



# Survey Results of Nitrogen Fertilizer BMPs on Minnesota's 2011 Corn Production

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Minnesota Department of Agriculture  
USDA, NASS, Minnesota Field Office

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## Introduction

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 acres. The focus of this survey is the use of fall application of nitrogen and the sidedress application of nitrogen on corn acres.

In Minnesota, nitrate is detected frequently in groundwater and surface water resources. Nitrate often exceeds the drinking water standards in groundwater, 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. Best management practices vary by BMP region across Minnesota. The MDA has two types of fertilizer surveys for farmers in Minnesota. On the even crop years, Minnesota farmers are surveyed for nitrogen use and rates on corn and other crop fields<sup>1</sup> for both commercial fertilizer and also manure. On odd numbered years, Minnesota farmers are surveyed for BMP adoption such as timing, placement and product use.

NASS developed a sample of over 7,000 farmers in early 2012. From this pool, approximately 2,100 farmers who raised corn during the 2011 growing season shared valuable information on -the practice of fall and sidedress applications of nitrogen.

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

Every year, MDA has partnered with NASS to produce a detailed report on nitrogen use or nitrogen management on corn acres in Minnesota. The first nitrogen fertilizer use survey was conducted in 2009 and was designed for commercial nitrogen fertilizer use on corn. Readers are encouraged to visit reports from this survey at:

<http://www.mda.state.mn.us/en/protecting/cleanwaterfund/gwdwprotection/nutrientmgmt/survey.aspx>

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<sup>1</sup> The MDA selected the crop of wheat to survey in 2010 in addition to corn.

## **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 fertilizer 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, Dave Knopf, 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 commercial fertilizer use information.

## **2011 Fertilizer Management Practices Summary and Highlights**

This report summarizes survey results for a number of important practices associated with nitrogen fertilizer use on Minnesota's 2011 corn acres. Over 2,100 farmers participated in the telephone survey and fertilizer information was collected for 676,000 corn acres, representing 9 percent of Minnesota's 7,700,000 harvested corn acres.

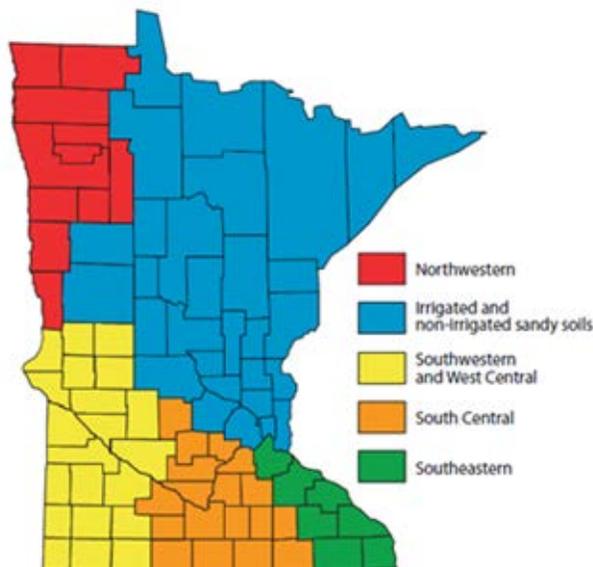
Farmers were interviewed over the phone in April. These are "cold calls," meaning that the farmers did not get any type of notification about the survey prior to the contact. Consequently, all information collected using this approach is based upon either the participant's memory or information readily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

Survey questions focused on the fall application of nitrogen and the sidedress application of nitrogen as per the Nitrogen BMP recommendations. Minnesota farmers in the Northwestern, Southwest and West Central and South Central regions were surveyed on fall application of nitrogen. Farmers in the Irrigated and Non-irrigated Sandy Soils and Southeastern regions were surveyed on sidedress applications of nitrogen. This is the first nitrogen BMP adoption survey performed by MDA and NASS to collect information on nitrogen management practices for Minnesota corn acres.

## **Survey Design and Implementation**

Five Nitrogen Best Management Practices 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. Nitrogen BMP regions are shown in Figure 1.

## Minnesota Nitrogen Best Management Practices Regions



**Figure 1. Minnesota Nitrogen Best Management Practices Regions.**

For the purpose of this report, 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.

### Data Collection Process and History

The MDA is required by state law to monitor pesticide use on a biennial basis (Minn. Stat. § 18B.064). In pursuit of fulfilling that responsibility, MDA began exploring the possibility of using the existing NASS framework to enhance and broaden pesticide use monitoring efforts. 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 the Environmental Protection Agency (EPA); projects were conducted from 2001-2003. These pilots were essential to the final methodology used in this survey.

