fertilizer use survey with over sampling of counties in southeast Minnesota. In the southeast counties, all corn farmers were in the sample data base. Wheat farmers came from all a data base of all wheat farmers across Minnesota, who did not participate in the corn survey. Famers who applied manure were a subset of the farmers who were drawn for the commercial nitrogen applications.

The general purpose of this survey was to ask farmers about commercial nitrogen applications on corn and wheat acres, and fundamental manure use practices such as manure use, rates, applications, incorporation, types of manure and other management decisions based on manure use on corn acres. The majority of nitrogen applied on Minnesota fields is applied on corn and wheat acres.

These types of surveys help MDA understand regulatory compliance, adoption of voluntary practices, potential informational roadblocks, and opportunities for future technical assistance.

Every other year, the MDA has partnered with NASS to produce a detailed report on nitrogen use and rates used on the state's major crops. The first nitrogen use survey was conducted in 2009 and was designed for commercial nitrogen use on corn. Readers are encouraged to visit the two reports from this survey at: "2009 Survey of Nitrogen Fertilizer Use" at:
http://www.mda.state.mn.us/protecting/cleanwaterfund/gwdwprotection/nutrientmgmtsurvey.aspx
On alternate years, farmers are interviewed on BMPs associated with their commercial nitrogen and manure applications. Due to the length and detail of the surveys, it would not be feasible to interview farmers on both nitrogen applications and nitrogen BMPs at the same time.

Acknowledgements

This survey was a cooperative effort by the Minnesota Department of Agriculture (MDA), the United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), and the NASS Field Offices in Minnesota and North Dakota. The detailed information about commercial nitrogen and manure use could not have been collected without the cooperation of the thousands of farmers who voluntarily responded to the survey in the midst of their busy lives, and for this we are extremely grateful. Special thanks go to Doug Hartwig and Dan Lofthus, Director and Deputy Director, respectively of the NASS Minnesota Field Office, Darm Jantzi, Director of the NASS North Dakota Field Office and their respective staff for assistance with survey design, data collection and processing. The MDA is

ultimately responsible for the representations of data provided in this report and for the design of the survey mechanism used to collect that data. Excellent participation and good record keeping practices by Minnesota farmers played a vital part in providing complete and detailed manure use information.

2010 Commercial Nitrogen and Manure Use Practices Summary and Highlights

This report summarizes survey results for a number of important practices associated with nitrogen and manure applications on Minnesota's 2010 corn and wheat acres. Over 4,500 corn producers participated in the telephone survey and information was collected for 1,100,000 corn acres, representing 15 percent of Minnesota's 7,400,000 corn acres. Over 1,000 wheat producers participated in the telephone survey and information was collected for 300,000 corn acres, representing 19 percent of Minnesota's 1,600,000 corn acres. Survey questions focused on the 96 percent of the respondents that fertilized corn with manure or nitrogen or wheat with nitrogen. This was the second fertilizer survey performed by the MDA and NASS to collect information on nitrogen use and management practices on Minnesota corn acres.

Survey Design and Implementation

Five Nitrogen BMP regions (noted as "BMP regions" throughout the report), were previously developed by MDA staff. Counties were clustered based on similarities in geology, soils, and crops. More information about BMP regions can be found at: http://www.mda.state.mn.us/protecting/bmps/nitrogenbmps.aspx. Regional nitrogen use information is used to help design and implement specific water quality monitoring and nitrogen educational programs.

Figure 1. Minnesota nitrogen BMP Regions.

For the purpose of this report the Minnesota nitrogen BMP regions will be defined as follows: Northwestern as NW, Irrigated and non-irrigated sandy soils as IRR, Southwestern and West Central As SW, South Central as SC, and Southeastern as SE.

NASS developed a systematic sample of 9,000 farms by randomly drawing from its entire database of all corn and wheat growers in Minnesota. There were 5,500 farmers that raised corn or wheat and completed the survey in 2010. The definition of "corn" for purposes of this report includes both grain and silage and excludes sweet corn and popcorn.

Due to the low intensity of row crop agriculture in portions of northern Minnesota, survey results were not listed when there were less than five responses in any category for corn, manure or wheat.

Data Collection Process and History

NASS has a long history of providing statewide crop and production statistics. Over the last decade, NASS has also become an important information source for pesticide and fertilizer use. Several joint pilot projects evolved with the financial assistance from Environmental Protection Agency (EPA) and were conducted from 2001-2003. These pilots were essential to the final methodology used in this report.

The first pilot[1] was conducted in 2001 by expanding the existing Agricultural Resource Management Study (ARMS) developed by NASS. The normal number of participating Minnesota corn farms in an ARMS survey is about 150. The pilot increased the number of personal interviews to approximately 600 and most of the enhancements were focused on the southern third of the state. The pilot provided reliable regionally-enhanced data on pesticide product choices and application rates. Additionally, primary sources of pesticide management, scouting, timing, and other pesticide management related information was obtained.

In neighboring North Dakota, the USDA, NASS, the North Dakota Field Office, and North Dakota State University Extension had already established a strong tradition in collecting statewide pesticide use by using NASS telephone enumerators. With the goal of expanding to a statewide scale while reducing costs, a second pilot[2] was developed. MDA and NASS used many techniques from the North Dakota program, but decided to expand the level of detail by including pesticide application rates. Historically, most mail or telephone style surveys have been unsuccessful at quantifying pesticide rates. Due to the numerous formulations, different application rates and units of measure (i.e. Active Ingredient (AI) can be expressed in pounds, ounces, pints or quarts), complications can quickly develop. Another major complicating factor may result due to the farmer using the services of a commercial pesticide applicator. If the farmer did not apply the product, the likelihood that the farmer would be familiar with the product and rate decreases significantly.

The second pilot survey was conducted in 2003 to test two methods of collecting pesticide rate information. “Method One” was conducted in Douglas County with 150 randomly selected farm operators. Operators were interviewed over the phone by the NASS enumerators. If the operator did not know the pesticides and/or rates, no additional follow-up work was conducted and the data was limited to information that was provided. “Method Two” was used in neighboring Grant County, where another 150 farm operators were contacted, and when farm records were incomplete, follow-up calls were made to the pesticide dealer to complete the survey. The number of surveys with complete data sets significantly increased with the additional assistance from the dealerships. Eighty-three percent of the surveys were complete in Grant County, where dealer follow-up calls were made, compared to forty-six percent in Douglas County. Equally impressive was the overall support by the local dealerships.

Subsequently, statewide pesticide use surveys were conducted on a yearly basis. Beginning in 2009 nitrogen use was added to the annual surveys. In 2010 a subset

[1] “Expanded Minnesota Agricultural Statistics Pesticide Use Data”, 2003, by NASS and MDA.
[2] Unpublished data. From the September 20, 2003 EPA Report.

of the fertilizer use survey included questions on manure applications and commercial nitrogen applications on wheat , which is the basis of this report.

Farmers are interviewed over the phone in April and May 2010. These are "cold calls," meaning that the farmers did not get any type of notification about the survey prior to the contact. Consequently, all information collected using this approach is based upon either the participant's memory or information readily available during the interview. Depending on the complexity of the farm, the interviews would typically last ten to thirty minutes.

Survey questions can be found in Appendix 1. Corresponding question numbers (noted as "Q" followed by the survey question number) are incorporated throughout the report and also in the table captions. The reader is encouraged to reference the survey to help interpret the results.

Data Reporting and Limitations

The primary purpose of this survey was to obtain an understanding of commercial nitrogen applications and basic manure management practices associated with corn and wheat production.

Due to the simplified method used to collect what is typically considered complex data, it is imperative that the reader understand the limitations of the data sets. Many surveys conducted by NASS employ advanced sampling strategies which are designed to statistically represent a non-homogenous population, thus "weighting" the data to account for sample size, county size, and crop acreage, etc. Such strategies can be very expensive and are not without their own limitations.[3] This survey did not employ such strategies; rather, corn and wheat farmers were randomly selected from across Minnesota. Therefore, weighting across areas or counties was not performed. The MDA can be contacted to further discuss interpretation of the survey data.

If responses were less than 5 for the Number of Responses, then the responses were not published and represented by "**". However, the data was still included in the overall statistical analysis. This is why certain columns will be slightly higher in the 'Totals/Averages' row of the relevant tables.

[3] For an explanation of survey methods and data quality associated with annual county-level data, visit the NASS "Quick Stats" Frequently Asked Questions website at: http://www.nass.usda.gov/QuickStats/Screens/faqs.htm

Statewide Commercial Nitrogen and Manure Applications and Management on Corn and Wheat.

Information on nitrogen management and manure was gathered for a typical corn field in the 2010 growing season. Information about management on all crop acres was not collected in this survey. Nitrogen applications on wheat were collected in this survey and will be reported after the corn analysis.

Farmers in the survey were first asked "Did you grow corn on your operation in 2010?" Then farmers were asked **"**How many corn acres were planted for field corn in 2010? Table 1 details the famers who responded they grew corn and the corresponding acres of corn grown (NQ1[4]).

Table 1. Summary of respondents and corresponding corn acres by county and BMP regions with and without manure.

County	BMP Region	Number of Respondents	Number of Corn Acres
Clay	NW	26	11,443
Kittson	NW	**	**
Mahnomen	NW	**	**
Marshall	NW	7	729
Norman	NW	23	8,523
Polk	NW	**	**
Red Lake	NW	5	729
Roseau	NW	6	2,575
Wilkin	NW	16	8,959
Totals/Averages	**NW**	**94**	**36,832**
Aitkin	IRR	5	380
Anoka	IRR	5	300
Becker	IRR	17	2,707
Benton	IRR	30	3,838
Cass	IRR	8	702
Chicago	IRR	18	4,272
Crow Wing	IRR	7	547
Hubbard	IRR	**	**
Isanti	IRR	21	5,142
Kanabec	IRR	9	982
Mille Lacs	IRR	24	3,014
Morrison	IRR	87	7,917
Otter Tail	IRR	86	19,680
Pine	IRR	22	1,405
Sherburne	IRR	16	5,239

[4] NQ1 is Nitrogen Question 1 and can be found at the end of the report in the appendix. All question references will be in this format.

County	BMP Region	Number of Respondents	Number of Corn Acres
Stearns	IRR	167	24,816
Todd	IRR	69	7,585
Wadena	IRR	13	1,564
Washington	IRR	16	3,361
Wright	IRR	40	5,112
Totals/Averages	**IRR**	**664**	**98,809**
Big Stone	SW	16	4,580
Chippewa	SW	32	18,516
Cottonwood	SW	46	17,606
Douglas	SW	28	4,107
Grant	SW	16	6,282
Jackson	SW	45	13,416
Kandiyohi	SW	42	15,809
Lac qui Parle	SW	43	18,158
Lincoln	SW	37	12,898
Lyon	SW	40	11,015
Murray	SW	38	9,957
Nobles	SW	60	14,646
Pipestone	SW	34	7,221
Pope	SW	35	12,429
Redwood	SW	61	17,177
Renville	SW	67	23,648
Rock	SW	28	5,618
Stevens	SW	28	11,249
Swift	SW	30	10,962
Traverse	SW	12	7,044
Yellow Medicine	SW	45	17426
Totals /Averages	**SW**	**783**	**259,764**
Blue Earth	SC	43	12,306
Brown	SC	48	12,406
Carver	SC	21	3,320
Dodge	SC	150	60,500
Faribault	SC	46	21,605
Freeborn	SC	47	20,711
Le Sueur	SC	35	6,211
Martin	SC	55	19,083
McLeod	SC	36	8,094
Meeker	SC	37	7,919
Mower	SC	251	74,177
Nicollet	SC	37	11,791
Rice	SC	32	9,597
Scott	SC	21	2,871
Sibley	SC	47	11,449
Steele	SC	31	10,771
Waseca	SC	50	17,692
Watonwan	SC	28	14,729
Totals /Averages	**SC**	**1,015**	**325,232**
Dakota	SE	159	36,340
Fillmore	SE	379	81,584
Goodhue	SE	391	86,340
Houston	SE	250	31,422
Olmsted	SE	279	60,287

County	BMP Region	Number of Respondents	Number of Corn Acres
Wabasha	SE	265	45,457
Winona	SE	297	44,083
Totals /Averages	**SE**	**2,020**	**385,513**
State	**All**	**4,576**	**1,106,150**

** Less than five responses

Farmers in the survey were then asked “Do you have a corn field without manure applied in the last five years? (NQ2)” Table 2 details the famers who answered yes to this question and the corresponding acres of corn grown.

Table 2. Summary of respondents and corresponding corn acres by county and BMP regions for all fields without manure.

County	BMP Region	Number of Respondents	Number of Corn Acres
Clay	NW	22	11,158
Kittson	NW	**	**
Mahnomen	NW	**	**
Marshall	NW	**	**
Norman	NW	19	8,052
Polk	NW	**	**
Red Lake	NW	**	**
Roseau	NW	**	**
Wilkin	NW	12	7,979
Totals/Averages	**NW**	**67**	**34,198**
Aitkin	IRR	**	**
Anoka	IRR	5	300
Becker	IRR	7	1,790
Benton	IRR	12	1,399
Cass	IRR	5	595
Chisago	IRR	12	1,727
Crow Wing	IRR	5	215
Hubbard	IRR	**	**
Isanti	IRR	18	3,729
Kanabec	IRR	7	945
Mille Lacs	IRR	14	2,525
Morrison	IRR	33	3,455
Otter Tail	IRR	56	15,271
Pine	IRR	9	778
Sherburne	IRR	10	4,965
Stearns	IRR	55	12,900
Todd	IRR	30	3,948
Wadena	IRR	8	1,163
Washington	IRR	11	3,174
Wright	IRR	27	3,982
Totals/Averages	**IRR**	**330**	**63,245**
Big Stone	SW	14	4,465
Chippewa	SW	28	17,596
Cottonwood	SW	33	14,147

County	BMP Region	Number of Respondents	Number of Corn Acres
Douglas	SW	12	2,982
Grant	SW	12	5,858
Jackson	SW	34	9,823
Kandiyohi	SW	22	7,696
Lac qui Parle	SW	39	15,358
Lincoln	SW	27	11,023
Lyon	SW	34	10,076
Murray	SW	30	8,752
Nobles	SW	42	11,572
Pipestone	SW	18	4,769
Pope	SW	24	9,863
Redwood	SW	42	11,942
Renville	SW	50	18,718
Rock	SW	21	4,748
Stevens	SW	24	9,819
Swift	SW	25	10,490
Traverse	SW	12	7,044
Yellow Medicine	SW	36	15,468
Totals /Averages	**SW**	**579**	**212,209**
Blue Earth	SC	34	10,348
Brown	SC	34	9,003
Carver	SC	12	2,125
Dodge	SC	107	44,647
Faribault	SC	36	19,957
Freeborn	SC	36	17,936
Le Sueur	SC	30	5,796
Martin	SC	37	14,422
McLeod	SC	23	6,334
Meeker	SC	22	4,599
Mower	SC	187	61,796
Nicollet	SC	22	6,850
Rice	SC	25	8,721
Scott	SC	18	2,576
Sibley	SC	28	8,498
Steele	SC	15	8,066
Waseca	SC	38	14,174
Watonwan	SC	25	11,444
Totals /Averages	**SC**	**729**	**257,292**
Dakota	SE	125	31,671
Fillmore	SE	253	66,247
Goodhue	SE	254	73,304
Houston	SE	133	20,748
Olmsted	SE	192	48,843
Wabasha	SE	146	32,293
Winona	SE	134	26,157
Totals /Averages	**SE**	**1,237**	**299,263**
State	**Without Manure**	**2,942**	**866,207**

** Less than five responses

Table 3 details the percent of farmers who had a corn field without manure applied by BMP region (NQ2).

Table 3. Percent of respondents with a corn field without manure applied.

BMP Region	Did you have a Field Without Manure Applied?	Percentage of Respondents
Northwestern	Yes	71
Northwestern	No	29
Irrigated and non-irrigated sandy soils	Yes	50
Irrigated and non-irrigated sandy soils	No	50
South Western and West Central	Yes	74
South Western and West Central	No	26
South Central	Yes	72
South Central	No	28
Southeastern	Yes	61
Southeastern	No	39
Statewide	Yes	64
Statewide	No	36

Table 4 details the previous crop planted before the current corn crop by region and the corresponding yield (NQ3, NQ4 and NQ6).

Table 4. Percent of acres by previous crop and the corresponding yields.

BMP Region	Previous Crop	Percent	Average Yield
Northwestern	Soybeans	60	136
Northwestern	Corn	**	**
Northwestern	Corn/Alfalfa	**	**
Northwestern	Alfalfa	**	**
Northwestern	Small Grains	18	130
Northwestern	Other	17	139
Irrigated and non-irrigated sandy soils	Soybeans	48	140
Irrigated and non-irrigated sandy soils	Corn	24	126
Irrigated and non-irrigated sandy soils	Corn/Alfalfa	5	134
Irrigated and non-irrigated sandy soils	Alfalfa	7	129
Irrigated and non-irrigated sandy soils	Small Grains	9	112
Irrigated and non-irrigated sandy soils	Other	7	132
South Western and West Central	Soybeans	78	165
South Western and West Central	Corn	13	168
South Western and West Central	Corn/Alfalfa	1	173
South Western and West Central	Alfalfa	2	142
South Western and West Central	Small Grains	3	148
South Western and West Central	Other	3	173
South Central	Soybeans	81	175
South Central	Corn	16	178
South Central	Corn/Alfalfa	1	175
South Central	Alfalfa	1	161
South Central	Small Grains	**	**
South Central	Other	1	171
Southeastern	Soybeans	58	172
Southeastern	Corn	24	173
Southeastern	Corn/Alfalfa	6	164
Southeastern	Alfalfa	9	164
Southeastern	Small Grains	1	141
Southeastern	Other	1	164
Statewide	Soybeans	66	168
Statewide	Corn	20	167
Statewide	Corn/Alfalfa	3	161
Statewide	Alfalfa	6	158
Statewide	Small Grains	2	130
Statewide	Other	3	154

** Less than five responses

Table 5 details the percentage of non-manure corn fields with nitrogen applied (NQ7).

Table 5. Commercial fertilizer applications applied to non-manure corn fields.

BMP Region	Fertilizer Applied	Percentage of Respondents
Northwestern	Yes	97
Northwestern	No	3
Irrigated and non-irrigated sandy soils	Yes	92
Irrigated and non-irrigated sandy soils	No	8
Southwestern and West Central	Yes	96
Southwestern and West Central	No	4
South Central	Yes	96
South Central	No	4
Southeastern	Yes	96
Southeastern	No	4
Statewide	Yes	96
Statewide	No	4

Method of nitrogen application, either by variable rate or by one rate (NQ8) and the results as a percentage by BMP region is provided in Table 6.

Table 6. Variable rate nitrogen applications by BMP region.

BMP Region	Variable Rate Nitrogen Application	Percentage of Respondents
Northwestern	Variable rate	9
Northwestern	One rate	91
Irrigated and non-irrigated sandy soils	Variable rate	22
Irrigated and non-irrigated sandy soils	One rate	78
Southwestern and West Central	Variable rate	19
Southwestern and West Central	One rate	81
South Central	Variable rate	35
South Central	One rate	65
Southeastern	Variable rate	22
Southeastern	One rate	78
Statewide	Variable rate	24
Statewide	One rate	76

Yields and corresponding nitrogen rates by BMP region are provided in Table 7 (NQ6 and NQ9).

Table 7. Nitrogen rates and average yields by BMP region.

BMP Region	Nitrogen Rate	Average Yield
Northwestern	130	135
Irrigated and non-irrigated sandy soils	120	132
Southwestern and West Central	148	165
South Central	158	175
Southeastern	150	171
Statewide	148	166

Nitrogen fertilizer rates and yields by BMP region on corn following different crops in are detailed in Table 8 (NQ3, NQ6 and NQ9).

Table 8. Average amount of nitrogen applied and corresponding yield by BMP region and previous crop.

BMP Region	Previous Crop	Nitrogen Rate Pounds per Acre	Previous Yield Bushels per Acre
Northwestern	Soybeans	131	136
Northwestern	Corn	**	**
Northwestern	Corn/Alfalfa	**	**
Northwestern	Alfalfa	**	**
Northwestern	Small Grains	120	130
Northwestern	Other	137	139
Irrigated and non-irrigated sandy soils	Soybeans	129	140
Irrigated and non-irrigated sandy soils	Corn	122	126
Irrigated and non-irrigated sandy soils	Corn/Alfalfa	102	134
Irrigated and non-irrigated sandy soils	Alfalfa	94	129
Irrigated and non-irrigated sandy soils	Small Grains	107	112
Irrigated and non-irrigated sandy soils	Other	114	132
Southwestern and West Central	Soybeans	146	165
Southwestern and West Central	Corn	162	168
Southwestern and West Central	Corn/Alfalfa	158	173
Southwestern and West Central	Alfalfa	112	142
Southwestern and West Central	Small Grains	136	148
Southwestern and West Central	Other	161	173
South Central	Soybeans	155	175
South Central	Corn	172	178
South Central	Corn/Alfalfa	157	175
South Central	Alfalfa	113	161
South Central	Small Grains	**	**
South Central	Other	145	171
Southeastern	Soybeans	150	172
Southeastern	Corn	166	173
Southeastern	Corn/Alfalfa	134	164
Southeastern	Alfalfa	120	164
Southeastern	Small Grains	137	141
Southeastern	Other	134	164
Statewide	Soybeans	148	168
Statewide	Corn	161	167
Statewide	Corn/Alfalfa	131	161
Statewide	Alfalfa	115	158
Statewide	Small Grains	122	130
Statewide	Other	136	154

****** Less than five responses.

Statewide: Corn Following Soybeans

The majority of farmers reported on a typical corn following soybean field. Statewide sixty-six percent of the fields reported were corn following soybean. Figure 2 details the counties where farmers reported on fields with corn following soybeans. There were 2,222 fields surveyed across Minnesota.

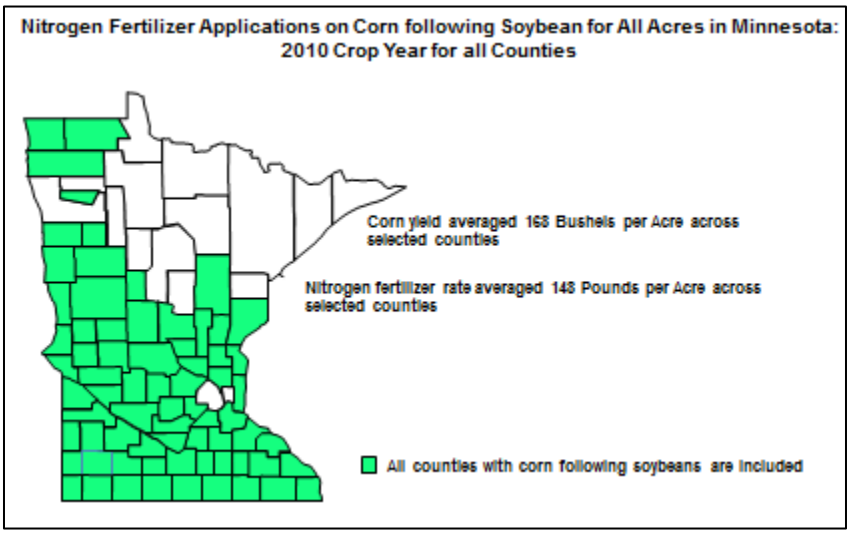

Figure 2. Counties with farmers reporting on corn following soybean fields.

Figure 3 details the distribution of average nitrogen fertilizer rates across Minnesota for corn following soybeans; the corresponding yields are detailed in red.

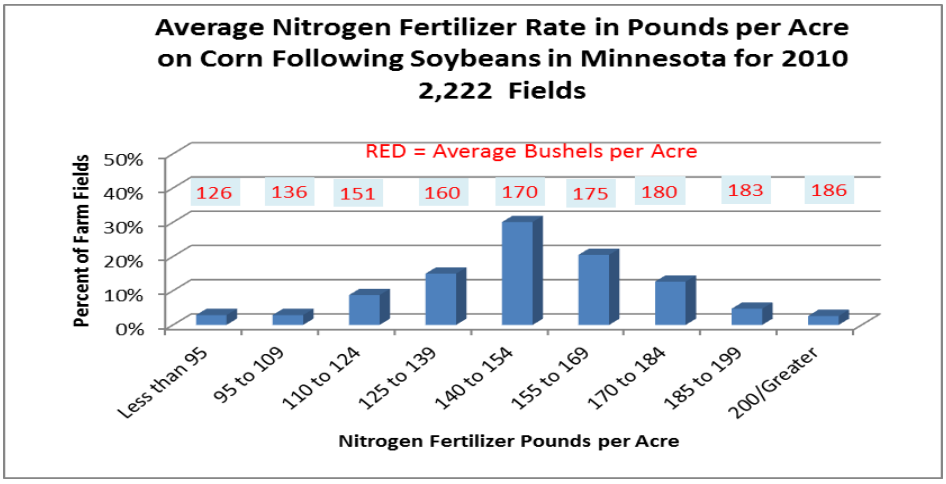

Figure 3. Average nitrogen fertilizer rates and yields on corn following soybeans in Minnesota for 2010: 2,222 fields.

Southeastern Region: Corn Following Soybeans

There were 860 fields that were included in the SE region corn following soybeans analysis. Figure 4 details the location, average rate of nitrogen fertilizer and average yield for corn following soybeans in the SE BMP region.

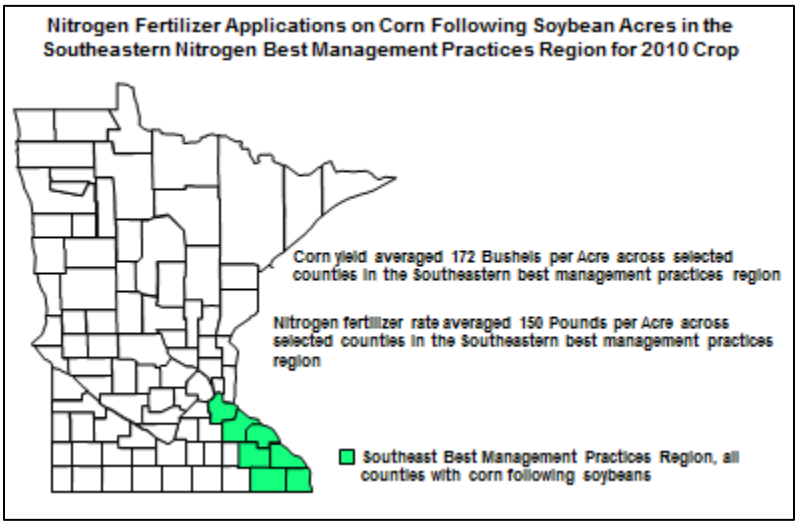

Figure 4. The corn yield averaged 172 bushels per acre and the nitrogen fertilizer rate averaged 150 pounds per acre across the SE BMP region.

Figure 5 details the distribution of nitrogen fertilizer rates across the SE BMP region for corn following soybeans; the corresponding yields are detailed in red.

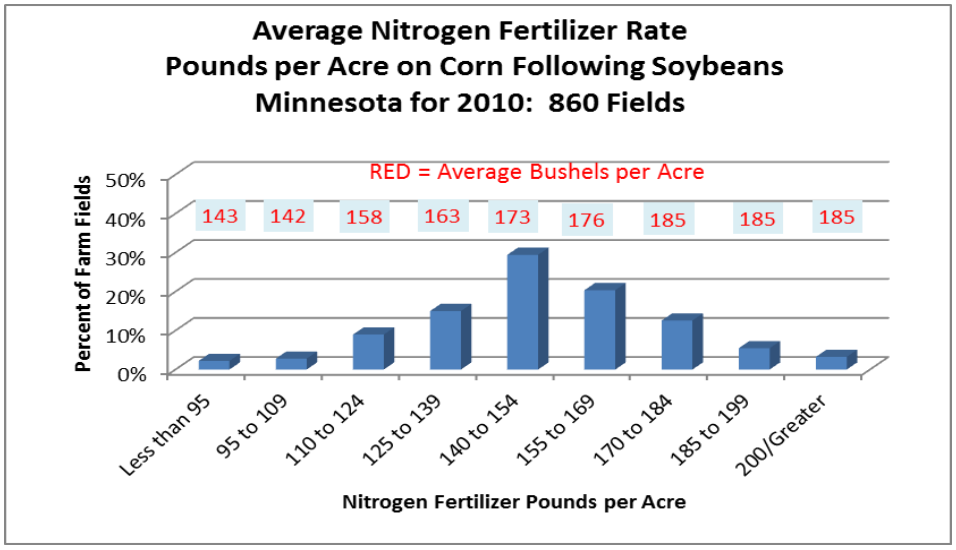

Figure 5. Average nitrogen fertilizer rates and yields on corn following soybeans in the SE BMP region for 2010: 860 fields.

In the SE BMP region, nitrogen fertilizer rates ranged from an average of 144 pounds per acre in Houston and Winona Counties to 155 pounds per acre in Goodhue County as shown in Table 9.

Table 9. Average county nitrogen fertilizer rates for the SE BMP region for corn following soybeans.

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Dakota	101	151	169
Fillmore	162	152	175
Goodhue	197	155	176
Houston	76	144	164
Olmsted	143	146	170
Wabasha	102	148	172
Winona	79	144	170

South Central Region: Corn Following Soybeans

There were 638 fields that were included in the SC BMP region corn following soybeans analysis. Figure 6 details the location, average rate of nitrogen fertilizer and average yield for corn following soybeans in the SC BMP region. All counties in the SC region had more than five responses.

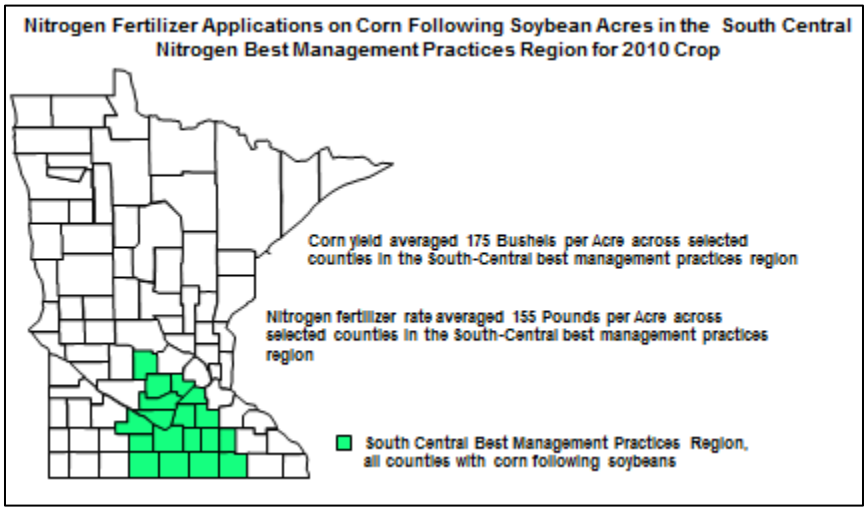

Figure 6. The corn yield averaged 175 bushels per acre and the nitrogen fertilizer rate averaged 155 pounds per acre across the SC BMP region.

Figure 7 details the distribution of nitrogen fertilizer rates across the SC BMP region for corn following soybeans; the corresponding yields are detailed in red.

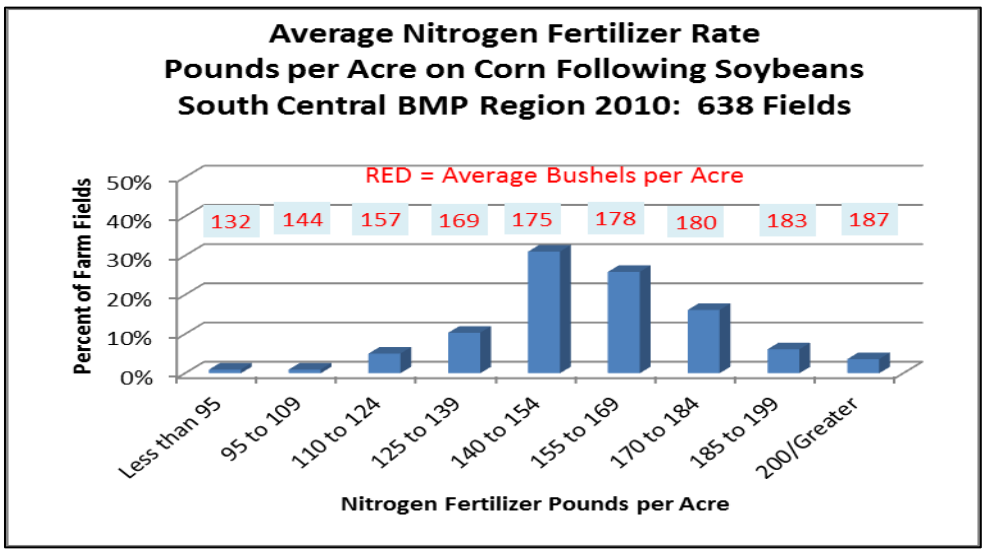

Figure 7. Average nitrogen fertilizer rates and yields on corn following soybeans in the SC BMP region for 2010: 638 fields.

In the SC BMP region, nitrogen fertilizer rates ranged from an average of 146 pounds per acre in Meeker County to 167 pounds per acre in Steele County as shown in Table 10.

Table 10. Average county nitrogen fertilizer rates for the SC BMP region corn following soybeans.

Average County Nitrogen Fertilizer Rates for the SC BMP Region for Corn Following Soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Blue Earth	29	163	177
Brown	31	156	175
Carver	10	147	170
Dodge	88	155	177
Faribault	33	163	183
Freeborn	30	158	177
Le Sueur	25	155	161
Martin	32	153	180
McLeod	21	149	170
Meeker	20	146	164
Mower	168	157	176
Nicollet	18	148	177
Rice	26	150	174
Scott	16	157	163
Sibley	22	147	177
Steele	14	167	184
Waseca	30	152	173
Watonwan	25	160	176

Southwestern and West Central Region: Corn Following Soybeans

There were 505 fields that were included in the SW region corn following soybeans analysis. Figure 8 details the location, average rate of nitrogen fertilizer and average yield for corn following soybeans in the SW BMP region.

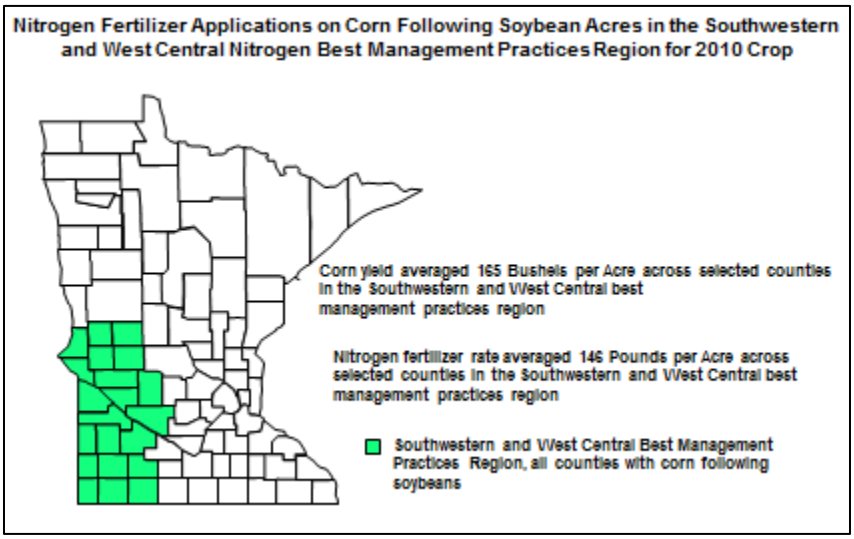

Figure 8. The corn yield averaged 165 bushels per acre and the nitrogen fertilizer rate averaged 146 pounds per acre across the SW BMP region.

Figure 9 details the distribution of nitrogen fertilizer rates across the SW BMP region for corn following soybeans; the corresponding yields are detailed in red.

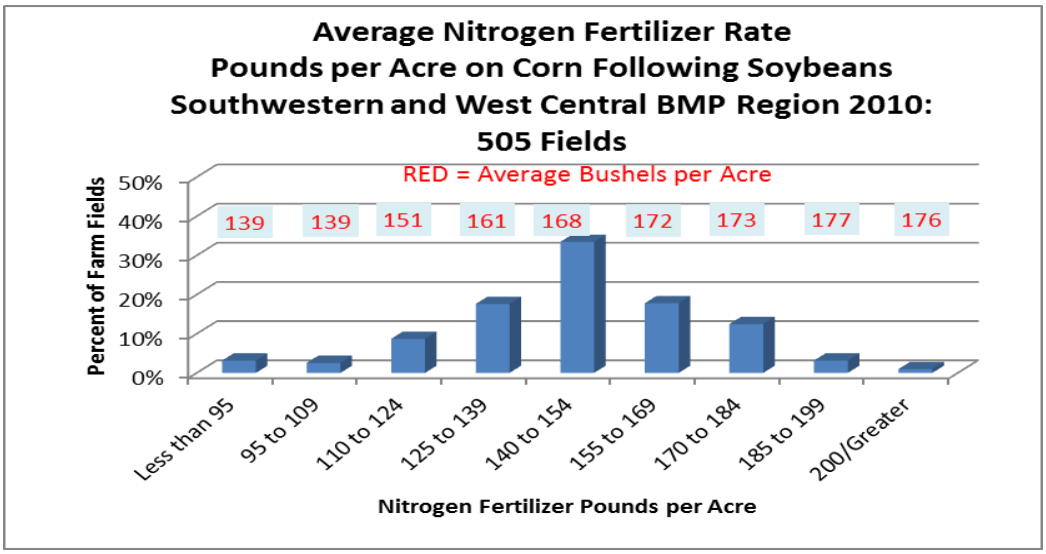

Figure 9. Average nitrogen fertilizer rates and yields on corn following soybeans in the SW BMP region for 2010: 505 fields.

In the SW BMP region, nitrogen fertilizer rates ranged from an average of 133 pounds per acre in Pipestone County to 163 pounds per acre in Renville County as shown in Table 11.

Table 11. Average county nitrogen fertilizer rates for the SW BMP region corn following soybeans.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for corn following soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Big Stone	12	140	162
Chippewa	17	148	168
Cottonwood	32	149	174
Douglas	10	140	152
Grant	11	136	154
Jackson	34	146	171
Kandiyohi	15	149	167
Lac qui Parle	36	135	156
Lincoln	25	140	154
Lyon	32	143	161
Murray	27	142	170
Nobles	39	143	170
Pipestone	14	133	154
Pope	18	141	156
Redwood	37	152	174
Renville	43	163	171
Rock	17	142	173
Stevens	22	145	159
Swift	20	154	164
Traverse	11	149	160
Yellow Medicine	33	144	165

Northwestern Region: Corn Following Soybeans

There were 46 fields that were included in the NW region corn following soybeans analysis. Figure 10 details the location, average rate of nitrogen fertilizer and average yield for corn following soybeans in the NW BMP region.

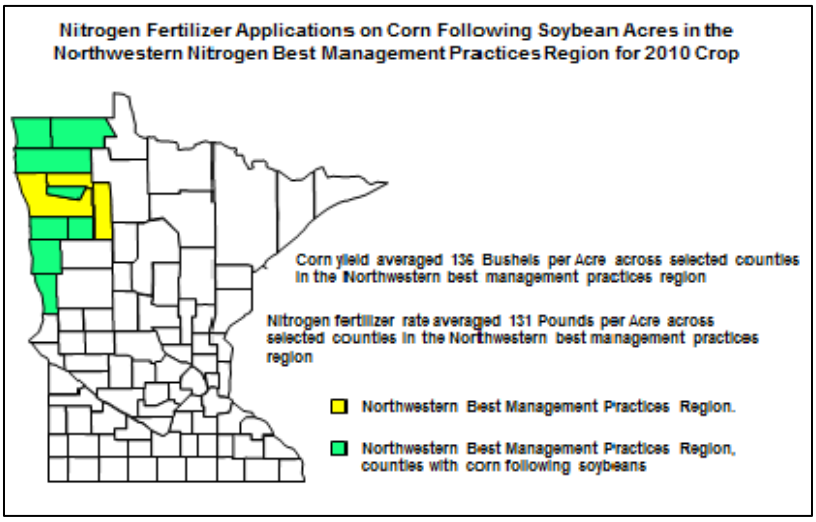

Figure 10. The corn yield averaged 136 bushels per acre and the nitrogen fertilizer rate averaged 131 pounds per acre across the NW BMP region.

Figure 11 details the distribution of nitrogen fertilizer rates across the NW BMP region for corn following soybeans; the corresponding yields are detailed in red.

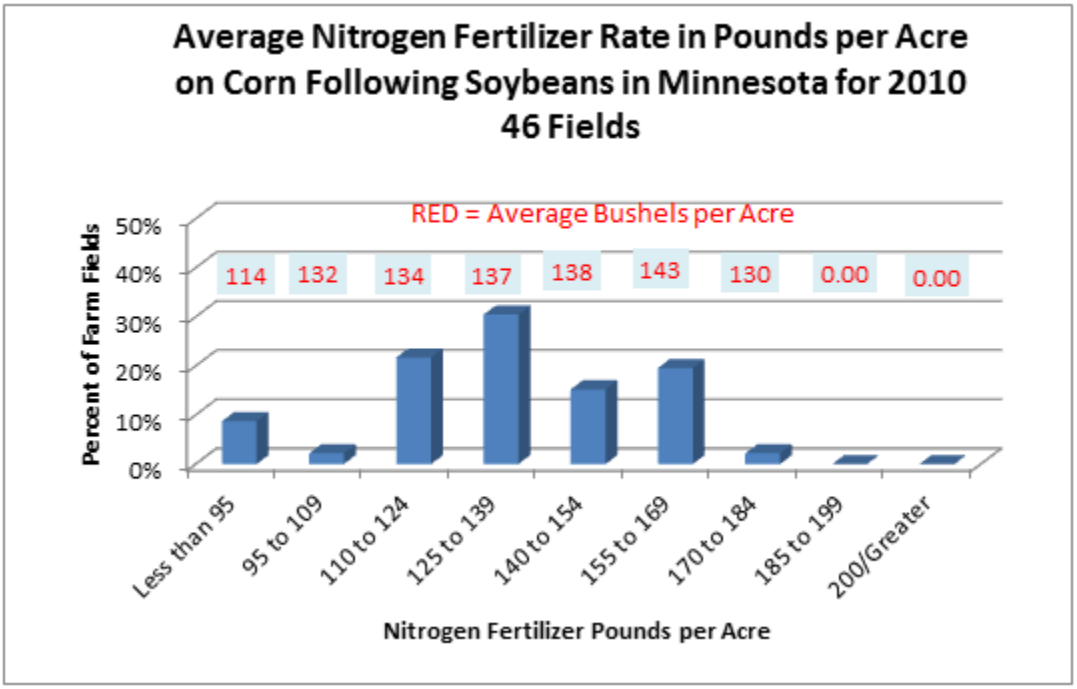

Figure 11. Average nitrogen fertilizer rates and yields on corn following soybeans in the NW BMP region for 2010: 46 fields.

Only three counties had more than five responses in the NW BMP region. Nitrogen fertilizer rates ranged from an average of 124 pounds per acre in Wilkin County to 141 pounds per acre in Clay County as shown in Table 12.

Table 12. Average county nitrogen fertilizer rates for the NW BMP region corn following soybeans.

Average County Nitrogen Fertilizer Rates for the NW BMP Region for Corn Following Soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Clay	13	141	141
Kittson	**	**	**
Mahnomen	**	**	**
Marshall	**	**	**
Norman	14	134	142
Red Lake	**	**	**
Roseau	**	**	**
Wilkin	10	124	132

** Less than five responses.

Irrigated and Non-irrigated Sandy Soils Region: Corn Following Soybeans

There were 173 fields that were included in the IRR BMP region corn following soybeans analysis. Figure 12 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following soybeans.

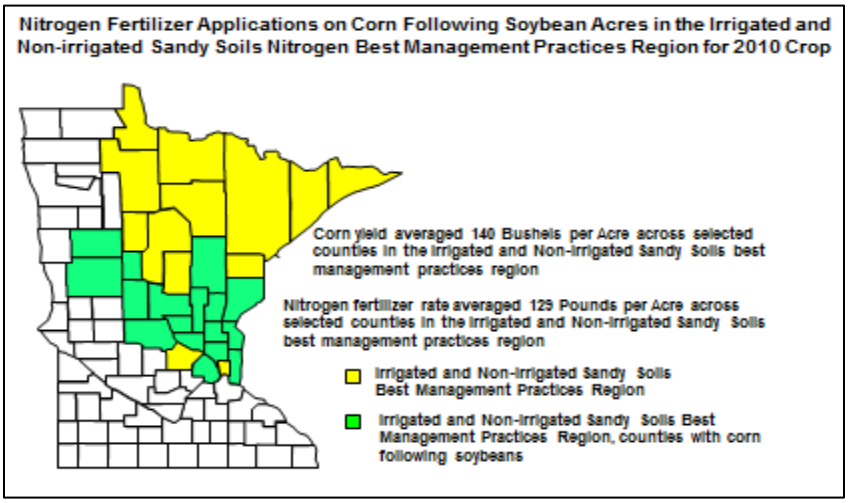

Figure 12. The corn yield averaged 140 bushels per acre and the nitrogen fertilizer rate averaged 129 pounds per acre across the IRR BMP region.

Figure 13 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following soybeans; the corresponding yields are detailed in red.

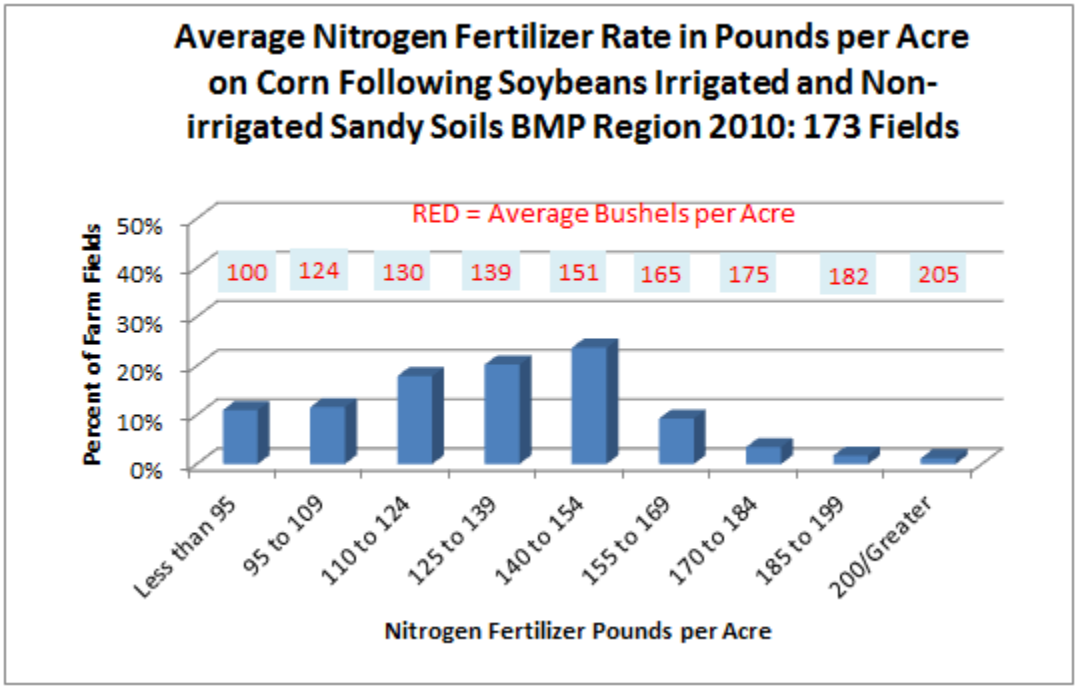

Figure 13. Average nitrogen fertilizer rates and yields on corn following soybeans in the IRR BMP region for 2010: 173 fields.

Twelve counties had more than five responses in the IRR BMP region. Nitrogen fertilizer rates ranged from an average of 117 pounds per acre in Todd County to 136 pounds per acre in Benton County as shown in Table 13.

Table 13. Average county nitrogen fertilizer rates for the Irrigated and non-irrigated sandy soils BMP region corn following soybeans.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Aitkin	**	**	**
Anoka	**	**	**
Becker	5	118	124
Benton	7	136	142
Chisago	10	122	144
Isanti	12	120	123
Kanabec	**	**	**
Mille Lacs	8	118	123
Morrison	11	122	128
Otter Tail	30	133	145
Pine	**	**	**
Sherburne	6	139	154
Stearns	33	136	147
Todd	10	117	127
Wadena	**	**	**
Washington	7	136	165
Wright	21	133	148

****** Less than five responses**.**

Statewide: Corn Following Corn

Statewide twenty percent of the fields reported were corn following corn fields. Figure 14 details the counties where farmers reported on fields with corn following corn. There were 665 corn following corn fields surveyed across Minnesota.

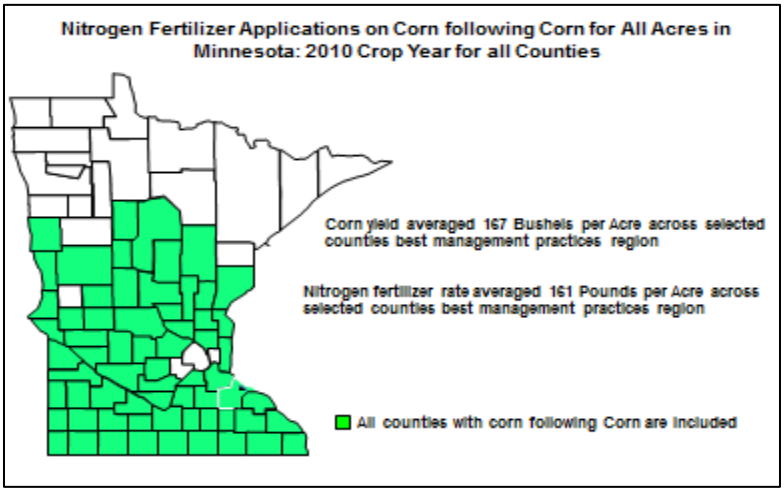

Figure 14. Counties with famers reporting on corn following corn fields.

Figure 15 details the distribution of average nitrogen fertilizer rates across Minnesota for the 665 corn following corn fields; the corresponding yields are detailed in red.

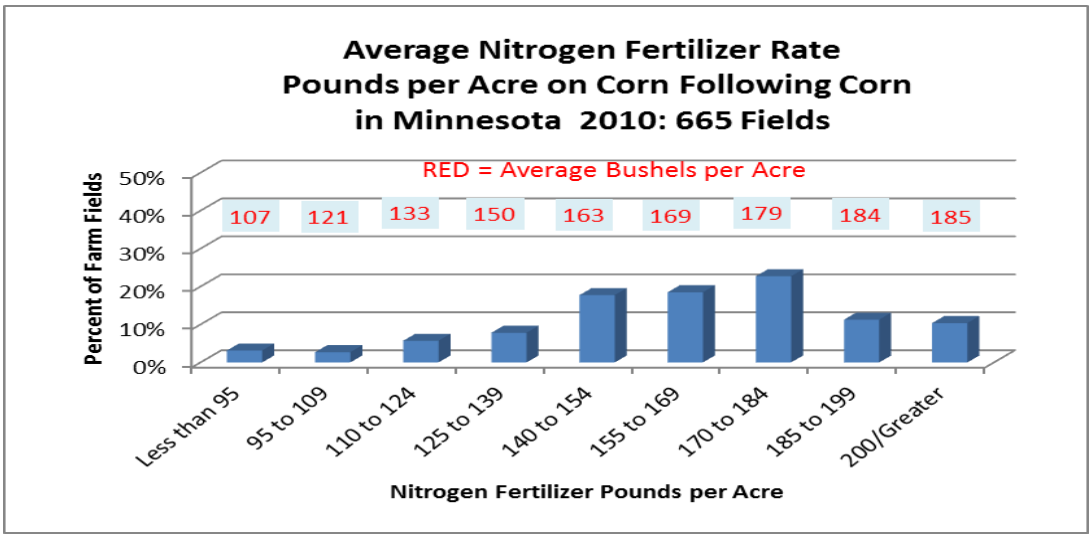

Figure 15. Average nitrogen fertilizer rates and yields on corn following corn in Minnesota for 2010: 665 fields.

Southeastern Region: Corn Following Corn

There were 361 fields that were included in the SE region corn following corn analysis. Figure 16 details the location, average rate of nitrogen fertilizer and average yield for corn following corn in the SE BMP region.

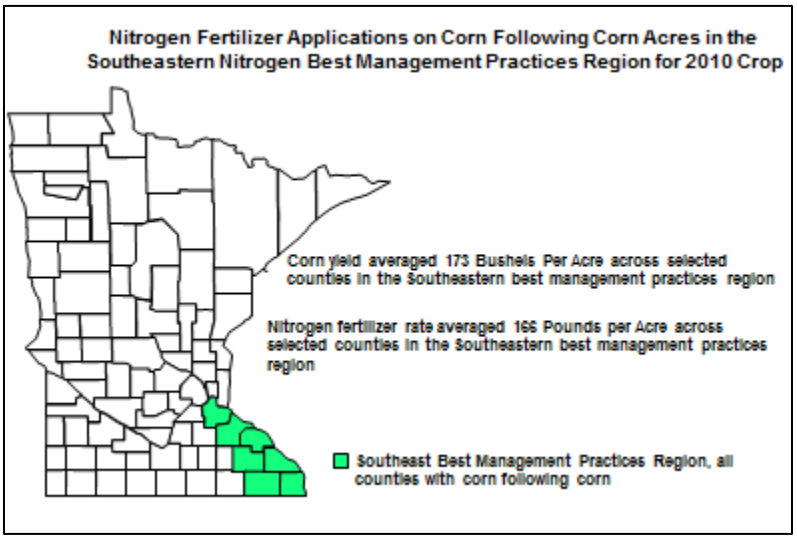

Figure 16. The corn yield averaged 173 bushels per acre and the nitrogen fertilizer rate averaged 166 pounds per acre across the SE BMP region.

Figure 17 details the distribution of nitrogen fertilizer rates across the SE BMP region for corn following corn; the corresponding yields are detailed in red.

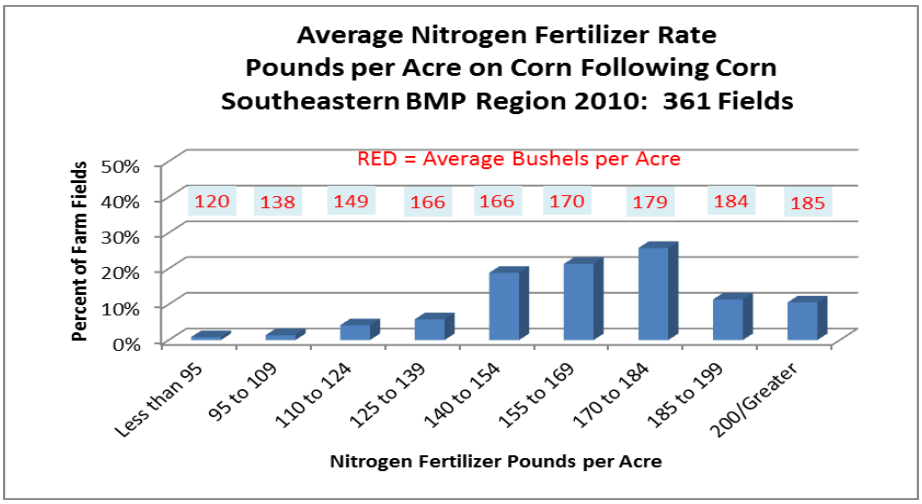

Figure 17. Average nitrogen fertilizer rates and yields on corn following corn in the SE BMP region for 2010: 361 fields.

In the SE BMP region, nitrogen fertilizer rates ranged from an average of 154 pounds per acre in Houston County to 177 pounds per acre in Goodhue County as shown in Table 14.

Table 14. Average county nitrogen fertilizer rates for the SE BMP region for corn following corn.

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Corn			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Dakota	40	170	176
Fillmore	83	165	172
Goodhue	68	177	179
Houston	39	154	157
Olmsted	48	162	174
Wabasha	39	164	175
Winona	44	164	171

South Central Region: Corn Following Corn

There were 128 fields that were included in the SC region corn following corn analysis. Figure 18 details the location, average rate of nitrogen fertilizer and average yield for corn following corn in the SC BMP region.

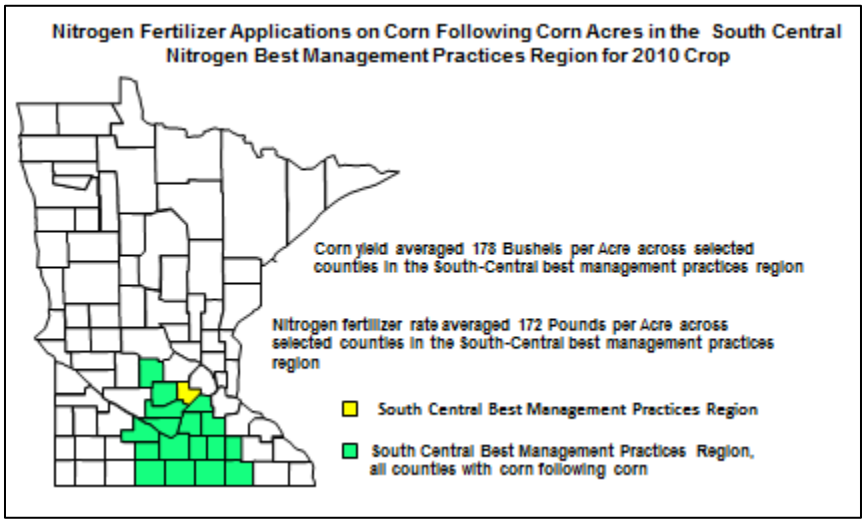

Figure 18. The corn yield averaged 178 bushels per acre and the nitrogen fertilizer rate averaged 172 pounds per acre across the SC BMP region.

Figure 19 details the distribution of nitrogen fertilizer rates across the SC BMP region for corn following corn; the corresponding yields are detailed in red.

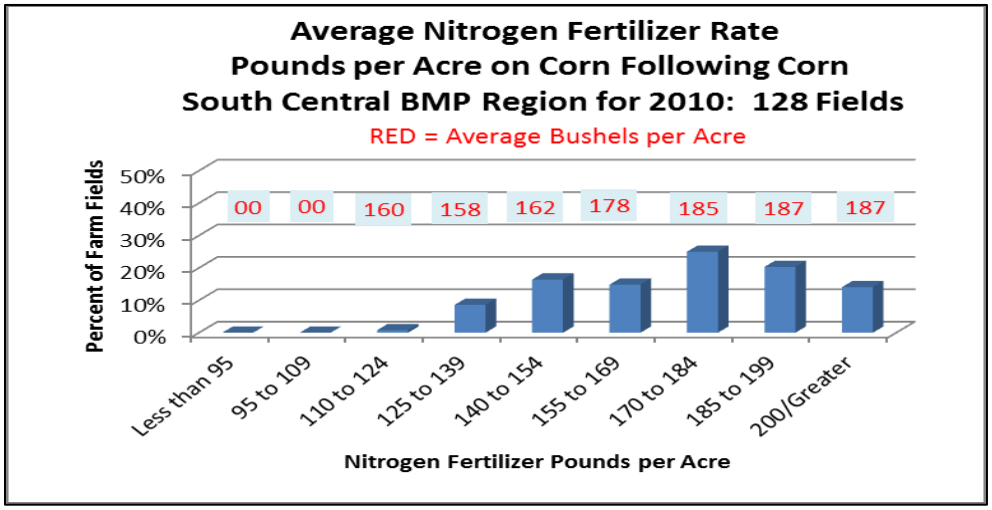

Figure 19. Average nitrogen fertilizer rates and yields on corn following soybeans in the SC BMP region for 2010: 128 fields.

Eleven counties had more than five responses in SC BMP region. Nitrogen fertilizer rates ranged from an average of 160 pounds per acre in Brown County to 184 pounds per acre in Waseca County as shown in Table 15.

Table 15. Average county nitrogen fertilizer rates for the SC BMP region for corn following corn.

Average County Nitrogen Fertilizer Rates for the SC BMP Region for Corn Following Corn			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Blue Earth	7	161	176
Brown	5	160	175
Dodge	15	174	182
Faribault	8	178	182
Freeborn	10	160	183
Le Sueur	6	170	173
Martin	7	168	177
McLeod	**	**	**
Meeker	**	**	**
Mower	30	177	179
Nicollet	7	162	184
Rice	**	**	**
Scott	**	**	**
Sibley	8	167	178
Steele	**	**	**
Waseca	8	184	174
Watonwan	**	**	**

****** Less than five responses**.**

Southwestern and West Central Region: Corn Following Corn

There were 85 fields that were included in the SW region corn following corn analysis. Figure 20 details the location, average rate of nitrogen fertilizer and average yield for corn following corn in the SW BMP region.

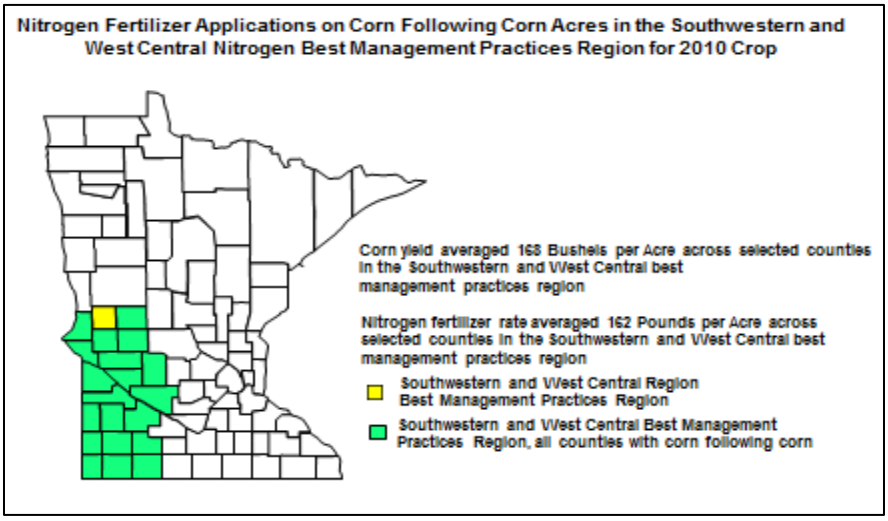

Figure 20. The corn yield averaged 168 bushels per acre and the nitrogen fertilizer rate averaged 162 pounds per acre across the South western and West Central BMP region.

Figure 21 details the distribution of nitrogen fertilizer rates across the SW BMP region for corn following corn; the corresponding yields are detailed in red.

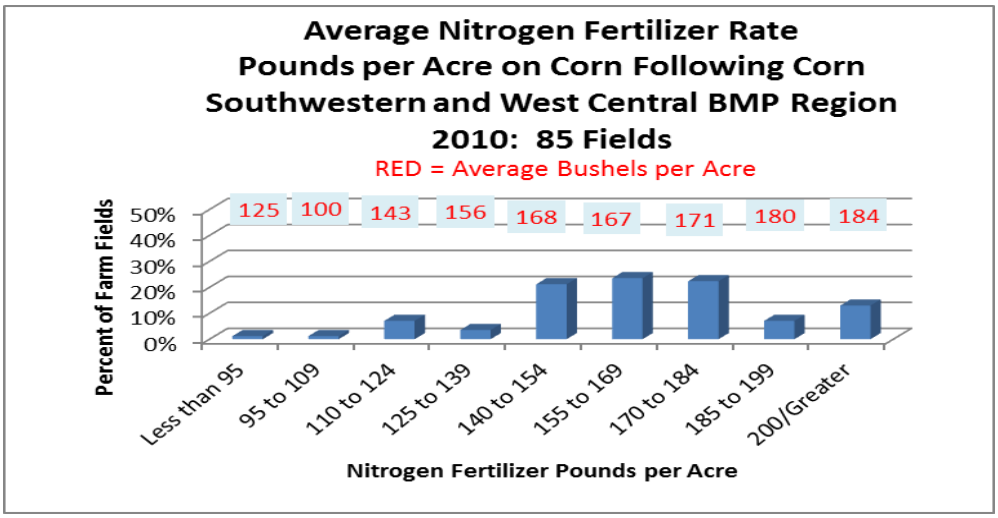

Figure 21. Average nitrogen fertilizer rates and yields on corn following soybeans in the SW BMP region for 2010: 85 fields.

Nine counties had more than five responses in SW BMP region. Nitrogen fertilizer rates ranged from an average of 140 pounds per acre in Kandiyohi County to 184 pounds per acre in Swift County as shown in Table 16.

Table 16. Average county nitrogen fertilizer rates for the SW BMP region for corn following corn.

Average County Nitrogen Fertilizer Rates for the Southwestern West Central BMP Region for Corn Following Corn			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Big Stone	**	**	**
Chippewa	9	165	176
Cottonwood	**	**	**
Douglas	**	**	**
Jackson	**	**	**
Kandiyohi	5	140	153
Lac qui Parle	5	154	166
Lincoln	**	**	**
Lyon	**	**	**
Murray	**	**	**
Nobles	6	162	168
Pipestone	**	**	**
Pope	5	151	159
Redwood	6	151	168
Renville	9	182	185
Rock	**	**	**
Stevens	6	149	165
Swift	5	184	170
Traverse	**	**	**
Yellow Medicine	7	161	155

****** Less than five responses**.**

Northwestern Region: Corn Following Corn

There were less than five fields that were included in the NW region corn following corn analysis. Corn following corn fields were only inventoried in Clay and Wilkin counties; therefore no analysis was conducted for the NW region on a county basis.

Irrigated and Non-irrigated Sandy Soils Region: Corn Following Corn

There were 88 fields that were included in the IRR BMP region corn following corn analysis. Figure 22 details the location, average rate of nitrogen fertilizer and average yield for corn following corn in the IRR BMP region.

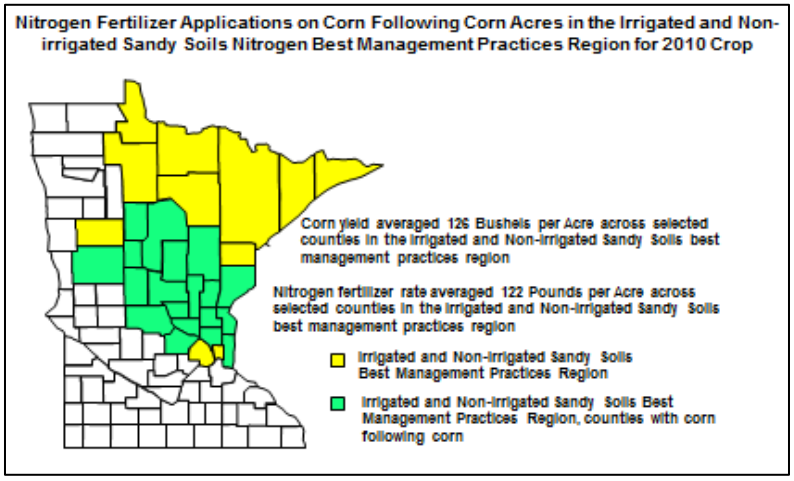

Figure 22. The corn yield averaged 126 bushels per acre and the nitrogen fertilizer rate averaged 122 pounds per acre across the IRR BMP region.

Figure 23 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following corn; the corresponding yields are detailed in red.

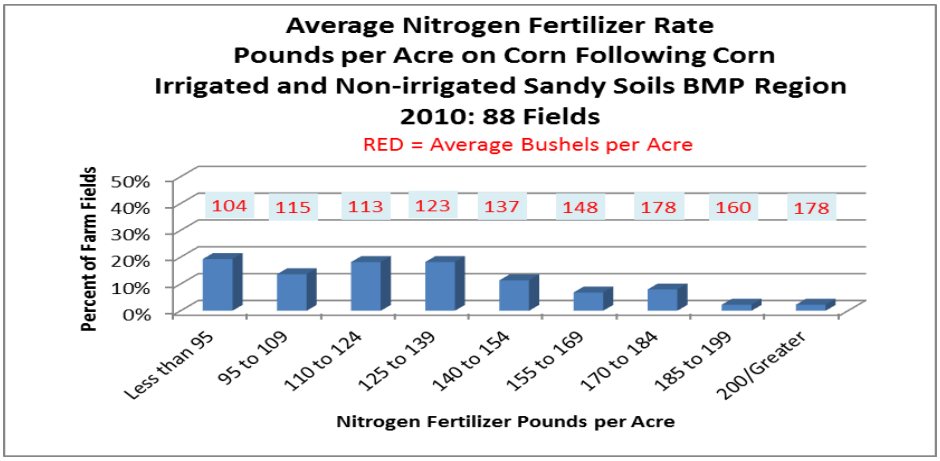

Figure 23. Average nitrogen fertilizer rates and yields on corn following corn in the IRR BMP region for 2010: 88 fields.

Six counties had more than five responses in IRR BMP region. Nitrogen fertilizer rates ranged from an average of 111 pounds per acre in Morrison County to 139 pounds per acre in Isanti County as shown in Table 17.

Table 17. Average county nitrogen fertilizer rates for the IRR BMP region for corn following corn.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Corn			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Aitkin	**	**	**
Anoka	**	**	**
Benton	**	**	**
Cass	**	**	**
Chisago	**	**	**
Crow Wing	**	**	**
Hubbard	**	**	**
Isanti	6	139	123
Kanabec	**	**	**
Mille Lacs	5	134	138
Morrison	13	111	121
Otter Tail	8	119	133
Pine	**	**	**
Sherburne	**	**	**
Stearns	10	124	132
Todd	14	124	121
Wadena	**	**	**
Washington	**	**	**
Wright	**	**	**

****** Less than five responses**.**

Statewide: Corn Following Corn Following Alfalfa

Statewide there were 113 fields that were included in the corn following corn following alfalfa in the statewide region analysis. Figure 24 details the location, average rate of nitrogen fertilizer and average yield for corn following corn following alfalfa throughout the state.

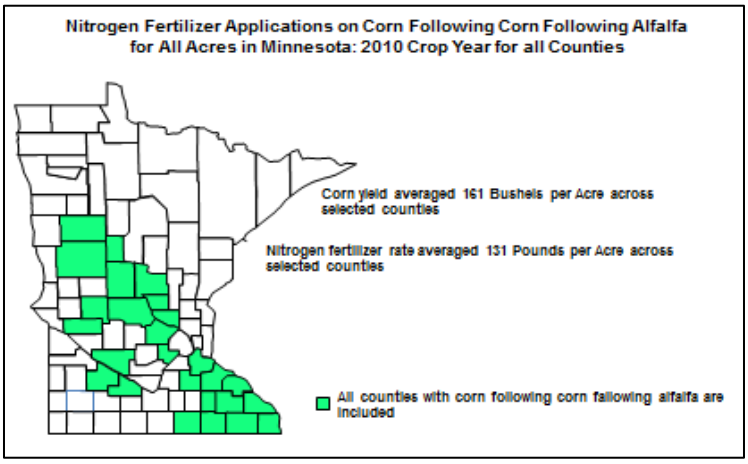

Figure 24. Counties with farmers reporting on corn following corn following alfalfa fields.

Figure 25 details the distribution of nitrogen fertilizer rates statewide for corn following corn following alfalfa fields; the corresponding yields are detailed in red.

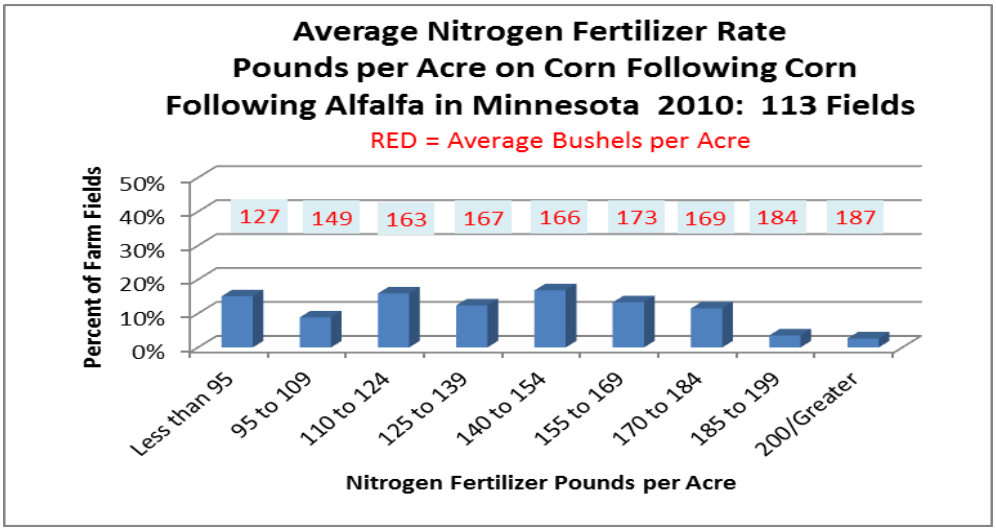

Figure 25. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in Minnesota for 2010: 113 fields.

Southeastern Region: Corn Following Corn Following Alfalfa

There were 84 fields that were included in the SE region corn following corn following alfalfa analysis. Figure 26 details the location, average rate of nitrogen fertilizer and average yield for corn following corn following alfalfa in the SE BMP region.

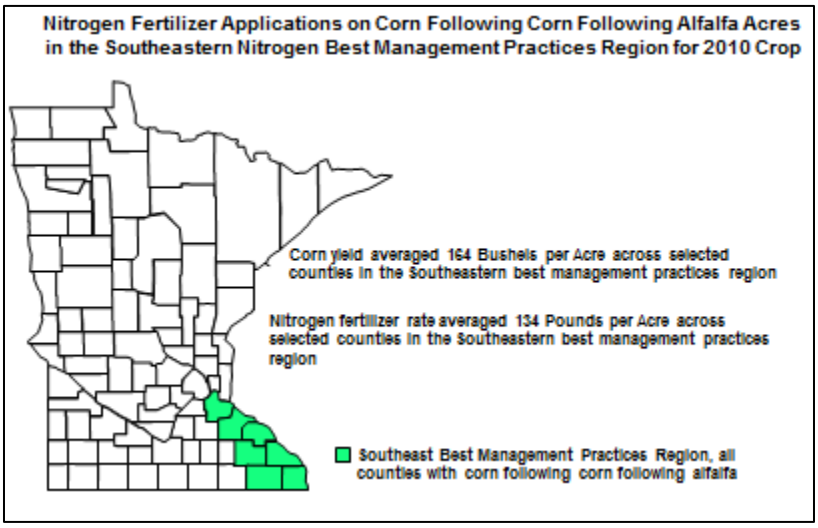

Figure 26. The corn yield averaged 164 bushels per acre and the nitrogen fertilizer rate averaged 134 pounds per acre across the SE BMP region.

Figure 27 details the distribution of nitrogen fertilizer rates across the SE BMP region for corn following corn following alfalfa; the corresponding yields are detailed in red.

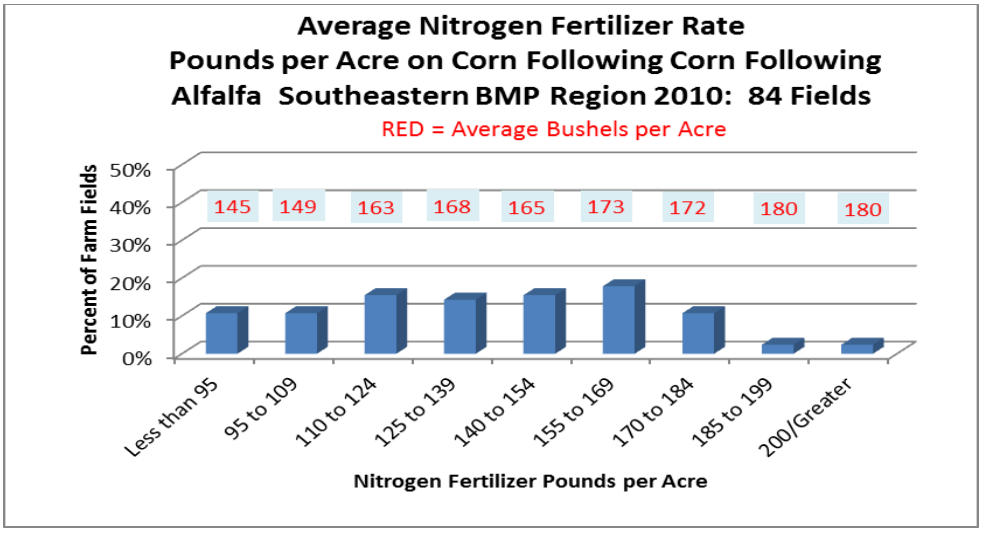

Figure 27. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the SE BMP region for 2010: 84 fields.

Six counties had more than five responses in SE BMP region. Nitrogen fertilizer rates ranged from an average of 127 pounds per acre in Goodhue County to 141 pounds per acre in Houston County as shown in Table 18.

Table 18. Average county nitrogen fertilizer rates for the SE BMP region for corn following corn following alfalfa.

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Corn Following Alfalfa			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Dakota	**	**	**
Fillmore	19	137	171
Goodhue	15	127	160
Houston	14	141	168
Olmsted	10	129	163
Wabasha	10	139	157
Winona	15	133	162

****** Less than five responses**.**

South Central Region: Corn Following Corn Following Alfalfa

There were 7 fields that were included in the SC BMP region corn following corn following alfalfa analysis. Figure 28 details the location, average rate of nitrogen fertilizer and average yield for corn following corn following alfalfa in the SC BMP region.

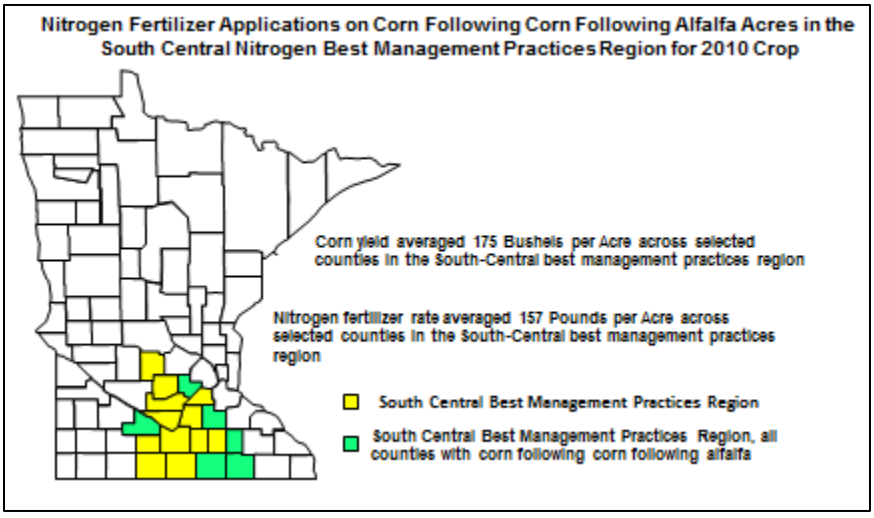

Figure 28. The corn yield averaged 175 bushels per acre and the nitrogen fertilizer rate averaged 157 pounds per acre across the SC BMP region.

Figure 29 details the distribution of nitrogen fertilizer rates across the SC BMP region for corn following corn following alfalfa; the corresponding yields are detailed in red.

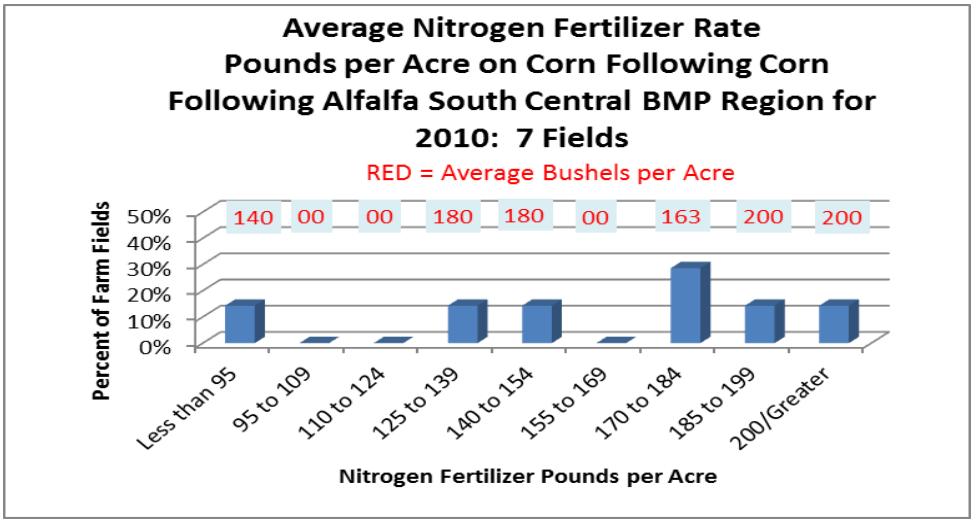

Figure 29. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the SC BMP region for 2010: 7 fields.

No counties had more than five responses in SC BMP region.

Southwestern and West Central Region: Corn Following Corn Following Alfalfa

There were five fields that were included in the SW region corn following corn following alfalfa analysis. Figure 30 details the location, average rate of nitrogen fertilizer and average yield for corn following corn following alfalfa in the SW BMP region.

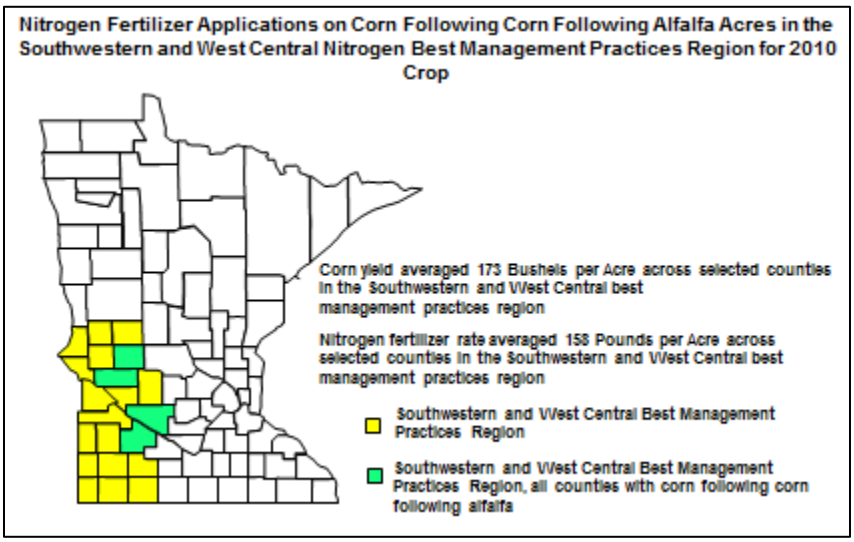

Figure 30. The corn yield averaged 173 bushels per acre and the nitrogen fertilizer rate averaged 158 pounds per acre across the SW BMP region.

Figure 31 details the distribution of nitrogen fertilizer rates across the SW BMP region for corn following corn following alfalfa; the corresponding yields are detailed in red.

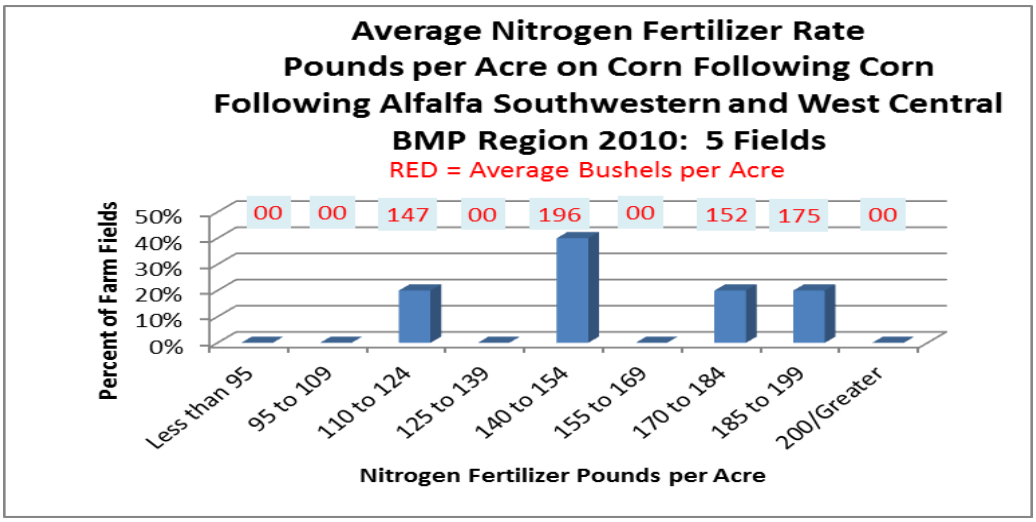

Figure 31. Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the SW BMP region for 2010: five fields.

No counties had more than five responses in SW BMP region.

Northwestern Region: Corn Following Corn Following Alfalfa

There were no fields that were included in the NW region corn following corn following alfalfa analysis; therefore no analysis was conducted for the NW region.

Irrigated and Non-irrigated Sandy Soils Region: Corn Following Corn Following Alfalfa

There were 17 fields that were included in the IRR BMP region corn following corn following alfalfa analysis. Figure 32 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following corn following alfalfa

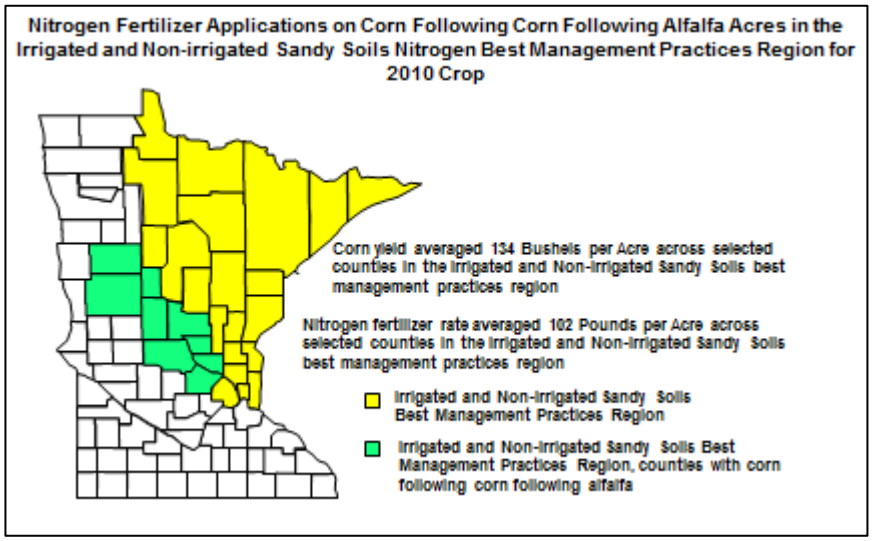

Figure 32. The corn yield averaged 134 bushels per acre and the nitrogen fertilizer rate averaged 102 pounds per acre across the IRR BMP region.

Figure 33 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following corn following alfalfa; the corresponding yields are detailed in red.

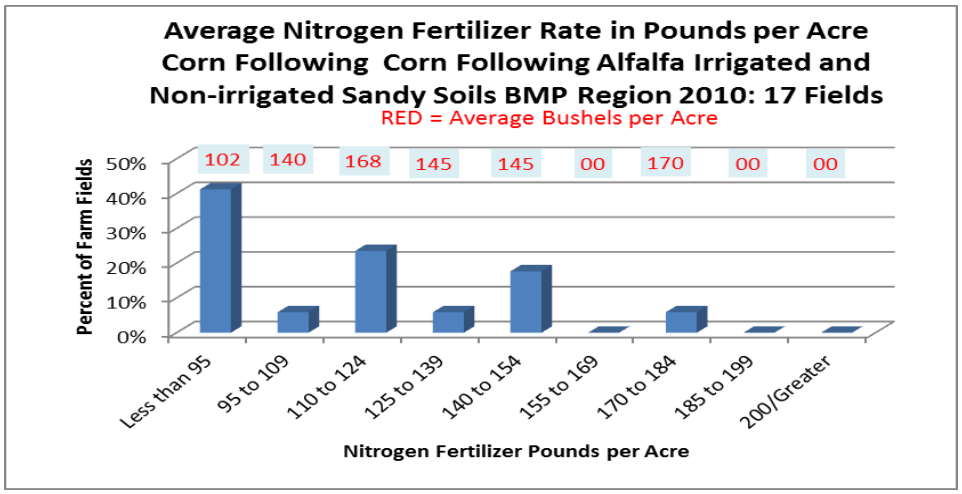

Figure 33.Average nitrogen fertilizer rates and yields on corn following corn following alfalfa in the IRR BMP region for 2010: 17 fields.

Only Todd County had more than five responses in the IRR BMP region. Nitrogen fertilizer rates averaged 134 pounds per acre as shown in Table 19.

Table 19. Average county nitrogen fertilizer rates for the IRR BMP region for corn following corn following alfalfa.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Corn Following Alfalfa			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Becker	**	**	**
Benton	**	**	**
Morrison	**	**	**
Otter Tail	**	**	**
Sherburne	**	**	**
Stearns	6	134	155
Todd	**	**	**
Wadena	**	**	**
Wright	**	**	**

****** Less than five responses**.**

Statewide: Corn Following Alfalfa

Statewide six percent of the fields reported were corn following alfalfa. Figure 34 details the counties where farmers reported on fields with corn following alfalfa. There were 186 corn following alfalfa fields surveyed across Minnesota.

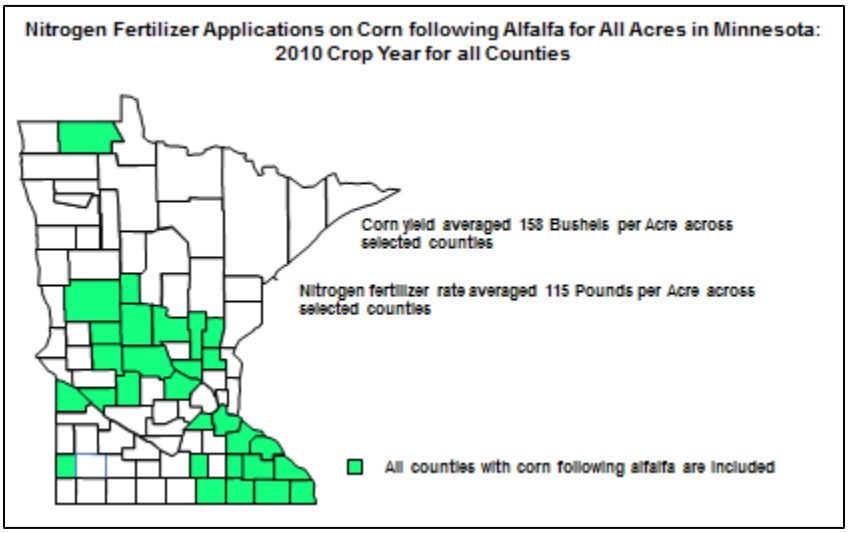

Figure 34. Counties with farmers reporting on corn following alfalfa fields.

Figure 35 details the distribution of average nitrogen fertilizer rates across Minnesota for corn following alfalfa; the corresponding yields are detailed in red.

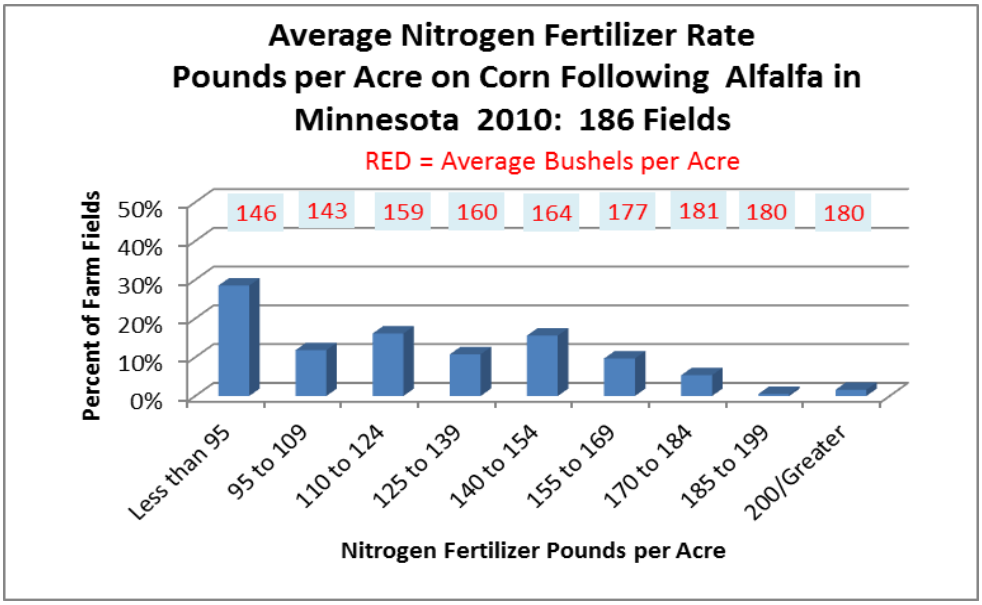

Figure 35. Average nitrogen fertilizer rates and yields on corn following alfalfa in Minnesota for 2010: 186 fields.

Southeastern Region: Corn Following Alfalfa

There were 139 fields that were included in the SE region corn following alfalfa analysis. Figure 36 details the location, average rate of nitrogen fertilizer and average yield for corn following alfalfa in the SE BMP region.

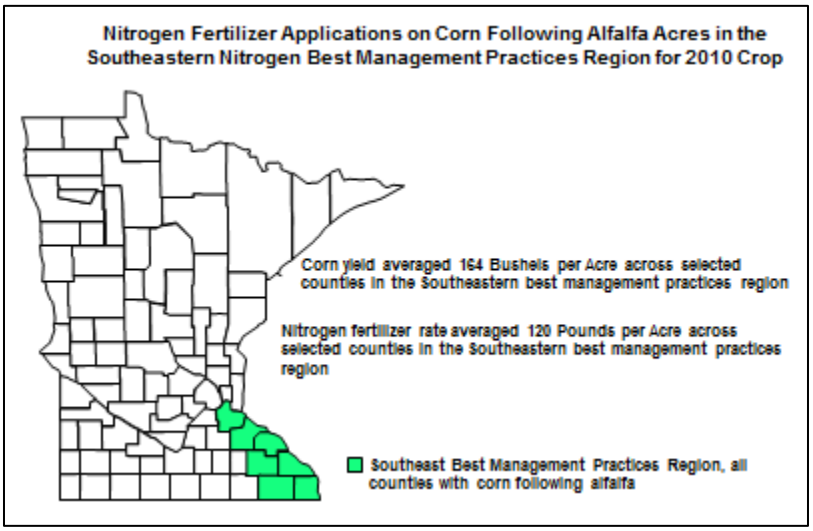

Figure 36. The corn yield averaged 164 bushels per acre and the nitrogen fertilizer rate averaged 120 pounds per acre across the SE BMP region.

Figure 37 details the distribution of nitrogen fertilizer rates across the SE BMP region for corn following alfalfa; the corresponding yields are detailed in red.

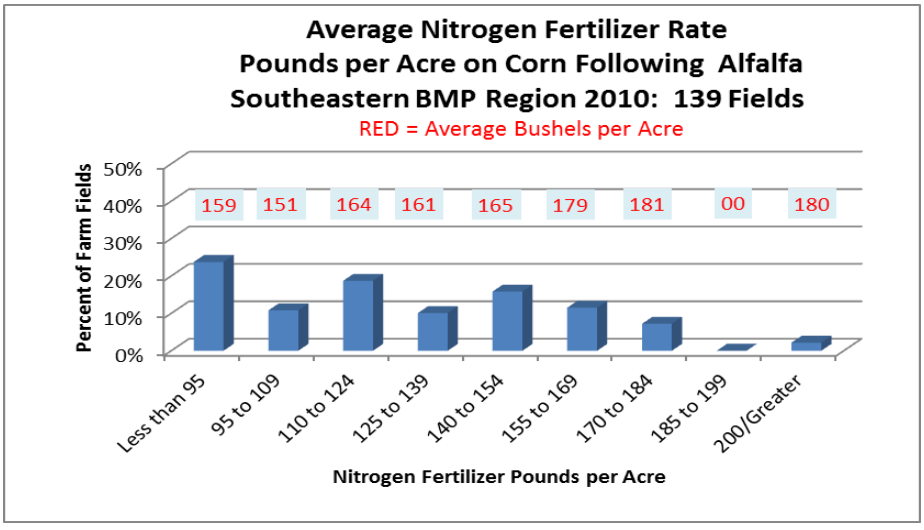

Figure 37. Average nitrogen fertilizer rates and yields on corn following alfalfa in the SE BMP region for 2010:139 fields.

Six counties had more than five responses in the SE BMP region. Nitrogen fertilizer rates ranged from an average of 112 pounds per acre in Winona County to 127 pounds per acre in Goodhue and Houston Counties as shown in Table 20.