The first pilot<sup>2</sup> was conducted in 2001 by expanding the existing Agricultural Resource Management Study (ARMS) developed by NASS. The typical 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-

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<sup>2</sup> “Expanded Minnesota Agricultural Statistics Pesticide Use Data”, 2003, by NASS and MDA.

enhanced data on pesticide product choices and application rates. Additionally, useful information on primary sources of pesticide management information, scouting, timing, and other pesticide management related information was obtained.

In neighboring North Dakota, 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<sup>3</sup> 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 use 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 of the fertilizer use survey included questions on manure applications.

## **Data Reporting and Limitations**

The primary purpose of this survey was to evaluate the use of fall applications and sidedress applications of nitrogen. 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

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<sup>3</sup> Unpublished data. From the September 20, 2003 EPA Report.

limitations.<sup>4</sup> This survey did not employ such strategies; rather, corn farmers were randomly selected from across Minnesota. Therefore, weighting across regions or counties was not performed. The MDA can be contacted to further discuss interpretation of the survey data.

The 2011 crop year survey was designed to capture fall applications of nitrogen in the Southwestern and West Central region, South Central region and the Northwestern region of Minnesota. In these three areas fall applications under certain conditions are considered best management practices as detailed in the University of Minnesota's best management practices that can be found at;

<http://www.extension.umn.edu/agriculture/nutrient-management/nitrogen>.

Sidedress applications of nitrogen were the focus of the survey in the Southeastern region and the Irrigated and non-irrigated sandy soils region of Minnesota. Soils in these regions are more prone to leaching and sidedress applications of nitrogen are recommended under certain circumstances.

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<sup>4</sup> 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 1. Summary of respondents and corresponding corn acres by county and BMP regions for all farmers.**

County	Nitrogen Best Management Practices Region	Number of Respondents	Number of Corn Acres	Fall Survey or Sidedress Survey
Clay	NW	28	19,142	Fall Survey
Kittson	NW	7	1,500	Fall Survey
Mahnomen	NW	18	4,850	Fall Survey
Marshall	NW	*	*	Fall Survey
Norman	NW	26	15,025	Fall Survey
Pennington	NW	*	*	Fall Survey
Polk	NW	8	6,321	Fall Survey
Red Lake	NW	16	2,483	Fall Survey
Roseau	NW	7	1,960	Fall Survey
Wilkin	NW	33	15,087	Fall Survey
<b>Totals</b>	<b>NW</b>	<b>153</b>	<b>70,030</b>	<b>Fall Survey</b>
Big Stone	SW	23	8,308	Fall Survey
Chippewa	SW	38	12,723	Fall Survey
Cottonwood	SW	41	13,331	Fall Survey
Douglas	SW	20	2,939	Fall Survey
Grant	SW	35	16,007	Fall Survey
Jackson	SW	34	15,484	Fall Survey
Kandiyohi	SW	28	10,328	Fall Survey
Lac qui Parle	SW	33	14,065	Fall Survey
Lincoln	SW	37	9,114	Fall Survey
Lyon	SW	27	10,602	Fall Survey
Murray	SW	35	10,610	Fall Survey
Nobles	SW	36	10,795	Fall Survey
Pipestone	SW	34	11,724	Fall Survey
Pope	SW	29	8,069	Fall Survey
Redwood	SW	40	13,904	Fall Survey
Renville	SW	38	19,234	Fall Survey
Rock	SW	31	12,489	Fall Survey
Stevens	SW	40	24,246	Fall Survey
Swift	SW	37	17,973	Fall Survey
Traverse	SW	40	25,263	Fall Survey
Yellow Medicine	SW	30	11,593	Fall Survey
<b>Totals</b>	<b>SW</b>	<b>706</b>	<b>278,801</b>	<b>Fall Survey</b>
Blue Earth	SC	34	16,060	Fall Survey
Brown	SC	45	9,186	Fall Survey
Carver	SC	27	5,623	Fall Survey
Dodge	SC	33	23,369	Fall Survey
Faribault	SC	41	15,705	Fall Survey
Freeborn	SC	39	14,823	Fall Survey
Le Sueur	SC	31	8,817	Fall Survey
Martin	SC	39	19,049	Fall Survey
McLeod	SC	22	6,566	Fall Survey
Meeker	SC	39	11,376	Fall Survey
Mower	SC	33	12,243	Fall Survey
Nicollet	SC	41	10,897	Fall Survey
Rice	SC	25	3,278	Fall Survey
Scott	SC	28	4,564	Fall Survey