Table 20. Average county nitrogen fertilizer rates for the SE BMP region for corn following alfalfa.

Average County Nitrogen Fertilizer Rates for the SE BMP Region for Corn Following Alfalfa			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Dakota	**	**	**
Fillmore	33	116	176
Goodhue	17	127	167
Houston	25	127	163
Olmsted	19	122	158
Wabasha	21	117	165
Winona	20	112	150

****** Less than five responses**.**

South Central Region: Corn Following Alfalfa

There were 8 fields that were included in the SC BMP region corn following alfalfa analysis. Figure 38 details the location, average rate of nitrogen fertilizer and average yield for corn following alfalfa in the SC BMP region.

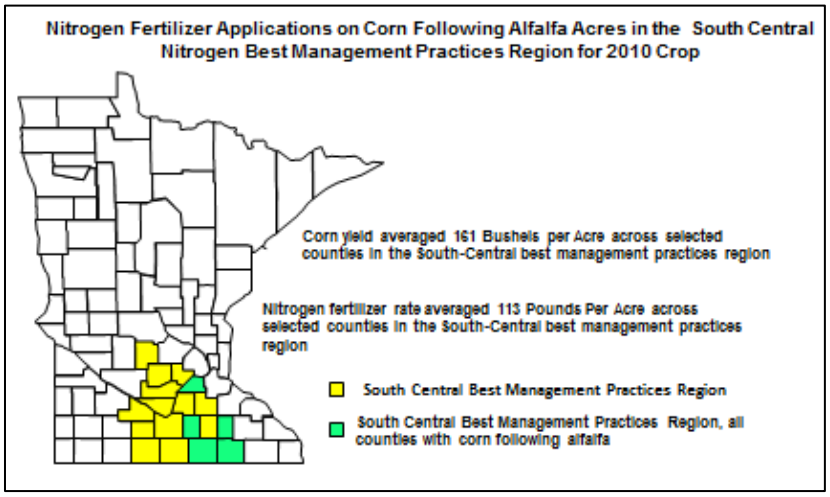

Figure 38. The corn yield averaged 161 bushels per acre and the nitrogen fertilizer rate averaged 113 pounds per acre across the SC BMP region.

Figure 39 details the distribution of nitrogen fertilizer rates across the SC BMP region for corn following alfalfa; the corresponding yields are detailed in red.

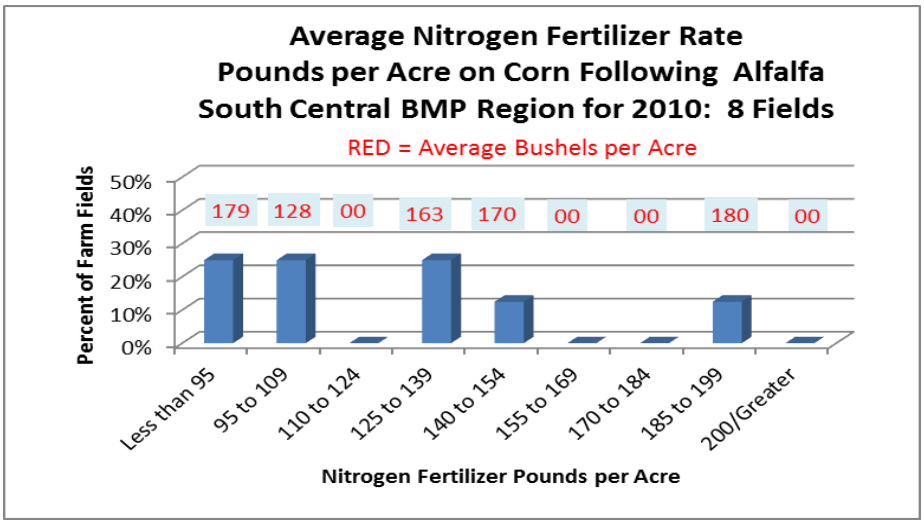

Figure 39. Average nitrogen fertilizer rates and yields on corn following alfalfa in the SC BMP region for 2010: 8 fields.

No counties had more than five responses in SC BMP region.

Southwestern and West Central Region: Corn Following Alfalfa

There were11 fields that were included in the SW region corn following alfalfa analysis. Figure 40 details the location, average rate of nitrogen fertilizer and average yield for corn following alfalfa in the SW BMP region.

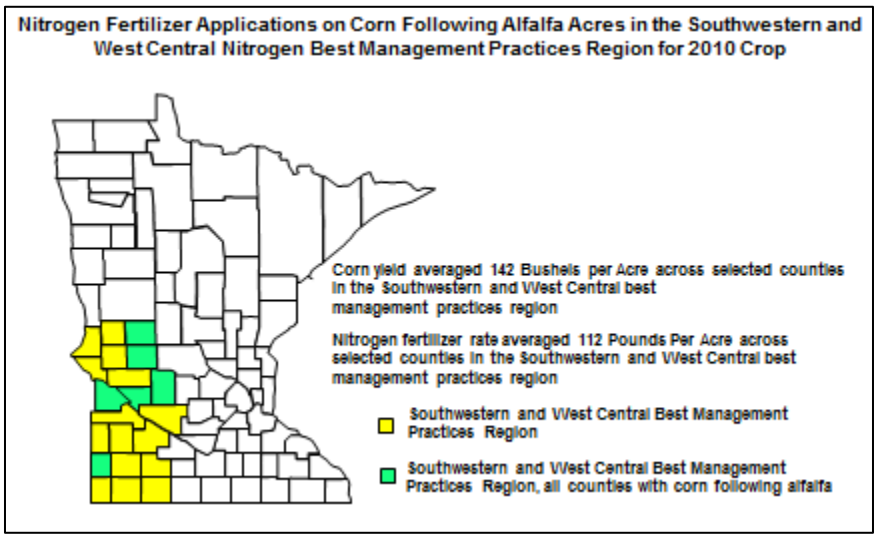

Figure 40. The corn yield averaged 142 bushels per acre and the nitrogen fertilizer rate averaged 112 pounds per acre across the SW BMP region.

Figure 41 details the distribution of nitrogen fertilizer rates across the SW BMP region for corn following alfalfa; the corresponding yields are detailed in red.

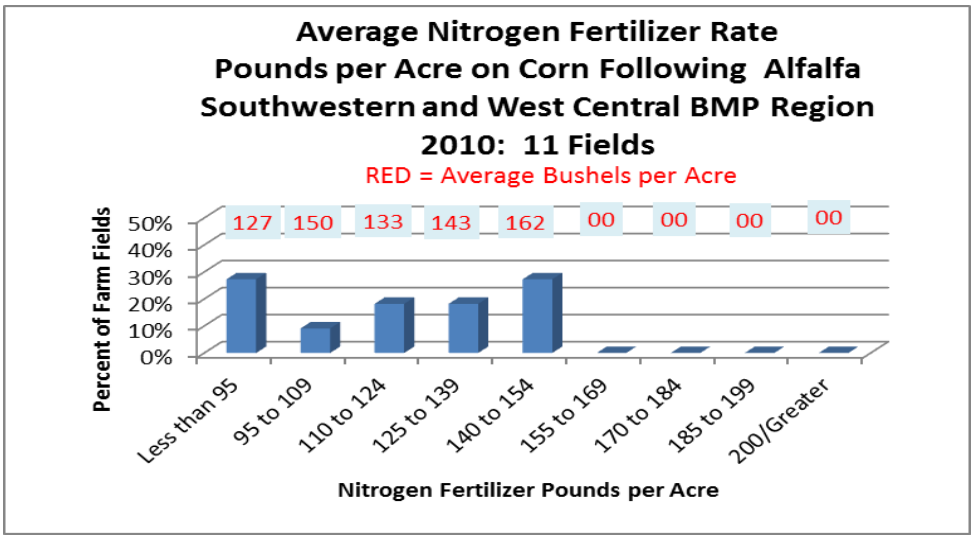

Figure 41. Average nitrogen fertilizer rates and yields on corn following alfalfa in the SW BMP region for 2010: 11 fields.

No counties had more than five responses in SW BMP region.

Northwestern Region: Corn Following Alfalfa

There were less than five fields that were included in the NW region corn following alfalfa analysis. Corns following alfalfa fields were only inventoried in Roseau County; therefore no analysis was conducted for the NW region on a county basis.

Irrigated and Non-irrigated Sandy Soils Region: Corn Following Alfalfa

There were 27 fields that were included in the IRR BMP region corn following alfalfa analysis. Figure 42 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following alfalfa.

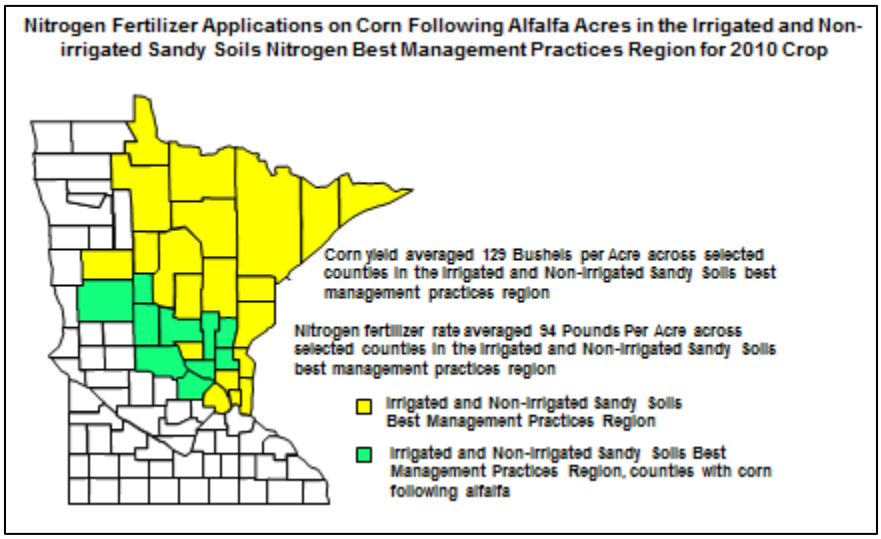

Figure 42. The corn yield averaged 129 bushels per acre and the nitrogen fertilizer rate averaged 94 pounds per acre across the IRR BMP region.

Figure 43 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following alfalfa; the corresponding yields are detailed in red.

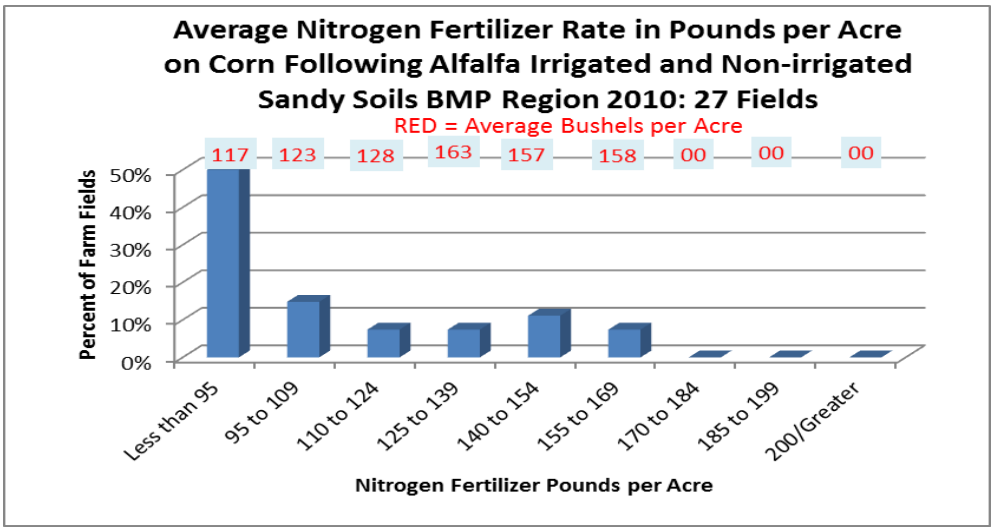

Figure 43. Average nitrogen fertilizer rates and yields on corn following alfalfa in the IRR BMP region for 2010: 27 fields.

Two counties had more than five responses in the IRR BMP region. Nitrogen fertilizer rates ranged from an average of 66 pounds per acre in Otter Tail County to 94 pounds per acre in Todd County as shown in Table 21.

Table 21.Average county nitrogen fertilizer rates for the IRR BMP region for corn following alfalfa.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Alfalfa			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Isanti	**	**	**
Kanabec	**	**	**
Mille Lacs	**	**	**
Morrison	**	**	**
Otter Tail	5	66	108
Sherburne	**	**	**
Stearns	**	**	**
Todd	7	94	126
Wadena	**	**	**
Wright	**	**	**

** Less than five responses.

Statewide: Corn Following Small Grains

Statewide two percent of the fields reported was corn following small grains fields. Figure 44 details the counties where farmers reported on fields with corn following small grains. There were 79 corn following small grains fields surveyed across Minnesota.

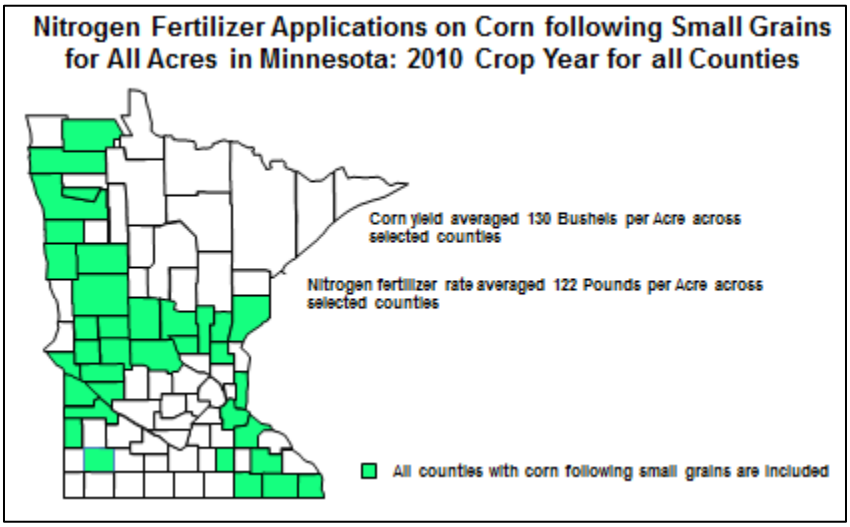

Figure 44. Counties with farmers reporting on corn following small grains fields.

Figure 45 details the distribution of average nitrogen fertilizer rates across Minnesota for corn following small grains; the corresponding yields are detailed in red.

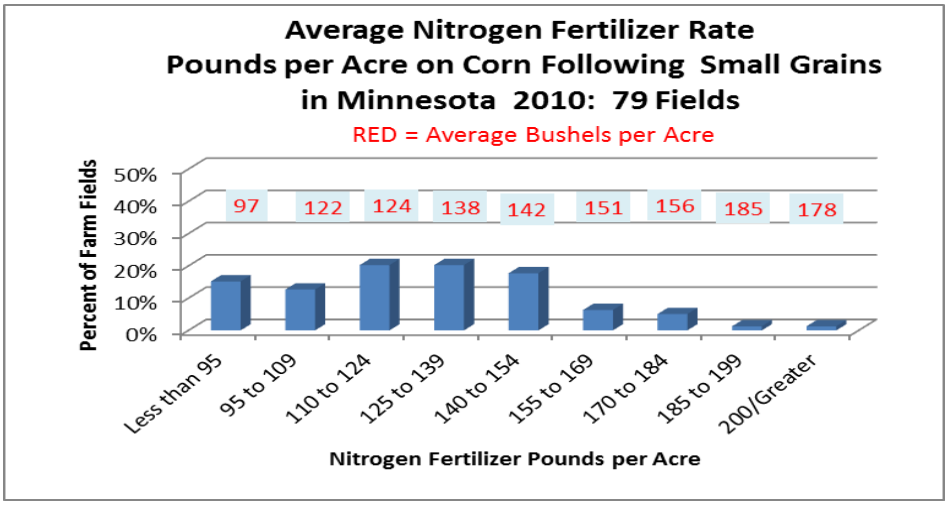

Figure 45. Average nitrogen fertilizer rates and yields on corn following small grains in Minnesota for 2010: 79 fields.

Southeastern Region: Corn Following Small grains

There were 10 fields that were included in the SE region corn following small grains analysis. Figure 46 details the location, average rate of nitrogen fertilizer and average yield for corn following small grains in the SE BMP region.

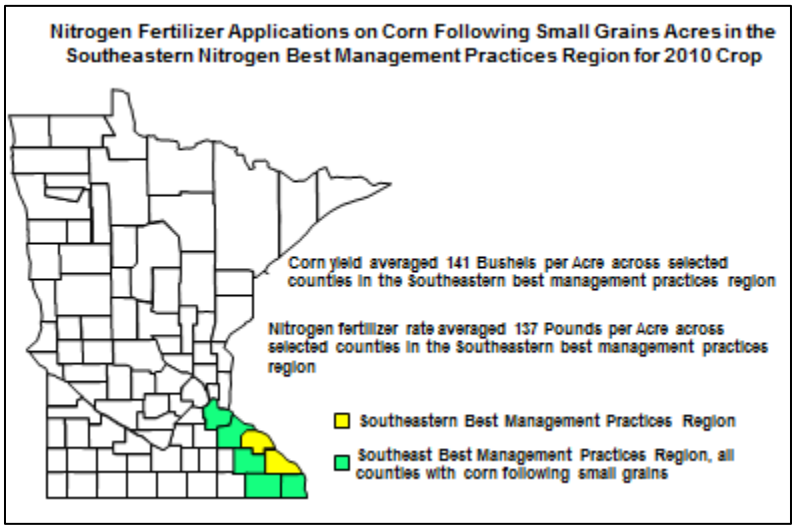

Figure 46. The corn yield averaged 141 bushels per acre and the nitrogen fertilizer rate averaged 137 pounds per acre across the SE BMP region.

Figure 47 details the distribution of nitrogen fertilizer rates across the SE BMP region for corn following small grains; the corresponding yields are detailed in red.

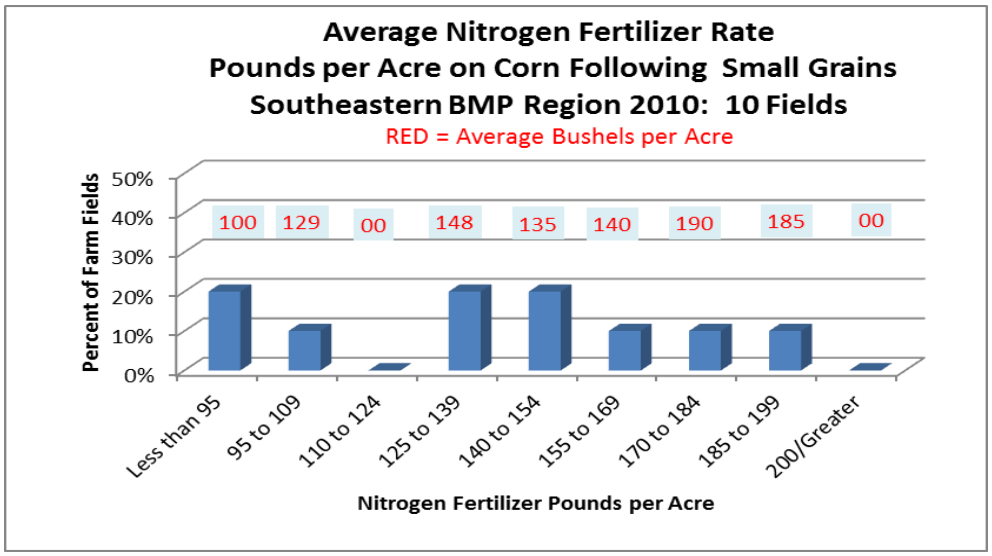

Figure 47. Average nitrogen fertilizer rates and yields on corn following small grains in the SE BMP region for 2010: 10 fields.

No counties had more than five responses in SE BMP region.

South Central Region: Corn Following Small Grains

There were less than five fields that were included in the corn following small grains in the NW region analysis. Corn following small grains fields were only inventoried in Mower and Steele Counties; therefore no analysis was conducted for the NW region.

Southwestern and West Central Region: Corn Following Small Grains

There were 22 fields that were included in the SW region corn following small grains analysis. Figure 48 details the location, average rate of nitrogen fertilizer and average yield for corn following small grains in the SW BMP region.

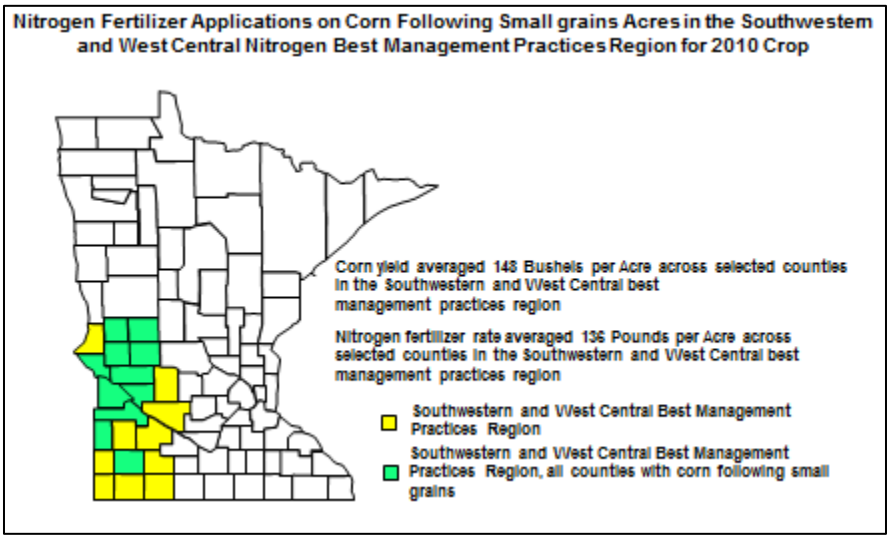

Figure 48. The corn yield averaged 148 bushels per acre and the nitrogen fertilizer rate averaged 136 pounds per acre across the SW BMP region.

Figure 49 details the distribution of nitrogen fertilizer rates across the SW BMP region for corn following small grains; the corresponding yields are detailed in red.

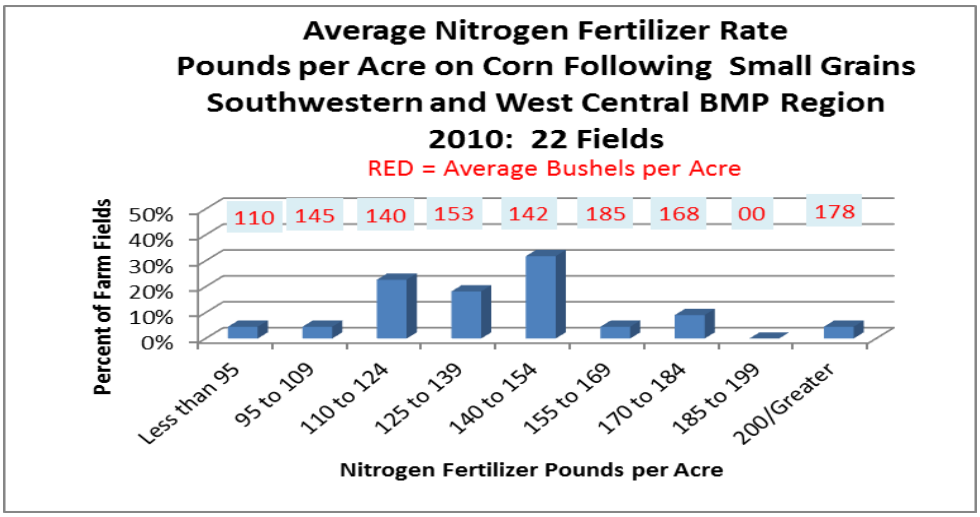

Figure 49. Average nitrogen fertilizer rates and yields on corn following small grains in the SW BMP region for 2010: 22 fields.

Only Lincoln County had more than five responses in the SW BMP region. Nitrogen fertilizer rates averaged 152 pounds per acre as shown in Table 22.

Table 22. Average county nitrogen fertilizer rates for the SW BMP region for corn following small grains.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for corn following small grains			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Big Stone	**	**	**
Chippewa	**	**	**
Douglas	**	**	**
Grant	**	**	**
Lac qui Parle	**	**	**
Lincoln	5	152	141
Murray	**	**	**
Pope	**	**	**
Stevens	**	**	**
Swift	**	**	**
Yellow Medicine	**	**	**

Northwestern Region: Corn Following Small Grains

There were 14 fields that were included in the NW region corn following small grains analysis. Figure 50 details the location, average rate of nitrogen fertilizer and average yield for corn following small grains in the NW BMP region.

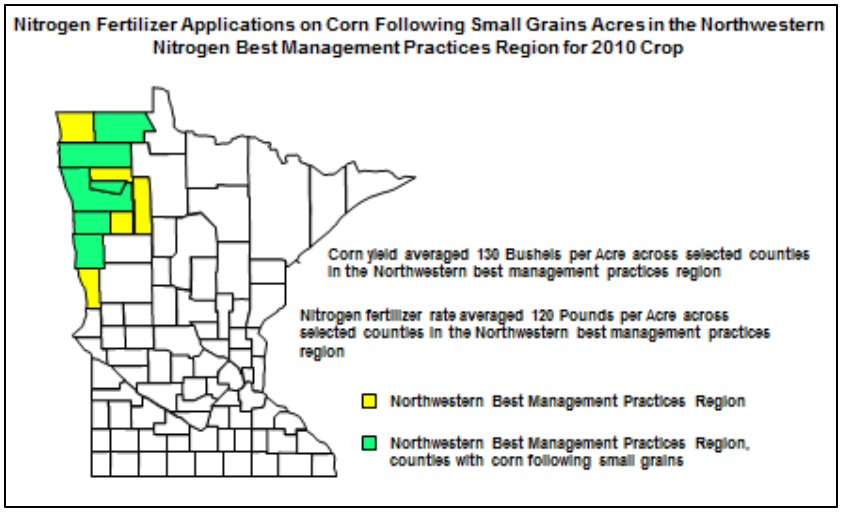

Figure 50. The corn yield averaged 130 bushels per acre and the nitrogen fertilizer rate averaged 120 pounds per acre across the NW BMP region.

Figure 51 details the distribution of nitrogen fertilizer rates across the NW BMP region for corn following small grains; the corresponding yields are detailed in red.

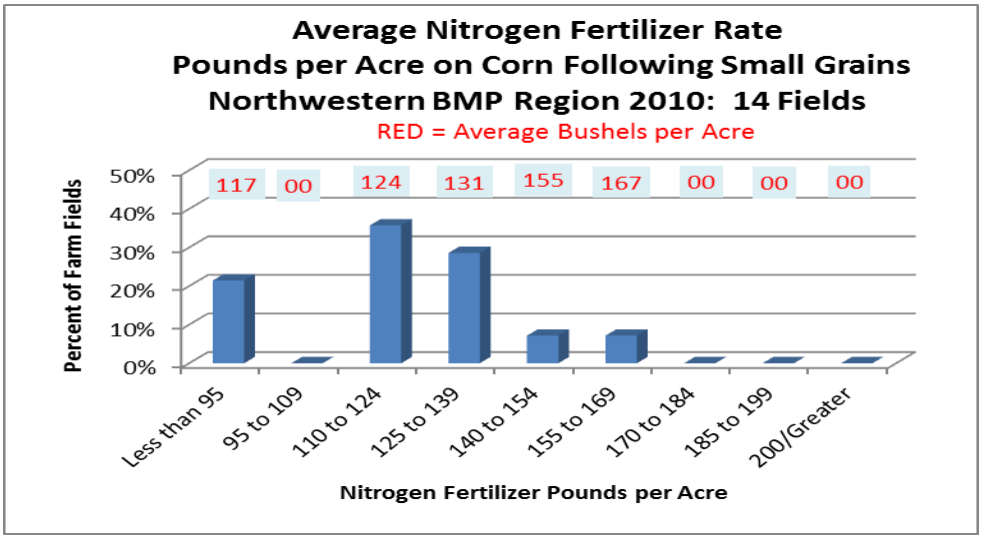

Figure 51. Average nitrogen fertilizer rates and yields on corn following small grains in the NW BMP region for 2010: 14fields.

Only Clay County had more than five responses in the NW BMP region. Nitrogen fertilizer rates averaged 115 pounds per acre as shown in Table 23.

Table 23. Average county nitrogen fertilizer rates for the NW BMP region for corn following small grains.

Average County Nitrogen Fertilizer Rates for the NW BMP Region for Corn Following Small Grains			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Clay	6	115	126
Marshall	**	**	**
Norman	**	**	**
Polk	**	**	**
Red Lake	**	**	**
Roseau	**	**	**

****** Less than five responses**.**

Irrigated and Non-irrigated Sandy Soils Region: Corn Following Small Grains

There were 31 fields that were included in the IRR BMP region corn following small grains analysis. Figure 52 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following small grains.

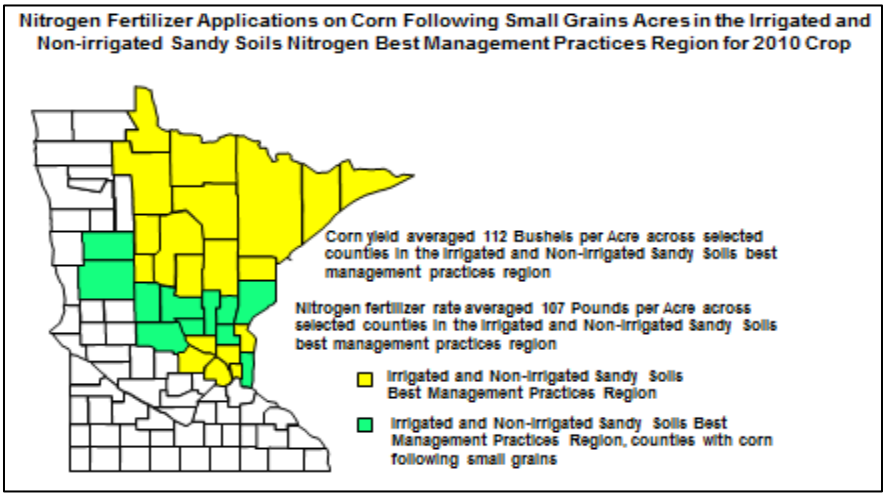

Figure 52. The corn yield averaged 112 bushels per acre and the nitrogen fertilizer rate averaged 107 pounds per acre across the IRR BMP region.

Figure 53 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following small grains; the corresponding yields are detailed in red.

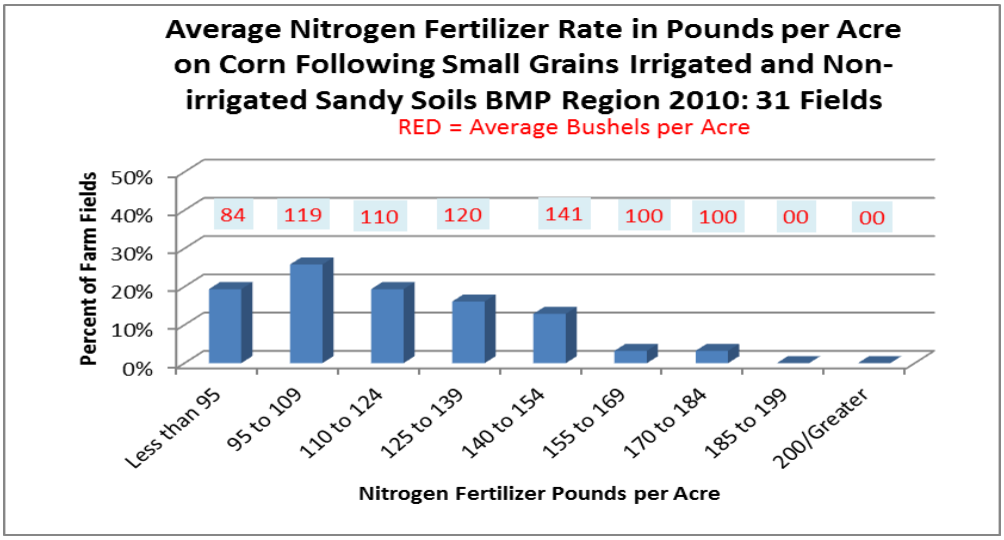

Figure 53. Average nitrogen fertilizer rates and yields on corn following small grains in the IRR BMP region for 2010: 31 fields.

Only Otter Tail County had more than five responses in the IRR BMP region. Nitrogen fertilizer rates averaged 108 pounds per acre as shown in Table 24.

Table 24. Average county nitrogen fertilizer rates for the IRR BMP region for corn following small grains.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Small Grains			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Becker	**	**	**
Benton	**	**	**
Isanti	**	**	**
Kanabec	**	**	**
Mille Lacs	**	**	**
Morrison	**	**	**
Otter Tail	11	108	115
Pine	**	**	**
Stearns	**	**	**
Todd	**	**	**
Washington	**	**	**

****** Less than five responses**.**

Statewide: Corn Following Other Crops

Statewide, three percent of the fields reported were corn following other crops. Figure 54 details the counties where farmers reported on fields with corn following other crops. There were 88 corn following other crops fields surveyed across Minnesota.

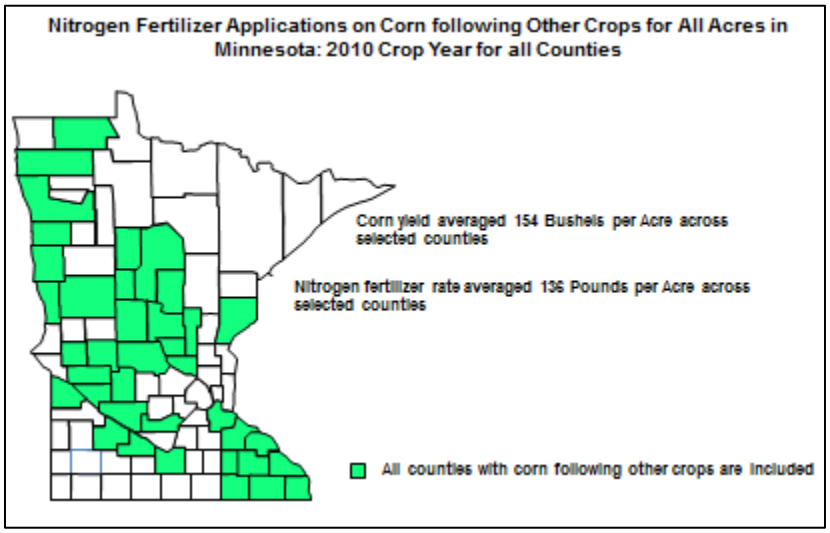

Figure 54. Counties with farmers reporting on corn following other crops fields.

Figure 55 details the distribution of average nitrogen fertilizer rates across Minnesota for that corn following other crops fields; the corresponding yields are detailed in red.

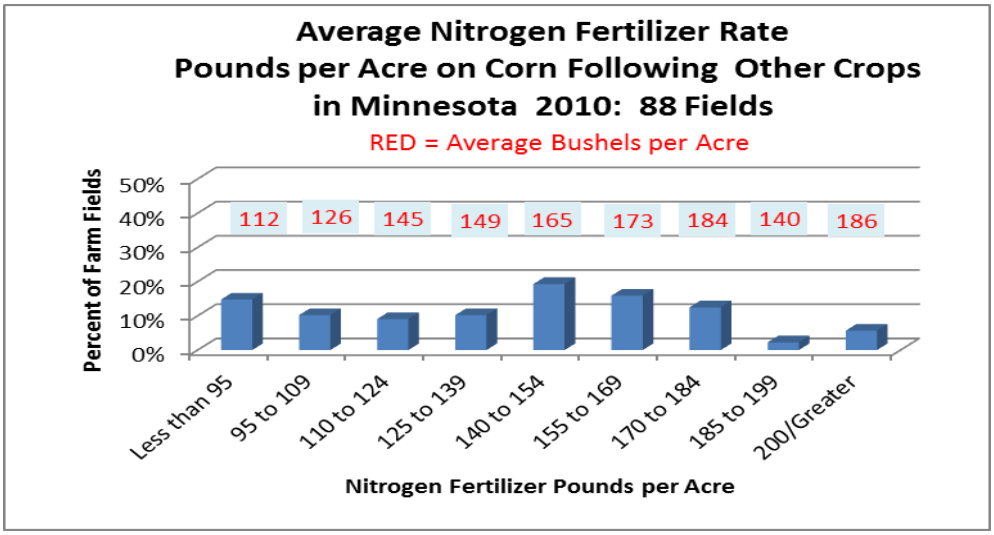

Figure 55. Average nitrogen fertilizer rates and yields on corn following other crops in Minnesota for 2010: 88 fields.

Southeastern Region: Corn Following Other Crops

There were 21 fields that were included in the SE region corn following other crops analysis. Figure 56 details the location, average rate of nitrogen fertilizer and average yield for corn following other crops in the SE BMP region.

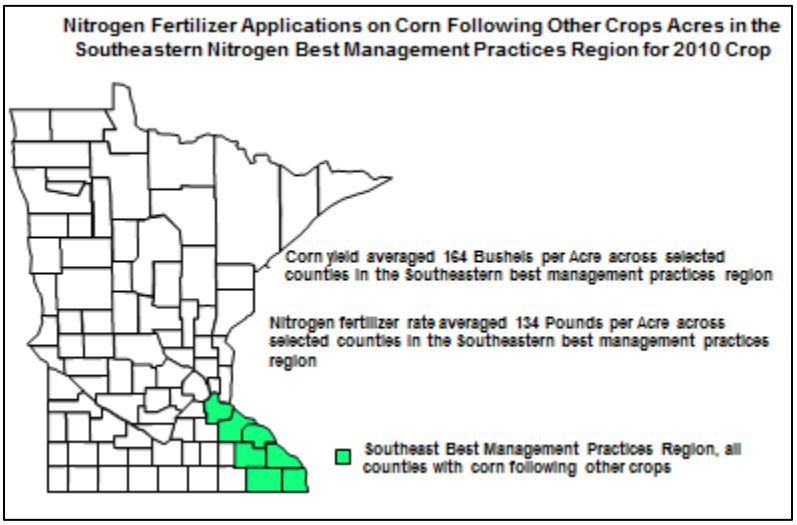

Figure 56. The corn yield averaged 164 bushels per acre and the nitrogen fertilizer rate averaged 134 pounds per acre across the SE BMP region.

Figure 57 details the distribution of nitrogen fertilizer rates across the SE BMP region for corn following other crops; the corresponding yields are detailed in red.

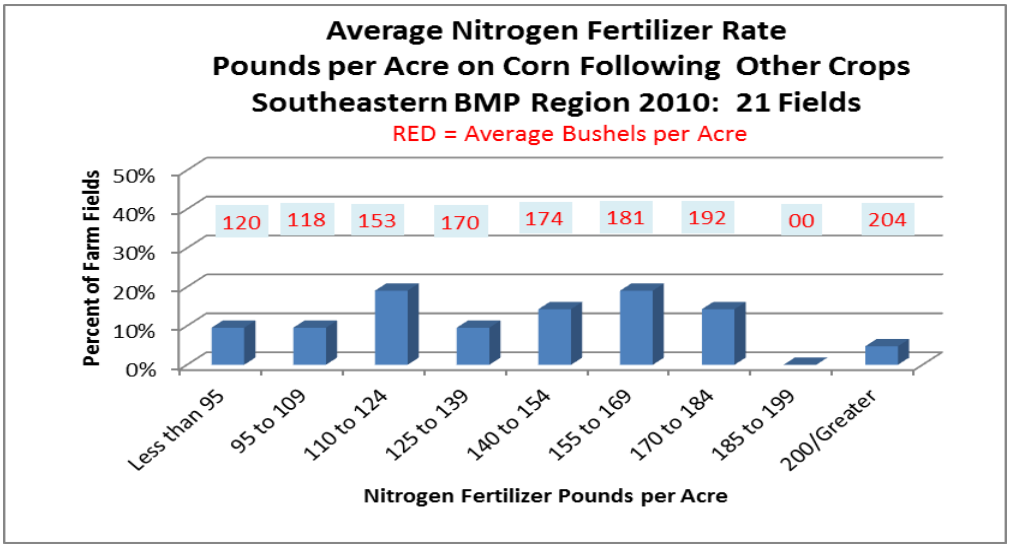

Figure 57. Average nitrogen fertilizer rates and yields on corn following other crops in the SE BMP region for 2010: 21 fields.

Only Fillmore County had more than five responses in the SE BMP region. Nitrogen fertilizer rates averaged 166 pounds per acre as shown in Table 25.

Table 25. Average county nitrogen fertilizer rates for SE BMP region for corn following other crops.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Other Crops			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Dakota	**	**	**
Fillmore	5	166	193
Goodhue	**	**	**
Houston	**	**	**
Olmsted	**	**	**
Wabasha	**	**	**
Winona	**	**	**

****** Less than five responses**.**

South Central Region: Corn Following Other Crops

There were 8 fields that were included in the SC BMP region corn following other crops analysis. Figure 58 details the location, average rate of nitrogen fertilizer and average yield for corn following other crops in the SC BMP region.

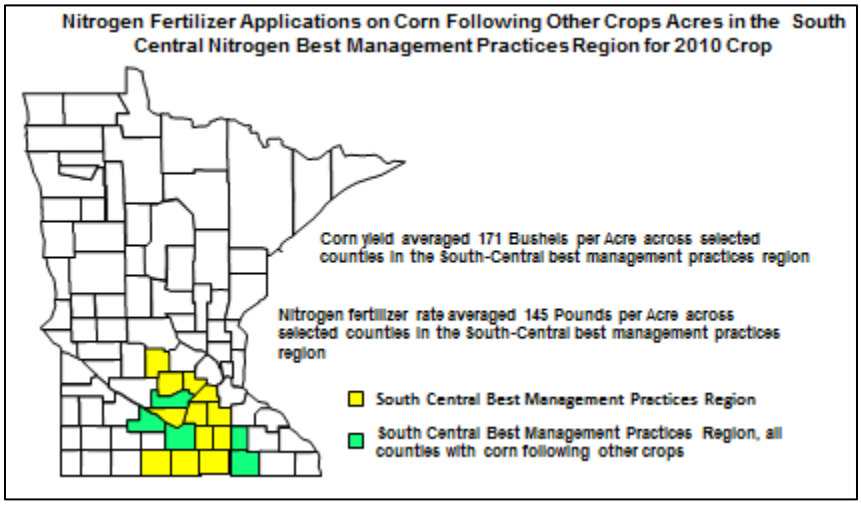

Figure 58. The corn yield averaged 171 bushels per acre and the nitrogen fertilizer rate averaged 145 pounds per acre across the SC BMP region.

Figure 59 details the distribution of nitrogen fertilizer rates across the SC BMP region for corn following other crops; the corresponding yields are detailed in red.

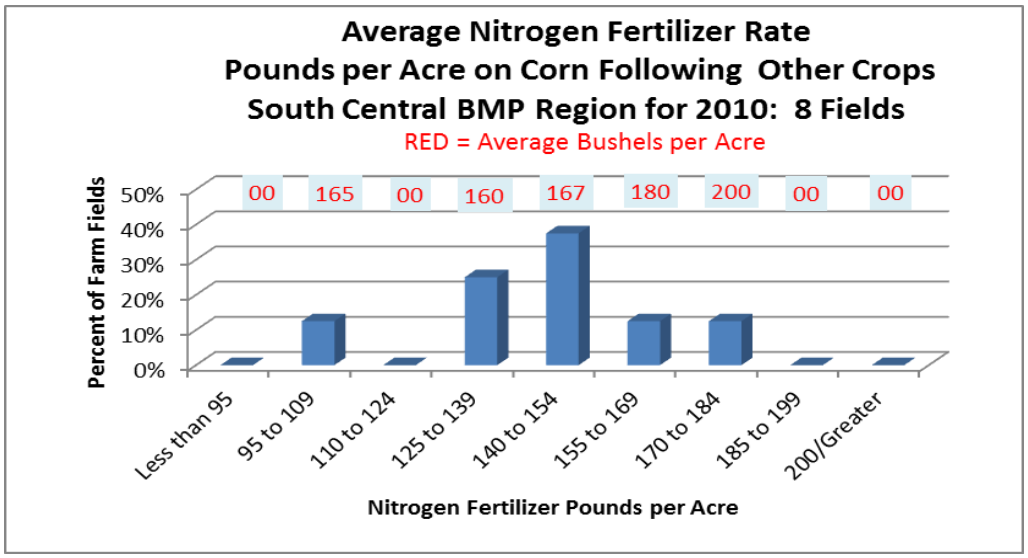

Figure 59. Average nitrogen fertilizer rates and yields on corn following other crops in the SC BMP region for 2010: 8 fields.

No counties had more than five responses in SC BMP region.

Southwestern and West Central Region: Corn Following Other Crops

There were 21 fields that were included in the SW region corn following other crops analysis. Figure 60 details the location, average rate of nitrogen fertilizer and average yield for corn following other crops in the SW BMP region.

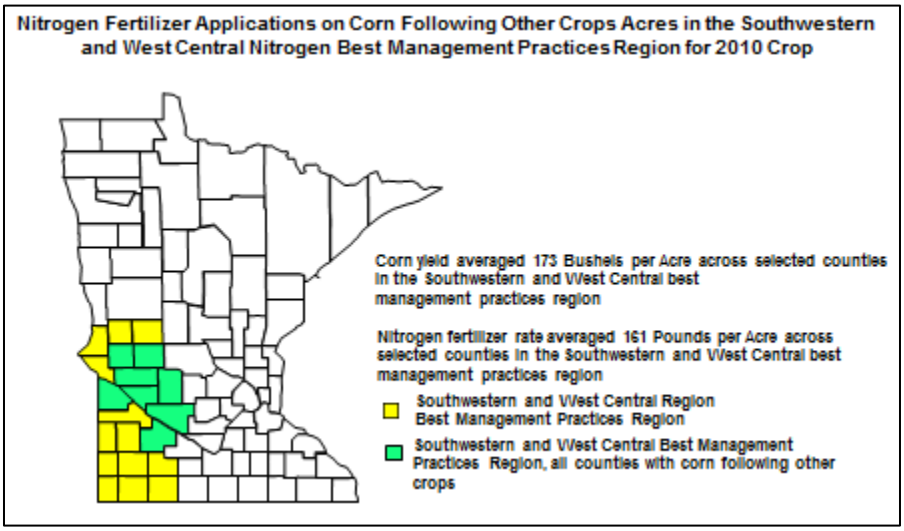

Figure 60. The corn yield averaged 173 bushels per acre and the nitrogen fertilizer rate averaged 161 pounds per acre across the SW BMP region.

Figure 61 details the distribution of nitrogen fertilizer rates across the SW BMP region for corn following other crops; the corresponding yields are detailed in red.

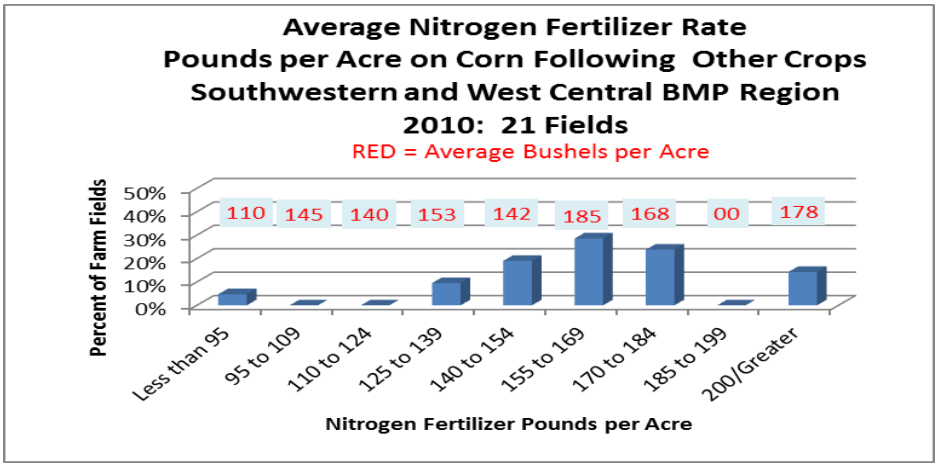

Figure 61. Average nitrogen fertilizer rates and yields on corn following other crops in the SW BMP region for 2010: 21 fields.

Two counties had more than five responses in the SE BMP region. Nitrogen fertilizer rates ranged from an average of 161 pounds per acre in Chippewa County to 165 pounds per acre in Renville County as shown in Table 26.