County	Nitrogen Best Management Practices Region	Number of Respondents	Number of Corn Acres	Fall Survey or Sidedress Survey
Sibley	SC	37	10,570	Fall Survey
Steele	SC	27	12,022	Fall Survey
Waseca	SC	35	9,976	Fall Survey
Watonwan	SC	36	16,026	Fall Survey
<b>Totals</b>	<b>SC</b>	<b>612</b>	<b>210,150</b>	<b>Fall Survey</b>
<b>State</b>	<b>ALL</b>	<b>1,471</b>	<b>558,981</b>	<b>Fall Survey</b>
Aitkin	NE	*	*	Sidedress Survey
Anoka	NE	20	2,500	Sidedress Survey
Becker	NE	21	11,210	Sidedress Survey
Benton	NE	30	5,307	Sidedress Survey
Cass	NE	*	*	Sidedress Survey
Chisago	NE	24	1,610	Sidedress Survey
Crow Wing	NE	15	1,894	Sidedress Survey
Hubbard	NE	15	1,485	Sidedress Survey
Isanti	NE	19	3,429	Sidedress Survey
Kanabec	NE	15	952	Sidedress Survey
Mille Lacs	NE	21	2,745	Sidedress Survey
Morrison	NE	32	5,262	Sidedress Survey
Otter Tail	NE	30	13,322	Sidedress Survey
Pine	NE	17	1,427	Sidedress Survey
Sherburne	NE	20	3,059	Sidedress Survey
Stearns	NE	36	4,732	Sidedress Survey
Todd	NE	26	3,211	Sidedress Survey
Wadena	NE	22	3,318	Sidedress Survey
Washington	NE	23	5,499	Sidedress Survey
Wright	NE	29	3,542	Sidedress Survey
<b>Totals</b>	<b>NE</b>	<b>421</b>	<b>74,687</b>	<b>Sidedress Survey</b>
Dakota	SE	22	6,218	Sidedress Survey
Fillmore	SE	37	8,032	Sidedress Survey
Goodhue	SE	35	6,625	Sidedress Survey
Houston	SE	30	3,395	Sidedress Survey
Olmsted	SE	29	7,927	Sidedress Survey
Wabasha	SE	33	5,195	Sidedress Survey
Winona	SE	45	5,070	Sidedress Survey
<b>Totals</b>	<b>SE</b>	<b>231</b>	<b>42,462</b>	<b>Sidedress Survey</b>
<b>State</b>	<b>ALL</b>	<b>652</b>	<b>117,149</b>	<b>Sidedress Survey</b>
<b>State All Surveys</b>	<b>ALL</b>	<b>2,123</b>	<b>676,130</b>	<b>All Surveys</b>

\* Less than five responses

Table 2 details the respondents and corresponding corn acres by county and BMP regions for all farmers in this study who fall applied nitrogen. The percent of acres operated by farmers with fall applied nitrogen is not the actual percent of acres with fall applied nitrogen but the acres operated by the farmers who fall applied nitrogen.

**Table 2. Summary of respondents and corresponding corn acres by county and BMP regions for all farmers who fall applied nitrogen.**

<b>County</b>	<b>Nitrogen Best Management Practices Region</b>	<b>Number of Respondents Fall Applying Nitrogen</b>	<b>Percent of Respondents Fall Applying Nitrogen</b>	<b>Percent of Acres Operated by Farmers Who Fall Applied Nitrogen</b>
Clay	NW	7	25	74
Kittson	NW	*	*	11
Mahnomen	NW	5	28	48
Marshall	NW	*	*	*
Norman	NW	8	31	31
Pennington	NW	*	*	*
Polk	NW	*	*	*
Red Lake	NW	*	*	*
Roseau	NW	*	*	*
Wilkin	NW	5	15	10
<b>Totals</b>	<b>NW</b>	<b>27</b>	<b>18</b>	<b>39</b>
Big Stone	SW	*	*	*
Chippewa	SW	20	53	59
Cottonwood	SW	18	44	47
Douglas	SW	*	*	*
Grant	SW	5	14	13
Jackson	SW	12	35	52
Kandiyohi	SW	13	46	76
Lac qui Parle	SW	13	39	61
Lincoln	SW	10	27	50
Lyon	SW	12	44	61
Murray	SW	11	31	46
Nobles	SW	7	19	39
Pipestone	SW	5	15	15
Pope	SW	8	28	45
Redwood	SW	22	55	55
Renville	SW	17	45	77
Rock	SW	16	52	72
Stevens	SW	19	48	51
Swift	SW	19	51	74
Traverse	SW	11	28	37
Yellow Medicine	SW	17	57	63
<b>Totals</b>	<b>SW</b>	<b>261</b>	<b>37</b>	<b>51</b>
Blue Earth	SC	16	47	49
Brown	SC	20	44	68
Carver	SC	*	*	*
Dodge	SC	7	21	64
Faribault	SC	17	41	52
Freeborn	SC	10	26	42

<b>County</b>	<b>Nitrogen Best Management Practices Region</b>	<b>Number of Respondents Fall Applying Nitrogen</b>	<b>Percent of Respondents Fall Applying Nitrogen</b>	<b>Percent of Acres Operated by Farmers Who Fall Applied Nitrogen</b>
Le Sueur	SC	13	42	63
Martin	SC	13	33	48
McLeod	SC	5	23	20
Meeker	SC	6	15	39
Mower	SC	7	21	28
Nicollet	SC	12	29	30
Rice	SC	*	*	30
Scott	SC	6	21	54
Sibley	SC	11	30	29
Steele	SC	*	*	18
Waseca	SC	16	46	77
Watonwan	SC	20	56	66
<b>Totals</b>	<b>SC</b>	<b>188</b>	<b>31</b>	<b>47</b>
<b>State</b>	<b>ALL</b>	<b>476</b>	<b>32</b>	<b>47</b>

\* Less than five responses

## Statewide Fall Applications and Management on Corn

Information on fall nitrogen applications was gathered on a typical corn field for the 2011 growing season. Total corn acres with fall applied nitrogen was not collected in this survey.

Survey participants who grew corn were asked if they had a field where they applied nitrogen in the fall. If yes, they were then asked the size of the field, the average yield of the field during the past five corn crops and if nitrogen was applied over the whole field.

Table 3 details the percentages of respondents that fall applied nitrogen from a major source such as urea or anhydrous ammonia on corn acres.

**Table 3. Fall application of nitrogen for the 2011 crop year. (Q.1)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Fall Apply Nitrogen for 2011?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes	18
Northwestern	No	82
Southwestern and West Central	Yes	37
Southwestern and West Central	No	63
South Central	Yes	31
South Central	No	69
Statewide	Yes	32
Statewide	No	68

Table 4 details the percentages of respondents that fall applied nitrogen and irrigated corn acres.

**Table 4. Farmers who fall apply nitrogen and also irrigate. (Q.2)**

<b>Nitrogen Best Management Practices Region</b>	<b>Do You Irrigate?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	4
Northwestern	None	96
Southwestern and West Central	All	1
Southwestern and West Central	Some	3
Southwestern and West Central	None	97
South Central	All	2
South Central	Some	7
South Central	None	92
Statewide	All	1
Statewide	Some	5
Statewide	None	94

\*Totals may not add due to rounding

Table 5 details the percentages of respondents that fall applied urea nitrogen on corn acres in the past 5 years.

**Table 5. Fall application of urea in the past 5 years. (Q.3)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Fall Applied Urea in the Past 5 Years?</b>	<b>Percent of All Respondents</b>
Northwestern	All	5
Northwestern	Some	10
Northwestern	None	84
Southwestern and West Central	All	9
Southwestern and West Central	Some	13
Southwestern and West Central	None	78
South Central	All	3
South Central	Some	2
South Central	None	95
Statewide	All	6
Statewide	Some	8
Statewide	None	86

\*Totals may not add due to rounding

Table 6 details the percentages of respondents who fall applied nitrogen of urea in 2011 for the 2012 crop.

**Table 6. Fall application. (Q.4)**

<b>Nitrogen Management Region</b>	<b>Did You Apply Urea This Past Fall for 2012 Crop?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes	12
Northwestern	No	88
Southwestern and West Central	Yes	15
Southwestern and West Central	No	85
South Central	Yes	4
South Central	No	96
Statewide	Yes	10
Statewide	No	90

\*Totals may not add due to rounding

Table 7 details the average date of urea application for fall applied urea in 2011 for the 2012 corn crop by BMP region.

**Table 7. Average date of urea application in 2011 for the 2012 corn crop. (Q.5)**

<b>Nitrogen Management Region</b>	<b>Average Date of Urea Application for the Fall of 2011</b>
Northwestern	10/27/2011
Southwestern and West Central	11/07/2011
South Central	11/07/2011
Statewide	11/06/2011

Table 8 details the percentages of respondents that fall applied nitrogen of urea in 2010 for the 2011 corn crop by BMP region.

**Table 8. Fall application of urea in the fall of 2010 for the 2011 season. (Q.6)**

<b>Nitrogen Management Region</b>	<b>Did You Apply Urea Fertilizer in the Fall of 2010 for the 2011 Season?</b>	<b>Percent of All Respondents</b>
Northwestern	All	3
Northwestern	Some	5
Northwestern	None	92
Southwestern and West Central	All	8
Southwestern and West Central	Some	6
Southwestern and West Central	None	86
South Central	All	2
South Central	Some	1
South Central	None	97
Statewide	All	5
Statewide	Some	4
Statewide	None	91

\*Totals may not add due to rounding

Table 9 details the percentages of respondents that incorporated fall applied urea in 2010 for the 2011 corn crop by BMP region.