Table 26. Average county nitrogen fertilizer rates for the SW BMP region for corn following other crops.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for corn following other crops			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Chippewa	5	161	172
Kandiyohi	**	**	**
Lac qui Parle	**	**	**
Pope	**	**	**
Redwood	**	**	**
Renville	5	165	181
Stevens	**	**	**
Swift	**	**	**

****** Less than five responses**.**

Northwestern Region: Corn Following Other Crops

There were 13 fields that were included in the NW region corn following other crops analysis. Figure 62 details the location, average rate of nitrogen fertilizer and average yield for corn following other crops in the NW BMP region.

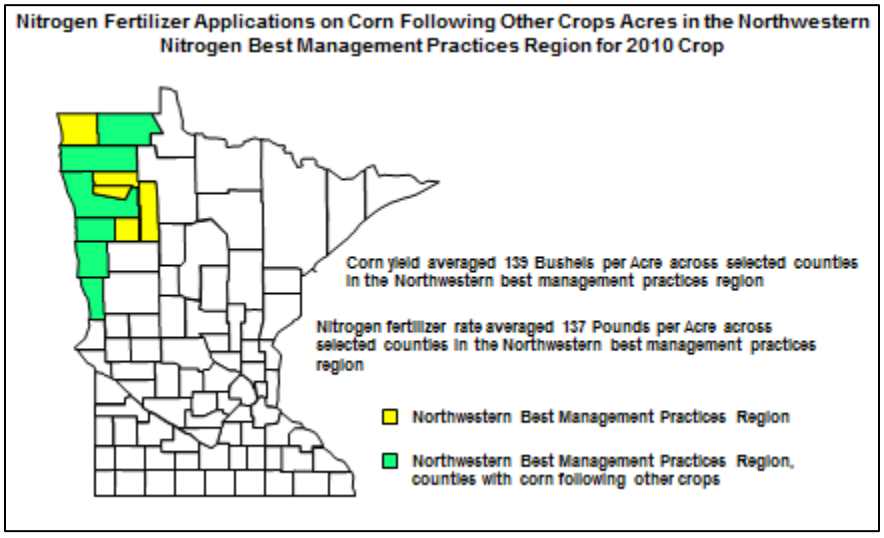

Figure 62. The corn yield averaged 139 bushels per acre and the nitrogen fertilizer rate averaged 137 pounds per acre across the NW BMP region.

Figure 63 details the distribution of nitrogen fertilizer rates across the NW BMP region for corn following other crops; the corresponding yields are detailed in red.

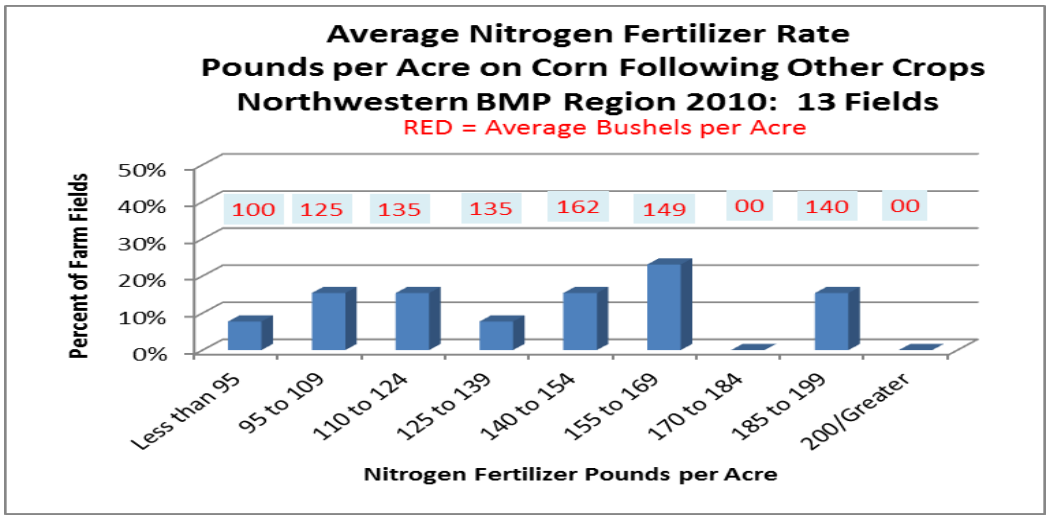

Figure 63. Average nitrogen fertilizer rates and yields on corn following other crops in the NW BMP region for 2010: 13 fields.

Only Norman County had more than five responses in the NW BMP region. Nitrogen fertilizer rates averaged 155 pounds per acre as shown in Table 27.

Table 27. Average county nitrogen fertilizer rates for the NW BMP region for corn following other crops.

Average County Nitrogen Fertilizer Rates for the NW BMP Region for Corn Following Other Crops			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Clay	**	**	**
Marshall	**	**	**
Norman	5	155	154
Polk	**	**	**
Roseau	**	**	**
Wilkin	**	**	**

****** Less than five responses**.**

Irrigated and Non-irrigated Sandy Soils Region: Corn Following Other Crops

There were 25 fields that were included in the IRR BMP region corn following other crops analysis. Figure 64 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following other crops.

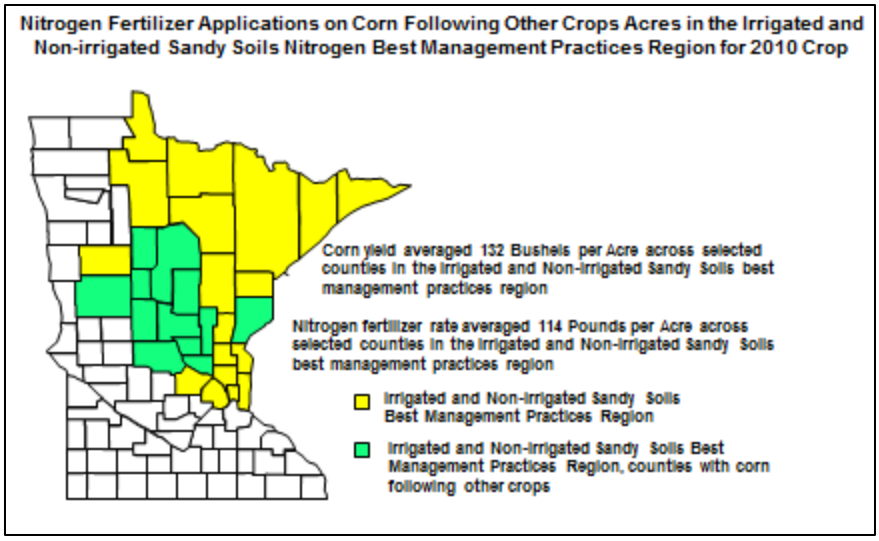

Figure 64. The corn yield averaged 132 bushels per acre and the nitrogen fertilizer rate averaged 114 pounds per acre across the IRR BMP region.

Figure 65 details the distribution of nitrogen fertilizer rates across the IRR BMP region for corn following other crops; the corresponding yields are detailed in red.

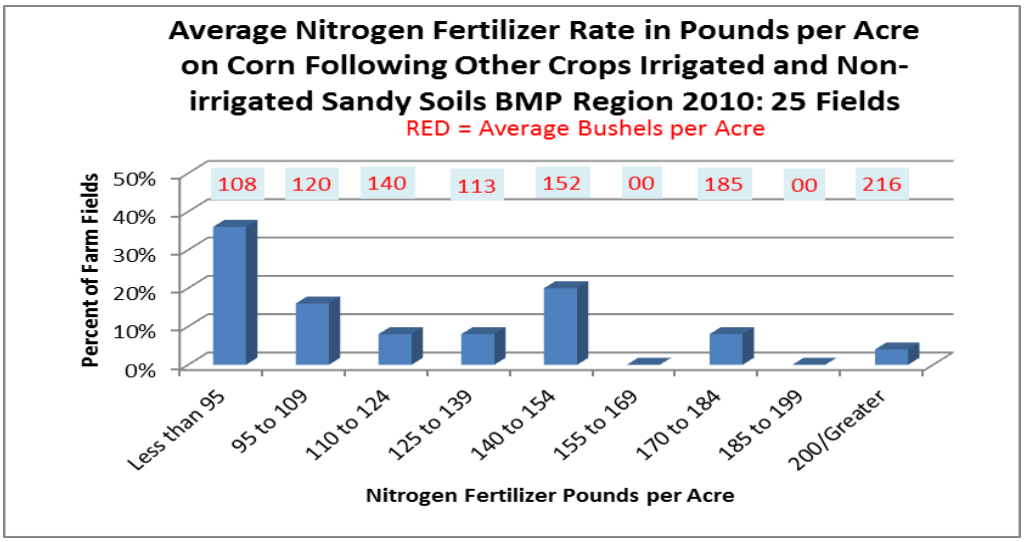

Figure 65. Average nitrogen fertilizer rates and yields on corn following other crops in the IRR BMP region for 2010: 25 fields.

Only Otter Tail County had more than five responses in the IRR BMP region. Nitrogen fertilizer rates averaged 101 pounds per acre as shown in Table 28.

Table 28. Average county nitrogen fertilizer rates for the IRR BMP region for corn following other crops.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Corn Following Other Crops			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Benton	**	**	**
Cass	**	**	**
Crow Wing	**	**	**
Hubbard	**	**	**
Mille Lacs	**	**	**
Morrison	**	**	**
Otter Tail	6	101	125
Pine	**	**	**
Sherburne	**	**	**
Stearns	**	**	**
Todd	**	**	**
Wadena	**	**	**

****** Less than five responses**.**

Table 29 details the major form of nitrogen applied to the corn field (NQ-10).

Table 29. The major form of nitrogen applied to the field.

BMP region	Major Form of the Nitrogen Applied	Percentage of Respondents
Northwestern	Anhydrous Ammonia	12
Northwestern	Urea	84
Northwestern	Liquid Nitrogen	4
Northwestern	Other	0
Northwestern	Unknown	0
Irrigated and non-irrigated sandy soils	Anhydrous Ammonia	18
Irrigated and non-irrigated sandy soils	Urea	64
Irrigated and non-irrigated sandy soils	Liquid Nitrogen	6
Irrigated and non-irrigated sandy soils	Other	10
Irrigated and non-irrigated sandy soils	Unknown	3
Southwestern and West Central	Anhydrous Ammonia	41
Southwestern and West Central	Urea	50
Southwestern and West Central	Liquid Nitrogen	6
Southwestern and West Central	Other	2
Southwestern and West Central	Unknown	1
South Central	Anhydrous Ammonia	64
South Central	Urea	24
South Central	Liquid Nitrogen	11
South Central	Other	2
South Central	Unknown	0
Southeastern	Anhydrous Ammonia	38
Southeastern	Urea	49
Southeastern	Liquid Nitrogen	11

BMP region	Major Form of the Nitrogen Applied	Percentage of Respondents
Southeastern	Other	2
Southeastern	Unknown	1
Statewide	Anhydrous Ammonia	42
Statewide	Urea	46
Statewide	Liquid Nitrogen	9
Statewide	Other	3
Statewide	Unknown	1

*Totals may not add due to rounding

Table 30 details the major form of nitrogen, average yield and nitrogen rate for those forms (NQ-10).

Table 30. Average amount of nitrogen applied and corresponding yield by BMP region and type of nitrogen.

BMP Region	Type of nitrogen	Nitrogen Rate Pounds per Acre	Previous Yield Bushels per Acre
Northwestern	Anhydrous Ammonia	131	136
Northwestern	Urea	**	**
Northwestern	Liquid Nitrogen	**	**
Northwestern	Other	120	130
Northwestern	Unknown	137	139
Irrigated and non-irrigated sandy soils	Anhydrous Ammonia	129	140
Irrigated and non-irrigated sandy soils	Urea	119	127
Irrigated and non-irrigated sandy soils	Liquid Nitrogen	94	129
Irrigated and non-irrigated sandy soils	Other	107	112
Irrigated and non-irrigated sandy soils	Unknown	114	132
Southwestern and West Central	Anhydrous Ammonia	146	165
Southwestern and West Central	Urea	162	168
Southwestern and West Central	Liquid Nitrogen	112	142
Southwestern and West Central	Other	136	148
Southwestern and West Central	Unknown	161	173
South Central	Anhydrous Ammonia	155	175
South Central	Urea	171	178
South Central	Liquid Nitrogen	113	161
South Central	Other	**	**
South Central	Unknown	145	171
Southeastern	Anhydrous Ammonia	150	172
Southeastern	Urea	160	171
Southeastern	Liquid Nitrogen	120	164
Southeastern	Other	137	141
Southeastern	Unknown	134	164

BMP Region	Type of nitrogen	Nitrogen Rate Pounds per Acre	Previous Yield Bushels per Acre
Northwestern	Anhydrous Ammonia	131	136
Statewide	Anhydrous Ammonia	148	168
Statewide	Urea	157	166
Statewide	Liquid Nitrogen	115	158
Statewide	Other	122	130
Statewide	Unknown	136	154

****** Less than five responses.

Table 31 details the commercial applications of 2009 fall fertilizer for the 2010 corn crop (NQ11).

Table 31. Fall applications of commercial fertilizer in 2009 for the 2010 corn crop.

BMP region	Did you Apply any Commercial Fertilizer in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	19
Northwestern	No	81
Irrigated and non-irrigated sandy soils	Yes	7
Irrigated and non-irrigated sandy soils	No	93
Southwestern and West Central	Yes	53
Southwestern and West Central	No	47
South Central	Yes	49
South Central	No	51
Southeastern	Yes	9
Southeastern	No	91
Statewide	Yes	27
Statewide	No	73

*Totals may not add due to rounding

Table 32 details the anhydrous ammonia applications in the fall of 2009 for the 2010 corn crop (NQ12).

Table 32. Applications of anhydrous ammonia in the Fall of 2009 for the 2010 corn crop.

BMP region	Did you Apply Anhydrous Ammonia in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	3
Northwestern	No	97
Irrigated and non-irrigated sandy soils	Yes	4
Irrigated and non-irrigated sandy soils	No	96

BMP region	Did you Apply Anhydrous Ammonia in the Fall of 2009?	Percentage of Respondents
Southwestern and West Central	Yes	34
Southwestern and West Central	No	66
South Central	Yes	38
South Central	No	62
Southeastern	Yes	6
Southeastern	No	94
Statewide	Yes	19
Statewide	No	81

*Totals may not add due to rounding

Table 33 details the urea applications in the fall of 2009 for the 2010 corn crop (NQ14).

Table 33. Applications of urea in the fall of 2009 for the 2010 corn crop.

BMP region	Did you Apply Urea in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	16
Northwestern	No	84
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	12
Southwestern and West Central	No	88
South Central	Yes	2
South Central	No	98
Southeastern	Yes	1
Southeastern	No	99
Statewide	Yes	4
Statewide	No	96

*Totals may not add due to rounding

Table 34 details the liquid nitrogen applications in the fall of 2009 for the 2010 corn crop (NQ16).

Table 34. Applications of liquid nitrogen in the fall of 2009 for the 2010 corn crop.

BMP region	Did you Apply Liquid Nitrogen (28%, 32%) in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	0
Irrigated and non-irrigated sandy soils	No	100
Southwestern and West Central	Yes	1

BMP region	Did you Apply Liquid Nitrogen (28%, 32%) in the Fall of 2009?	Percentage of Respondents
Southwestern and West Central	No	99
South Central	Yes	1
South Central	No	99
Southeastern	Yes	0
Southeastern	No	100
Statewide	Yes	0
Statewide	No	100

*Totals may not add due to rounding

Table 35 details the phosphorus applications in the fall of 2009 for the 2010 corn crop (NQ18). In Minnesota over 99.9% of phosphorus fertilizers contain nitrogen, therefore phosphorus applications are needed to extract the nitrogen contributions to the corn crop.

Table 35. Applications of phosphorus fertilizers such as MAP or DAP in the fall of 2009 for the 2010 corn crop.

BMP region	Did you Apply Phosphorus in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	14
Northwestern	No	86
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	27
Southwestern and West Central	No	73
South Central	Yes	25
South Central	No	75
Southeastern	Yes	5
Southeastern	No	95
Statewide	Yes	14
Statewide	No	86

*Totals may not add due to rounding

Table 36 details the applications of other fertilizers in the fall of 2009 for the 2010 corn crop (NQ20).

Table 36. Applications of other fertilizers in the fall of 2009 for the 2010 corn crop.

BMP region	Did you Apply Other Sources of Fertilizer in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	1
Northwestern	No	99
Irrigated and non-irrigated sandy soils	Yes	1

Irrigated and non-irrigated sandy soils	No	99
Southwestern and West Central	Yes	3
Southwestern and West Central	No	97
South Central	Yes	3
South Central	No	97
Southeastern	Yes	1
Southeastern	No	99
Statewide	Yes	2
Statewide	No	98

*Totals may not add due to rounding

Table 37 details the applications of commercial fertilizers in the spring as a preplant for the 2010 corn crop (NQ23).

Table 37. Applications of commercial fertilizers in the spring as a preplant for the 2010 corn crop.

BMP region	Did you Apply Commercial Fertilizer in the Spring as a Preplant?	Percentage of Respondents
Northwestern	Yes	83
Northwestern	No	17
Irrigated and non-irrigated sandy soils	Yes	61
Irrigated and non-irrigated sandy soils	No	39
Southwestern and West Central	Yes	55
Southwestern and West Central	No	45
South Central	Yes	61
South Central	No	39
Southeastern	Yes	88
Southeastern	No	12
Statewide	Yes	72
Statewide	No	28

*Totals may not add due to rounding

Table 38 details the applications of anhydrous ammonia in the spring as a preplant for the 2010 corn crop (NQ24).

Table 38. Applications of anhydrous ammonia in the spring as a preplant for the 2010 corn crop.

BMP region	Did you Apply Anhydrous as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	8
Northwestern	No	92
Irrigated and non-irrigated sandy soils	Yes	9
Irrigated and non-irrigated sandy soils	No	91

BMP region	Did you Apply Anhydrous as a Preplant in the Spring of 2010?	Percentage of Respondents
Southwestern and West Central	Yes	5
Southwestern and West Central	No	95
South Central	Yes	23
South Central	No	77
Southeastern	Yes	30
Southeastern	No	70
Statewide	Yes	21
Statewide	No	79

*Totals may not add due to rounding

Table 39 details the applications of urea in the spring as a preplant for the 2010 corn crop (NQ26).

Table 39. Applications of urea in the spring as a preplant for the 2010 corn crop.

BMP region	Did you Apply Urea as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	68
Northwestern	No	32
Irrigated and non-irrigated sandy soils	Yes	41
Irrigated and non-irrigated sandy soils	No	59
Southwestern and West Central	Yes	40
Southwestern and West Central	No	60
South Central	Yes	22
South Central	No	78
Southeastern	Yes	47
Southeastern	No	53
Statewide	Yes	40
Statewide	No	60

*Totals may not add due to rounding

Table 40 details the applications of liquid nitrogen in the spring as a preplant for the 2010 corn crop (NQ28).

Table 40. Applications of liquid nitrogen in the spring as a preplant for the 2010 corn crop.

BMP region	Did you Apply Liquid Nitrogen (28%, 32%) as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	5
Northwestern	No	95

BMP region	Did you Apply Liquid Nitrogen (28%, 32%) as a Preplant in the Spring of 2010?	Percentage of Respondents
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	6
Southwestern and West Central	No	94
South Central	Yes	13
South Central	No	87
Southeastern	Yes	9
Southeastern	No	91
Statewide	Yes	9
Statewide	No	91

*Totals may not add due to rounding

Table 41 details the applications of phosphorus such as MAP or DAP in the spring as a preplant for the 2010 corn crop (NQ30).

Table 41. Applications of phosphorus in the spring as a preplant for the 2010 corn crop.

BMP region	Did you Apply Phosphorus as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	44
Northwestern	No	56
Irrigated and non-irrigated sandy soils	Yes	14
Irrigated and non-irrigated sandy soils	No	86
Southwestern and West Central	Yes	23
Southwestern and West Central	No	77
South Central	Yes	20
South Central	No	80
Southeastern	Yes	24
Southeastern	No	76
Statewide	Yes	22
Statewide	No	78

*Totals may not add due to rounding

Table 42 details the applications of other fertilizers in the spring as a preplant for the 2010 corn crop (NQ32).

Table 42. Applications of other fertilizers in the spring as a preplant for the 2010 corn crop.

BMP region	Did you Apply Other Sources of Fertilizer as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	9
Northwestern	No	91
Irrigated and non-irrigated sandy soils	Yes	11
Irrigated and non-irrigated sandy soils	No	89
Southwestern and West Central	Yes	5
Southwestern and West Central	No	95
South Central	Yes	5
South Central	No	95
Southeastern	Yes	6
Southeastern	No	94
Statewide	Yes	6
Statewide	No	94

*Totals may not add due to rounding

Table 43 details the applications of commercial fertilizers in the spring as a starter or at planting for the 2010 corn crop (NQ34).

Table 43. Applications of commercial fertilizers in the spring as a starter or at planting for the 2010 corn crop.

BMP region	Did you Apply Commercial Fertilizer in the Spring as a Starter or at Planting?	Percentage of Respondents
Northwestern	Yes	53
Northwestern	No	47
Irrigated and non-irrigated sandy soils	Yes	71
Irrigated and non-irrigated sandy soils	No	29
Southwestern and West Central	Yes	28
Southwestern and West Central	No	72
South Central	Yes	58
South Central	No	42
Southeastern	Yes	74
Southeastern	No	26
Statewide	Yes	61
Statewide	No	39

*Totals may not add due to rounding

Table 44 details the applications of urea in the spring as a starter or at planting for the 2010 corn crop (NQ35).

Table 44. Applications of urea in the spring as a starter or at planting for the 2010 corn crop.

BMP region	Did you Apply Urea as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	6
Northwestern	No	94
Irrigated and non-irrigated sandy soils	Yes	37
Irrigated and non-irrigated sandy soils	No	63
Southwestern and West Central	Yes	7
Southwestern and West Central	No	93
South Central	Yes	5
South Central	No	95
Southeastern	Yes	16
Southeastern	No	84
Statewide	Yes	13
Statewide	No	87

*Totals may not add due to rounding

Table 45 details the applications of liquid nitrogen in the spring as a starter or at planting for the 2010 corn crop (NQ37).

Table 45. Applications of liquid nitrogen in the spring as a starter or at planting for the 2010 corn crop.

BMP region	Did you Apply Liquid Nitrogen (28%, 32%) as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	17
Northwestern	No	83
Irrigated and non-irrigated sandy soils	Yes	8
Irrigated and non-irrigated sandy soils	No	92
Southwestern and West Central	Yes	9
Southwestern and West Central	No	91
South Central	Yes	17
South Central	No	83
Southeastern	Yes	16
Southeastern	No	84
Statewide	Yes	14
Statewide	No	86

*Totals may not add due to rounding

Table 46 details the applications of phosphorus such as MAP or DAP in the spring as a starter or at planting for the 2010 corn crop (NQ39).

Table 46. Applications of phosphorus in the spring as a starter or at planting for the 2010 corn crop.

BMP region	Did you Apply Phosphorus as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	29
Northwestern	No	71
Irrigated and non-irrigated sandy soils	Yes	29
Irrigated and non-irrigated sandy soils	No	71
Southwestern and West Central	Yes	13
Southwestern and West Central	No	87
South Central	Yes	34
South Central	No	66
Southeastern	Yes	40
Southeastern	No	60
Statewide	Yes	32
Statewide	No	68

*Totals may not add due to rounding

Table 47 details the applications of phosphorus such as MAP or DAP in the spring as a starter or at planting for the 2010 corn crop (NQ41).

Table 47. Applications of other fertilizer in the spring as a starter or at planting for the 2010 corn crop.

BMP region	Did you Apply Other Fertilizers as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	9
Northwestern	No	91
Irrigated and non-irrigated sandy soils	Yes	13
Irrigated and non-irrigated sandy soils	No	87
Southwestern and West Central	Yes	3
Southwestern and West Central	No	97
South Central	Yes	8
South Central	No	92
Southeastern	Yes	10
Southeastern	No	90
Statewide	Yes	8
Statewide	No	92

*Totals may not add due to rounding

Table 48 details the applications of commercial fertilizers post planting or sidedress for the 2010 corn crop (NQ43).

Table 48. Applications of commercial fertilizers at post planting or sidedress for the 2010 corn crop.

BMP region	Did you Apply Commercial Fertilizer After Planting such as a Sidedress?	Percentage of Respondents
Northwestern	Yes	6
Northwestern	No	94
Irrigated and non-irrigated sandy soils	Yes	29
Irrigated and non-irrigated sandy soils	No	71
Southwestern and West Central	Yes	10
Southwestern and West Central	No	90
South Central	Yes	10
South Central	No	90
Southeastern	Yes	8
Southeastern	No	92
Statewide	Yes	11
Statewide	No	89

*Totals may not add due to rounding

Table 49 details the applications of anhydrous ammonia as a post planting or sidedress for the 2010 corn crop (NQ44).

Table 49. Applications of anhydrous ammonia as a post planting or sidedress for the 2010 corn crop.

BMP region	Did you Apply Anhydrous Ammonia as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	3
Northwestern	No	97
Irrigated and non-irrigated sandy soils	Yes	6
Irrigated and non-irrigated sandy soils	No	94
Southwestern and West Central	Yes	4
Southwestern and West Central	No	96
South Central	Yes	3
South Central	No	97
Southeastern	Yes	3
Southeastern	No	97
Statewide	Yes	3
Statewide	No	97

*Totals may not add due to rounding

Table 50 details the applications of urea as a post planting or sidedress for the 2010 corn crop (NQ46).

Table 50. Applications of urea as a post planting or sidedress for the 2010 corn crop.

BMP region	Did you Apply Urea as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	1
Northwestern	No	99
Irrigated and non-irrigated sandy soils	Yes	18
Irrigated and non-irrigated sandy soils	No	82
Southwestern and West Central	Yes	2
Southwestern and West Central	No	98
South Central	Yes	1
South Central	No	99
Southeastern	Yes	1
Southeastern	No	99
Statewide	Yes	3
Statewide	No	97

*Totals may not add due to rounding

Table 51 details the applications of liquid nitrogen as a post planting or sidedress for the 2010 corn crop (NQ48).

Table 51. Applications of liquid nitrogen as a post planting or sidedress for the 2010 corn crop.

BMP region	Did you Apply Liquid Nitrogen (28%, 32%) as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	3
Northwestern	No	97
Irrigated and non-irrigated sandy soils	Yes	5
Irrigated and non-irrigated sandy soils	No	95
Southwestern and West Central	Yes	4
Southwestern and West Central	No	96
South Central	Yes	5
South Central	No	95
Southeastern	Yes	4
Southeastern	No	96
Statewide	Yes	4
Statewide	No	96

*Totals may not add due to rounding

Table 52 details the applications of phosphorus such as MAP or DAP as a post planting or sidedress for the 2010 corn crop (NQ50).

Table 52. Applications of phosphorus as a post planting or sidedress for the 2010 corn crop.

BMP region	Did you Apply Phosphorus as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	1
Southwestern and West Central	No	99
South Central	Yes	1
South Central	No	99
Southeastern	Yes	0
Southeastern	No	100
Statewide	Yes	1
Statewide	No	99

*Totals may not add due to rounding

Table 53 details the applications other fertilizers as a post planting or sidedress for the 2010 corn crop (NQ52).

Table 53. Applications of other fertilizers as a post planting or sidedress for the 2010 corn crop.

BMP region	Did you Apply Other Fertilizers as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	1
Irrigated and non-irrigated sandy soils	No	99
Southwestern and West Central	Yes	0
Southwestern and West Central	No	100
South Central	Yes	0
South Central	No	100
Southeastern	Yes	0
Southeastern	No	100
Statewide	Yes	0
Statewide	No	100

*Totals may not add due to rounding

Figure 66 details the form of nitrogen that was applied to corn acres statewide based on total pounds of nitrogen applied.

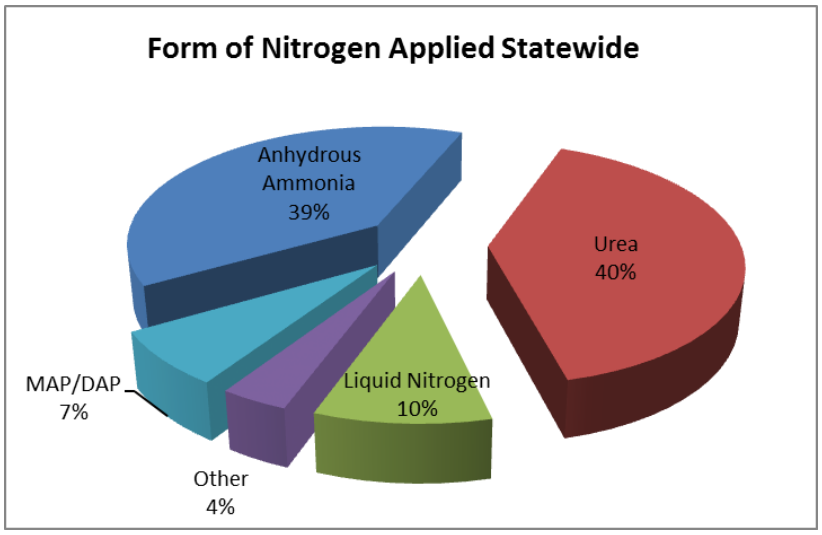

Figure 66. The form of the nitrogen applied to corn acres in the state for the 2010 survey for all fields applied with nitrogen fertilizer (Based on total pounds of nitrogen applied).

Figure 67 details the form of nitrogen that was applied to corn acres in the SE BMP region.

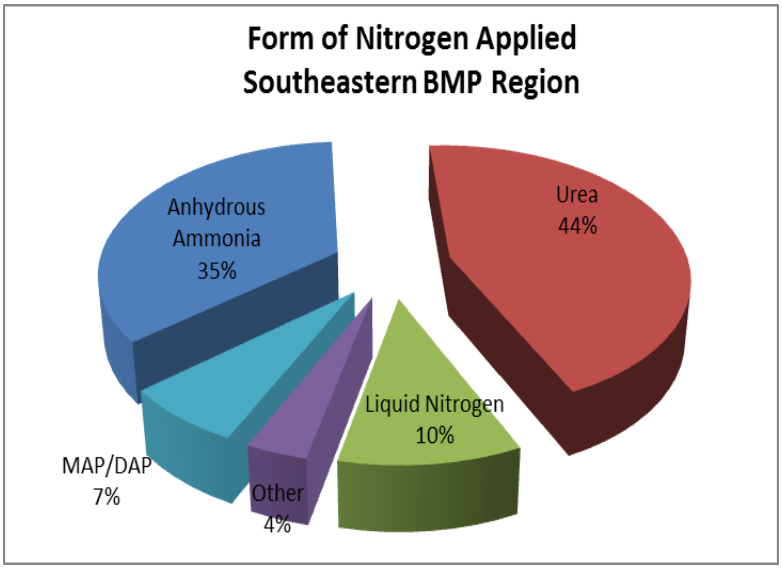

Figure 67. The form of the nitrogen applied to corn acres in the SE BMP region for the 2010 survey for all fields applied with nitrogen fertilizer.

Figure 68 details the form of nitrogen that was applied to corn acres in the SC BMP region.

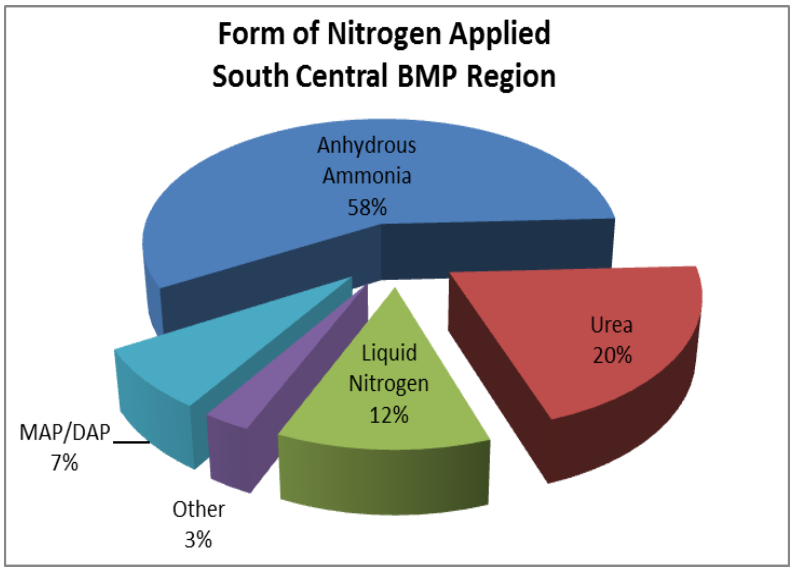

Figure 68. The form of the nitrogen applied to corn acres in the SC BMP region for the 2010 survey for all fields applied with nitrogen fertilizer.

Figure 69 details the form of nitrogen that was applied to corn acres in the SW BMP region.

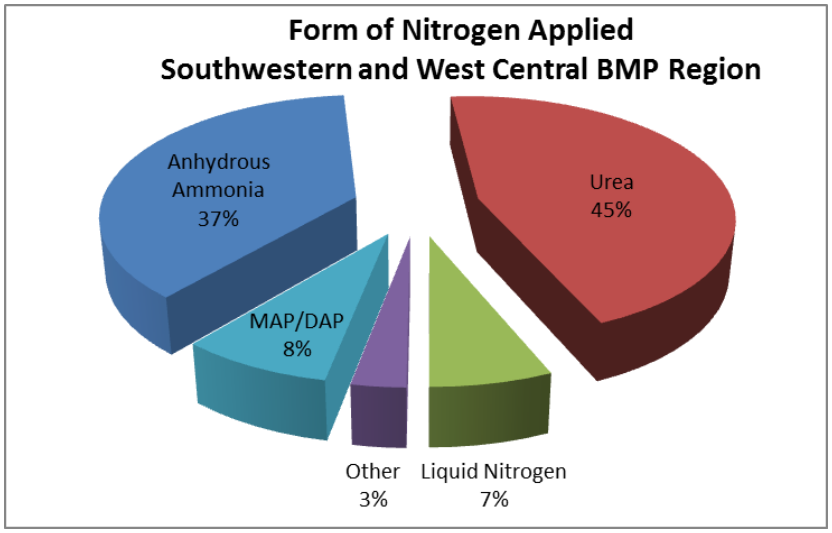

Figure 69. The form of the nitrogen applied to corn acres in the SW BMP region for the 2010 survey for all fields applied with nitrogen fertilizer.

Figure 70 details the form of nitrogen that was applied to corn acres in the NW BMP region.

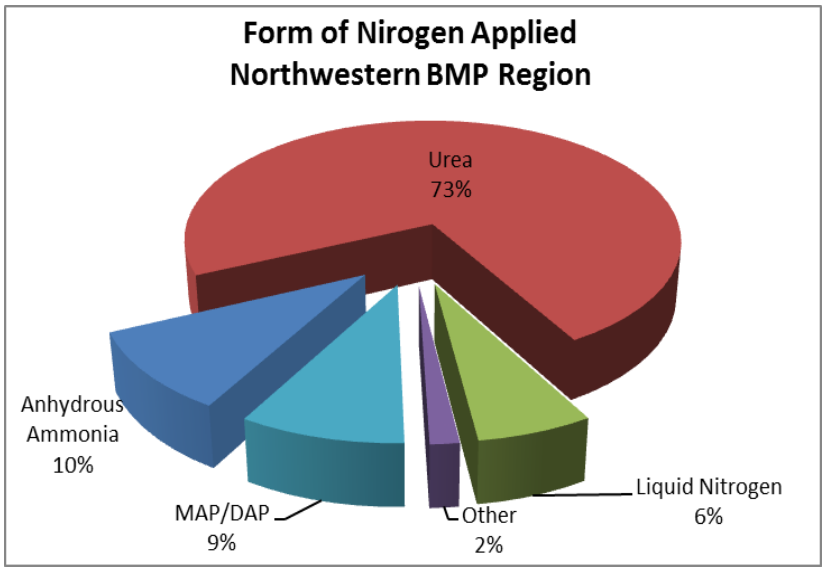

Figure 70. The form of the nitrogen applied to corn acres in the NW BMP region for the 2010 survey for all fields applied with nitrogen fertilizer.

Figure 71 details the form of nitrogen that was applied to corn acres in the IRR BMP region.

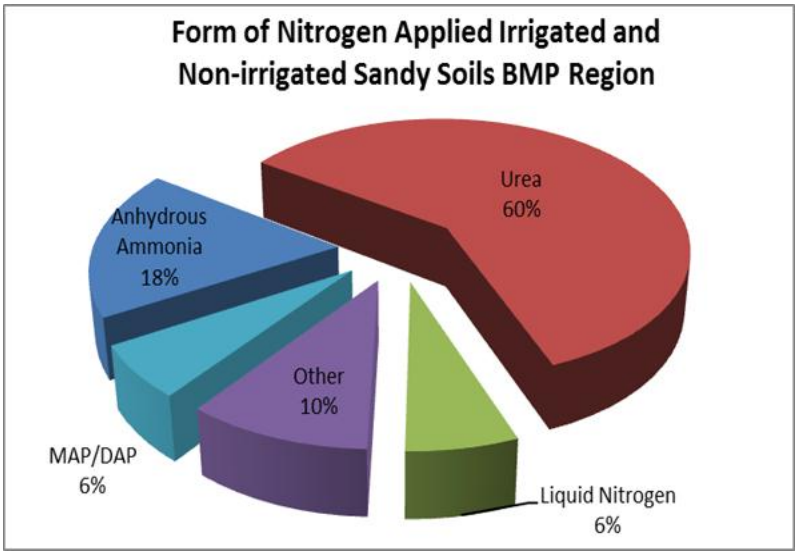

Figure 71. The form of the nitrogen applied to corn acres in the IRR BMP region for the 2010 survey for all fields applied with nitrogen fertilizer.

Figure 72 details the timing of anhydrous ammonia applications on corn acres across the state of Minnesota for an average field by pounds of nitrogen applied.

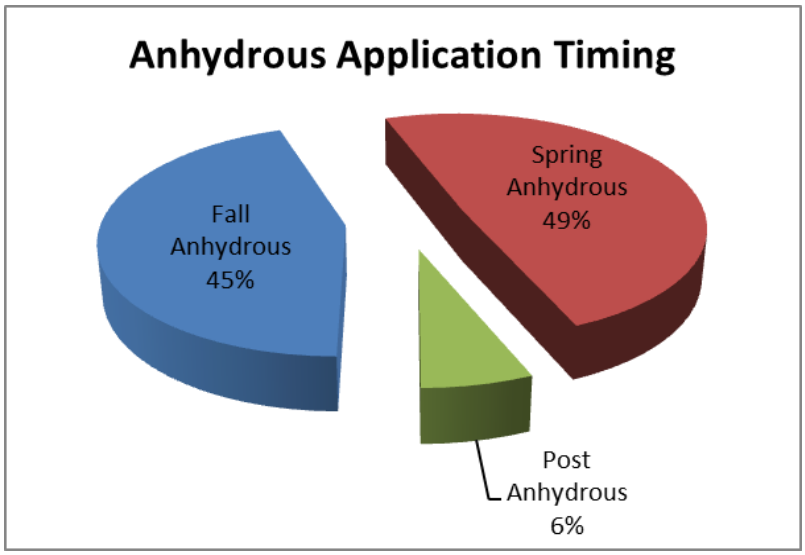

Figure 72. Timing of anhydrous ammonia applications to corn acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 73 details the timing of urea applications on corn acres across the state for an average field by pounds of nitrogen applied.

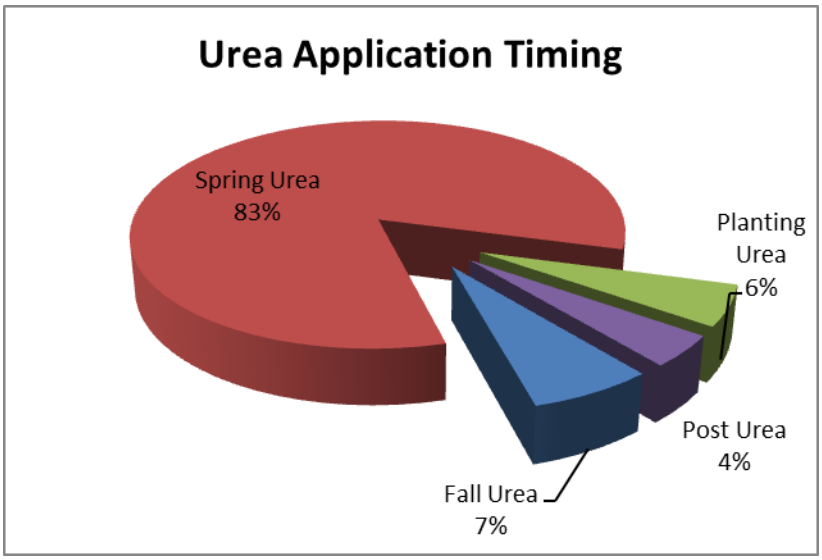

Figure 73. Timing of Urea applications to corn acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 74 details the timing of liquid nitrogen applications on corn acres across the state for an average field by pounds of nitrogen applied.

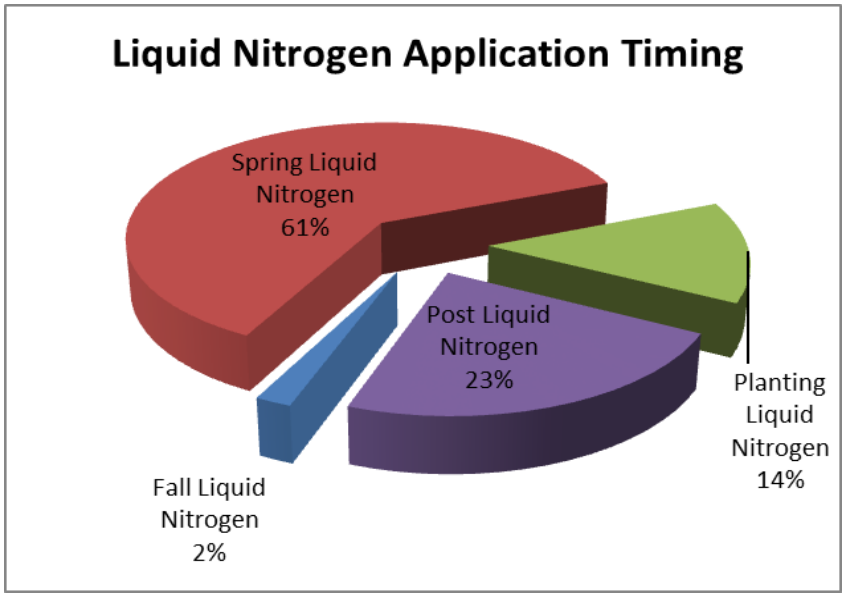

Figure 74. Timing of Liquid Nitrogen applications to corn acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 75 details the timing of other nitrogen applications on corn acres across the state for an average field by pounds of nitrogen applied.

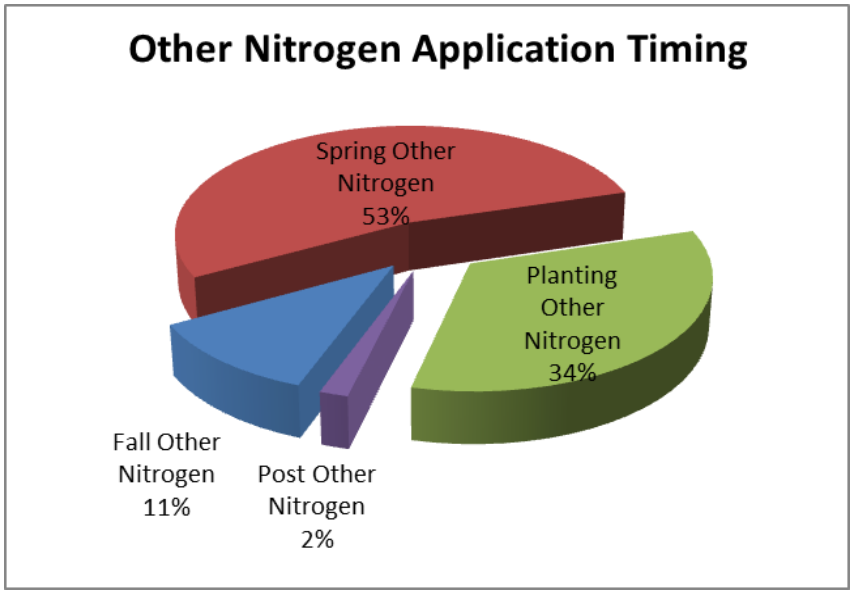

Figure 75. Timing of Other Nitrogen applications to corn acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 76 details the timing of MAP/DAP Nitrogen applications on corn acres across the state for an average field by pounds of nitrogen applied.

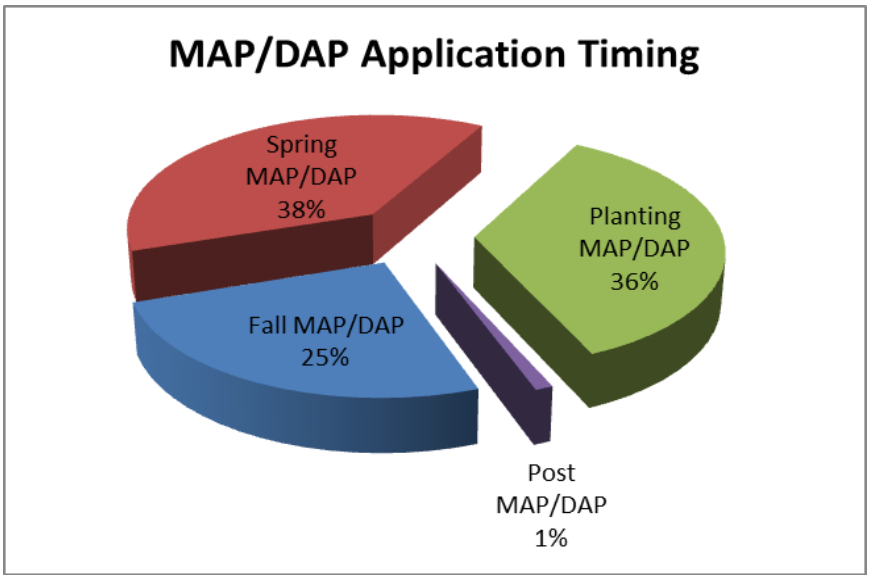

Figure 76. Timing of MAP/DAP Nitrogen applications to corn acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Wheat Survey

The following section of the report is based on the 1,000 wheat farmers surveyed in the spring of 2011.

Farmers in the survey were first asked “Did you grow wheat on your operation in 2010?” Then farmers were asked **“**How many wheat acres were planted in 2010? Table 54 details the famers who responded they grew wheat and the corresponding acres of wheat grown (WQ1, WQ2).

Table 54. . Summary of respondents and corresponding wheat acres by county and BMP regions with and without fertilizer, and with and without manure history).

County	BMP Region	Number of Respondents	Number of Wheat Acres
Clay	NW	60	22,938
Clearwater	NW	6	395
Kittson	NW	37	31,189
Mahnomen	NW	20	5,578
Marshall	NW	82	46,830
Norman	NW	44	15,533

County	BMP Region	Number of Respondents	Number of Wheat Acres
Pennington	NW	27	18,946
Polk	NW	112	70,650
Red Lake	NW	19	6,292
Roseau	NW	51	28,705
Wilkin	NW	29	14,622
Totals/Averages	**NW**	**487**	**261,678**
Aitkin	IRR	**	**
Becker	IRR	24	3,879
Beltrami	IRR	8	1,079
Benton	IRR	5	172
Carlton	IRR	**	**
Chisago	IRR	**	**
Hennepin	IRR	**	**
Hubbard	IRR	**	**
Isanti	IRR	**	**
Itasca	IRR	*	**
Kanabec	IRR	**	**
Koochiching	IRR	**	**
Lake of the Woods	IRR	10	2,814
Mille Lacs	IRR	**	**
Morrison	IRR	11	540
Otter Tail	IRR	67	11,634
Pine	IRR	6	496
Ramsey	IRR	**	**
St. Louis	IRR	**	**
Stearns	IRR	36	2,173
Todd	IRR	21	1,696
Wadena	IRR	**	**
Washington	IRR	**	**
Wright	IRR	22	940
Totals/Averages	**IRR**	**238**	**27,624**
Big Stone	SW	8	958
Chippewa	SW	6	408
Cottonwood	SW	5	413
Douglas	SW	23	2,097
Grant	SW	27	3,798
Jackson	SW	**	**
Kandiyohi	SW	10	627
Lac qui Parle	SW	18	1,513
Lincoln	SW	18	1,346
Lyon	SW	7	291
Murray	SW	5	245
Nobles	SW	**	**
Pipestone	SW	5	195
Pope	SW	13	826
Redwood	SW	9	245
Renville	SW	17	1,162
Rock	SW	**	**
Stevens	SW	23	4,649
Swift	SW	18	1,932
Traverse	SW	23	3,524
Yellow Medicine	SW	14	992
Totals /Averages	**SW**	**252**	**25,279**

County	BMP Region	Number of Respondents	Number of Wheat Acres
Blue Earth	SC	**	**
Brown	SC	5	161
Carver	SC	**	**
Faribault	SC	**	**
Le Sueur	SC	12	520
McLeod	SC	18	546
Meeker	SC	17	660
Nicollet	SC	**	**
Rice	SC	5	148
Scott	SC	6	120
Sibley	SC	14	418
Steele	SC	**	**
Waseca	SC	**	**
Watonwan	SC	**	**
Totals /Averages	**SC**	**95**	**3,280**
Dakota	SE	**	**
Totals /Averages	SE	****	****
State	**ALL**	**1,073**	**317,896**

** Less than five responses

Farmers in the survey were then asked “Do you have a wheat field without manure applied in the last five years? (WQ7)” Then farmers were asked “Did you apply fertilizer on this field? “Table 55 details the percent of farmers who had a wheat field without manure and was fertilized by BMP region.