**Table 9. Percentage of farmers incorporating fall applied urea. (Q.7)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Incorporate the Urea Fertilizer?</b>	<b>Percent of All Respondents</b>
Northwestern	All	92
Northwestern	Some	8
Northwestern	None	0
Southwestern and West Central	All	76
Southwestern and West Central	Some	13
Southwestern and West Central	None	10
South Central	All	50
South Central	Some	25
South Central	None	25
Statewide	All	75
Statewide	Some	14
Statewide	None	11

\*Totals may not add due to rounding

Table 10 details the percentages of respondents that fall applied urea using variable rate technology or more than one rate per field, such as using management zones.

**Table 10. Percent of farmers fall applying urea using variable rate applications. (Q.8)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was Any of the Applied Urea Applied Variable Rate?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	8
Northwestern	None	92
Southwestern and West Central	All	11
Southwestern and West Central	Some	14
Southwestern and West Central	None	74
South Central	All	38
South Central	Some	0
South Central	None	63
Statewide	All	13
Statewide	Some	12
Statewide	None	75

\*Totals may not add due to rounding

Table 11 details the percentages of respondents that fall applied urea at the same time or with a phosphate source such as MAP or DAP.

**Table 11. Percent of farmers fall applying urea including a phosphorus source such as MAP/DAP. (Q.9)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did the Fall Application of Urea Including a Phosphorus Source Such as MAP/DAP?</b>	<b>Percent of All Respondents</b>
Northwestern	All	69
Northwestern	Some	15
Northwestern	None	15
Southwestern and West Central	All	69
Southwestern and West Central	Some	19
Southwestern and West Central	None	13
South Central	All	56
South Central	Some	13
South Central	None	31
Statewide	All	67
Statewide	Some	18
Statewide	None	15

\*Totals may not add due to rounding

Table 12 details the percentages of respondents that use variable rate or more than one rate to fall apply MAP or DAP.

**Table 12. Percent of farmers using variable rate to fall apply MAP/DAP. (Q.10)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Fall Applied MAP/DAP Applied Using Variable Rate?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	0
Northwestern	None	100
Southwestern and West Central	All	14
Southwestern and West Central	Some	17
Southwestern and West Central	None	69
South Central	All	36
South Central	Some	0
South Central	None	64
Statewide	All	15
Statewide	Some	13
Statewide	None	71

\*Totals may not add due to rounding

Table 13 details the percentages of respondents that apply herbicides with or at the same time as fall applied urea.

**Table 13. Percent of farmers applying herbicides with or at the same time as fall applied urea. (Q.11)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Fall Application of Urea Applied at the Same Time as an Herbicide Application?</b>	<b>Percent of All Respondents</b>
Northwestern	All	15
Northwestern	Some	0
Northwestern	None	85
Southwestern and West Central	All	4
Southwestern and West Central	Some	1
Southwestern and West Central	None	95
South Central	All	13
South Central	Some	0
South Central	None	88
Statewide	All	6
Statewide	Some	1
Statewide	None	93

\*Totals may not add due to rounding

Table 14 details the percentages of respondents that fall applied urea and also have anhydrous ammonia available at their dealership.

**Table 14. Percent of farmers, who fall apply urea that have anhydrous ammonia available at their dealership. (Q.12)**

<b>Nitrogen Best Management Practices Region</b>	<b>Is Anhydrous Ammonia Available at Your Dealer?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes	62
Northwestern	No	38
Southwestern and West Central	Yes	81
Southwestern and West Central	No	19
South Central	Yes	80
South Central	No	20
Statewide	Yes	79
Statewide	No	21

\*Totals may not add due to rounding

Table 15 details the type of tillage used before the fall application of urea by the percentages of respondents that used each type of tillage.

**Table 15. Type of tillage performed before fall application of urea on the majority of the farmers' fields. (Q.13)**

<b>Nitrogen Best Management Practices Region</b>	<b>What type of Tillage did You do Before the Fall Application of Urea?</b>	<b>Percent of All Respondents</b>
Northwestern	Conventional	33
Northwestern	Minimum	17
Northwestern	Mulch	17
Northwestern	None	33
Southwestern and West Central	Conventional	12
Southwestern and West Central	Minimum	19
Southwestern and West Central	Mulch	12
Southwestern and West Central	None	57
South Central	Conventional	13
South Central	Minimum	20
South Central	Mulch	13
South Central	None	53
Statewide	Conventional	14
Statewide	Minimum	19
Statewide	Mulch	12
Statewide	None	55

\*Totals may not add due to rounding

Table 16 details the type of tillage used to incorporate the fall application of urea on the majority of the fields by the percentages of respondents who used each type of tillage.