Table 55. Summary of respondents and corresponding wheat acres by county and BMP regions for all fields without manure and with fertilizer.

County	BMP region	Number of Respondents	Number of Wheat Acres
Clay	NW	48	20,877
Clearwater	NW	**	**
Kittson	NW	33	30,159
Mahnomen	NW	16	5,213
Marshall	NW	77	44,300
Norman	NW	35	14,897
Pennington	NW	27	18,946
Polk	NW	95	64,722
Red Lake	NW	16	5,782
Roseau	NW	48	28,091
Wilkin	NW	26	14,160
Totals/Averages	**NW**	**425**	**247,387**
Aitkin	IRR	**	***
Becker	IRR	13	2,296
Beltrami	IRR	7	979
Benton	IRR	**	**
Isanti	IRR	**	**
Itasca	IRR	**	**
Kanabec	IRR	**	**

County	BMP region	Number of Respondents	Number of Wheat Acres
Koochiching	IRR	**	**
Lake of the Woods	IRR	6	2,387
Mille Lacs	IRR	**	**
Morrison	IRR	**	**
Otter Tail	IRR	43	8,858
Pine	IRR	6	496
Ramsey	IRR	**	**
St. Louis	IRR	**	**
Stearns	IRR	10	609
Todd	IRR	8	701
Wadena	IRR	**	**
Washington	IRR	**	**
Wright	IRR	7	374
Totals/Averages	**IRR**	**121**	**18,858**
Big Stone	SW	6	656
Chippewa	SW	5	258
Cottonwood	SW	**	**
Douglas	SW	13	1,655
Grant	SW	17	2,641
Kandiyohi	SW	8	576
Lac qui Parle	SW	12	1,183
Lincoln	SW	8	635
Lyon	SW	**	**
Murray	SW	**	**
Pipestone	SW	**	**
Pope	SW	6	438
Redwood	SW	**	**
Renville	SW	8	615
Stevens	SW	15	3,505
Swift	SW	14	1,677
Traverse	SW	17	2,945
Yellow Medicine	SW	7	594
Totals /Averages	**SW**	**147**	**17,875**
Blue Earth	SC	**	**
Brown	SC	**	**
Carver	SC	**	**
Dodge	SC	6	365
Faribault	SC	8	304
Freeborn	SC	8	312
Le Sueur	SC	**	**
Martin	SC	**	**
McLeod	SC	**	**
Meeker	SC	**	**
Mower	SC	**	**
Nicollet	SC	**	**
Totals /Averages	**SC**	**38**	**1,666**
State	**All**	**731**	**285,786**

** Less than five responses

Table 6 details the percent of farmers who had a wheat field without manure applied by BMP region (WQ2).

Table 56. Percent of respondents with a wheat field without manure applied.

BMP Region	Did you have a Field without Manure Applied?	Percentage of Respondents
Northwestern	Yes	91
Northwestern	No	9
Irrigated and non-irrigated sandy soils	Yes	61
Irrigated and non-irrigated sandy soils	No	39
South Western and West Central	Yes	62
South Western and West Central	No	38
South Central	Yes	52
South Central	No	48
Southeastern	Yes	**
Southeastern	No	**
Statewide	Yes	74
Statewide	No	26

** Less than five responses

Table 57 details the previous crop planted before the current wheat crop by region and the corresponding yield (WQ3 and WQ6).

Table 57. Percent of acres by previous crop and the corresponding yields.

BMP Region	Previous Crop	Percent	Average Yield
Northwestern	Soybeans	77	54
Northwestern	Corn	**	**
Northwestern	Alfalfa	2	45
Northwestern	Small Grains	6	46
Northwestern	Other	15	56
Irrigated and non-irrigated sandy soils	Soybeans	91	47
Irrigated and non-irrigated sandy soils	Corn	8	52
Irrigated and non-irrigated sandy soils	Alfalfa	5	37
Irrigated and non-irrigated sandy soils	Small Grains	7	42
Irrigated and non-irrigated sandy soils	Other	10	35
South Western and West Central	Soybeans	84	53
South Western and West Central	Corn	8	50
South Western and West Central	Alfalfa	**	**
South Western and West Central	Small Grains	**	**
South Western and West Central	Other	5	53
South Central	Soybeans	84	53
South Central	Corn	13	45
South Central	Alfalfa	**	**
South Central	Small Grains	**	**
South Central	Other	**	**
Southeastern	Soybeans	**	**
Southeastern	Corn	**	**

BMP Region	Previous Crop	Percent	Average Yield
Southeastern	Alfalfa	**	**
Southeastern	Small Grains	**	**
Southeastern	Other	**	**
Statewide	Soybeans	79	53
Statewide	Corn	4	50
Statewide	Alfalfa	2	45
Statewide	Small Grains	5	44
Statewide	Other	11	53

** Less than five responses

Table 58 details the percentage of non-manure wheat fields with nitrogen applied (WQ7).

Table 58. Commercial fertilizer applications applied to non-manured wheat fields.

BMP Region	Fertilizer Applied	Percentage of Respondents
Northwestern	Yes	96
Northwestern	No	4
Irrigated and non-irrigated sandy soils	Yes	84
Irrigated and non-irrigated sandy soils	No	16
Southwestern and West Central	Yes	95
Southwestern and West Central	No	5
South Central	Yes	78
South Central	No	22
Southeastern	Yes	**
Southeastern	No	**
Statewide	Yes	93
Statewide	No	7

** Less than five responses

Method of nitrogen application by variable rate or by one rate (WQ8) and the results as a percentage by BMP region is provided in Table 59.

Table 59. Variable rate nitrogen applications by BMP region for wheat acres.

BMP Region	Variable Rate Nitrogen Application	Percentage of Respondents
Northwestern	Variable rate	16
Northwestern	One rate	84
Irrigated and non-irrigated sandy soils	Variable rate	8
Irrigated and non-irrigated sandy soils	One rate	92
Southwestern and West Central	Variable rate	7

BMP Region	Variable Rate Nitrogen Application	Percentage of Respondents
Northwestern	Variable rate	16
Southwestern and West Central	One rate	93
South Central	Variable rate	5
South Central	One rate	33
Southeastern	Variable rate	**
Southeastern	One rate	**
Statewide	Variable rate	13
Statewide	One rate	87

** Less than five responses

Yields and corresponding nitrogen rates by BMP region are provided in Table 60.

Table 60. Nitrogen rates and average yields by BMP region for wheat acres.

BMP Region	Nitrogen Rate Pounds per Acre	Average Yield Bushels per Acre
Northwestern	114	54
Irrigated and non-irrigated sandy soils	89	45
Southwestern and West Central	91	53
South Central	90	51
Southeastern	**	**
Statewide	104	52

** Less than five responses

Nitrogen fertilizer rates and yields by BMP regions on wheat following different crops are detailed in Table 61 (WQ3, WQ6 and WQ9).

Table 61. Average amount of nitrogen applied and corresponding yield by BMP region and previous crop.

BMP Region	Previous Crop	Nitrogen Rate Pounds per Acre	Previous Yield Bushels per Acre
Northwestern	Soybeans	115	54
Northwestern	Corn	**	**
Northwestern	Alfalfa	97	45
Northwestern	Small Grains	94	46
Northwestern	Other	118	56
Irrigated and non-irrigated sandy soils	Soybeans	90	47
Irrigated and non-irrigated sandy soils	Corn	84	52
Irrigated and non-irrigated sandy soils	Alfalfa	86	37
Irrigated and non-irrigated sandy soils	Small Grains	80	42
Irrigated and non-irrigated sandy soils	Other	98	35
Southwestern and West Central	Soybeans	91	53
Southwestern and West Central	Corn	87	50
Southwestern and West Central	Alfalfa	**	**
Southwestern and West Central	Small Grains	**	**
Southwestern and West Central	Other	99	53
South Central	Soybeans	91	53
South Central	Corn	97	45
South Central	Alfalfa	**	**
South Central	Small Grains	**	**
South Central	Other	**	**
Southeastern	Soybeans	**	**
Southeastern	Corn	**	**
Southeastern	Alfalfa	**	**
Southeastern	Small Grains	**	**
Southeastern	Other	**	**
Statewide	Soybeans	104	53
Statewide	Corn	91	50
Statewide	Alfalfa	82	45
Statewide	Small Grains	90	44
Statewide	Other	114	53

****** Less than five responses.

Statewide: Wheat Following Soybeans

The majority of farmers reported on a typical wheat following soybean field. Statewide seventy nine percent of the fields reported was wheat following soybean fields. Figure 77 details the counties where farmers reported on fields with wheat following soybeans. There were 575 wheat following soybean fields surveyed across Minnesota.

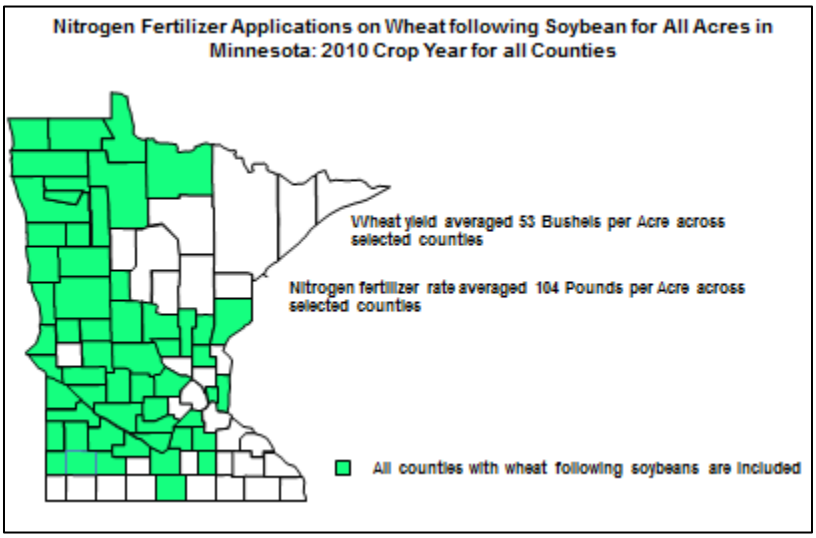

Figure 77. Counties with farmers reporting on wheat following soybean fields.

Figure 78 details the distribution of average nitrogen fertilizer rates across Minnesota for wheat following soybeans; the corresponding yields are detailed in red.

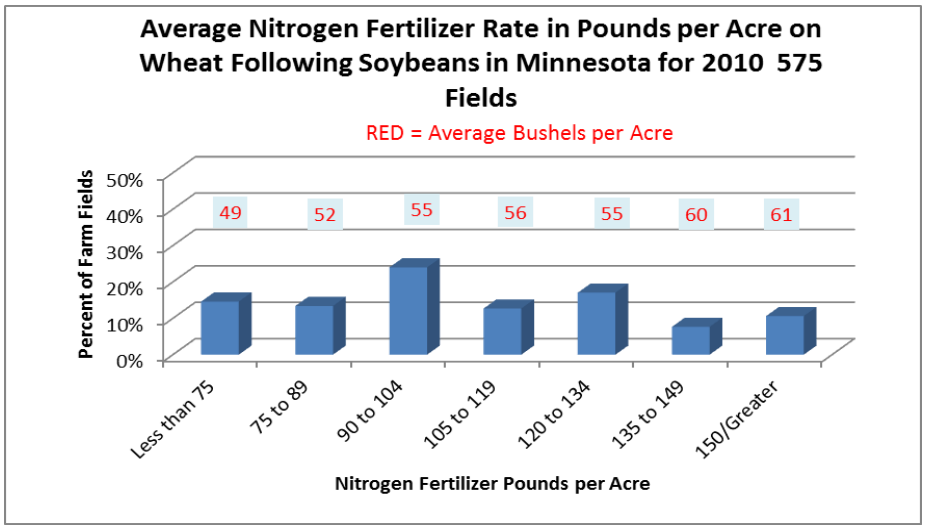

Figure 78. Average nitrogen fertilizer rates and yields on wheat following soybeans in Minnesota for 2010: 575 fields.

Southeastern Region: Wheat Following Soybeans

There were no fields that were included in the wheat following soybeans in the SE region analysis. Wheat following soybeans fields were not inventoried in any counties; therefore no analysis was conducted for the SE region on a county basis.

South Central Region: Wheat Following Soybeans

There were 32 fields that were included in the SC BMP region wheat following soybeans analysis. Figure 79 details the location, average rate of nitrogen fertilizer and average yield for wheat following soybeans in the SC BMP region.

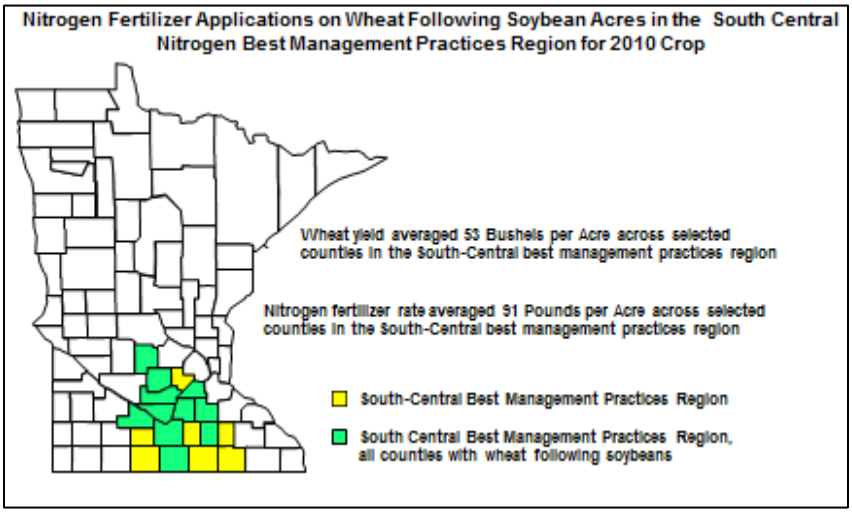

Figure 79. The wheat yield averaged 53 bushels per acre and the nitrogen fertilizer rate average 91 pounds per acre across the SC BMP region.

Figure 80 details the distribution of nitrogen fertilizer rates across the SC BMP region for wheat following soybeans; the corresponding yields are detailed in red.

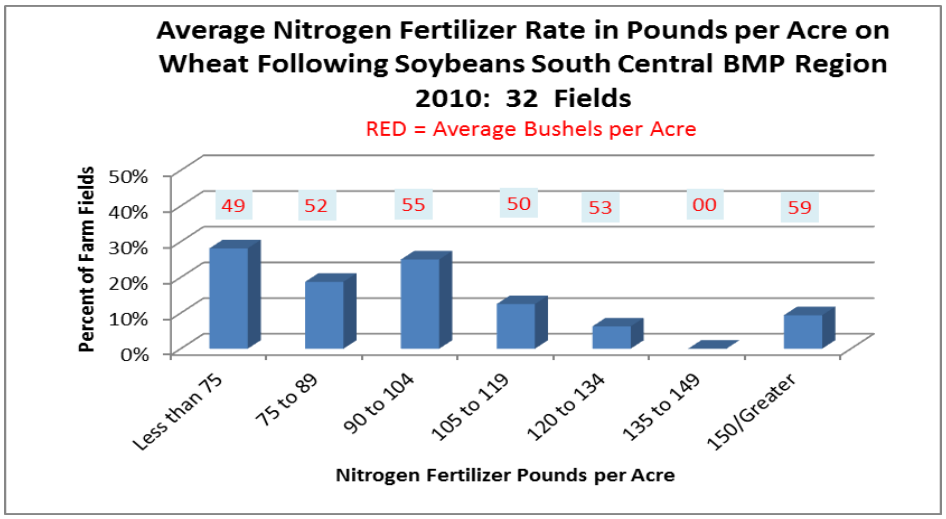

Figure 80. Average nitrogen fertilizer rates and yields on wheat following soybeans in the SC BMP region for 2010: 32 fields.

Three counties had more than five responses in the SC BMP region. Nitrogen fertilizer rates ranged from an average of 78 pounds per acre in McLeod County to 107 pounds per acre in Le Sueur County as shown in Table 62.

Table 62. Average county nitrogen fertilizer rates for the SC BMP region for wheat following soybeans.

Average County Nitrogen Fertilizer Rates for the SC BMP Region for Wheat Following Soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Blue Earth	**	**	**
Brown	**	**	**
Faribault	**	**	**
Le Sueur	6	107	64
McLeod	6	78	52
Meeker	7	98	49
Nicollet	**	**	**
Rice	**	**	**
Scott	**	**	**
Sibley	**	**	**
Steele	**	**	**

****** Less than five responses.

Southwestern and West Central Region: Wheat Following Soybeans

There were 124 fields that were included in the SW region wheat following soybeans analysis. Figure 81 details the location, average rate of nitrogen fertilizer and average yield for wheat following soybeans in the SW BMP region.

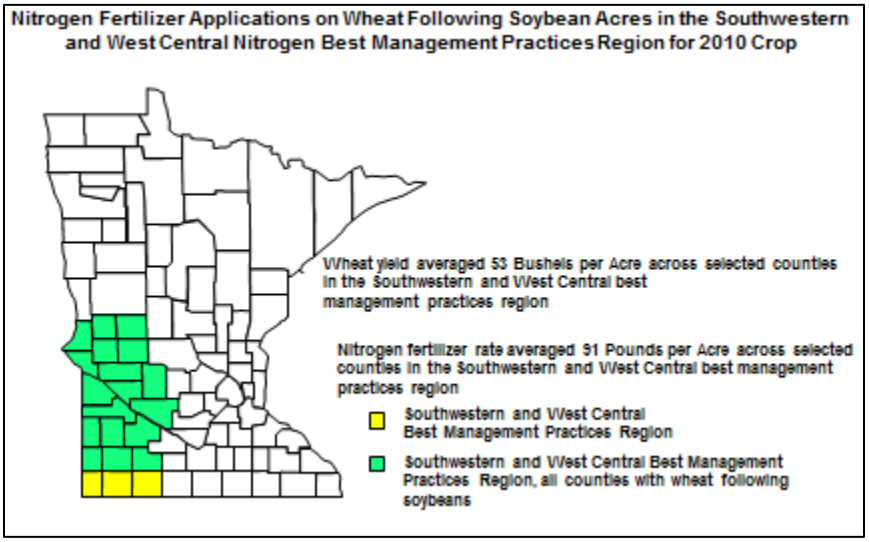

Figure 81. The wheat yield averaged 53 bushels per acre and the nitrogen fertilizer rate average 91 pounds per acre across the SW BMP region.

Figure 82 details the distribution of nitrogen fertilizer rates across the SW BMP region for wheat following soybeans; the corresponding yields are detailed in red.

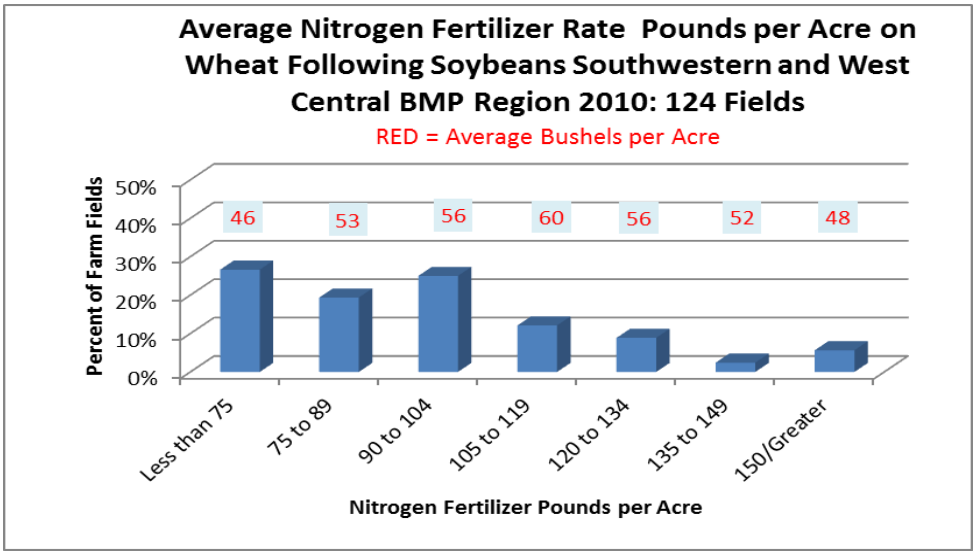

Figure 82. Average nitrogen fertilizer rates and yields on wheat following soybeans in the SW BMP region for 2010: 124 fields.

Eleven counties had more than five responses in the SW BMP region. Nitrogen fertilizer rates ranged from an average of 61 pounds per acre in Lincoln County to 103 pounds per acre in Grant County as shown in Table 63.

Table 63. Average county nitrogen fertilizer rates for the SW BMP region for wheat following soybeans.

Average County Nitrogen Fertilizer Rates for the SW BMP Region for Wheat Following Soybeans			
County	**Number of Farm Fields**	**Nitrogen Rate Pounds per Acre**	**Yield Bushels per Acre**
Big Stone	5	96	58
Chippewa	**	**	**
Cottonwood	**	**	**
Douglas	11	90	48
Grant	16	103	53
Kandiyohi	5	65	50
Lac qui Parle	9	100	52
Lincoln	6	61	53
Lyon	**	**	**
Murray	**	**	**
Pipestone	**	**	**
Pope	6	88	49
Redwood	**	**	**
Renville	**	**	**
Stevens	14	89	53
Swift	12	77	57
Traverse	16	98	52
Yellow Medicine	6	96	53

****** Less than five responses**.**

Northwestern Region: Wheat Following Soybeans

There were 328 fields that were included in the NW region wheat following soybeans analysis. Figure 83 details the location, average rate of nitrogen fertilizer and average yield for wheat following soybeans in the NW BMP region.

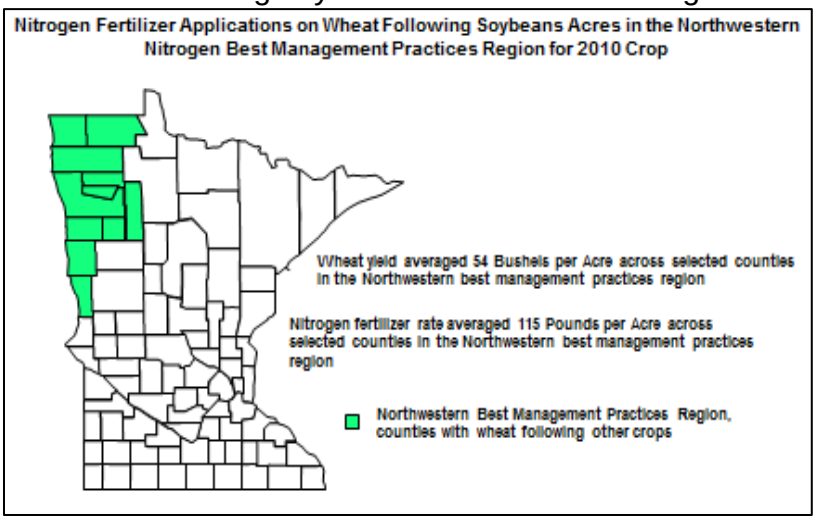

Figure 83. The wheat yield averaged 54 bushels per acre and the nitrogen fertilizer rate average 115 pounds per acre across the NW BMP region.

Figure 84 details the distribution of nitrogen fertilizer rates across the NW BMP region for wheat following soybeans; the corresponding yields are detailed in red.

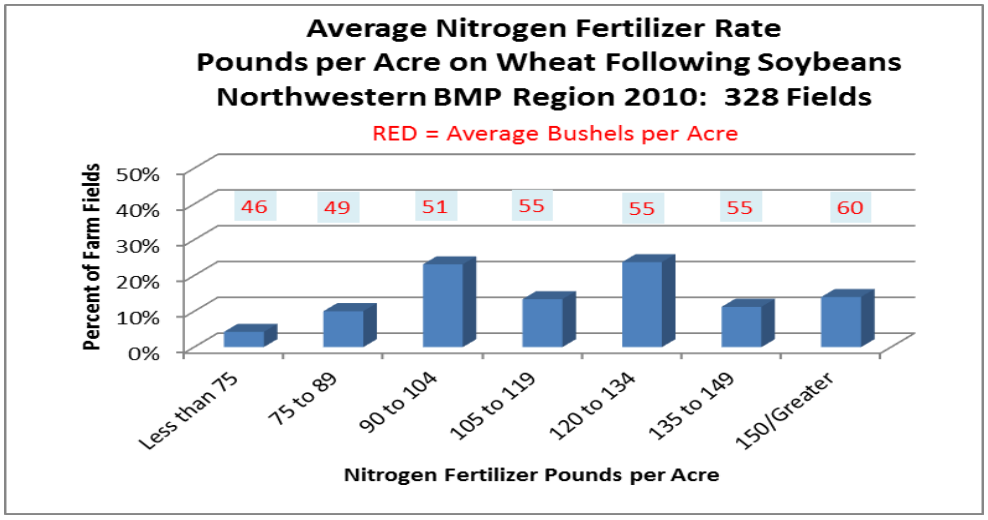

Figure 84. Average nitrogen fertilizer rates and yields on wheat following soybeans in the NW BMP region for 2010: 328 fields.

Ten counties had more than five responses in the NW BMP region. Nitrogen fertilizer rates ranged from an average of 103 pounds per acre in Wilkin County to 135 pounds per acre in Kittson County as shown in Table 64.

Table 64. Average county nitrogen fertilizer rates for the NW BMP region for wheat following soybeans.

Average County Nitrogen Fertilizer Rates for the NW BMP Region for Wheat Following Soybeans			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Clay	42	114	53
Clearwater	**	**	**
Kittson	22	135	52
Mahnomen	14	106	53
Marshall	54	113	54
Norman	25	110	56
Pennington	23	113	52
Polk	77	121	60
Red Lake	14	111	54
Roseau	32	112	48
Wilkin	22	103	50

****** Less than five responses**.**

Irrigated and Non-irrigated Sandy Soils Region: Wheat Following Soybeans

There were 91 fields that were included in the IRR BMP region wheat following soybeans analysis. Figure 85 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following soybeans.

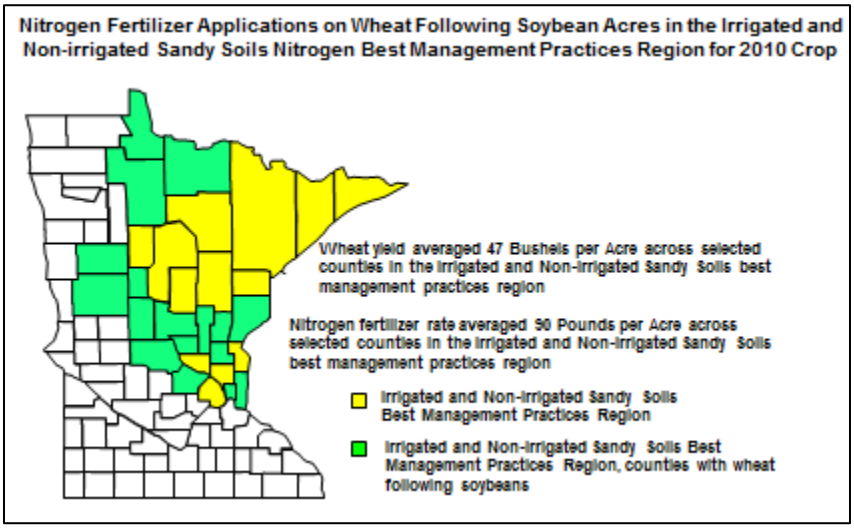

Figure 85. The wheat yield averaged 47 bushels per acre and the nitrogen fertilizer rate average 90 pounds per acre across the IRR BMP region.

Figure 86 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following soybeans; the corresponding yields are detailed in red.

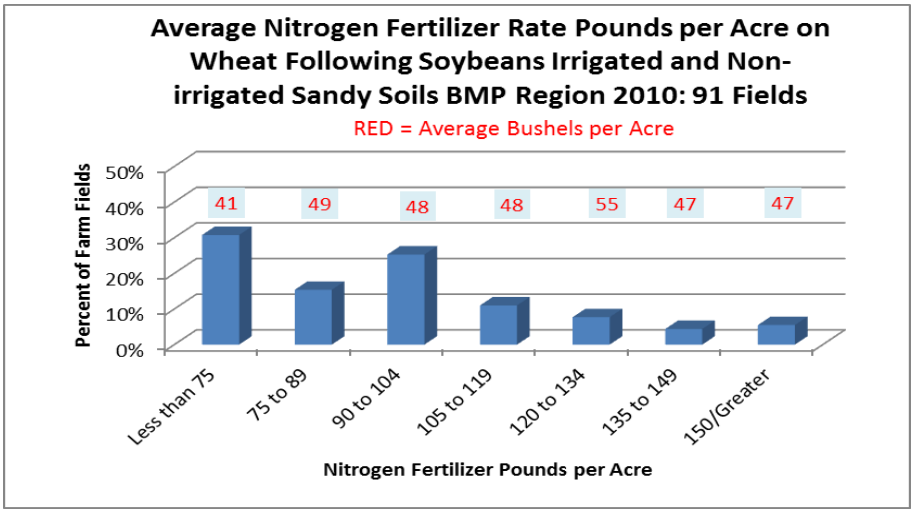

Figure 86. Average nitrogen fertilizer rates and yields on wheat following soybeans in the IRR BMP region for 2010: 91 fields.

Six counties had more than five responses in the IRR BMP region. Nitrogen fertilizer rates ranged from an average of 69 pounds per acre in Todd County to 111 pounds per acre in Ramsey County as shown in Table 64.

Table 65. Average county nitrogen fertilizer rates for the IRR BMP region for wheat following soybeans.

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Wheat Following Soybeans			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Becker	11	90	46
Beltrami	**	**	**
Benton	**	**	**
Isanti	**	**	**
Kanabec	**	**	**
Koochiching	**	**	**
Lake of the Woods	**	**	**
Mille Lacs	**	**	**
Morrison	**	**	**
Otter Tail	37	94	49
Pine	5	111	40
Ramsey	**	**	**
Stearns	8	99	46
Todd	5	69	43
Wadena	**	**	**
Washington	**	**	**

Average County Nitrogen Fertilizer Rates for the IRR BMP Region for Wheat Following Soybeans			
Wright	6	73	49

****** Less than five responses**.**

Statewide: Wheat Following Corn

Statewide four percent of the fields reported were wheat following corn. Figure 83 details the counties where farmers reported on fields with wheat following corn. There were 29 wheat following corn fields surveyed across Minnesota.

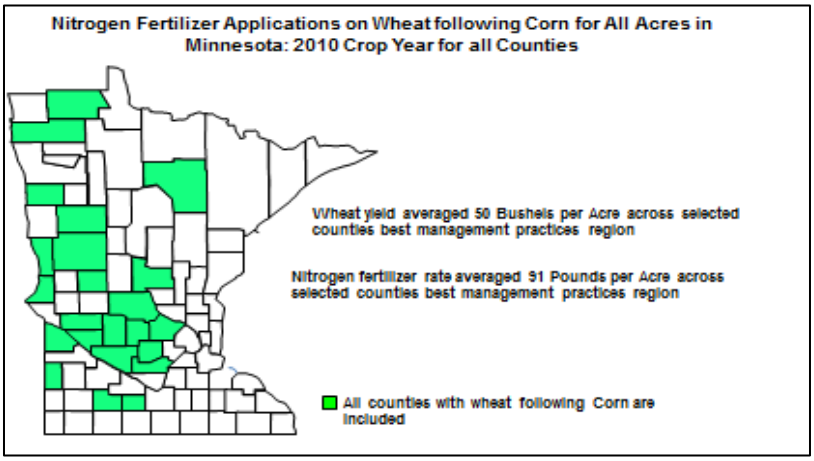

Figure 87: Counties with famers reporting on wheat following corn fields.

Figure 88 details the distribution of average nitrogen fertilizer rates across Minnesota for wheat following corn; the corresponding yields are detailed in red.

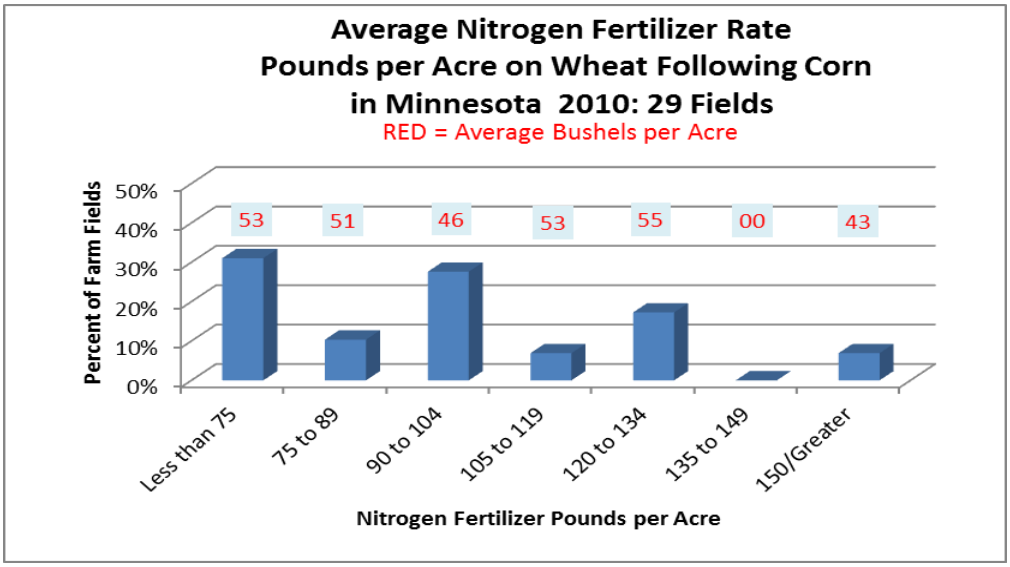

Figure 88. Average nitrogen fertilizer rates and yields on wheat following corn in Minnesota for 2010: 29 fields.

Southeastern Region: Wheat Following Corn

There were no fields that were included in the wheat following corn in the SE region analysis. Wheat following corn fields were not inventoried in any counties; therefore no analysis was conducted for the SE region.

South Central Region: Wheat Following Corn

There were five fields that were included in the SC region wheat following corn analysis. Figure 89 details the location, average rate of nitrogen fertilizer and average yield for wheat following corn in the SC BMP region.

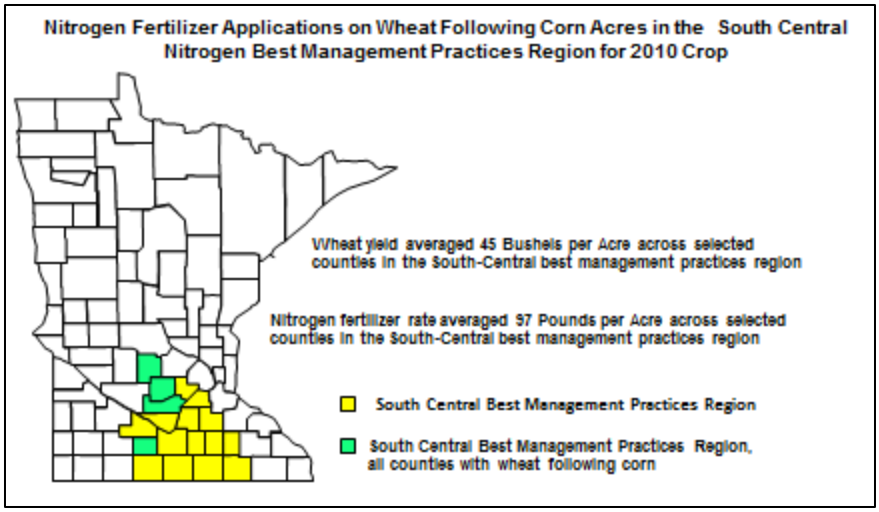

Figure 89. The Wheat yield averaged 45 bushels per acre and the nitrogen fertilizer rate average 97 pounds per acre across the SC BMP region.

No counties had more than five responses in SC BMP region; therefore no analysis was conducted for the SC region on a county basis.

Southwestern and West Central Region: Wheat Following Corn

There were 12 fields that were included in the SW region wheat following corn analysis. Figure 90 details the location, average rate of nitrogen fertilizer and average yield for wheat following corn in the SW BMP region.

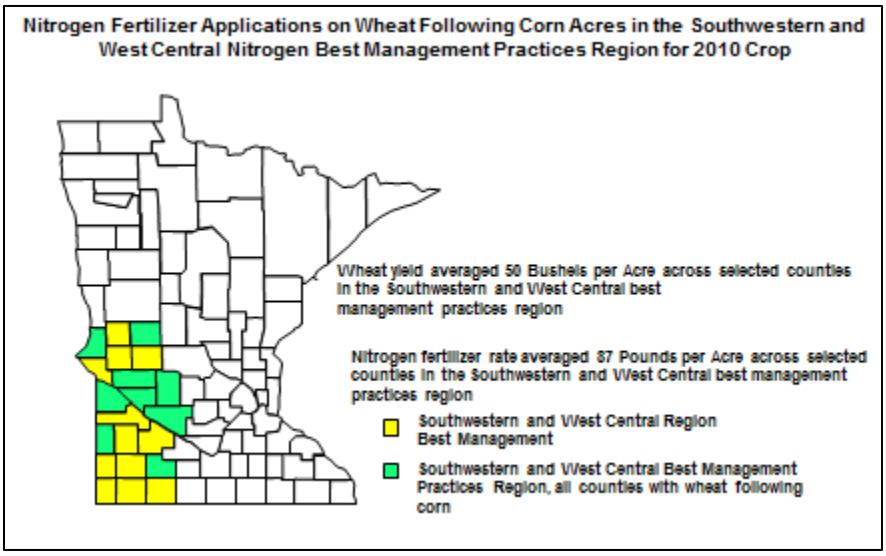

Figure 90. The wheat yield averaged 50 bushels per acre and the nitrogen fertilizer rate average 87 pounds per acre across the South western and West Central BMP region.

Figure 91 details the distribution of nitrogen fertilizer rates across the SW BMP region for wheat following corn; the corresponding yields are detailed in red.

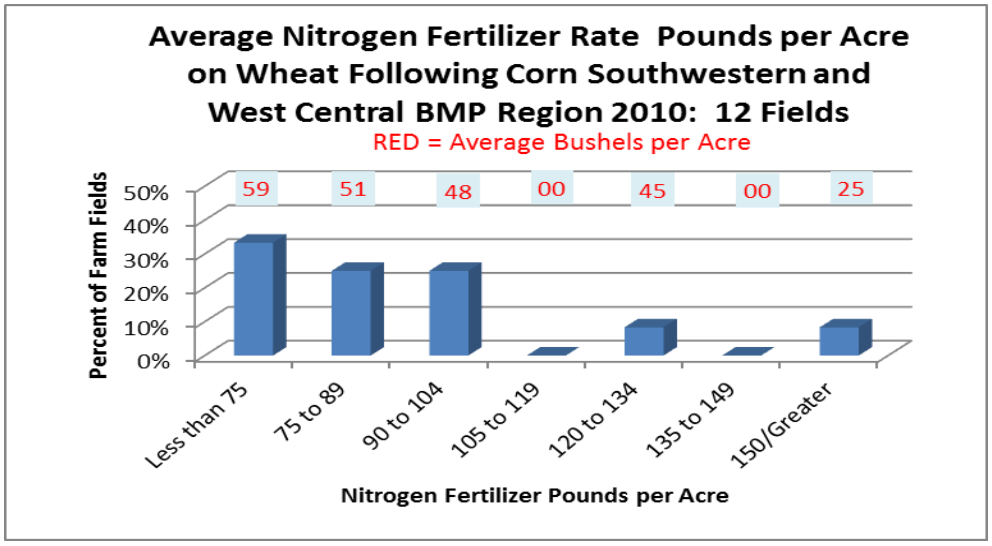

Figure 91. Average nitrogen fertilizer rates and yields on wheat following corn in the SW BMP region for 2010: 12 fields.

No counties had more than five responses in SW BMP region; therefore no analysis was conducted for the SW region on a county basis.

Northwestern Region: Wheat Following Corn

There were less than five fields that were included in the Wheat following corn in the NW region analysis. Wheat following corn fields were only inventoried in Marshall, Norman, Roseau and Wilkin counties; therefore no analysis was conducted for the NW region on a county basis.

Irrigated and Non-irrigated Sandy Soils Region: Wheat Following Corn

There were 8 fields that were included in the IRR BMP region wheat following corn analysis. Figure 92 details the location, average rate of nitrogen fertilizer and average yield for wheat following corn in the IRR BMP region.

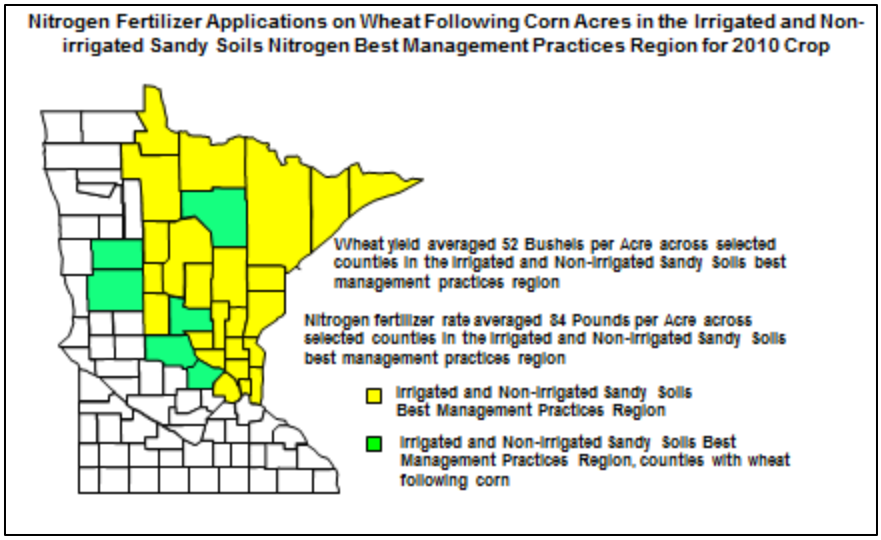

Figure 92. The wheat yield averaged 52 bushels per acre and the nitrogen fertilizer rate average 84 pounds per acre across the IRR BMP region.

Figure 93 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following corn; the corresponding yields are detailed in red.

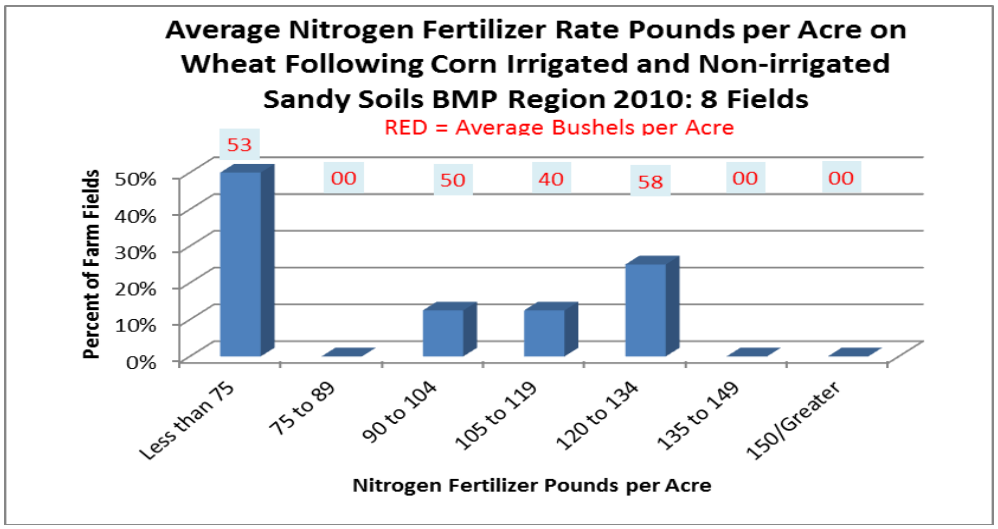

Figure 93. Average nitrogen fertilizer rates and yields on wheat following corn in the IRR BMP region for 2010: 8 fields.

No counties had more than five responses in IRR BMP region; therefore no analysis was conducted for the IRR on a county basis.

Statewide: Wheat Following Alfalfa

Statewide two percent of the fields reported was wheat following alfalfa. Figure 94 details the counties where farmers reported on fields with wheat following alfalfa. There were 15 wheat following alfalfa fields surveyed across Minnesota.

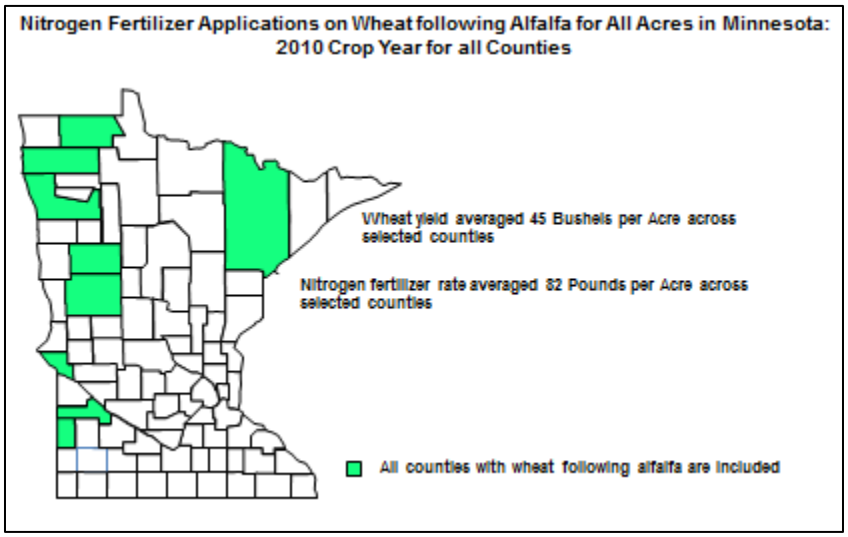

Figure 94. Counties with farmers reporting on wheat following alfalfa fields.

Figure 95 details the distribution of average nitrogen fertilizer rates across Minnesota for wheat following alfalfa; the corresponding yields are detailed in red.

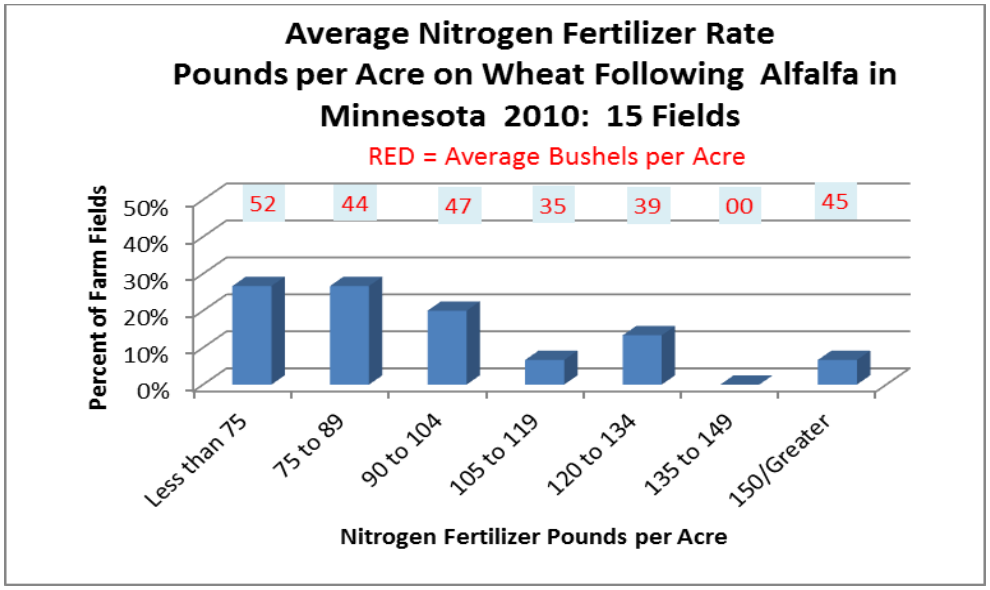

Figure 95. Average nitrogen fertilizer rates and yields on wheat following alfalfa in Minnesota for 2010: 15 fields.