**Table 16. Type of tillage used to incorporate the fall application of urea on the majority of the fields. (Q.14)**

<b>Nitrogen Best Management Practices Region</b>	<b>What Type of Tillage did You do Use to Incorporate the Fall Application?</b>	<b>Percent of All Respondents</b>
Northwestern	Conventional	33
Northwestern	Minimum	17
Northwestern	Mulch	33
Northwestern	None	17
Southwestern and West Central	Conventional	28
Southwestern and West Central	Minimum	26
Southwestern and West Central	Mulch	29
Southwestern and West Central	None	15
Southwestern and West Central	Ridge	2
South Central	Conventional	20
South Central	Minimum	33
South Central	Mulch	13
South Central	None	33
Statewide	Conventional	28
Statewide	Minimum	26
Statewide	Mulch	28
Statewide	None	17
Statewide	Ridge	2

§ Percent was calculated using only those respondents who answered yes or no to the question.

\*Totals may not add due to rounding

Table 17 details the timing of any other commercial nitrogen source on corn acres fall applied with urea by percent of respondents.

**Table 17. Applications of any other commercial nitrogen on corn acres with fall applied urea. (Q.15)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply any Other Commercial Nitrogen on Fall Applied Urea Corn Acres?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes-Side	8
Northwestern	Yes-Spring	23
Northwestern	No	69
Southwestern and West Central	Yes-Side	7
Southwestern and West Central	Yes-Spring	6
Southwestern and West Central	No	87
South Central	Yes-Side	13
South Central	Yes-Spring	13
South Central	No	75
Statewide	Yes-Side	8
Statewide	Yes-Spring	9
Statewide	No	83

§ Percent was calculated using only those respondents who answered yes or no to the question.

\*Totals may not add due to rounding

Table 18 details the percentages of respondents that fall applied anhydrous ammonia nitrogen on corn acres in the past 5 years.

**Table 18. Fall application of anhydrous ammonia in the past 5 years. (Q.16)**

<b>Nitrogen Best Management Practices Region</b>	<b>Have You Fall Applied Anhydrous Ammonia in the Past 5 Years?</b>	<b>Percent of All Respondents</b>
Northwestern	All	3
Northwestern	Some	5
Northwestern	None	92
Southwestern and West Central	All	16
Southwestern and West Central	Some	12
Southwestern and West Central	None	72
South Central	All	18
South Central	Some	9
South Central	None	73
Statewide	All	16
Statewide	Some	10
Statewide	None	74

§ Percent was calculated using only those respondents who answered yes or no to the question.

\*Totals may not add due to rounding

Table 19 details the percentages of respondents that fall applied anhydrous ammonia nitrogen in 2011 for the 2012 corn crop.

**Table 19. Fall application of anhydrous ammonia this past fall (2011) for the 2012 corn crop. (Q.17)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Fall Apply Anhydrous Ammonia this Past Fall for 2012?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes	5
Northwestern	No	95
Southwestern and West Central	Yes	21
Southwestern and West Central	No	79
South Central	Yes	19
South Central	No	81
Statewide	Yes	18
Statewide	No	82

§ Percent was calculated using only those respondents who answered yes or no to the question.

\*Totals may not add due to rounding

Table 20 details the average date of urea application for fall applied anhydrous ammonia in 2011 for the 2012 corn crop by BMP region.

**Table 20. Average date of anhydrous ammonia applications this past fall of 2011. (Q.18)**

<b>Nitrogen Management Region</b>	<b>Average Date of Anhydrous Ammonia Application for the Fall of 2011</b>
Northwestern	10/20/2011
Southwestern and West Central	11/8/2011
South Central	11/2/2011
Statewide	11/5/2011

Table 21 details the percentages of respondents that fall applied nitrogen of anhydrous ammonia in 2010 for the 2011 corn crop by BMP region.

**Table 21. Fall application of anhydrous ammonia fertilizer in the fall of 2010 for the 2011 season. (Q.19)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Fall-Apply any Anhydrous Ammonia Fertilizer in the Fall of 2010?</b>	<b>Percent of All Respondents</b>
Northwestern	All	2
Northwestern	Some	1
Northwestern	None	97
Southwestern and West Central	All	17
Southwestern and West Central	Some	10
Southwestern and West Central	None	74
South Central	All	13
South Central	Some	8
South Central	None	79
Statewide	All	13
Statewide	Some	8
Statewide	None	79

\*Totals may not add due to rounding

Table 22 details the percentages of respondents that used N-serve on fall applied anhydrous ammonia by BMP region.