Southeastern Region: Wheat Following Alfalfa

There were no fields that were included in the SE region wheat following alfalfa analysis; therefore no analysis was conducted for the SE region on a county basis.

South Central Region: Wheat Following Alfalfa

There were no fields that were included in the in the SC region wheat following alfalfa analysis; therefore, no analysis was conducted for the SC region on a county basis.

Southwestern and West Central Region: Wheat Following Alfalfa

There were three fields that were included in the SW region wheat following alfalfa analysis. Figure 96 details the location, average rate of nitrogen fertilizer and average yield for wheat following alfalfa in the SW BMP region.

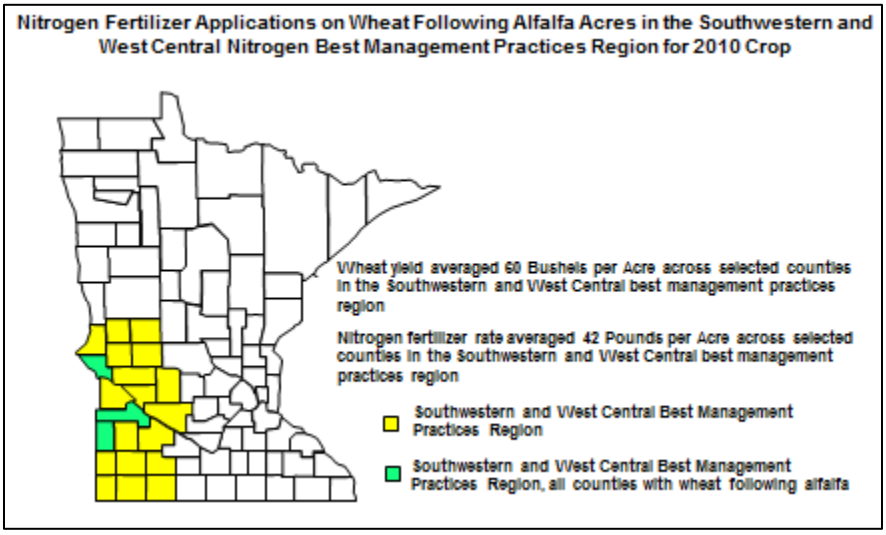

Figure 96. The wheat yield averaged 60 bushels per acre and the nitrogen fertilizer rate average 42 pounds per acre across the SW BMP region.

No counties had more than five responses in SW BMP region; therefore no analysis was conducted for the SW region on a county basis.

Northwestern Region: Wheat Following Alfalfa

There were 7 fields that were included in the NW region wheat following alfalfa analysis. Figure 97 details the location, average rate of nitrogen fertilizer and average yield for wheat following alfalfa in the NW BMP region.

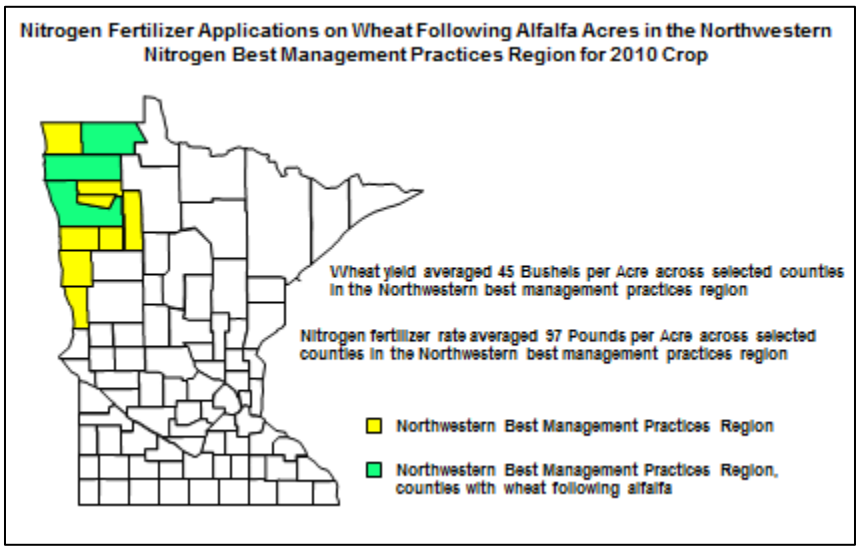

Figure 97. The wheat yield averaged 45 bushels per acre and the nitrogen fertilizer rate average 97 pounds per acre across the NW BMP region.

No counties had more than five responses in NW region BMP region; therefore no analysis was conducted for the NW region on a county basis.

Irrigated and Non-irrigated Sandy Soils Region: Wheat Following Alfalfa

There were five fields that were included in the IRR BMP region wheat following alfalfa analysis. Figure 98 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following alfalfa.

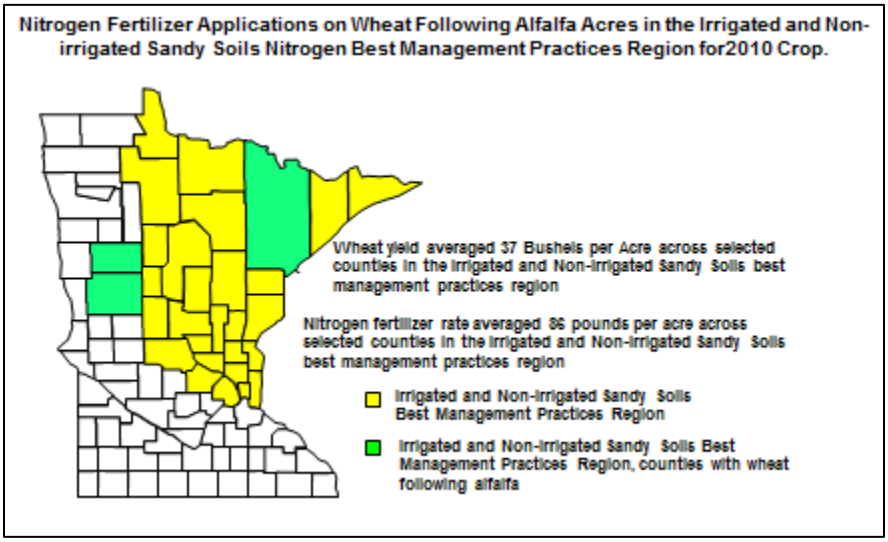

Figure 98. The wheat yield averaged 37 bushels per acre and the nitrogen fertilizer rate average 86 pounds per acre across the IRR BMP region.

No counties had more than five responses in IRR region BMP region; therefore no analysis was conducted for the IRR region on a county basis.

Statewide: Wheat Following Small Grains

Statewide five percent of the fields reported were wheat following small grains. Figure 99 details the counties where farmers reported on fields with wheat following small grains. There were 33 wheat following small grains fields surveyed across Minnesota.

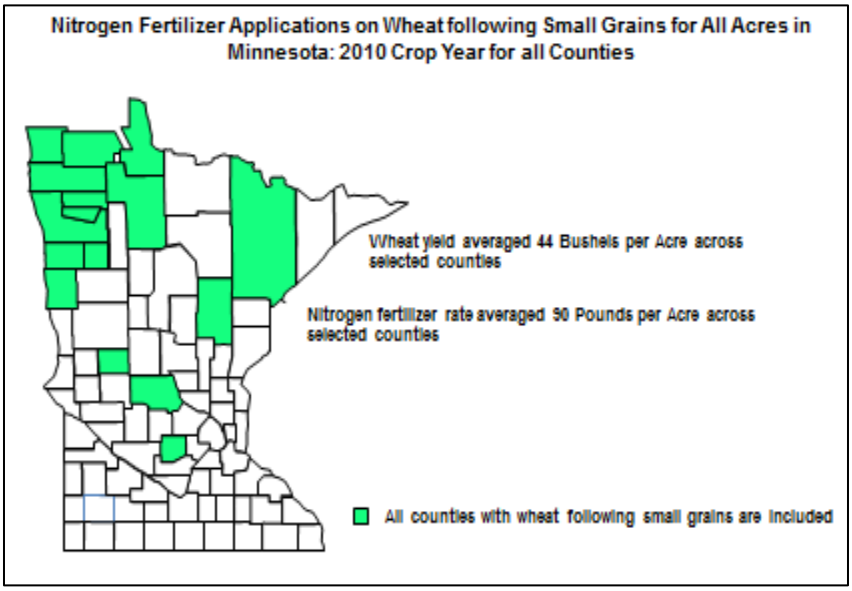

Figure 99. Counties with farmers reporting on wheat following small grains fields.

Figure 100 details the distribution of average nitrogen fertilizer rates across Minnesota for wheat following small grains; the corresponding yields are detailed in red.

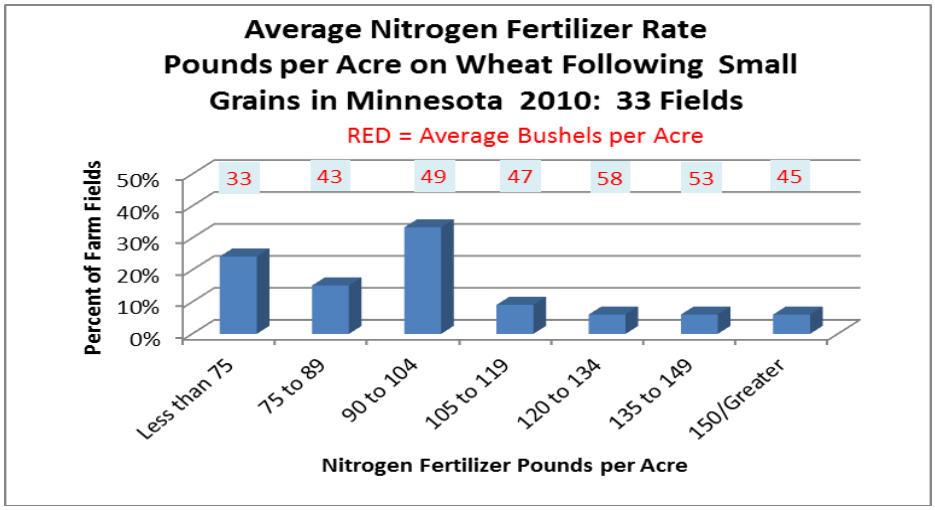

Figure 100.Average nitrogen fertilizer rates and yields on wheat following small grains in Minnesota for 2010: 33 fields.

Southeastern Region: Wheat Following Small grains

There were no fields that were included in the in the SE region wheat following small grains analysis; therefore no analysis was conducted for the SE region on a county basis.

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South Central Region: Corn Following Small Grains

There were less than five fields that were included in the in the SC region wheat following small grains analysis. Wheat following small grains fields were only inventoried in McLeod County; therefore, no analysis was conducted for the NW region on a county basis.

Southwestern and West Central Region: Wheat Following Small Grains

There were less than five fields that were included in the in the SW region wheat following small grains analysis. Wheat following small grains fields was only inventoried in Douglas County; therefore no analysis was conducted for the SW region on a county basis.

Northwestern Region: Wheat Following Small Grains

There were 24 fields that were included in the NW region wheat following small grains analysis. Figure 101 details the location, average rate of nitrogen fertilizer and average yield for wheat following small grains in the NW BMP region.

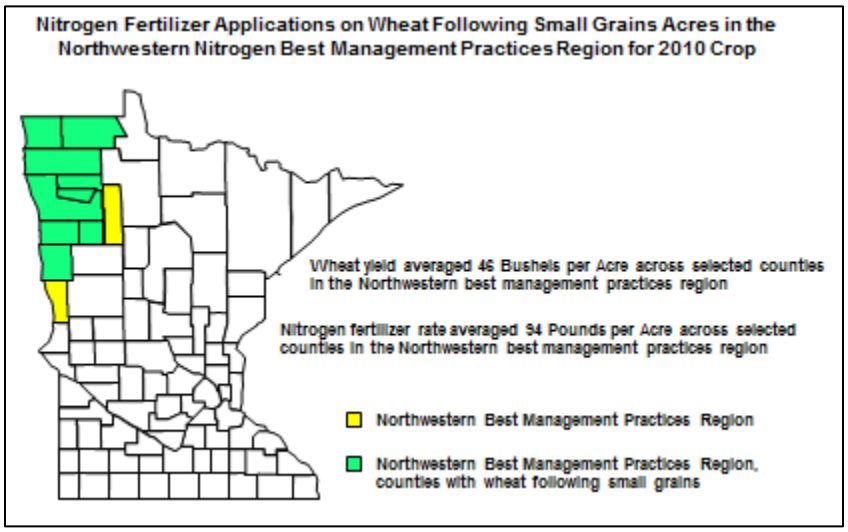

Figure 101. The wheat yield averaged 46 bushels per acre and the nitrogen fertilizer rate average 94 pounds per acre across the NW BMP region.

Figure 102 details the distribution of nitrogen fertilizer rates across the NW BMP region for wheat following small grains; the corresponding yields are detailed in red.

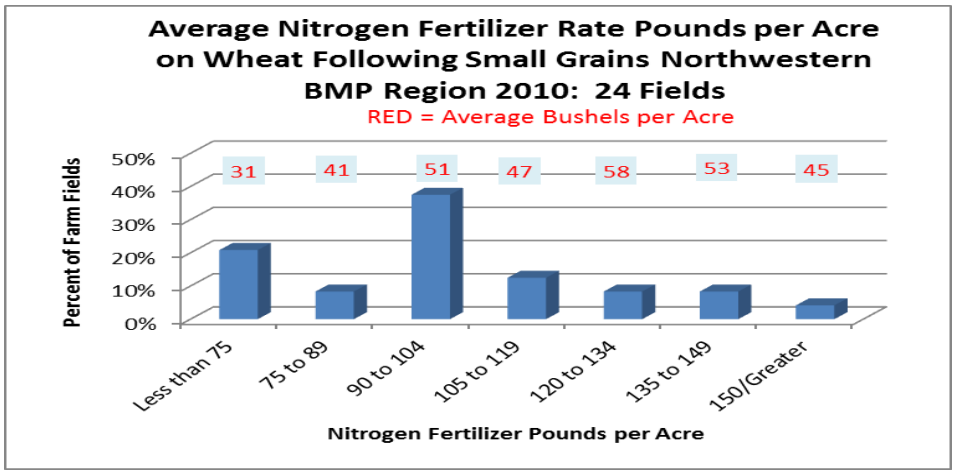

Figure 102. Average nitrogen fertilizer rates and yields on corn following small grains in the NW BMP region for 2010: 24 fields.

Two counties had more than five responses in the NW BMP region. Nitrogen fertilizer rates ranged from an average of 98 pounds per acre in Marshall County to 101 pounds per acre in Kittson County as shown in Table 66.

Table 66. Average county nitrogen fertilizer rates for the NW BMP region for wheat following small grains.

Average County Nitrogen Fertilizer Rates for the NW BMP Region for Wheat Following Small Grains			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Clay	**	**	**
Kittson	5	98	47
Mahnomen	**	**	**
Marshall	6	101	52
Norman	**	**	**
Pennington	**	**	**
Polk	**	**	**
Red Lake	**	**	**
Roseau	**	**	**

****** Less than five responses**.**

Irrigated and Non-irrigated Sandy Soils Region: Wheat Following Small Grains

There were 7 fields that were included in the IRR BMP region corn following small grains analysis. Figure 103 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following small grains.

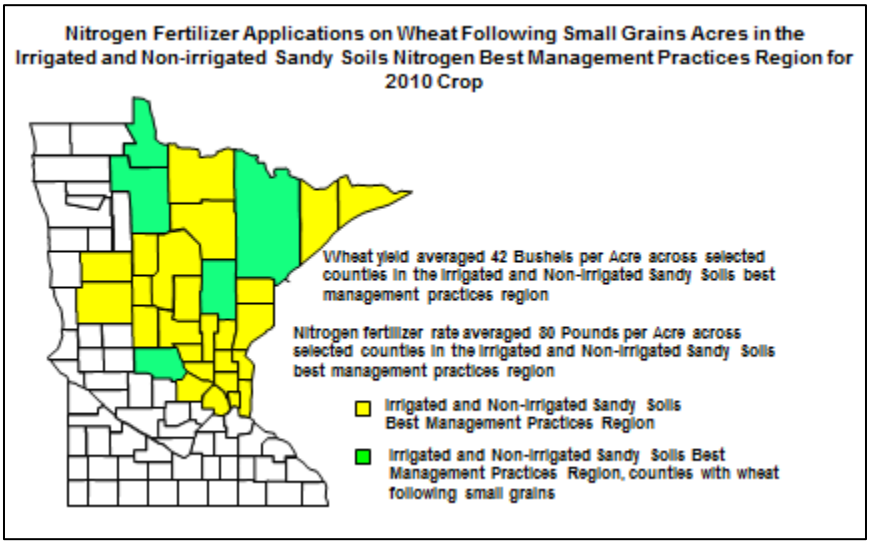

Figure 103. The wheat yield averaged 42 bushels per acre and the nitrogen fertilizer rate average 80 pounds per acre across the IRR BMP region.

Figure 104 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following small grains; the corresponding yields are detailed in red.

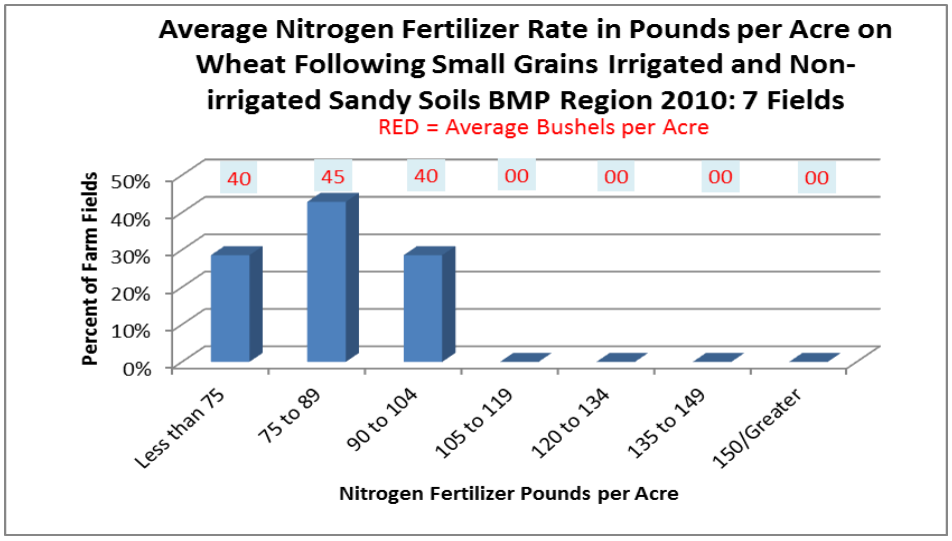

Figure 104. Average nitrogen fertilizer rates and yields on corn following small grains in the IRR BMP region for 2010: 7 fields.

No counties had more than five responses in the IRR BMP region; therefore no analysis was conducted for the IRR region on a county basis.

Statewide: Wheat Following Other Crops

Statewide eleven percent of the fields reported were wheat following other crops. Figure 105 details the counties where farmers reported on fields with wheat following other crops. There were 79 wheat following other crops fields surveyed across Minnesota.

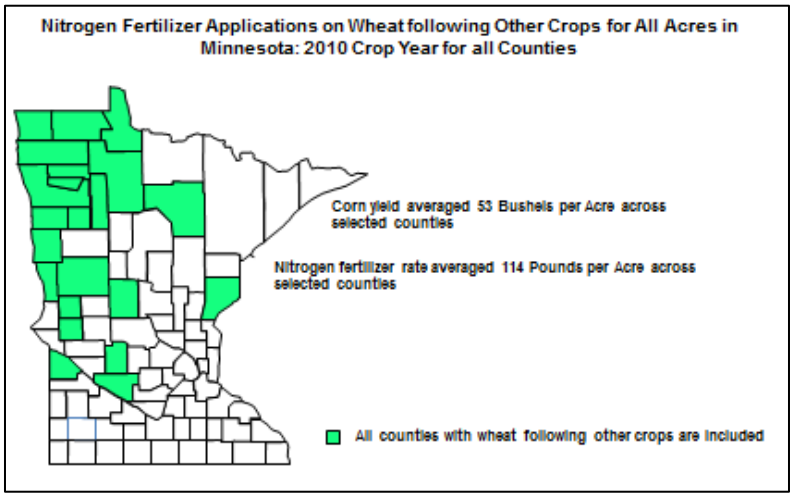

Figure 105. Counties with farmers reporting on wheat following other crops fields.

Figure 106 details the distribution of average nitrogen fertilizer rates across Minnesota for that wheat following other crops; the corresponding yields are detailed in red.

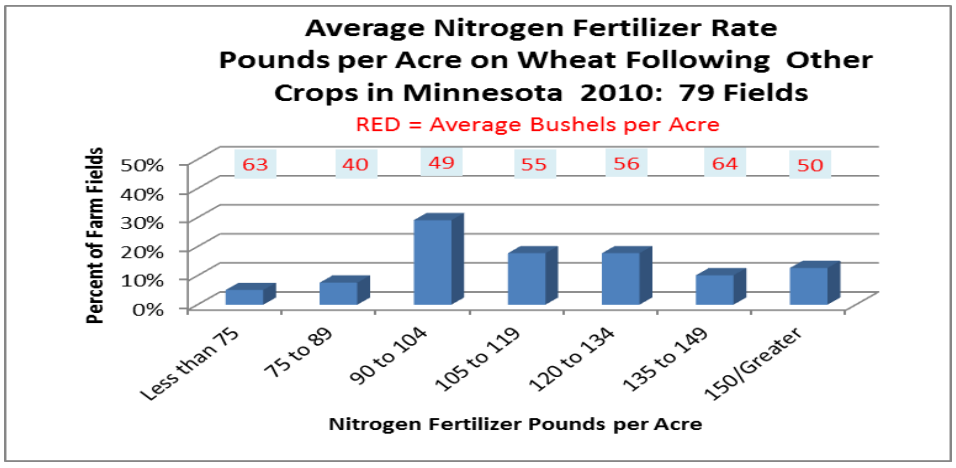

Figure 106. Average nitrogen fertilizer rates and yields on wheat following other crops in Minnesota for 2010: 79 fields.

Southeastern Region: Wheat Following Other Crops

There were no fields that were included in the SE region wheat following other crops analysis; therefore no analysis was conducted for the SE region on a county basis.

South Central Region: Wheat Following Other Crops

There were no fields that were included in the SC region wheat following other crops analysis; therefore no analysis was conducted for the SC region on a county basis.

Southwestern and West Central Region: Wheat Following Other Crops

There were 7 fields that were included in the SW region wheat following other crops analysis. Figure 107 details the location, average rate of nitrogen fertilizer and average yield for wheat following other crops in the SW BMP region.

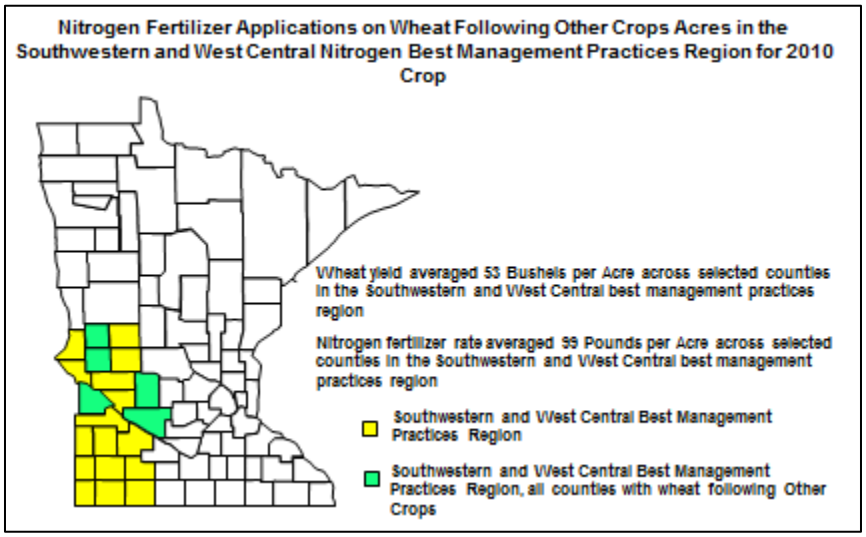

Figure 107. The wheat yield averaged 53 bushels per acre and the nitrogen fertilizer rate average 99 pounds per acre across the SW BMP region.

Figure 108 details the distribution of nitrogen fertilizer rates across the SW BMP region for wheat following small grains; the corresponding yields are detailed in red.

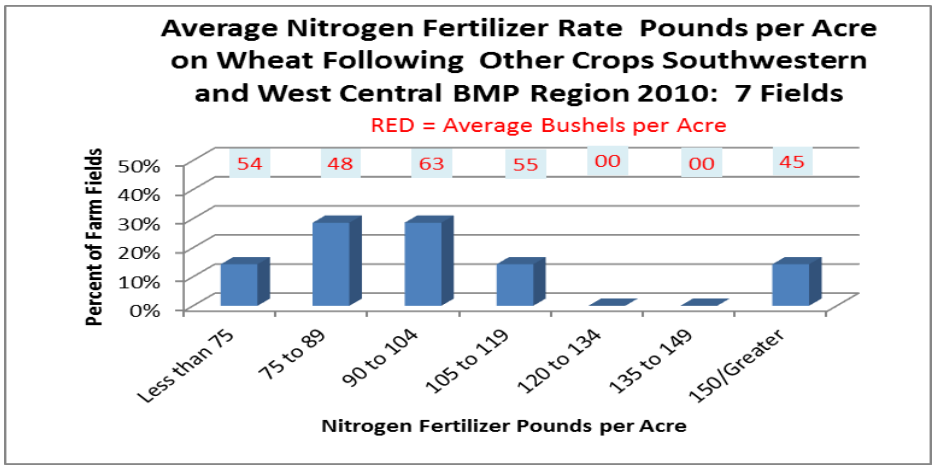

Figure 108. Average nitrogen fertilizer rates and yields on wheat following other crops in the SW BMP region for 2010: 7 fields.

No counties had more than five responses in SW BMP region; therefore no analysis was for the SW region on a county basis.

Northwestern Region: Wheat Following Other Crops

There were 62 fields that were included in the NW region wheat following other crops analysis. Figure 109 details the location, average rate of nitrogen fertilizer and average yield for wheat following other crops in the NW BMP region.

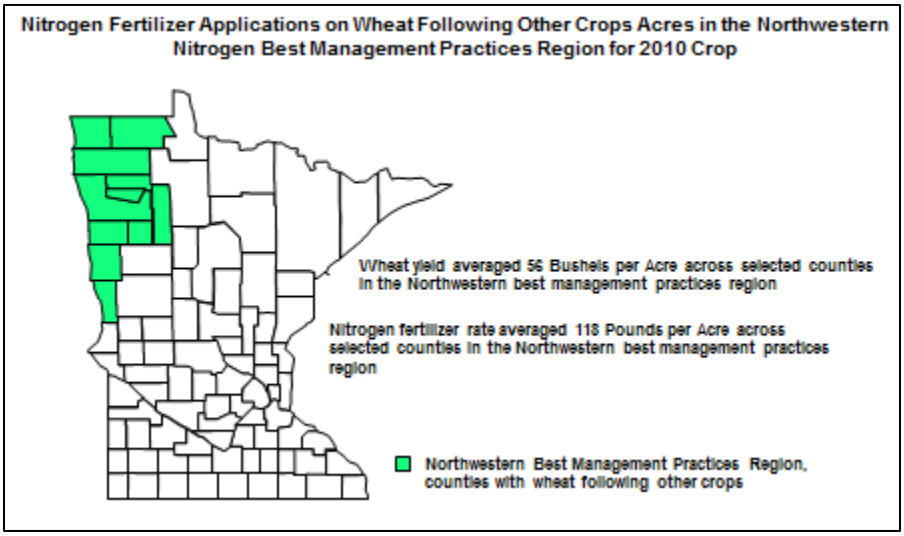

Figure 109. The wheat yield averaged 56 bushels per acre and the nitrogen fertilizer rate average 118 pounds per acre across the NW BMP region.

Figure 110 details the distribution of nitrogen fertilizer rates across the NW BMP region for wheat following other crops; the corresponding yields are detailed in red.

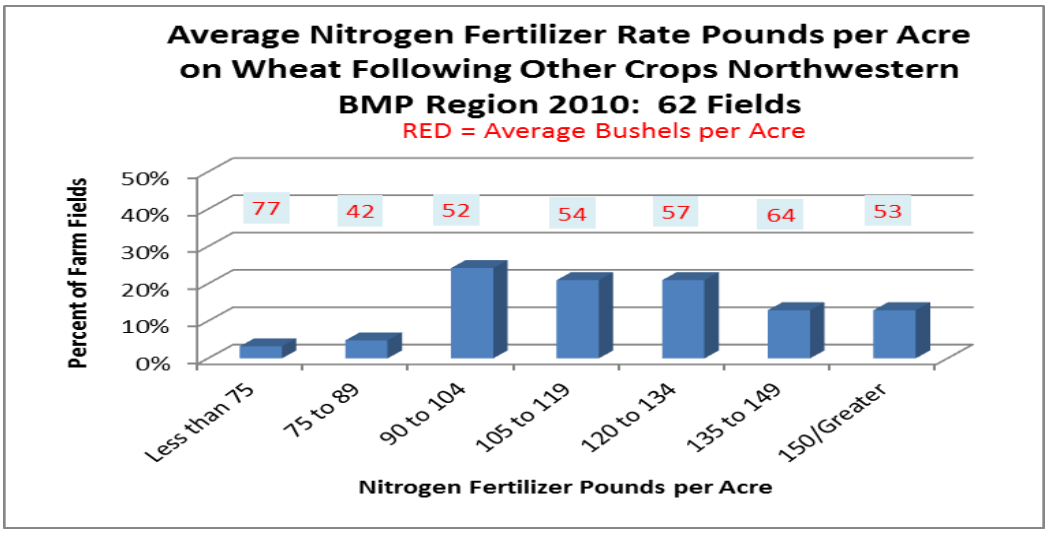

Figure 110. Average nitrogen fertilizer rates and yields on wheat following other crops in the NW BMP region for 2010: 62 fields.

Five counties had more than five responses in the NW BMP region. Nitrogen fertilizer rates ranged from an average of 107 pounds per acre in Roseau County to 127 pounds per acre in Mahnomen County as shown in Table 67.

Table 67. Average county nitrogen fertilizer rates for the NW BMP region for wheat following other crops.

Average County Nitrogen Fertilizer Rates for the NW BMP Region for Wheat Following Other Crops			
County	Number of Farm Fields	Nitrogen Rate Pounds per Acre	Yield Bushels per Acre
Clay	**	**	**
Clearwater	**	**	**
Kittson	6	109	49
Mahnomen	**	**	**
Marshall	12	127	56
Norman	7	117	61
Pennington	**	**	**
Polk	16	126	63
Red Lake	**	**	**
Roseau	11	107	46
Wilkin	**	**	**

****** Less than five responses**.**

Irrigated and Non-irrigated Sandy Soils Region: Wheat Following Other Crops

There were 10 fields that were included in the IRR BMP region wheat following other crops analysis. Figure 111 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following other crops.

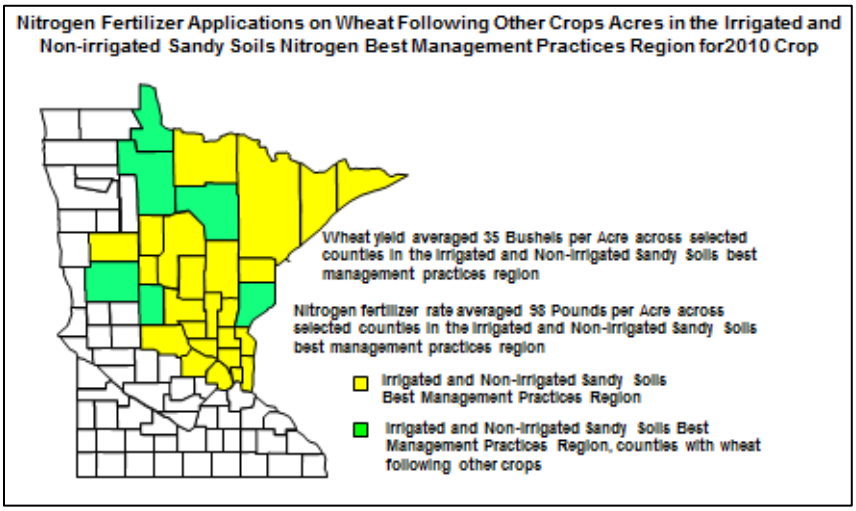

Figure 111. The wheat yield averaged 35 bushels per acre and the nitrogen fertilizer rate average 98 pounds per acre across the IRR BMP region.

Figure 112 details the distribution of nitrogen fertilizer rates across the IRR BMP region for wheat following other crops; the corresponding yields are detailed in red.

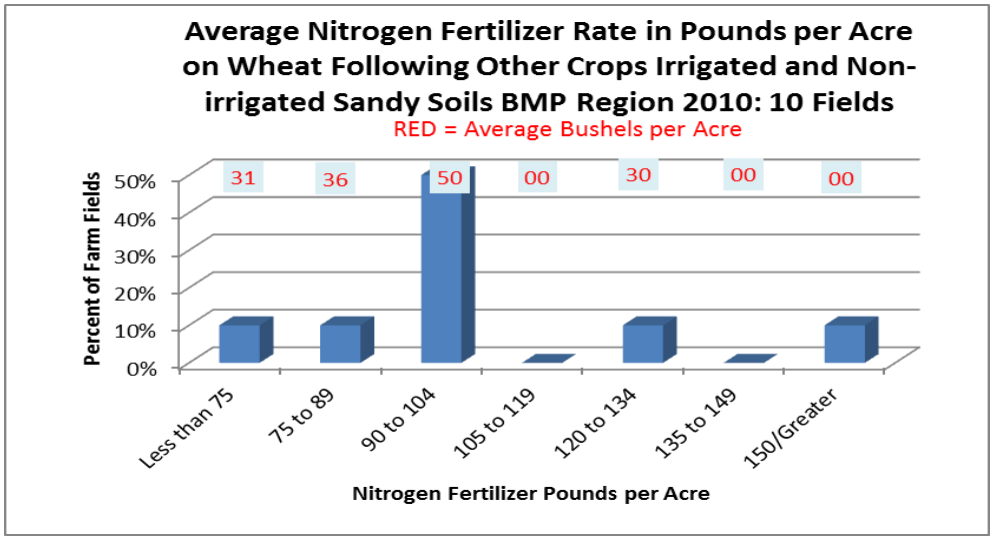

Figure 112. Average nitrogen fertilizer rates and yields on wheat following other crops in the IRR BMP region for 2010: 10 fields.

No counties had more than five responses in IRR BMP region; therefore no analysis was conducted for the IRR region on a county basis.

Table 68 details the major form of nitrogen applied to the wheat field (WQ-9).

Table 68. The major form of nitrogen applied on this field.

BMP Region	Major Form of the Nitrogen Applied	Percentage of Respondents
Northwestern	Anhydrous Ammonia	27
Northwestern	Urea	70
Northwestern	Liquid Nitrogen	1
Northwestern	Other	2
Irrigated and non-irrigated sandy soils	Anhydrous Ammonia	2
Irrigated and non-irrigated sandy soils	Urea	89
Irrigated and non-irrigated sandy soils	Liquid Nitrogen	2
Irrigated and non-irrigated sandy soils	Other	5
Irrigated and non-irrigated sandy soils	Unknown	2
Southwestern and West Central	Anhydrous Ammonia	5
Southwestern and West Central	Urea	86
Southwestern and West Central	Liquid Nitrogen	2
Southwestern and West Central	Other	6
South Central	Anhydrous Ammonia	5
South Central	Urea	84
South Central	Liquid Nitrogen	5
South Central	Other	5
Statewide	Anhydrous Ammonia	17
Statewide	Urea	77
Statewide	Liquid Nitrogen	1
Statewide	Other	4
Statewide	Unknown	0

*Totals may not add due to rounding

Table 69 details the major form of nitrogen, the average yield and nitrogen rate for those forms (WQ-9).

Table 69. Average amount of nitrogen applied and corresponding yield by BMP region and type of nitrogen.

BMP Region	Previous Crop	Nitrogen Rate Pounds per Acre	Previous Yield Bushels per Acre
Northwestern	Anhydrous Ammonia	115	54
Northwestern	Urea	**	**
Northwestern	Liquid Nitrogen	97	45
Northwestern	Other	94	46
Northwestern	Unknown	118	56
Irrigated and non-irrigated sandy soils	Anhydrous Ammonia	90	47
Irrigated and non-irrigated sandy soils	Urea	84	52
Irrigated and non-irrigated sandy soils	Liquid Nitrogen	86	37
Irrigated and non-irrigated sandy soils	Other	80	42
Irrigated and non-irrigated sandy soils	Unknown	98	35
Southwestern and West Central	Anhydrous Ammonia	91	53
Southwestern and West Central	Urea	87	50
Southwestern and West Central	Liquid Nitrogen	**	**
Southwestern and West Central	Other	**	**
Southwestern and West Central	Unknown	99	53
South Central	Anhydrous Ammonia	91	53
South Central	Urea	97	45
South Central	Other	**	**
Statewide	Anhydrous Ammonia	104	53
Statewide	Urea	91	50
Statewide	Liquid Nitrogen	82	45
Statewide	Other	90	44
Statewide	Unknown	114	53

****** Less than five responses.

Table 70 details the major form of nitrogen applied to the wheat field (WQ-10).

Table 70. Nitrogen incorporation by region for wheat fields.

BMP Region	Incorporation	Percentage of Respondents
Northwestern	Yes	94
Northwestern	No	6
Irrigated and non-irrigated sandy soils	Yes	88
Irrigated and non-irrigated sandy soils	No	12
Southwestern and West Central	Yes	94
Southwestern and West Central	No	6
South Central	Yes	87
South Central	No	13
Statewide	Yes	92
Statewide	No	8

*Totals may not add due to rounding

Table 71 details the commercial applications of 2009 fall fertilizer for the 2010 wheat crop (WQ11).

Table 71. Fall applications of commercial fertilizer in 2009 for the 2010 wheat crop.

BMP Region	Did you Apply any Commercial Fertilizer in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	28
Northwestern	No	72
Irrigated and non-irrigated sandy soils	Yes	8
Irrigated and non-irrigated sandy soils	No	92
Southwestern and West Central	Yes	15
Southwestern and West Central	No	85
South Central	Yes	13
South Central	No	87
Statewide	Yes	22
Statewide	No	78

*Totals may not add due to rounding

Table 72. Applications of anhydrous ammonia in the fall of 2009 for the 2010 wheat crop.

BMP Region	Did you Apply Anhydrous Ammonia in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	12
Northwestern	No	88
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	5
Southwestern and West Central	No	95
South Central	Yes	3
South Central	No	97
Statewide	Yes	8
Statewide	No	92

*Totals may not add due to rounding

Table 73 details the urea applications in the fall of 2009 for the 2010 wheat crop (WQ14).

Table 73. Applications of urea in the fall of 2009 for the 2010 wheat crop.

BMP Region	Did you Apply Urea in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	16
Northwestern	No	84
Irrigated and non-irrigated sandy soils	Yes	5
Irrigated and non-irrigated sandy soils	No	95
Southwestern and West Central	Yes	8
Southwestern and West Central	No	92
South Central	Yes	5
South Central	No	92
Statewide	Yes	12
Statewide	No	88

*Totals may not add due to rounding

Table 74 details the liquid nitrogen applications, such as 28% or 32%, in the fall of 2009 for the 2010 wheat crop (WQ16); no farmers applied.

Table 74. Applications of liquid nitrogen in the fall of 2009 for the 2010 wheat crop.

BMP Region	Did you Apply Liquid Nitrogen (28%, 32%) in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	0
Irrigated and non-irrigated sandy soils	No	100
Southwestern and West Central	Yes	0
Southwestern and West Central	No	100
South Central	Yes	0
South Central	No	100
Statewide	Yes	0
Statewide	No	100

*Totals may not add due to rounding

Table 75 details the phosphorus applications in the fall of 2009 for the 2010 wheat crop (WQ18). In Minnesota over 99.9% of phosphorus fertilizers contain nitrogen; therefore phosphorus applications are needed to extract the nitrogen contributions to the wheat crop.

Table 75. Applications of phosphorus fertilizers such as MAP or DAP in the fall of 2009 for the 2010 wheat crop.

BMP Region	Did you Apply Phosphorus in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	6
Northwestern	No	94
Irrigated and non-irrigated sandy soils	Yes	4
Irrigated and non-irrigated sandy soils	No	96
Southwestern and West Central	Yes	7
Southwestern and West Central	No	93
South Central	Yes	5
South Central	No	95
Statewide	Yes	6
Statewide	No	94

*Totals may not add due to rounding

Table 76 details the applications of other fertilizers in the fall of 2009 for the 2010 wheat crop (WQ20).

Table 76. Applications of other fertilizers in the fall of 2009 for the 2010 wheat crop.

BMP Region	Did you Apply Other Sources of Fertilizer in the Fall of 2009?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	0
Irrigated and non-irrigated sandy soils	No	100
Southwestern and West Central	Yes	1
Southwestern and West Central	No	99
South Central	Yes	0
South Central	No	100
Statewide	Yes	0
Statewide	No	100

*Totals may not add due to rounding

Table 77 details the applications of commercial fertilizers in the spring as a preplant for the 2010 wheat crop (WQ22).

Table 77. Applications of commercial fertilizers in the spring as a preplant for the 2010 wheat crop.

BMP Region	Did you Apply Commercial Fertilizer in the Spring as a Preplant?	Percentage of Respondents
Northwestern	Yes	70
Northwestern	No	30
Irrigated and non-irrigated sandy soils	Yes	79
Irrigated and non-irrigated sandy soils	No	21
Southwestern and West Central	Yes	82
Southwestern and West Central	No	18
South Central	Yes	76
South Central	No	24
Statewide	Yes	74
Statewide	No	26

*Totals may not add due to rounding

Table 78 details the applications of anhydrous ammonia in the spring as a preplant for the 2010 wheat crop (WQ24).

Table 78. Applications of anhydrous ammonia in the spring as a preplant for the 2010 wheat crop.

BMP Region	Did you Apply Anhydrous as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	14
Northwestern	No	86
Irrigated and non-irrigated sandy soils	Yes	1
Irrigated and non-irrigated sandy soils	No	99
Southwestern and West Central	Yes	2
Southwestern and West Central	No	98
South Central	Yes	3
South Central	No	97
Statewide	Yes	9
Statewide	No	91

*Totals may not add due to rounding

Table 79 details the applications of urea in the spring as a preplant for the 2010 wheat crop (WQ25).

Table 79. Applications of urea in the spring as a preplant for the 2010 wheat crop.

BMP Region	Did you Apply Urea as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	51
Northwestern	No	49
Irrigated and non-irrigated sandy soils	Yes	72
Irrigated and non-irrigated sandy soils	No	28
Southwestern and West Central	Yes	72
Southwestern and West Central	No	28
South Central	Yes	68
South Central	No	32
Statewide	Yes	60
Statewide	No	40

*Totals may not add due to rounding

Table 80 details the applications of liquid nitrogen in the spring as a preplant for the 2010 wheat crop (WQ26).

Table 80. Applications of liquid nitrogen in the spring as a preplant for the 2010 wheat crop.

BMP Region	Did you Apply Liquid Nitrogen (28%, 32%) as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	1
Northwestern	No	99
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	99
Southwestern and West Central	Yes	1
Southwestern and West Central	No	99
South Central	Yes	3
South Central	No	97
Statewide	Yes	1
Statewide	No	99

*Totals may not add due to rounding

Table 81 details the applications of phosphorus such as MAP or DAP in the spring as a preplant for the 2010 wheat crop (WQ28).

Table 81. Did you apply any phosphorus sources such as MAP or DAP or other dry fertilizer in the spring as a preplant?

BMP Region	Did you Apply Phosphorus as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	23
Northwestern	No	77
Irrigated and non-irrigated sandy soils	Yes	18
Irrigated and non-irrigated sandy soils	No	82
Southwestern and West Central	Yes	31
Southwestern and West Central	No	69
South Central	Yes	26
South Central	No	74
Statewide	Yes	24
Statewide	No	76

*Totals may not add due to rounding

Table 82 details the applications of other fertilizers in the spring as a preplant for the 2010 wheat crop (WQ31).

Table 82. Applications of other fertilizers in the spring as a preplant for the 2010 wheat crop.

BMP Region	Did you Apply Other Sources of Fertilizer as a Preplant in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	1
Northwestern	No	99
Irrigated and non-irrigated sandy soils	Yes	5
Irrigated and non-irrigated sandy soils	No	95
Southwestern and West Central	Yes	5
Southwestern and West Central	No	95
South Central	Yes	5
South Central	No	95
Statewide	Yes	3
Statewide	No	97

*Totals may not add due to rounding

Table 83 details the applications of commercial fertilizers in the spring as a starter or at planting for the 2010 wheat crop (WQ32).

Table 83. Did you apply any commercial fertilizer in the spring as a starter or planting for the wheat crop season?

BMP Region	Did you Apply Commercial Fertilizer in the Spring as a Starter or at Planting?	Percentage of Respondents
Northwestern	Yes	37
Northwestern	No	63
Irrigated and non-irrigated sandy soils	Yes	15
Irrigated and non-irrigated sandy soils	No	85
Southwestern and West Central	Yes	6
Southwestern and West Central	No	94
South Central	Yes	13
South Central	No	87
Statewide	Yes	26
Statewide	No	74

*Totals may not add due to rounding

Table 84 details the applications of urea in the spring as a starter or at planting for the 2010 wheat crop (WQ33).

Table 84. Applications of urea in the spring as a starter or at planting for the 2010 wheat crop.

BMP Region	Did you Apply Urea as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	7
Northwestern	No	93
Irrigated and non-irrigated sandy soils	Yes	8
Irrigated and non-irrigated sandy soils	No	92
Southwestern and West Central	Yes	4
Southwestern and West Central	No	96
South Central	Yes	5
South Central	No	95
Statewide	Yes	6
Statewide	No	94

*Totals may not add due to rounding

Table 85 details the applications of liquid nitrogen in the spring as a starter or at planting for the 2010 wheat crop (WQ35).

Table 85. Applications of liquid nitrogen in the spring as a starter or at planting for the 2010 wheat crop.

BMP Region	Did you Apply Liquid Nitrogen (28%, 32%) as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	2
Northwestern	No	98
Irrigated and non-irrigated sandy soils	Yes	1
Irrigated and non-irrigated sandy soils	No	99
Southwestern and West Central	Yes	0
Southwestern and West Central	No	100
South Central	Yes	3
South Central	No	97
Statewide	Yes	2
Statewide	No	98

*Totals may not add due to rounding

Table 86 details the applications of phosphorus such as MAP or DAP in the spring as a starter or at planting for the 2010 wheat crop (WQ37).

Table 86. Applications of phosphorus in the spring as a starter or at planting for the 2010 wheat crop.

BMP Region	Did you Apply Phosphorus as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	28
Northwestern	No	72
Irrigated and non-irrigated sandy soils	Yes	7
Irrigated and non-irrigated sandy soils	No	93
Southwestern and West Central	Yes	3
Southwestern and West Central	No	97
South Central	Yes	5
South Central	No	95
Statewide	Yes	18
Statewide	No	82

*Totals may not add due to rounding

Table 87 details the applications of phosphorus such as MAP or DAP in the spring as a starter or at planting for the 2010 wheat crop (WQ38).

Table 87. Applications of other fertilizer in the spring as a starter or at planting for the 2010 wheat crop.

BMP Region	Did you Apply Other Fertilizers as a Starter or at Planting in the Spring of 2010?	Percentage of Respondents
Northwestern	Yes	3
Northwestern	No	97
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	1
Southwestern and West Central	No	99
South Central	Yes	0
South Central	No	100
Statewide	Yes	2
Statewide	No	98

*Totals may not add due to rounding

Table 88 details the applications of commercial fertilizers post planting or sidedress for the 2010 wheat crop (WQ41).

Table 88. Applications of commercial fertilizers at post planting or sidedress for the 2010 wheat crop.

BMP Region	Did you Apply Commercial Fertilizer After Planting such as a Sidedress?	Percentage of Respondents
Northwestern	Yes	5
Northwestern	No	95
Irrigated and non-irrigated sandy soils	Yes	8
Irrigated and non-irrigated sandy soils	No	92
Southwestern and West Central	Yes	3
Southwestern and West Central	No	97
South Central	Yes	11
South Central	No	89
Statewide	Yes	6
Statewide	No	94

*Totals may not add due to rounding

Table 89 details the applications of anhydrous ammonia as a post planting or sidedress for the 2010 wheat crop (WQ42).

Table 89. Applications of anhydrous ammonia as a post planting or sidedress for the 2010 wheat crop.

BMP Region	Did you Apply Anhydrous Ammonia as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	0
Irrigated and non-irrigated sandy soils	No	100
Southwestern and West Central	Yes	0
Southwestern and West Central	No	100
South Central	Yes	0
South Central	No	100
Statewide	Yes	0
Statewide	No	100

*Totals may not add due to rounding

Table 90 details the applications of urea as a post planting or sidedress for the 2010 wheat crop (WQ44).

Table 90. Applications of urea as a post planting or sidedress for the 2010 wheat crop.

BMP Region	Did you Apply Urea as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	2
Northwestern	No	98
Irrigated and non-irrigated sandy soils	Yes	5
Irrigated and non-irrigated sandy soils	No	95
Southwestern and West Central	Yes	3
Southwestern and West Central	No	97
South Central	Yes	8
South Central	No	92
Statewide	Yes	3
Statewide	No	97

*Totals may not add due to rounding

Table 91 details the applications of liquid nitrogen as a post planting or sidedress for the 2010 wheat crop (WQ46).

Table 91. Applications of liquid nitrogen as a post planting or sidedress for the 2010 Wheat crop.

BMP Region	Did you Apply Liquid Nitrogen (28%, 32%) as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	3
Northwestern	No	97
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	1
Southwestern and West Central	No	99
South Central	Yes	3
South Central	No	97
Statewide	Yes	3
Statewide	No	97

*Totals may not add due to rounding

Table 92 details the applications of phosphorus such as MAP or DAP as a post planting or sidedress for the 2010 wheat crop (WQ48).

Table 92. Applications of phosphorus as a post planting or sidedress for the 2010 wheat crop.

BMP Region	Did you Apply Phosphorus as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	2
Irrigated and non-irrigated sandy soils	No	98
Southwestern and West Central	Yes	0
Southwestern and West Central	No	100
South Central	Yes	3
South Central	No	97
Statewide	Yes	1
Statewide	No	99

*Totals may not add due to rounding

Table 93 details the applications other fertilizers as a post planting or sidedress for the 2010 wheat crop (WQ50).

Table 93. Applications of other fertilizers as a post planting or sidedress for the 2010 corn crop.

BMP Region	Did you Apply Other Fertilizers as a Post Planting or Sidedress in 2010?	Percentage of Respondents
Northwestern	Yes	0
Northwestern	No	100
Irrigated and non-irrigated sandy soils	Yes	0
Irrigated and non-irrigated sandy soils	No	100
Southwestern and West Central	Yes	0
Southwestern and West Central	No	100
South Central	Yes	0
South Central	No	100
Statewide	Yes	0
Statewide	No	0

*Totals may not add due to rounding

Table 94 details the type of soil sampling that the wheat growers used in the last five years. (WQ52).

Table 94. What type of soil sampling do you use? List all that you used in last five years.

BMP Region	What Type of Soil Sampling was Used in the Last five Years?	Percentage of Respondents
Northwestern	Traditional	71
Northwestern	Grid	6
Northwestern	Zone	11
Northwestern	Other	1
Northwestern	None	10
Irrigated and non-irrigated sandy soils	Traditional	74
Irrigated and non-irrigated sandy soils	Grid	3
Irrigated and non-irrigated sandy soils	Zone	2
Irrigated and non-irrigated sandy soils	Other	2
Irrigated and non-irrigated sandy soils	None	18
Southwestern and West Central	Traditional	65
Southwestern and West Central	Grid	7
Southwestern and West Central	Zone	9
Southwestern and West Central	Other	2
Southwestern and West Central	None	17
South Central	Traditional	51
South Central	Grid	20
South Central	Zone	7
South Central	Other	2
South Central	None	20
Statewide	Traditional	69
Statewide	Grid	7
Statewide	Zone	9
Statewide	Other	2
Statewide	None	13

*Totals may not add due to rounding

Figure 113 details the form of nitrogen that was applied to wheat acres statewide.

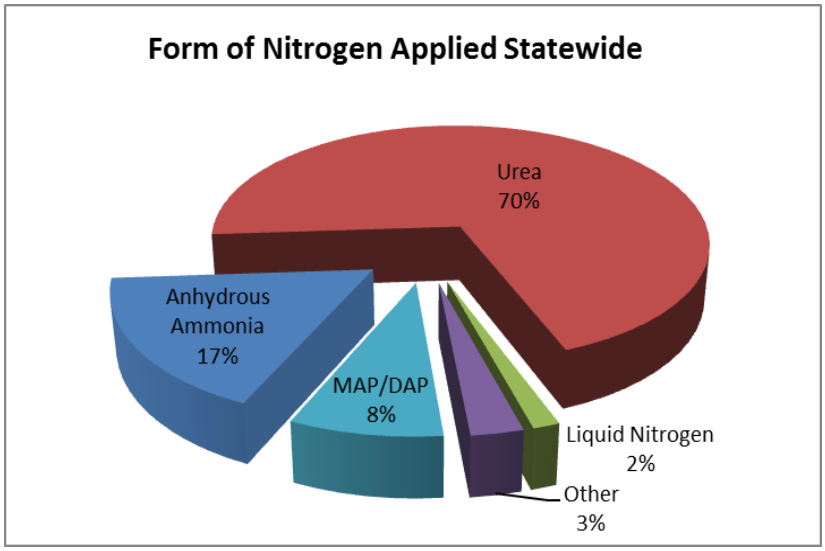

Figure 113. Chemical form of the nitrogen applied to wheat acres in the state for the 2010 survey for all fields with nitrogen fertilizer applied.

Figure 114 details the form of nitrogen that was applied to wheat acres in the SC BMP region.

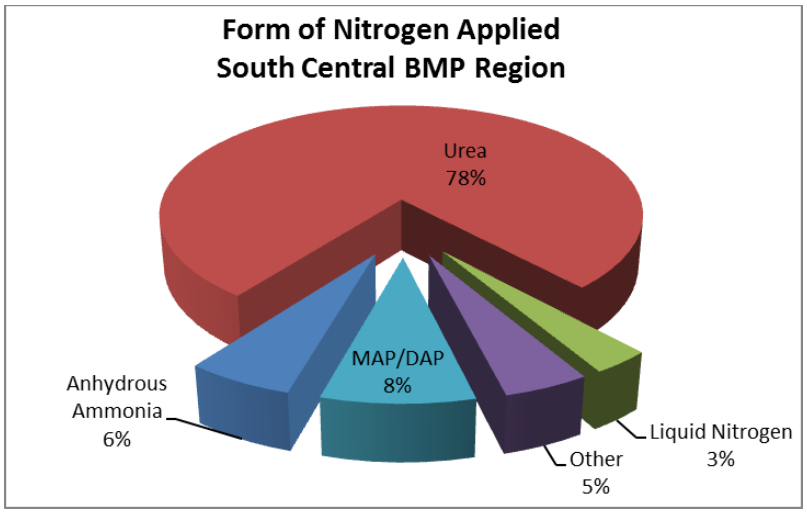

Figure 114. Chemical form of the nitrogen applied to wheat acres in the SC BMP region for the 2010 survey for all fields with nitrogen fertilizer applied.

Figure 115 details the form of nitrogen that was applied to wheat acres in the Southwestern and Central BMP region.

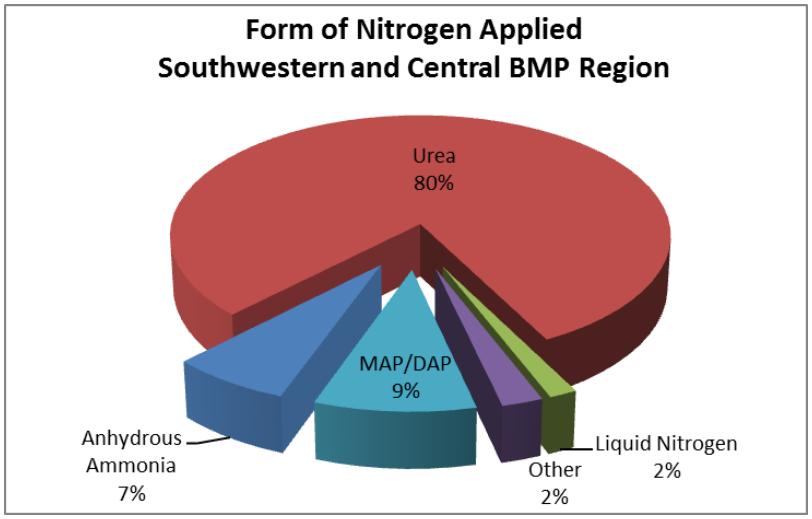

Figure 115. Chemical form of the nitrogen applied to wheat acres in the Southwestern and Central BMP region for the 2010 survey for all fields with nitrogen fertilizer applied.

Figure 116 details the form of nitrogen that was applied to wheat acres in the NW BMP region.

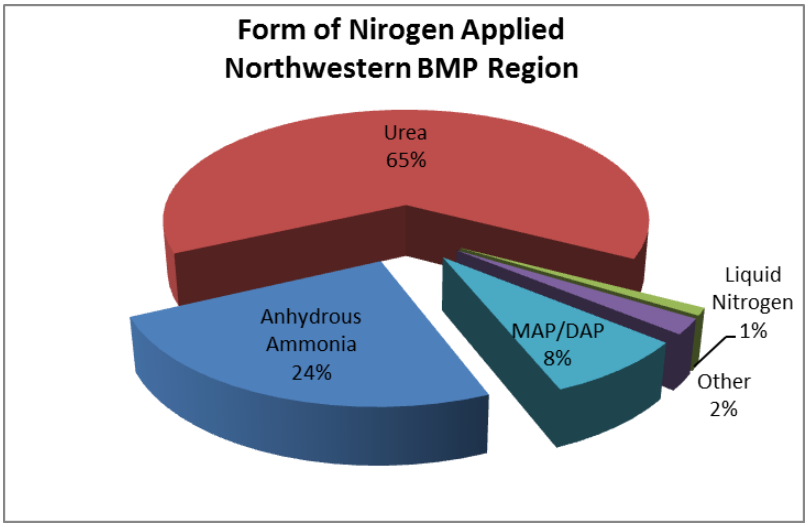

Figure 116. Chemical form of the nitrogen applied to wheat acres in the NW BMP region for the 2010 survey for all fields with nitrogen fertilizer applied.

Figure 117 details the form of nitrogen that was applied to wheat acres in the IRR BMP region.

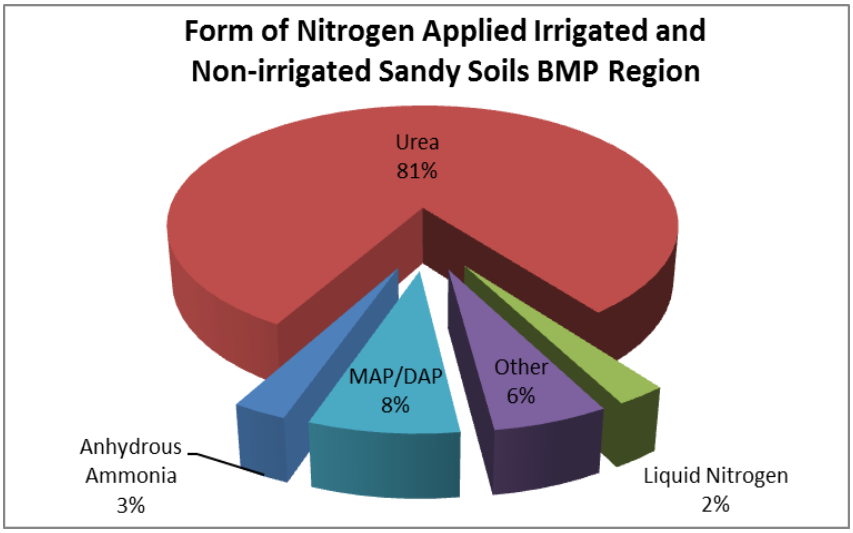

Figure 117. Chemical form of the nitrogen applied to wheat acres in the IRR BMP region for the 2010 survey for all fields with nitrogen fertilizer applied.

Figure 118 details the timing of anhydrous ammonia applications on wheat acres across the state of Minnesota for an average field by pounds of nitrogen applied.

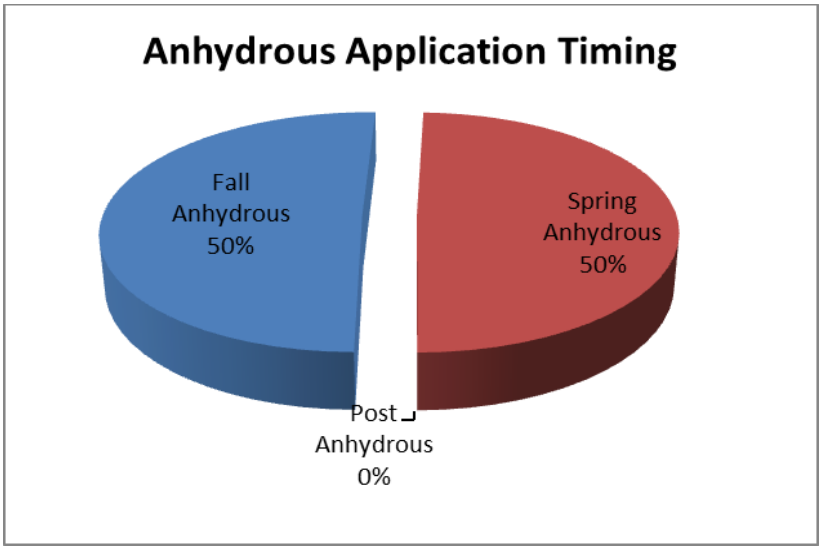

Figure 118. Timing of anhydrous ammonia applications to wheat acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 119 details the timing of urea applications on wheat acres across the state for an average field by pounds of nitrogen applied.

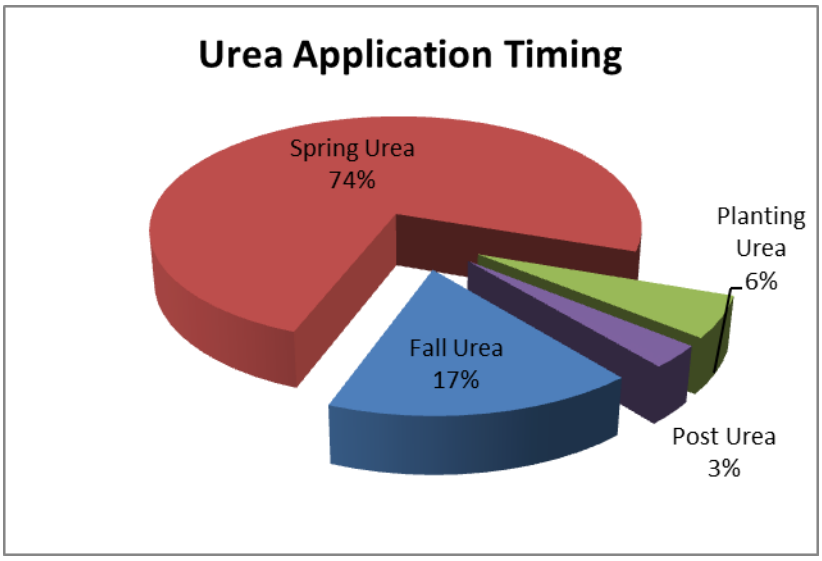

Figure 119. Timing of urea applications to wheat acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 120 details the timing of liquid nitrogen applications on wheat acres across the state for an average field by pounds of nitrogen applied.

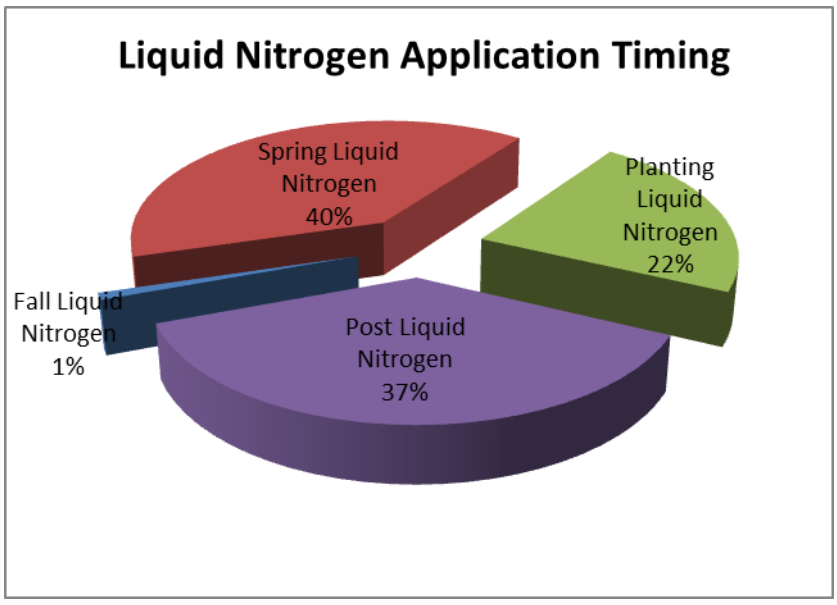

Figure 120. Timing of liquid nitrogen applications to wheat acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 121 details the timing of other nitrogen applications on wheat acres across the state for an average field by pounds of nitrogen applied.

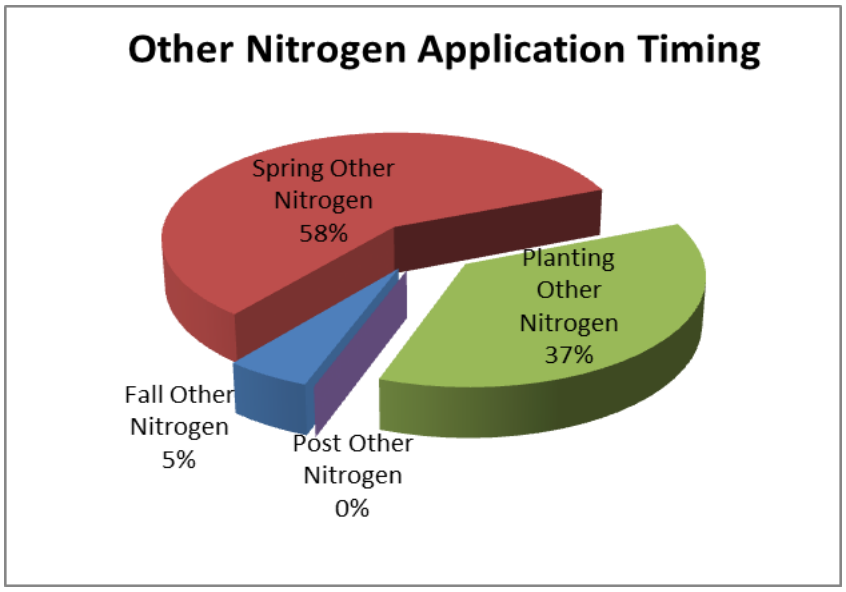

Figure 121. Timing of other nitrogen applications to wheat acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

Figure 122 details the timing of MAP/DAP applications containing nitrogen on wheat acres across the state for an average field by pounds of nitrogen applied.

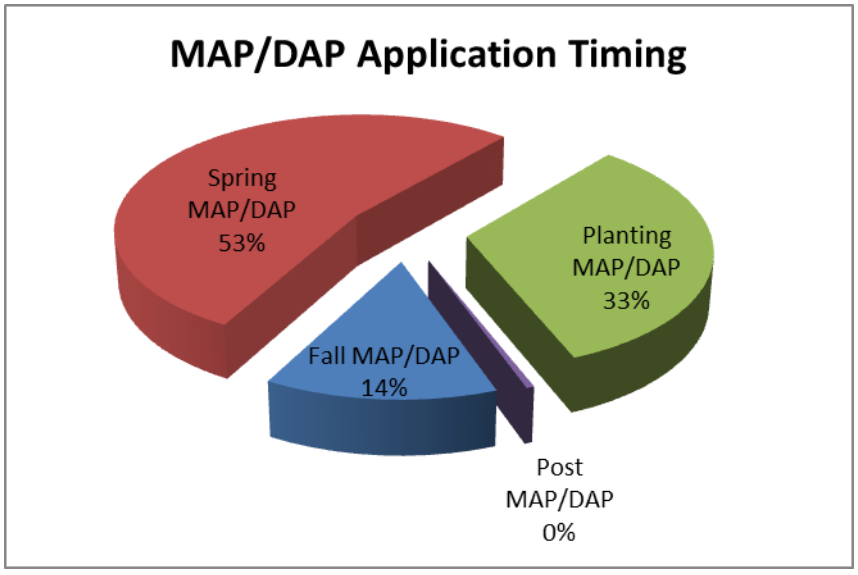

Figure 122. Timing of MAP/DAP applications containing nitrogen to wheat acres across Minnesota by pounds of nitrogen applied in the 2010 survey.

2010 Manure Use Practices Summary and Highlights

Manure is a valuable source of nitrogen for Minnesota corn farmers. The primary purpose of this survey was to obtain an understanding of basic manure management practices associated with corn production.

This report summarizes survey results for a number of important practices associated with manure use on Minnesota's 2010 corn acres. Over 2,500 producers participated in the telephone survey and herbicide information was collected for 570,000 manured acres. This is the first herbicide survey performed by the MDA and NASS to collect information on manure management practices on Minnesota corn acres.

NASS developed a sampling population of 7,000 farms by randomly drawing from its entire database of all corn growers in Minnesota. There were 2,500 farmers that applied manure in 2010 and that completed the survey. All growers were asked basic questions regarding manure use and management.

Data Reporting and Limitations

The primary purpose of this survey was to obtain an understanding of basic manure management practices.

Due to the simplified method used to collect what is typically considered complex data, it is imperative that the reader understand the limitations of the data sets. Many surveys conducted by NASS employ advanced sampling strategies which are designed to statistically represent a non-homogenous population, thus "weighting" the data to account for sample size, county size, and crop acreage, etc. Such strategies can be very expensive and are not without their own limitations.[5] This survey did not employ such strategies; rather, farmers who used manure were randomly selected from across Minnesota. Therefore, weighting across areas or counties was not performed. The MDA can be contacted to further discuss interpretation of the survey data.

[5] For an explanation of survey methods and data quality associated with annual county-level data, visit the NASS "Quick Stats" Frequently Asked Questions website at: http://www.nass.usda.gov/QuickStats/Screens/faqs.htm

Table 95. Summary of respondents and corresponding corn acres by county and BMP region.

County	BMP Region	Number of Respondents	Number of Corn Acres
Clay	NW	5	345
Kittson	NW	**	**
Mahnomen	NW	**	**
Marshall	NW	5	385
Norman	NW	6	1,101
Polk	NW	**	**
Red Lake	NW	**	**
Roseau	NW	5	2,545
Wilkin	NW	**	**
Totals/Averages	**NW**	**35**	**8,560**
Aitkin	IRR	**	**
Anoka	IRR	**	**
Becker	IRR	13	2,142
Benton	IRR	24	3,401
Cass	IRR	5	607
Chicago	IRR	8	3,604
Crow Wing	IRR	**	**
Hubbard	IRR	**	**
Isanti	IRR	6	2,237
Kanabec	IRR	6	642
Mille Lacs	IRR	18	1,708
Morrison	IRR	68	6,628
Otter Tail	IRR	43	8,100
Pine	IRR	19	1,222
Sherburne	IRR	8	2,546
Stearns	IRR	141	20,175
Todd	IRR	50	6,161
Wadena	IRR	9	1,281
Washington	IRR	5	532
Wright	IRR	24	4,230
Totals/Averages	**IRR**	**457**	**66,132**
Big Stone	SW	**	**
Chippewa	SW	9	3,852
Cottonwood	SW	21	9,644
Douglas	SW	21	2,806
Grant	SW	**	**
Jackson	SW	14	3,309
Kandiyohi	SW	21	10,003
Lac qui Parle	SW	16	10,025
Lincoln	SW	19	5,520
Lyon	SW	15	4,078
Murray	SW	18	4,499
Nobles	SW	26	6,685
Pipestone	SW	21	4,524
Pope	*SW*	*22*	*3,913*

County	BMP Region	Number of Respondents	Number of Corn Acres
Redwood	SW	27	8,714
Renville	SW	26	9,926
Rock	SW	15	3,782
Stevens	SW	10	5,375
Swift	SW	13	6,552
Yellow Medicine	SW	18	8,478
Totals/Averages	**SW**	**341**	**112,769**
Blue Earth	SC	19	7,200
Brown	SC	19	6,303
Carver	SC	10	1,297
Dodge	SC	62	27,174
Faribault	SC	17	9,465
Freeborn	SC	19	6,727
Le Sueur	SC	12	2,334
Martin	SC	30	11,251
McLeod	SC	17	3,920
Meeker	SC	20	4,364
Mower	SC	117	32,468
Nicollet	SC	20	7,683
Rice	SC	17	8,393
Scott	SC	10	2,075
Sibley	SC	27	5,836
Steele	SC	22	6,465
Waseca	SC	22	12,330
Watonwan	SC	10	7,117
Totals/Average	**SC**	**470**	**162,402**
Dakota	SE	64	17,159
Fillmore	SE	234	50,278
Goodhue	SE	221	45,492
Houston	SE	178	20,910
Olmsted	SE	139	30,605
Wabasha	SE	188	29,088
Winona	SE	213	27,977
Totals/Average	**SE**	**1237**	**221,509**
State	**ALL**	**2540**	**571,372**

Statewide Manure Applications and Management on Corn.

Information on manure management was gathered on a typical corn field for the 2010 growing season. Information about management on all crop acres was not collected in this survey. Manure applications on crops other than corn were not collected in this survey. Typically in Minnesota the vast amount of manure applied is for the following corn crop. Manure is generally applied after the previous crop is harvested and before the corn crop is planted, usually in the fall or spring. Manure information was collected at the same time as pesticide and commercial fertilizer information during the survey, thus limiting the amount of information that could be gathered due to time restraints for the farmer. If manure was not used, the respondent's survey on manure was then concluded.

Participants who grew corn were asked if they had a field that was applied with manure. If yes, they were then asked the size of the field, the average yield of the field during the past corn crops and if the whole field was applied with manure. Table 96 summarizes the percent of corn farmers with a field applied with manure (MQ1). Table 97 details the average size of the field, average yield, and percent of fields with complete manure coverage (MQ2, MQ3 & MQ4).

Table 96. Percentage of respondents that applied manure on corn acres.

BMP Region	Did you have a Field Applied with Manure?	Percent of All Respondents
Northwestern	Yes	38
Northwestern	No	62
Irrigated and non-irrigated sandy soils	Yes	69
Irrigated and non-irrigated sandy soils	No	31
South Western and West Central	Yes	44
South Western and West Central	No	56
South Central	Yes	47
South Central	No	53
Southeastern	Yes	62
Southeastern	No	38
Statewide	Yes	56
Statewide	No	44

Table 97. Corn acres of the field, average yield and manure coverage of that field.

BMP Region	Average Size of Field (Acres)	Average Yield per Acre	Percent of Fields with Complete Manure Coverage
Northwestern	5	139	83
Irrigated and non-irrigated sandy soils	38	124	88
Southwestern and West Central	76	183	80
South Central	72	175	81
Southeastern	31	172	89
Statewide	46	169	86

Table 98 details the main source of manure applied on the corn field surveyed (MQ.5).

Table 98. The main source of manure for the corn field.

BMP Region	Main Source of Manure	Percent of All Respondents
Northwestern	Dairy	23
Northwestern	Beef	57
Northwestern	Hog	9
Northwestern	Poultry	11
Irrigated and non-irrigated sandy soils	Dairy	47
Irrigated and non-irrigated sandy soils	Beef	40
Irrigated and non-irrigated sandy soils	Hog	3
Irrigated and non-irrigated sandy soils	Poultry	7
Irrigated and non-irrigated sandy soils	Other	3
Southwestern and West Central	Dairy	13
Southwestern and West Central	Beef	46
Southwestern and West Central	Hog	28
Southwestern and West Central	Poultry	9
Southwestern and West Central	Other	4
South Central	Dairy	24
South Central	Beef	32
South Central	Hog	39
South Central	Poultry	3
South Central	Other	2
Southeastern	Dairy	42
Southeastern	Beef	47
Southeastern	Hog	7
Southeastern	Poultry	1
Southeastern	Other	2
Statewide	Dairy	36
Statewide	Beef	43

BMP Region	Main Source of Manure	Percent of All Respondents
Statewide	Hog	15
Statewide	Poultry	4
Statewide	Other	2

*Totals may not add due to rounding

Table 99 details the percentage of respondents that applied liquid or solid manure on the surveyed corn acres (MQ6).

Table 99. Percentage of respondents that applied liquid or solid manure on the surveyed corn acres.

BMP Region	Solid or Liquid	Percent Solid or Liquid
Northwestern	Solid	80
Northwestern	Liquid	20
Irrigated and non-irrigated sandy soils	Solid	76
Irrigated and non-irrigated sandy soils	Liquid	24
Southwestern and West Central	Solid	68
Southwestern and West Central	Liquid	32
South Central	Solid	55
South Central	Liquid	45
Southeastern	Solid	77
Southeastern	Liquid	23
Statewide	Solid	71
Statewide	Liquid	29

*Totals may not add due to rounding

Method of application for liquid manure applications and corresponding percentages are provided in Table 100 (MQ7).

Table 100. Method of application for liquid manure applications and corresponding percentages.

BMP Region	Method of Application for Liquid Manure	Percent of All Respondents
Northwestern	Sweep Injection	29
Northwestern	Knife Injection	14
Northwestern	Disc Injection	14
Northwestern	Broadcast Incorporation within one day	14
Northwestern	Broadcast Incorporation within two to four days	14
Northwestern	Broadcast over 4 days	14
Irrigated and non-irrigated sandy soils	Sweep Injection	17
Irrigated and non-irrigated sandy soils	Knife Injection	26
Irrigated and non-irrigated sandy soils	Disc Injection	12
Irrigated and non-irrigated sandy soils	Broadcast Incorporation within one day	28
Irrigated and non-irrigated sandy soils	Broadcast Incorporation within two to four days	11
Irrigated and non-irrigated sandy soils	Broadcast over 4 days	5
Irrigated and non-irrigated sandy soils	Broadcast No Incorporation	2
Southwestern and West Central	Sweep Injection	15
Southwestern and West Central	Knife Injection	27
Southwestern and West Central	Disc Injection	44
Southwestern and West Central	Broadcast Incorporation within one day	8
Southwestern and West Central	Broadcast Incorporation within two to four days	5
Southwestern and West Central	Broadcast over 4 days	1
South Central	Sweep Injection	22
South Central	Knife Injection	29
South Central	Disc Injection	35
South Central	Broadcast Incorporation within one day	6
South Central	Broadcast Incorporation within two to four days	3
South Central	Broadcast over 4 days	2
South Central	Broadcast No Incorporation	2
Southeastern	Sweep Injection	22
Southeastern	Knife Injection	35
Southeastern	Disc Injection	9
Southeastern	Broadcast Incorporation within one day	7
Southeastern	Broadcast Incorporation within two to four days	10
Southeastern	Broadcast over 4 days	13
Southeastern	Broadcast No Incorporation	4
Statewide	Sweep Injection	20
Statewide	Knife Injection	31
Statewide	Disc Injection	22
Statewide	Broadcast Incorporation within one day	10
Statewide	Broadcast Incorporation within two to four days	8
Statewide	Broadcast over 4 days	7
Statewide	Broadcast no Incorporation	3

*Totals may not add due to rounding

Method of application for solid manure applications and corresponding percentages are provided in Table 100 (MQ8).

Table 101. Method of application for solid manure applications and corresponding percentages of respondents.

BMP Region	Method of Application for Solid Manure	Percent of All Respondents
Northwestern	Broadcast Incorporation within one day	14
Northwestern	Broadcast Incorporation within two to four days	32
Northwestern	Broadcast over 4 days	39
Northwestern	Broadcast No Incorporation	14
Irrigated and non-irrigated sandy soils	Broadcast Incorporation within one day	16
Irrigated and non-irrigated sandy soils	Broadcast Incorporation within two to four days	25
Irrigated and non-irrigated sandy soils	Broadcast over 4 days	46
Irrigated and non-irrigated sandy soils	Broadcast No Incorporation	13
Southwestern and West Central	Broadcast Incorporation within one day	22
Southwestern and West Central	Broadcast Incorporation within two to four days	22
Southwestern and West Central	Broadcast over 4 days	43
Southwestern and West Central	Broadcast No Incorporation	13
South Central	Broadcast Incorporation within one day	15
South Central	Broadcast Incorporation within two to four days	24
South Central	Broadcast over 4 days	49
South Central	Broadcast No Incorporation	11
Southeastern	Broadcast Incorporation within one day	8
Southeastern	Broadcast Incorporation within two to four days	15
Southeastern	Broadcast over 4 days	55
Southeastern	Broadcast No Incorporation	22
Statewide	Broadcast Incorporation within one day	13
Statewide	Broadcast Incorporation within two to four days	20
Statewide	Broadcast over 4 days	50
Statewide	Broadcast No Incorporation	17

*Totals may not add due to rounding

Farmers can apply manure on a field all at one time or it can be over a period of time such as daily or weekly. Table 102 details the responses to the question as to how often the manure was applied (MQ9).

Table 102. Timing of manure applications by approximate date or overtime.

BMP Region	Was the Manure Applied on an Approximate Date or Over Time	Percent of All Respondents
Northwestern	Approximate date	86
Northwestern	Over a period of time	14
Irrigated and non-irrigated sandy soils	Approximate date	72
Irrigated and non-irrigated sandy soils	Over a period of time	28
Southwestern and West Central	Approximate date	76
Southwestern and West Central	Over a period of time	24
South Central	Approximate date	78
South Central	Over a period of time	22
Southeastern	Approximate date	67
Southeastern	Over a period of time	33
Statewide	Approximate date	71
Statewide	Over a period of time	29

*Totals may not add due to rounding

For farmers that applied on a specific date, table 103 details the responses to the question as to when the manure was applied in regards to the general season (MQ10). If a farmer applied it on two to four specific dates, then the date was classified as “all year”.

Table 103. Seasonal timing for those farmers who applied manure on a specific date.

BMP Region	What was the Approximate Date the Manure was Applied?	Percent of All Respondents
Northwestern	Fall 2009	55
Northwestern	Spring 2010	45
Irrigated and non-irrigated sandy soils	All Year	2
Irrigated and non-irrigated sandy soils	Don't know	2
Irrigated and non-irrigated sandy soils	Fall 2009	35
Irrigated and non-irrigated sandy soils	Spring 2010	58
Irrigated and non-irrigated sandy soils	Summer 2009	1
Irrigated and non-irrigated sandy soils	Winter 2009	2
Southwestern and West Central	All Year	2
Southwestern and West Central	Don't know	1
Southwestern and West Central	Fall 2009	63
Southwestern and West Central	Spring 2010	26
Southwestern and West Central	Summer 2009	4

BMP Region	What was the Approximate Date the Manure was Applied?	Percent of All Respondents
Southwestern and West Central	Winter 2009	3
South Central	All Year	2
South Central	Don't know	1
South Central	Fall 2009	62
South Central	Spring 2010	30
South Central	Summer 2009	1
South Central	Winter 2009	4
Southeastern	All Year	2
Southeastern	Don't know	1
Southeastern	Fall 2009	32
Southeastern	Spring 2010	56
Southeastern	Summer 2009	1
Southeastern	Winter 2009	7
Statewide	All Year	2
Statewide	Don't know	1
Statewide	Fall 2009	44
Statewide	Spring 2010	47
Statewide	Summer 2009	2
Statewide	Winter 2009	5

*Totals may not add due to rounding

Table 104 details the responses to the question as to how often the manure was applied for those farmers who applied manure over a period of time (MQ11).

Table 104. Frequency of manure applications for famers who applied manure over a period of time.

BMP region	How Often was the Manure Applied?	Percent of All Respondents
Northwestern	Daily	60
Northwestern	Weekly	40
Irrigated and non-irrigated sandy soils	Daily	39
Irrigated and non-irrigated sandy soils	Weekly	24
Irrigated and non-irrigated sandy soils	Monthly	15
Irrigated and non-irrigated sandy soils	Other	23
Southwestern and West Central	Daily	24
Southwestern and West Central	Weekly	29
Southwestern and West Central	Monthly	19
Southwestern and West Central	Other	29
South Central	Daily	33
South Central	Weekly	29
South Central	Monthly	16
South Central	Other	22
Southeastern	Daily	32

BMP region	How Often was the Manure Applied?	Percent of All Respondents
Southeastern	Weekly	24
Southeastern	Monthly	25
Southeastern	Other	19
Statewide	Daily	33
Statewide	Weekly	25
Statewide	Monthly	21
Statewide	Other	21

*Totals may not add due to rounding

Table 105 details the last time manure was applied on field surveyed, before the current manure application (MQ12).

Table 105. Date of last manure application.

BMP Region	When was the Last Application of Manure on this Field?	Percent of All Respondents
Northwestern	2005	7
Northwestern	2006	3
Northwestern	2007	21
Northwestern	2008	41
Northwestern	2009	28
Irrigated and non-irrigated sandy soils	2004 and before	4
Irrigated and non-irrigated sandy soils	2005	1
Irrigated and non-irrigated sandy soils	2006	5
Irrigated and non-irrigated sandy soils	2007	13
Irrigated and non-irrigated sandy soils	2008	26
Irrigated and non-irrigated sandy soils	2009	51
Southwestern and West Central	2004 and before	8
Southwestern and West Central	2005	6
Southwestern and West Central	2006	9
Southwestern and West Central	2007	25
Southwestern and West Central	2008	25
Southwestern and West Central	2009	28
South Central	2004 and before	8
South Central	2005	5
South Central	2006	6
South Central	2007	26
South Central	2008	26
South Central	2009	30
Southeastern	2004 and before	4
Southeastern	2005	5
Southeastern	2006	7
Southeastern	2007	14
Southeastern	2008	24

BMP Region	When was the Last Application of Manure on this Field?	Percent of All Respondents
Southeastern	2009	48
Statewide	2004 and before	8
Statewide	2005	6
Statewide	2006	9
Statewide	2007	25
Statewide	2008	25
Statewide	2009	28

Table 106 details how many miles it was to the field from the manure source to apply manure (MQ13).

Table 106. Distance to the field for manure applications.

BMP Region	Liquid or Solid Manure	Average Miles to the Field
Northwestern	Solid	1.00
Northwestern	Liquid	1.89
Northwestern	All	1.71
Irrigated and non-irrigated sandy soils	Solid	1.36
Irrigated and non-irrigated sandy soils	Liquid	1.69
Irrigated and non-irrigated sandy soils	All	1.61
Southwestern and West Central	Solid	1.80
Southwestern and West Central	Liquid	2.38
Southwestern and West Central	All	2.19
South Central	Solid	1.73
South Central	Liquid	1.89
South Central	All	1.82
Southeastern	Solid	1.44
Southeastern	Liquid	1.22
Southeastern	All	1.27
Statewide	Solid	1.56
Statewide	Liquid	1.57
Statewide	All	1.57

*Totals may not add due to rounding

Table 107 details how many miles it was to the field from the manure source to apply manure by manure type (MQ13)

Table 107. Distance to the field for manure applications by animal type.

BMP Region	Animal Type	Average Miles to the Field
Northwestern	Dairy	1.13
Northwestern	Beef	1.25
Northwestern	Hog	1.00
Northwestern	Poultry	7.00
Irrigated and non-irrigated sandy soils	Dairy	1.31
Irrigated and non-irrigated sandy soils	Beef	0.95
Irrigated and non-irrigated sandy soils	Hog	1.64
Irrigated and non-irrigated sandy soils	Poultry	5.45
Irrigated and non-irrigated sandy soils	Other	8.00
Southwestern and West Central	Dairy	1.74
Southwestern and West Central	Beef	1.46
Southwestern and West Central	Hog	1.80
Southwestern and West Central	Poultry	8.31
Southwestern and West Central	Other	1.18
South Central	Dairy	1.44
South Central	Beef	1.06
South Central	Hog	1.71
South Central	Poultry	8.20
South Central	Other	8.30
Southeastern	Dairy	1.25
Southeastern	Beef	0.95
Southeastern	Hog	1.42
Southeastern	Poultry	9.50
Southeastern	Other	2.68
Statewide	Dairy	1.31
Statewide	Beef	1.04
Statewide	Hog	1.66
Statewide	Poultry	7.60
Statewide	Other	4.37

*Totals may not add due to rounding

Table 108 details if the farmer knows the amount of nitrogen that is in the manure (MQ14).

Table 108. Knowledge of nitrogen content of manure.

BMP Region	Knowledge of the Actual Amount of Nitrogen Applied?	Percent of All Respondents
Northwestern	Yes	11
Northwestern	No	89
Irrigated and non-irrigated sandy soils	Yes	16
Irrigated and non-irrigated sandy soils	No	84
Southwestern and West Central	Yes	36
Southwestern and West Central	No	64
South Central	Yes	34
South Central	No	66
Southeastern	Yes	17
Southeastern	No	83
Statewide	Yes	23
Statewide	No	77

[§] Percent was calculated using only those respondents who answered yes or no to the question.
*Totals may not add due to rounding

Table 109 details the amount of nitrogen applied per acre by type of livestock manure (MQ15).

Table 109. Total amount of nitrogen applied per acre from manure by livestock type.

BMP Region	Main Source of Manure	Average Amount of Manure Applied as Pounds per Acre
Northwestern	Beef	80
Northwestern	Hog	180
Northwestern	Poultry	73
Northwestern	All	101
Irrigated and non-irrigated sandy soils	Dairy	104
Irrigated and non-irrigated sandy soils	Beef	62
Irrigated and non-irrigated sandy soils	Hog	156
Irrigated and non-irrigated sandy soils	Poultry	93
Irrigated and non-irrigated sandy soils	Other	60
Irrigated and non-irrigated sandy soils	All	102
Southwestern and West Central	Dairy	159
Southwestern and West Central	Beef	82
Southwestern and West Central	Hog	151
Southwestern and West Central	Poultry	122

BMP Region	Main Source of Manure	Average Amount of Manure Applied as Pounds per Acre
Southwestern and West Central	Other	75
Southwestern and West Central	All	131
South Central	Dairy	100
South Central	Beef	124
South Central	Hog	146
South Central	Poultry	126
South Central	Other	73
South Central	All	135
Southeastern	Dairy	108
Southeastern	Beef	55
Southeastern	Hog	152
Southeastern	Poultry	144
Southeastern	Other	90
Southeastern	All	109
Statewide	Dairy	109
Statewide	Beef	72
Statewide	Hog	149
Statewide	Poultry	116
Statewide	Other	79
Statewide	All	120

Due to the straight-forward nature of the following figures, only a minimal amount of supporting information was provided (MQ15).

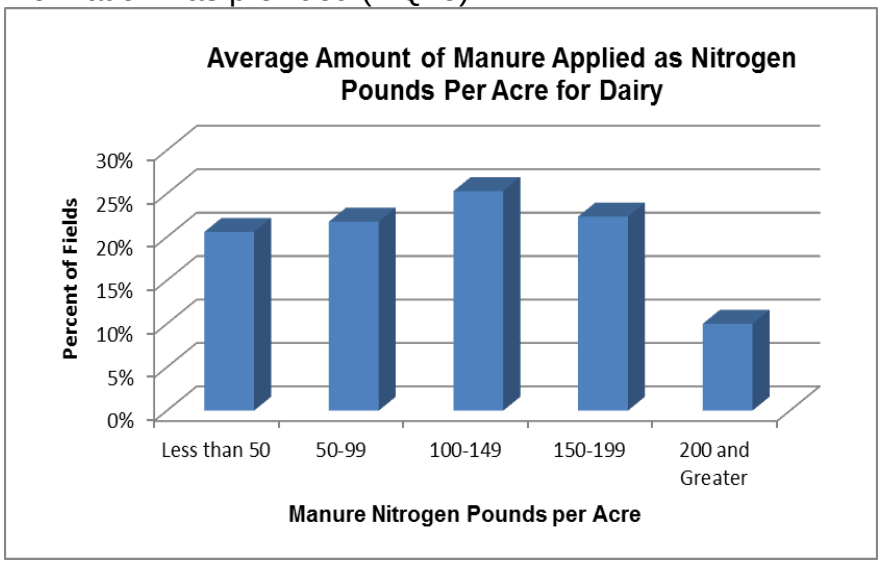

Figure 123. Average amount of manure applied as pounds per acre for dairy manure applications.

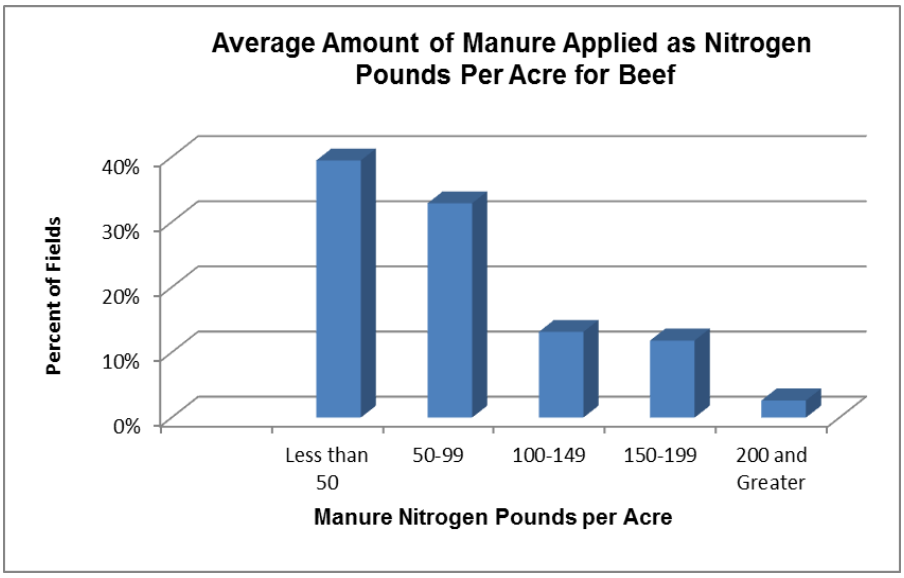

Figure 124. Average amount of manure applied as pounds per acre for beef manure applications.

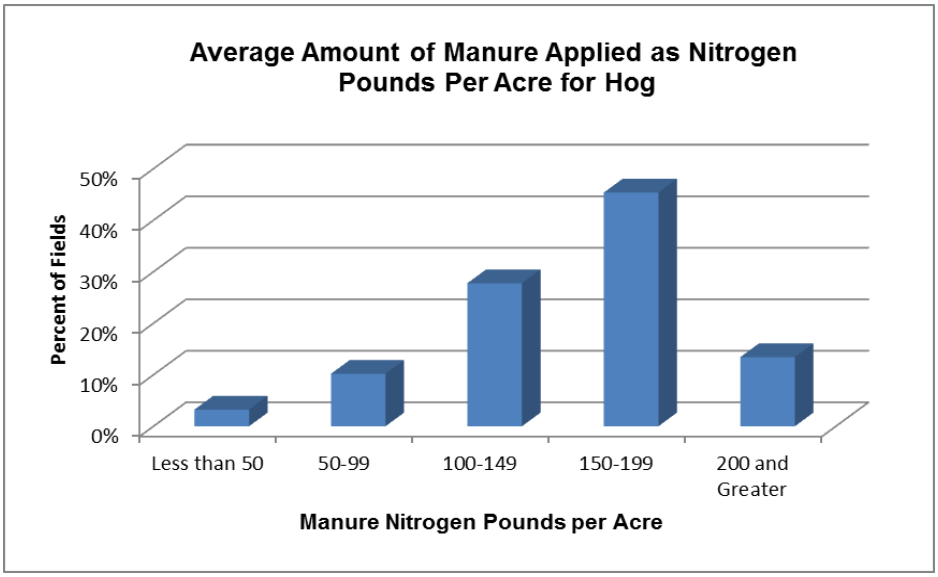

Figure 125. Average amount of manure applied as pounds per acre for hog manure applications.