**Table 22. Anhydrous ammonia applications including N-serve. (Q.20)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did the Anhydrous Ammonia Application Include N-Serve?</b>	<b>Percent of All Respondents</b>
Northwestern	All	25
Northwestern	Some	75
Northwestern	None	0
Southwestern and West Central	All	9
Southwestern and West Central	Some	4
Southwestern and West Central	None	87
South Central	All	48
South Central	Some	11
South Central	None	41
Statewide	All	28
Statewide	Some	7
Statewide	None	65

\*Totals may not add due to rounding

Table 23 details the percentages of respondents that apply herbicides with or at the same time as fall applied anhydrous ammonia.

**Table 23. Fall applications of herbicides on corn acres applied with anhydrous ammonia. (Q.21)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Fall Application of Anhydrous Ammonia Applied at the Same Time as an Herbicide Application?</b>	<b>Percent of All Respondents</b>
Northwestern	All	25
Northwestern	Some	0
Northwestern	None	75
Southwestern and West Central	All	4
Southwestern and West Central	Some	2
Southwestern and West Central	None	94
South Central	All	12
South Central	Some	3
South Central	None	85
Statewide	All	8
Statewide	Some	2
Statewide	None	90

\*Totals may not add due to rounding

Table 24 details the percentages of respondents that fall applied anhydrous ammonia using variable rate technology or more than one rate per field, such as using management zones.

**Table 24. Fall applications of anhydrous ammonia applied using variable rate. (Q.22)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was any of the Fall Applied Anhydrous Ammonia Applied as Variable Rate?</b>	<b>Percent of All Respondents</b>
Northwestern	All	25
	Some	0
	None	75
Southwestern and West Central	All	8
	Some	10
	None	82
South Central	All	14
	Some	10
	None	76
Statewide	All	11
	Some	10
	None	79

\*Totals may not add due to rounding

Table 25 details the percentages of respondents that fall applied anhydrous ammonia at the same time or with a phosphate source such as MAP or DAP.

**Table 25. Percent of farmers fall applying a phosphorus source such as MAP/DAP on corn acres applied with fall applied anhydrous ammonia. (Q.23)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Fall Apply a Phosphorus Source Such as MAP/DAP?</b>	<b>Percent of All Respondents</b>
Northwestern	All	50
Northwestern	Some	0
Northwestern	None	50
Southwestern and West Central	All	42
Southwestern and West Central	Some	17
Southwestern and West Central	None	41
South Central	All	43
South Central	Some	19
South Central	None	38
Statewide	All	43
Statewide	Some	18
Statewide	None	40

\*Totals may not add due to rounding

Table 26 details the percentages of respondents with fall applied anhydrous ammonia that use variable rate or more than one rate to fall apply MAP or DAP.

**Table 26. Fall applied MAP/DAP applied variable rate. (Includes fields that were zoned or applied at more than one rate as “Yes”) (Q.24)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was Any of the Fall Applied MAP/DAP Applied Variable Rate?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	0
Northwestern	None	100
Southwestern and West Central	All	16
Southwestern and West Central	Some	14
Southwestern and West Central	None	71
South Central	All	34
South Central	Some	16
South Central	None	49
Statewide	All	24
Statewide	Some	15
Statewide	None	61

\*Totals may not add due to rounding

Table 27 details the type of tillage used before the fall application of anhydrous ammonia by the percentages of respondents that used each type of tillage.

**Table 27. Type of tillage done before the fall application of anhydrous ammonia. (Q.25)**

<b>Nitrogen Best Management Practices Region</b>	<b>What Type of Tillage did You do Before the Fall Application of Anhydrous Ammonia?</b>	<b>Percent of All Respondents</b>
Northwestern	Minimum	33
Northwestern	Mulch	33
Northwestern	None	33
Southwestern and West Central	Conventional	19
Southwestern and West Central	Minimum	28
Southwestern and West Central	Mulch	26
Southwestern and West Central	None	25
Southwestern and West Central	Ridge	1
South Central	Conventional	19
South Central	Minimum	27
South Central	Mulch	18
South Central	None	35
South Central	Ridge	1
Statewide	Conventional	19
Statewide	Minimum	28
Statewide	Mulch	22
Statewide	None	30
Statewide	Ridge	1

\*Totals may not add due to rounding

Table 28 details the timing of any other commercial nitrogen source on corn acres fall applied with anhydrous ammonia by percent of respondents.