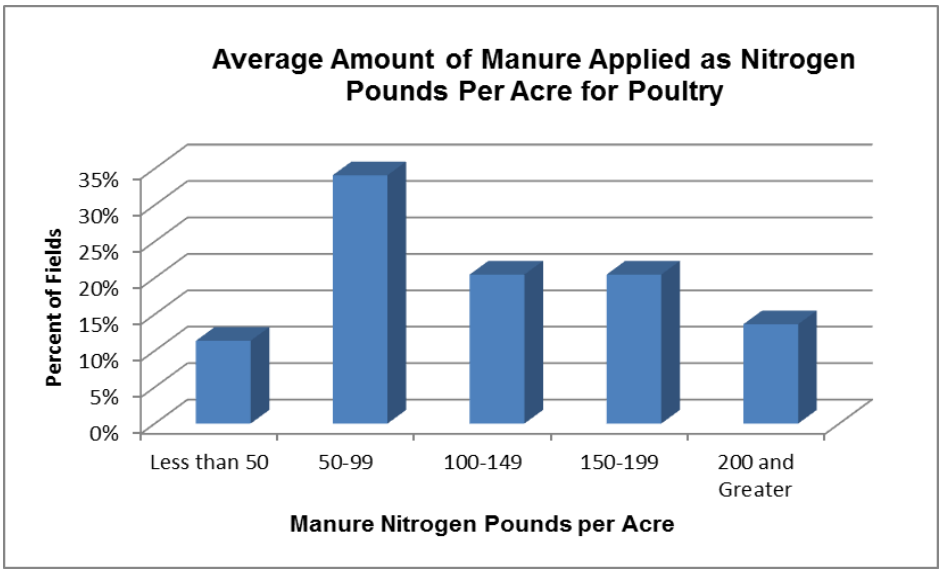

Figure 126. Average amount of manure applied as pounds per acre for poultry manure applications.

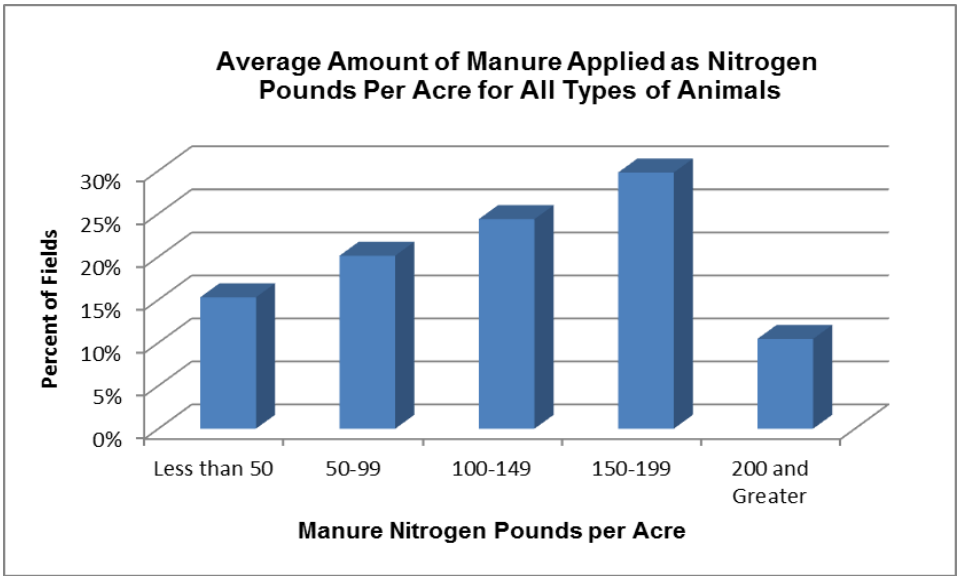

Figure 127. Average amount of manure applied as pounds per acre for all types of animal manure.

Table 110 details if the manure was applied using variable rate technology (MQ16).

Table 110. Manure applications using variable rate technology.

BMP Region	Was Manure Applied Using Variable Rate?	Percent of Respondents
Northwestern	Yes	14
Northwestern	No	86
Irrigated and non-irrigated sandy soils	Yes	13
Irrigated and non-irrigated sandy soils	No	87
Southwestern and West Central	Yes	12
Southwestern and West Central	No	88
South Central	Yes	11
South Central	No	89
Southeastern	Yes	11
Southeastern	No	89
Statewide	Yes	12
Statewide	No	88

*Totals may not add due to rounding

Table 111 details if the farmer knows the manure application rate (MQ17).

Table 111. Farmer's knowledge of application rates.

BMP Region	Manure Applied Rate in Gallons or Ton per Acre?	Percent of Respondents
Northwestern	Yes	43
Northwestern	No	57
Irrigated and non-irrigated sandy soils	Yes	41
Irrigated and non-irrigated sandy soils	No	59
Southwestern and West Central	Yes	50
Southwestern and West Central	No	50
South Central	Yes	58
South Central	No	42
Southeastern	Yes	40
Southeastern	No	60
Statewide	Yes	45
Statewide	No	55

Table 111 details if the farmer knows the manure application rate for liquid manure applications (MQ18).

Table 112. Rates for liquid of manure applications by region.

BMP Region	Average per Acre Gallons
Northwestern	7,680
Irrigated and non-irrigated sandy soils	7,236
Southwestern and West Central	4,667
South Central	4,548
Southeastern	6,350
Statewide	5,734

Table 111 details if the farmer knows the manure application rate for solid manure applications (MQ19).

Table 113. Rates for solid of manure applications by region.

BMP Region	Average per Acre Tons
Northwestern	4.22
Irrigated and non-irrigated sandy soils	6.99
Southwestern and West Central	6.18
South Central	5.34
Southeastern	7.77
Statewide	6.90

Table 114 details the percent of farmers who applied commercial fertilizer on the manured field (MQ20).

Table 114. Commercial fertilizer applications on manured fields by region.

BMP Region	Did you Applied Commercial Fertilizer?	Percent of All Respondents
Northwestern	Yes	66
Northwestern	No	34
Irrigated and non-irrigated sandy soils	Yes	69
Irrigated and non-irrigated sandy soils	No	31
Southwestern and West Central	Yes	66
Southwestern and West Central	No	34
South Central	Yes	70
South Central	No	30
Southeastern	Yes	75
Southeastern	No	25
Statewide	Yes	72
Statewide	No	28

Table 115 details the amount of nitrogen applied to the manured field from commercial nitrogen by livestock type (MQ21).

Table 115. Total amount of nitrogen from commercial fertilizer applied to manured fields by livestock type.

BMP Region	Main Source of Manure	Average Amount of Commercial Nitrogen as Pounds per Acre
Northwestern	Dairy	**
Northwestern	Beef	115
Northwestern	Hog	**
Northwestern	All	100
Irrigated and non-irrigated sandy soils	Dairy	86
Irrigated and non-irrigated sandy soils	Beef	101
Irrigated and non-irrigated sandy soils	Hog	89
Irrigated and non-irrigated sandy soils	Poultry	86
Irrigated and non-irrigated sandy soils	Other	122
Irrigated and non-irrigated sandy soils	All	94
Southwestern and West Central	Dairy	91
Southwestern and West Central	Beef	114
Southwestern and West Central	Hog	82
Southwestern and West Central	Poultry	82
Southwestern and West Central	Other	110
Southwestern and West Central	All	101
South Central	Dairy	107
South Central	Beef	125
South Central	Hog	67
South Central	Poultry	67
South Central	Other	125
South Central	All	99
Southeastern	Dairy	99
Southeastern	Beef	123
Southeastern	Hog	65
Southeastern	Poultry	77
Southeastern	Other	110
Southeastern	All	109
Statewide	Dairy	97
Statewide	Beef	119
Statewide	Hog	70
Statewide	Poultry	79
Statewide	Other	115
Statewide	All	104

****** Less than five responses**.**

Table 116 details the total amount of nitrogen applied to fields from both manure and commercial nitrogen (MQ20 and MQ21).

Table 116. Total amount of nitrogen applied to fields from both commercial fertilizer and nitrogen.

BMP region	Main Source of Manure	Average Amount of Total Nitrogen per Acre from Manure and Fertilizer
Northwestern	Beef	**
Northwestern	Hog	**
Northwestern	All	**
Irrigated and non-irrigated sandy soils	Dairy	159
Irrigated and non-irrigated sandy soils	Beef	132
Irrigated and non-irrigated sandy soils	Hog	217
Irrigated and non-irrigated sandy soils	Poultry	144
Irrigated and non-irrigated sandy soils	Other	**
Irrigated and non-irrigated sandy soils	All	163
South Western and West Central	Dairy	185
South Western and West Central	Beef	178
South Western and West Central	Hog	178
South Western and West Central	Poultry	201
South Western and West Central	Other	**
South Western and West Central	All	180
South Central	Dairy	155
South Central	Beef	181
South Central	Hog	188
South Central	Poultry	186
South Central	Other	**
South Central	All	182
Southeastern	Dairy	165
Southeastern	Beef	147
Southeastern	Hog	186
Southeastern	Poultry	**
Southeastern	Other	**
Southeastern	All	165
Statewide	Dairy	163
Statewide	Beef	160
Statewide	Hog	188
Statewide	Poultry	183
Statewide	Other	165
Statewide	All	173

****** Less than five responses**.**

The following figures detail the range of nitrogen applied from commercial and manure sources by type of manure.

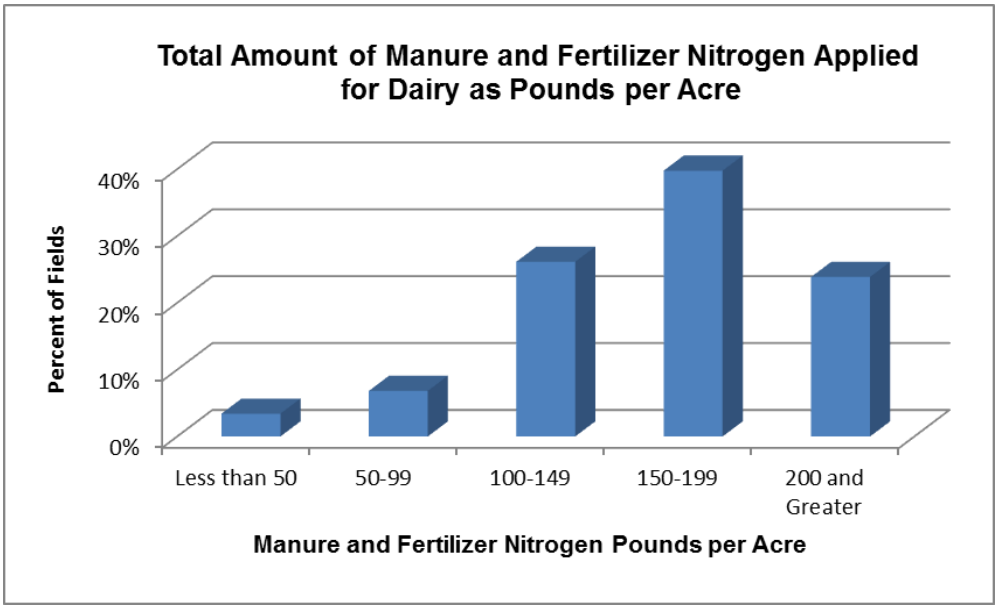

Figure 128. Total amount of nitrogen from manure and fertilizer applied as pounds per acre for fields applied with dairy manure.

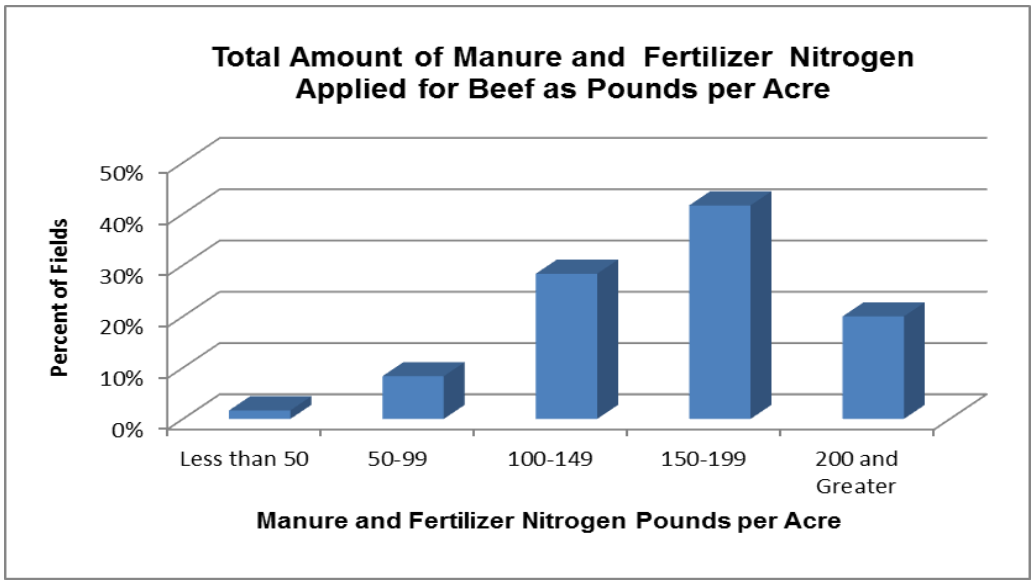

Figure 129. Total amount of nitrogen from manure and fertilizer applied as pounds per acre for fields applied with beef manure.

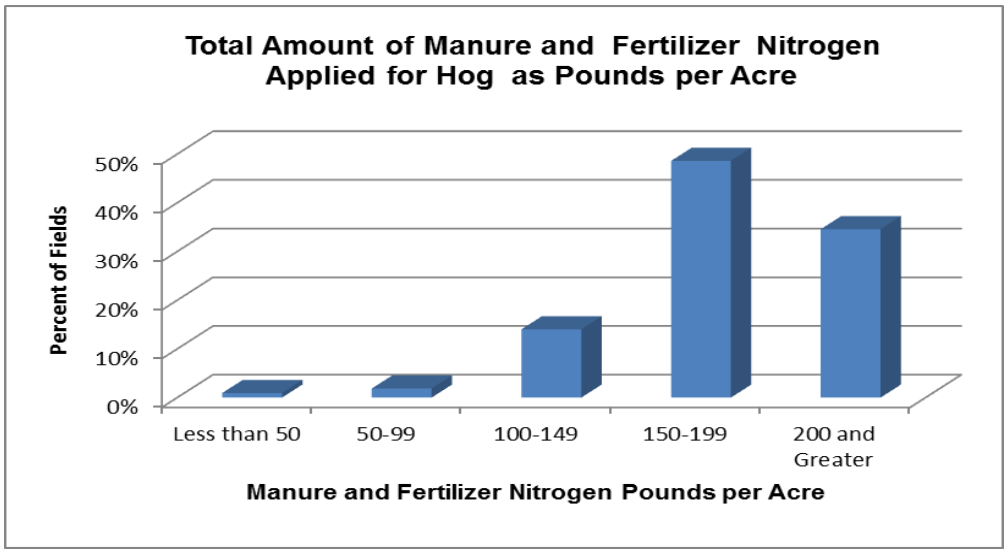

Figure 130. Total amount of nitrogen from manure and fertilizer applied as pounds per acre for fields applied with hog manure.

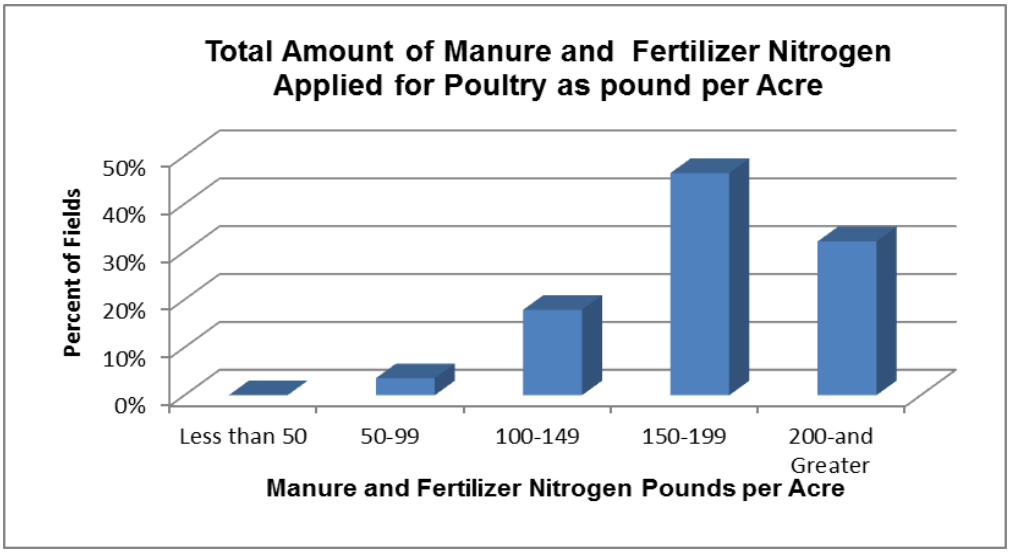

Figure 131. Total amount of nitrogen from manure and fertilizer applied as pounds per acre for fields applied with poultry manure.

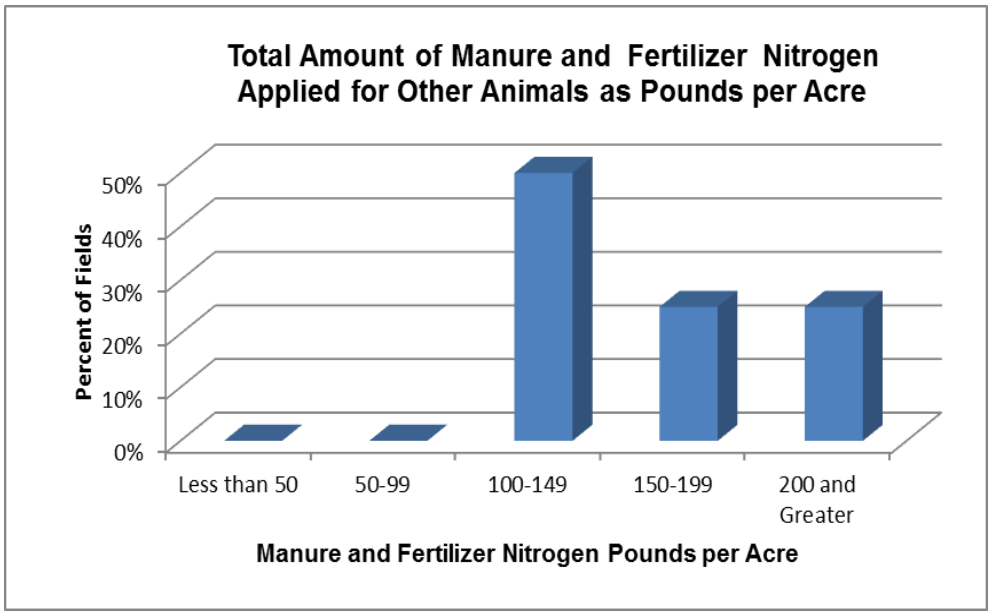

Figure 132. Total amount of nitrogen from manure and fertilizer applied as pounds per acre for fields applied with manure from other animals.

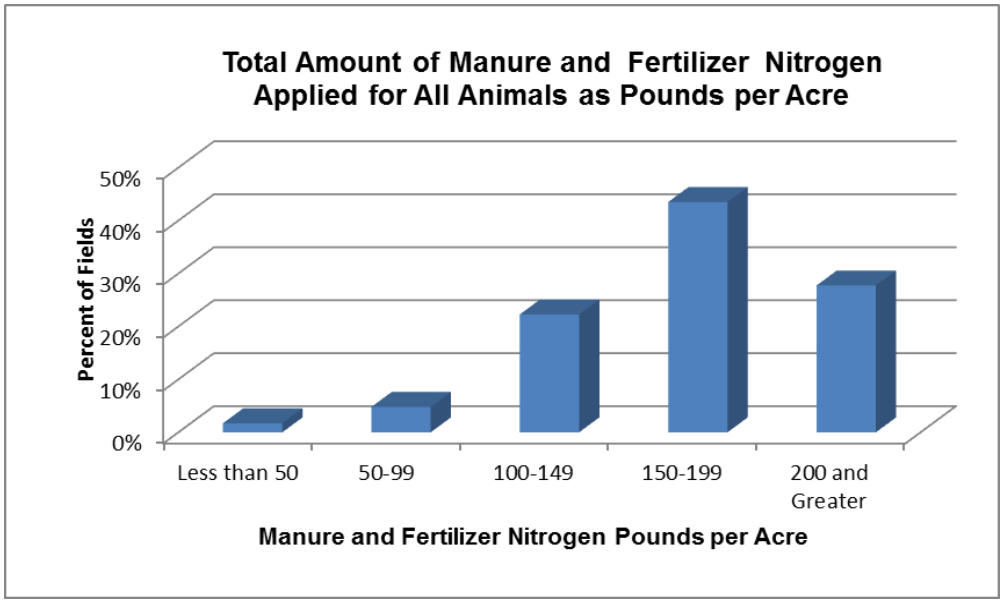

Figure 133. Total amount of nitrogen from manure and fertilizer applied as pounds per acre for fields applied with all sources of manure.

Table 117 details if the manure applied was from the farmers livestock (MQ22).

Table 117. Origin of the manure in regards to livestock ownership source.

BMP Region	Was the Manure From the Farmer's Livestock?	Percent of All Respondents
Northwestern	Yes	83
Northwestern	No	17
Irrigated and non-irrigated sandy soils	Yes	92
Irrigated and non-irrigated sandy soils	No	8
Southwestern and West Central	Yes	81
Southwestern and West Central	No	19
South Central	Yes	80
South Central	No	20
Southeastern	Yes	90
Southeastern	No	10
Statewide	Yes	87
Statewide	No	13

*Totals may not add due to rounding

Table 118 details when the manure was last tested for nutrients (Q23).

Table 118. Date of last test for manure nutrient content.

BMP Region	When was the Manure Last Tested?	Percent of All Respondents
Northwestern	This Year	4
Northwestern	Last 3 Years	11
Northwestern	Over 3 Years ago	14
Northwestern	Don't Test	71
Irrigated and non-irrigated sandy soils	This year	18
Irrigated and non-irrigated sandy soils	Last 3 years	12
Irrigated and non-irrigated sandy soils	Over 3 years ago	12
Irrigated and non-irrigated sandy soils	Don't test	57
Southwestern and West Central	This year	24
Southwestern and West Central	Last 3 years	17
Southwestern and West Central	Over 3 years ago	13
Southwestern and West Central	Don't test	46
South Central	This year	38
South Central	Last 3 years	11
South Central	Over 3 Years ago	12
South Central	Don't test	40
Southeastern	This year	15
Southeastern	Last 3 ears	14
Southeastern	Over 3 years ago	14
Southeastern	Don't Test	56
Statewide	This year	21
Statewide	Last 3 years	14
Statewide	Over 3 years ago	13
Statewide	Don't test	53

*Totals may not add due to rounding

Table 119 details the type of soil test the respondent used in the last five years (MQ24).

Table 119. Type of soil test used in the last five years.

BMP Region	Type of Soil Testing	Percent of Respondents
Northwestern	Traditional	69
Northwestern	Grid	3
Northwestern	Other	3
Northwestern	None	26
Irrigated and non-irrigated sandy soils	Traditional	59
Irrigated and non-irrigated sandy soils	Grid	8
Irrigated and non-irrigated sandy soils	Zone	3
Irrigated and non-irrigated sandy soils	Other	3
Irrigated and non-irrigated sandy soils	None	25
Southwestern and West Central	Traditional	63
Southwestern and West Central	Grid	23
Southwestern and West Central	Zone	11
Southwestern and West Central	Other	3
Southwestern and West Central	None	10
South Central	Traditional	43
South Central	Grid	45
South Central	Zone	1
South Central	Other	2
South Central	None	9
Southeastern	Traditional	59
Southeastern	Grid	18
Southeastern	Zone	4
Southeastern	Other	4
Southeastern	None	17
Statewide	Traditional	57
Statewide	Grid	21
Statewide	Zone	5
Statewide	Other	3
Statewide	None	16

*Totals may not add due to rounding

Tables 120 through 123 are focused on pesticide use or well testing and are only for farmers in the SE or SC BMP regions.

Table 120 details atrazine use on corn acres in 2010 for farmers who applied manure (MQ25).

Table 120. Atrazine use on corn acres in 2010.

BMP Region	Was Atrazine Applied on Corn Acres in 2010?	Percent of Respondents
South Central	Yes	22
South Central	No	78
Southeastern	Yes	18
Southeastern	No	82
Statewide	Yes	19
Statewide	No	81

*Totals may not add due to rounding

Table 121details acetochlor use on corn acres in 2010 for farmers who use manure (MQ26).

Table 121. Acetochlor use on corn acres in 2010.

BMP Region	Was Acetochlor Applied on Corn Acres in 2010?	Percent of Respondents
South Central	Yes	14
South Central	No	86
Southeastern	Yes	14
Southeastern	No	86
Statewide	Yes	14
Statewide	No	86

*Totals may not add due to rounding

Table 122 details who determines if application setbacks or restrictions are appropriate (MQ27).

Table 122. Person who determines application setbacks or restrictions.

BMP Region	Who Determines if Setbacks are Appropriate on the Farm?	Percent of Respondents
South Central	I Do	35
South Central	Dealer	14
South Central	Both	43
South Central	Neither	8
Southeastern	I Do	32
Southeastern	Dealer	24
Southeastern	Both	37
Southeastern	Neither	7
Statewide	I Do	33
Statewide	Dealer	23
Statewide	Both	37
Statewide	Neither	7

*Totals may not add due to rounding

Table 123 details farmers who were interested in having their well tested for nitrates (MQ28).

Table 123. Respondents interested in having their well tested for nitrates.

BMP Region	Farmers Interested in Testing Their Well	Percent of Respondents
South Central	Yes	53
South Central	No	47
Southeastern	Yes	47
Southeastern	No	53
Statewide	Yes	48
Statewide	No	52

*Totals may not add due to rounding

Appendix 1. Survey Form

Survey questions for fertilizer start after the farmer is questioned about pesticide use.

Fertilizer Use Questions Field 1 2010 Crop Season

FIELDS MP102 Part 2 (Corn Field Field 1)

Setup Question **VerifyAcres** Earlier you reported you planted XXXX acres of corn in 2010. Is that correct?" Yes No

Setup Question **Ask Acres** Earlier you reported that you did NOT plan any corn in 2010. Is that correct? : Yes No

Setup Question **Corn** Did you grow CORN on your operation in 2010? : Yes no

N Question 1 Corn Acre How many corn acres were planted for FIELD CORN in 2010?

LeadIn1 I now will ask you questions about your fertilizer and manure inputs on corn acres. First on a corn field or two without manure in the last five years and then on a corn field with manure applied for the 2010 growing season."

N Question 2 **NoManure** Do you have a corn field WITHOUT manure applied in the last 5 years?" : Yes No

LeadIn2 Think about an average corn field you planted in 2010 with NO manure or compost applied in the last five years. I will ask you questions about that specific field. All questions should be in relation to that specific field." :

N Question 3 **PrevCrop** What was the crop planted on this field 2009?" :

PrevCrop =

(Soybeans (1) "Soybeans",

Corn (2) "Corn",

Alfalfa (3) "Alfalfa",

Small Grains (4) "Small Grains",

Other (99) "Other")

N Question 4 IfCorn Was alfalfa planted in 2008?" : Yes no, DK, RF

N Question 5 IfCornAcres How many acres are in this field?" :

N Question 6 AveYld What was the average yield of this field over the last 3 corn crops DK, RF

N Question 7 FertApplied Was any commercial fertilizer applied to this corn field in 2010? Please include fall applications in 2009 for the 2010 crop year." Yes no

N Question 8 FertRate Was any commercial fertilizer applied on this field at more than one rate or a variable rate? If Yes, use a field average." : Yes no, DK, RF

LeadIn3 I will now ask you for all your commercial fertilizer applications made to this field for the 2010 crop year. These will include fall applications in 2009 for the 2010 crop year, preplant and post plant applications including any nitrogen in starters, phosphorus or sulfur sources made for the 2010 crop. :

N Question 9 TotalN what was the total amount of nitrogen applied PER ACRE on this field? Nitrogen per acre: DK, RF

TotalN_Revised: This is a storage field if respondent corrects Total N pounds in later questions.

N Question 10 NForm What form was the majority of the nitrogen applied on this field?" :

AnhydAmm_ (10) "Anhydrous Ammonia",

Urea_ (11) "Urea and coated urea such as ESN",

LiquidN_ (12) "Liquid N such as 28%N, 32%N, or other UAN solutions",

Other_ (13) "Other",

UNKNOWN_ (99) "I don't know")

{****Fall Applications Follow****}

N Question 11 FallFert Did you apply any commercial fertilizer in the fall of 2009 for the 2010 crop season?" Yes No

N Question 12 FallAnhydrous Did you apply Anhydrous Ammonia in the fall of 2009?" : Yes No

N Question 13 FallAnhydrous How many pounds per acre of nitrogen were applied as Anhydrous Ammonia? Pounds per Acre" : , DK, RF

N Question14 **FallUrea** Did you apply Urea in the fall of 2009? : Yes No

N Question 15 **FallUrea_Lb** How many pounds per acre of nitrogen were applied as Urea? Pounds per Acre" : , DK, RF

N Question16 **FallLiq** Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions in the fall of 2009?" : Yes No

N Question17 **FallLiq_Lb** How many pound per acre of nitrogen were applied as Liquid Nitrogen? Pounds per Acre, DK, RF

N Question18 **FallMAP** "Did you apply any phosphorus sources such as MAP or DAP in the fall of 2009?" : Yes No

N Question19 **FallMAP_Lb** How many pounds of nitrogen were applied as MAP or DAP? Pounds per Acre, DK, RF

N Question20 **FallOtherN** Did you apply Other sources of fertilizer in the fall of 2009 that included nitrogen? (Not Potash)" : Yes No

N Question 21 **FallOtherN_Lb** How many pounds per acre of nitrogen were applied from other sources of fertilizer? Pounds per Acre" : , DK, RF

Setup Question **FallVerify_Lb** Were all fall sources included in the total nitrogen that you stated earlier?" : Yes No

Setup Question **FixFall_Lb** Originally reported: XXXXXX What is the correct total amount of Nitrogen applied?" : , DK, RF

{****Preplant Applications Follow****}

N Question 23 **SprFert** Did you apply any commercial fertilizer in the spring as a preplant for the crop season?" :Yes No

N Question 24 **SprAnhydrous** Did you apply Anhydrous Ammonia in the spring of 2010?" : Yes No

N Question 25 **SprAnhydrous_Lb** How many pounds per acre of nitrogren were applied as Anhydrous Ammonia? Pounds per Acre, DK, RF

N Question 26 **SprUrea** Did you apply Urea in the spring as a preplant?" : Yes No

N Question 27 **SprUrea_Lb** How many pounds per acre of nitrogen were applied as Urea? Pounds per Acre: , DK, RF

N Question 28 **SprLiq** Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions in the spring as a preplant?" : Yes No

N Question 29 **SprLiq_Lb** How many pounds per acre of nitrogen were applied as Liquid Nitrogen? Pounds per Acre :, DK, RF

N Question 30 **SprMAP** **Did** you apply any phosphorus sources such as MAP or DAP or other dry fertilizer in the spring as a preplant?" : Yes No

N Question 31 **SprMAP_Lb** How many pounds per acre of nitrogen were applied as MAP or DAP or other dry fertilizer? Pounds per Acres, DK, RF

N Question 32 **SprOtherN** Did you apply Other sources of fertilizer in the spring as a preplant that included nitrogen? (Not Potash)" : Yes No

N Question 33 **SprOtherN_Lb** How many pounds per acre of nitrogen were applied from Other sources of fertilizer? Pounds per Acre : s, DK, RF

Setup Question **SprVerify_Lb** Were all spring preplant sources included in the total nitrogen Revised pounds that you stated earlier?" :tYes No

Setup Question **FixSpr_** What is the correct total amount of Nitrogen applied?" , DK, RF

{****Applications at Planting Follow****}

N Question 34 **PltFert** Did you apply any commercial fertilizer in the spring as a starter or at planting for the crop season?" : Yes No

N Question 35 **PltUrea** Did you apply Urea in the spring as a starter or at planting?" :Yes No

N Question 36 **PltUrea_Lb** How many pounds per acre of nitrogen were applied as Urea? Pounds per Acre : , DK, RF

N Question 37 **PltLiq** Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions in the spring as a starter or at planting?" : Yes No

N Question 38 **PltLiq_Lb** How many pounds per acre of nitrogen were applied as Liquid Nitrogen? Pounds per Acre :, DK, RF

N Question 39 **PltMAP** Did you apply any phosphorus sources such as MAP or DAP, or 10-34-0 or other dry fertilizer in the spring as a starter or at planting?" : Yes No

N Question 40 PltMAP_Lb How many pounds per acre of nitrogen were applied as MAP or DAP or other dry fertilizer? Pounds per Acre :, DK, RF

N Question 41 PltOtherN Did you apply Other sources of fertilizer in the spring as a starter or at planting that included nitrogen? (Not Potash)" : Yes No

N Question 42 PltOtherN_Lb How many pounds per acre of nitrogen were applied from Other sources of fertilizer? Pounds per Acre" : , DK, RF

Setup Question PltVerify_Lb Were all planting and starter sources included in the total nitrogen Total N Revised pounds) that you stated earlier?" : Yes No

Setup Question FixPlt_Lb What is the correct total amount of Nitrogen applied?" : , DK, RF

{****Applications at Post Planting Follow****}

N Question 43 PostFert Did you apply any commercial fertilizer after planting such as a sidedress for the crop season?" : Yes No

N Question 44 PostAnhydrous Did you apply Anhydrous Ammonia post planting such as a sidedress?" : Yes No

N Question 45 PostAnhydrous_Lb How many pounds per acre of nitrogren were applied as Anhydrous Ammonia? Pounds per Acre, DK, RF

N Question 46 PostUrea Did you apply Urea in the spring as a sidedress?" : Yes No

N Question 47 PostUrea_Lb How many pounds per acre of nitrogren were applied as Urea? Pounds per Acre:, DK, RF

N Question 48 PostLiq Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions after planting such as a sidedress?" : Yes No

N Question 49 PostLiq_Lb "@YRESPONDENT: How many pounds per acre of nitrogen were applied as Liquid Nitrogen? Pounds per Acre: , DK, RF

N Question 50 PostMAP Did you apply any phosphorus sources such as MAP or DAP or other dry fertilizer after planting such as a sidedress" : Yes No

N Question 51 PostMAP_Lb How many pounds per acre of @Bnitrogen@B were applied as MAP or DAP or other dry fertilizer? Pounds per Acre" : , DK, RF

N Question 52 PostOtherN Did you apply Other sources of fertilizer after planting such as a sidedress that included nitrogen? (Not Potash)" : Yes No

N Question 53 **PostOtherN_Lb** How many pounds per acre of @Bnitrogen@B were applied from Other sources of fertilizer? Pounds per Acre" : , DK, RF

Setup Question **PostVerify_Lb** Were all post plant and sidedress sources included in the total nitrogen that you stated earlier?" : Yes No

Setup Question **FixPost_Lb** What is the correct total amount of Nitrogen applied?" , DK, RF

Setup Question **AnotherField** \ Do you have a corn field with a different crop planted in 2009 than the field we just talked about. It also should NOT have had manure in the past 5 years. For instance, if the field we talked about was corn following corn, do you have a field of corn following soybeans?" : Yes No

If yes the same nitrogen questions were asked for the second field of corn.

Fertilizer Use Questions for Wheat Survey 2010

Setup Question LeadIn1 Did you grow any Wheat on your operation in 2010? : Yes No

W Question 1 AllWheat How many acres of Wheat did you plant in 2010?

_____

Setup Comment LeadIn2 I will ask you questions about your fertilizer inputs on Wheat acres on a Wheat field WITHOUT manure in the last five years.

W Question 2 Screen Do you have a Wheat field WITHOUT manure applied in the last 5 years? Yes No

Setup Comment LeadIn3 Think about an average Wheat field you planted in 2010 with no manure or compost applied in the last five years. I will ask you questions about that specific field. All questions should be in relation to that specific field.

W Question 3 PrevCrop What was the crop planted on this field in 2009?

Soybeans (1) "Soybeans",

Corn (2) "Corn",

Alfalfa (3) "Alfalfa",

Small Grains (4) "Small Grains",

Other (99) "Other")

W Question 5 FldAcres How many acres are in the field? _____

W Question 6 Yield What was the average yield of this field over the last three wheat crops? _____ Yield bushels per acre

W Question 7 FertApplied Was commercial fertilizer applied to this Wheat field in 2010? Please include all fall applications in 2009 Yes No

W Question 8 FertVarRate Was any commercial fertilizer applied on this field at more than one rate or a variable rate? Yes No

Setup Comment LeadIn3a I will now ask you for all your commercial fertilizer applications made to this field for the 2010 crop year. These will include fall applications in 2009 for the 2010 crop year, preplant and postplant, applications

including any nitrogen in starters, phosphorus or sulfur sources made for the 2010 crop

W Question 8 **TotalN** What was the total amount of nitrogen applied PER ACRE on this field? ___ Nitrogen pounds per acre

TotalN_Revised This is a storage field if respondent corrects Total N pounds in later questions.

W Question 9 **NForm** What form was the majority of the nitrogen applied on this field?

__Anhydrous
__Urea
__Liquid such as 28%
__Other

W Question 10 **NInc** Was it incorporated? Yes No

Fall Applications Follow

W Question 11 **FallFert** Did you apply any commercial fertilizer in the fall of 2009 for the 2010 crop season? Yes No

W Question 12 **FallAnhydrous** Did you apply Anhydrous Ammonia in the fall of 2009 Yes No

W Question 13 **FallAnhydrous_Lb** How many pounds per acre of nitrogen were applied as Anhydrous Ammonia? ____ Pounds per Acre

W Question 14 **FallUrea** Did you apply Urea in the fall of 2009 Yes No

W Question 15 **FallUrea_Lb** How many pounds per acre of nitrogen were applied as Urea? ____ Pounds per Acre

W Question 16 **FallLiq** Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions in the fall of 2009? Yes No

W Question 17 **FallLiq_Lb** How many pound per acre of nitrogen were applied as Liquid Nitrogen?_____ Pounds per Acre

W Question 18 **FallMAP** Did you apply any phosphorus sources such as MAP or DAP in the fall of 2009? Yes No

W Question 19 FallMAP_Lb How many pounds of nitrogen were applied as MAP or DAP? _____ Pounds per Acre

W Question 20 FallOtherN Did you apply Other sources of fertilizer in the fall of 2009 that included nitrogen?(Not Potash) Yes No

W Question 21 FallOtherN_Lb How many pounds per acre of nitrogen were applied from other sources of fertilizer? __ Pounds per Acre

Correction Question FallVerify_Lb Were all fall sources included in the total nitrogen that you stated earlier? Yes No

Correction Question FixFall_Lb What is the correct total amount of Nitrogen applied? _____

Preplant Applications Follow

W Question 22 SprFert Did you apply any commercial fertilizer in the spring as a preplant for the crop season? Yes No

W Question 23 SprAnhydrous Did you apply Anhydrous Ammonia in the spring of2010? Yes No

W Question 24 SprAnhydrous_Lb How many pounds per acre of nitrogen were applied as Anhydrous Ammonia?____ Pounds per Acre

W Question 25 SprUrea Did you apply Urea in the spring as a preplant? Yes No

W Question 26 SprUrea_Lb How many pounds per acre of nitrogen were applied as Urea?_____ Pounds per Acre

W Question 6 SprLiq Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions in the spring as a preplant? Yes No

W Question 27 SprLiq_Lb How many pounds per acre of nitrogen were applied as Liquid Nitrogen? _____ Pounds per Acre

W Question 28 SprMAP Did you apply any phosphorus sources such as MAP or DAP or other dry fertilizer in the spring as a preplant? Yes No

W Question 29 SprMAP_Lb How many pounds per acre of nitrogen were applied as MAP or DAP or other dry fertilizer?_ Pounds per Acre

W Question 30 SprOtherN Did you apply Other sources of fertilizer in the spring as a preplant that included nitrogen? (Not Potash) Yes No

W Question 31 SprOtherN_Lb How many pounds per acre of nitrogen were applied from Other sources of fertilizer?__ Pounds per Acre

Correction Question SprVerify_Lb Were all spring preplant sources included in the total nitrogen that you stated earlier? Yes No

Correction Question FixSpr_Lb What is the correct total amount of Nitrogen applied?" ___

Applications at Planting Follow

W Question 32 PltFert Did you apply any commercial fertilizer in the spring as a starter or at planting for the crop season? Yes No

W Question 33 PltUrea Did you apply Urea in the spring as a starter or at planting? Yes No

W Question 34 PltUrea_Lb How many pounds per acre of nitrogen were applied as Urea?____ Pounds per Acre

W Question 35 PltLiq Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions in the spring as a starter or at planting? Yes No

W Question 36 PltLiq_Lb How many pounds per acre of nitrogen were applied as Liquid Nitrogen?_____ Pounds per Acre

W Question 37 PltMAP Did you apply any phosphorus sources such as MAP or DAP, or 10-34-0 or other dry fertilizer in the spring as a starter or at planting? Yes No

W Question 38 PltMAP_Lb How many pounds per acre of nitrogen were applied as MAP or DAP or other dry fertilizer?___ Pounds per Acre

W Question 39 PltOtherN Did you apply Other sources of fertilizer in the spring as a starter or at planting that included nitrogen? (Not Potash) Yes No

W Question 40 PltOtherN_Lb How many pounds per acre of nitrogen were applied from Other sources of fertilizer?___ Pounds per Acre

Correction Question PltVerify_Lb Were all planting and starter sources included in the total nitrogen pounds that you stated earlier? Yes No

Correction Question FixPlt_Lb What is the correct total amount of Nitrogen applied?" _____

Applications at Post Planting Follow

W Question 41 **PostFert** Did you apply any commercial fertilizer after planting such as a sidedress for the crop season? Yes No

W Question 42 **PostAnhydrous** Did you apply Anhydrous Ammonia post planting such as a sidedress? Yes No

W Question 43 **PostAnhydrous_Lb** How many pounds per acre of nitrogen were applied as Anhydrous Ammonia?___ Pounds per Acre

W Question 44 **PostUrea** Did you apply Urea in the spring as a sidedress? Yes No

W Question 45 **PostUrea_Lb** How many pounds per acre of nitrogen were applied as Urea?____ Pounds per Acre

W Question 46 **PostLiq** Did you apply Liquid Nitrogen such as 28%, 32% or other UAN solutions after planting such as a sidedress? Yes No

W Question 47 **PostLiq_Lb** How many pounds per acre of nitrogen were applied as Liquid Nitrogen? _____ Pounds per Acre

W Question 48 **PostMAP** Did you apply any phosphorus sources such as MAP or DAP or other dry fertilizer after planting

such as a sidedress? Yes No

W Question 49 **PostMAP_Lb** How many pounds per acre of nitrogen were applied as MAP or DAP or other dry fertilizer?__ Pounds per Acre

W Question 50 **PostOtherN** Did you apply Other sources of fertilizer after planting such as a sidedress that included nitrogen? (Not Potash) Yes No

W Question 51 **PostOtherN_Lb** How many pounds per acre of nitrogen were applied from Other sources of fertilizer?__ Pounds per Acre

Correction Question **PostVerify_Lb** Were all post plant and sidedress sources included in the total nitrogen that you stated earlier? Yes No

Correction Question **FixPost_Lb** What is the correct total amount of Nitrogen applied?_____

W Question 52 **SoilSamp1** **through** **SoilSamp5** What type of soil sampling do you use?

List all that you used in the last 5 years.

Enter multiple choices as 1-2-3, for example._____

2010 Manure use report

Manure Use Questions 2010 Crop Season

M Question 1. Do you have a corn field that was applied with manure for the 2010 crop year, including manure applied in the fall of 2009? Yes No

LeadIn2, Think about an average corn field you planted in 2010 with manure applied for the 2010 growing season. (Includes manure applications in the fall of 2009 for the 2010 crop.) I will ask you questions about that specific field. All questions should be in relation to that specific field.

M Question 2. ManAcre, how many acres are in the field?

M Question 3. ManYld, what was the average yield of this field over the last corn crops?

M Question 4. ManWhole, did the whole field receive manure? Yes No

M Question 5. ManSource, what is the main source of manure used on this field?

Dairy (1) "Dairy",
Beef (2) "Beef",
Hog (3) "Hog",
Poultry (4) "Poultry",
Other (5) "Other",
DoNotKnow (99) "Don't Know"

M Question 6. ManType, Was the Manure applied solid or liquid?

Solid (1) "Solid",
Liquid (2) "Liquid")

M Question 7. ManLiquidMethod, what was the method of application of manure on this field?

Sweep (1) "Sweep Injection",
Knife (2) "Knife Injection",
Disc (3) "Disc Injection",
BroadCast1 (4) "Broadcast Incorporation within one day",
BroadCast2 (5) "Broadcast Incorporation within two to four days",
BroadCast4 (6) "Broadcast Incorporation over 4 days",
Broadcast None (7) Broadcast any Incorporation

M Question 8. ManSolidMethod, what was the method of application of manure on this field?

BroadCast1 (4) "Broadcast Incorporation within one day",
BroadCast2 (5) "Broadcast Incorporation within two to four days",
BroadCast4 (6) "Broadcast Incorporation over 4 days",
Broadcast None (7) Broadcast any Incorporation

M Question 9. ManAppDatem, what was the approximate date of the manure application

Date (1) "Approximate Date",
Periodic (2) "Over a period of time"

M Question 10. ManOneDate, what was the approximate date the manure was applied?

M Question 11. ManPeriodic, When was the manure applied?

Daily (1) "Daily",
Weekly (2) "Weekly",
Monthly (3) "Monthly",
Other (4) "Other"

M Question 12. ManPrior, Prior to the manure application for the 2010 season, when was the last application of manure on this field?

M Question 13. ManMiles, How many miles from the manure storage/source to the field?

M Question 14. ManN, do you know the actual amount of Nitrogen applied from this manure? Yes No

M Question 15. ManN_Lb, what is the total Nitrogen applied from the manure as pounds per acre?

M Question 16. ManVarTech, Was the manure on this field applied using variable rate technology? Yes No

M Question 17. ManRate, do you know the manure application rate in gallons per acre or tons per acre? Yes No

M Question 18. ManRateAmt, what is the application rate on this field?

M Question 19. ManRateUnit, what is the unit?

Gallons (1) "Gallons per Acre",
Tons (2) "Tons per Acre"

M Question 20. ManFert, did you also apply commercial fertilizers to this field for the 2010crop year? Yes No

M Question 21. ManFertAmt, what was the total amount of Nitrogen applied PER ACRE to this field from commercial fertilizer for the 2010 crop year, including all sources. Don't forget the starter may include Nitrogen as well as phosphorus or sulfur sources.

M Question 22. ManOwn, Was this manure from your own farm operation? Yes No

M Question 23. ManTest, When was your manure last tested for nutrient content
This Year (1) "This year (include 2009 applications for the 2010 crop year)",
Last3 (2) "Last 3 years",
Over3 (3) "Over 3 years ago",
DontTest (4) "Don't Test")

M Question 24. SoilSamp1 - **SoilSamp5,** What type of soil sampling do you use. List all that you used in the last 5 years.
Traditional (1) "Traditional",
Grid_ (2) "Grid",
Zone (3) "Zone",
Other (4) "Other",
None (5) "None"

M Question 25. Atrazine, Was atrazine applied on ANY of your corn acres 2010?" Yes (1) No (3) DontK (5)

M Question 26. Acetochlor, Was acetochlor applied on ANY of your corn acres in 2010 Yes (1) No (3) DontK (5)

M Question 27. SetBacks, Setbacks or restrictions are part of many pesticide labels. Who determines if applications setbacks or restrictions are appropriate on your farm?
I_Do (1) “I do (the farmer)",
Dealer (2) "Dealer",
Both (3) "Both together",
Neither (4) "Neither"

M Question 28. Testing, if funding and capacity is available, would you be interested in having the Minnesota Department of Agriculture sample your well for pesticides and nitrate? Yes No