**Table 28. Application of other commercial nitrogen on corn acres with fall applied anhydrous ammonia. (Q.26)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply any Other Commercial Nitrogen on Corn Acres?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes-Side	0
Northwestern	Yes-Spring	0
Northwestern	No	100
Southwestern and West Central	Yes-Side	6
Southwestern and West Central	Yes-Spring	6
Southwestern and West Central	No	89
South Central	Yes-Side	8
South Central	Yes-Spring	11
South Central	No	81
Statewide	Yes-Side	7
Statewide	Yes-Spring	8
Statewide	No	85

\*Totals may not add due to rounding

Table 29 details the use of starter on any corn acres with fall applied nitrogen by percent of respondents.

**Table 29. Starter fertilizer applications. (Q.27)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply a Starter Fertilizer?</b>	<b>Percent of All Respondents</b>
Northwestern	All	74
Northwestern	Some	7
Northwestern	None	19
Southwestern and West Central	All	35
Southwestern and West Central	Some	7
Southwestern and West Central	None	58
South Central	All	63
South Central	Some	1
South Central	None	36
Statewide	All	48
Statewide	Some	4
Statewide	None	47

\*Totals may not add due to rounding

Table 30 details the type of starter used on any corn acres with fall applied nitrogen by percent of respondents.

**Table 30. Type of starter used. (Q.28)**

<b>Nitrogen Best Management Practices Region</b>	<b>What Kind of Starter was It?</b>	<b>Percent of All Respondents</b>
Northwestern	Dry	9
Northwestern	Liquid	91
Southwestern and West Central	Dry	12
Southwestern and West Central	Liquid	88
South Central	Dry	19
South Central	Liquid	81
Statewide	Dry	15
Statewide	Liquid	85

\*Totals may not add due to rounding

Table 31 details the use of fall application of ESN on corn acres by percent of respondents.

**Table 31. Fall application of ESN. (Q.29)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Fall Apply ESN?</b>	<b>Percent of All Respondents</b>
Northwestern	All	1
Northwestern	Some	0
Northwestern	None	99
Southwestern and West Central	All	0
Southwestern and West Central	Some	0
Southwestern and West Central	None	100
South Central	All	<1
South Central	Some	<1
South Central	None	100
Statewide	All	<1
Statewide	Some	<1
Statewide	None	100

\*Totals may not add due to rounding

Table 32 details the use of fall application of Agrotain or Super U on corn acres by percent of respondents.

**Table 32. Use of Agrotain or Super U. (Q.30)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was Agrotain or Super U Used?</b>	<b>Percent of All Respondents</b>
Northwestern	All	1
Northwestern	Some	<1
Northwestern	None	98
Southwestern and West Central	All	0
Southwestern and West Central	Some	0
Southwestern and West Central	None	100
South Central	All	<1
South Central	Some	<1
South Central	None	99
Statewide	All	<1
Statewide	Some	<1
Statewide	None	99

\*Totals may not add due to rounding

Table 33 details the manure applications on corn acres with fall applied nitrogen by percent of respondents.

**Table 33. Manure applications on acres to be planted to corn in 2011. (Q.31)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply Manure on Acres to be Planted to Corn in 2011?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	7
Northwestern	None	93
Southwestern and West Central	All	6
Southwestern and West Central	Some	32
Southwestern and West Central	None	62
South Central	All	9
South Central	Some	32
South Central	None	59
Statewide	All	7
Statewide	Some	31
Statewide	None	62

\*Totals may not add due to rounding

Table 34 details the average nitrogen rate for corn acres following soybeans with fall applied nitrogen and no manure applied by percent of respondents.

**Table 34. On corn acres without manure, the average total nitrogen rate per acre applied on corn acres following soybeans. (Q.32)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Total Nitrogen Rate per Acre Applied on Corn Acres Following Soybeans</b>	<b>Percent of All Respondents</b>
Northwestern	120	5
Southwestern and West Central	144	55
South Central	147	40
Statewide	144	100

\*Totals may not add due to rounding

Table 35 details the average nitrogen rate for corn acres following corn with fall applied nitrogen and no manure applied by percent of respondents.

**Table 35. On your corn acres without manure, the average total nitrogen rate per acre applied on corn acres following corn. (Q.33) (Q.36)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Total Nitrogen Rate per Acre Applied on Corn Acres Following Corn</b>	<b>Percent of All Respondents</b>
Northwestern	136	5
Southwestern and West Central	163	48
South Central	173	47
Statewide	167	100

\*Totals may not add due to rounding

Table 36 details the average nitrogen rate for corn acres following alfalfa with fall applied nitrogen and no manure applied by percent of respondents.

**Table 36. On your corn acres without manure, the average total nitrogen rate per acre applied on corn acres following alfalfa. (Q.34)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Total Nitrogen Rate per Acre Applied on Corn Acres Following Alfalfa</b>	<b>Percent of All Respondents</b>
Northwestern	78	21
Southwestern and West Central	91	37
South Central	119	42
Statewide	100	100

\*Totals may not add due to rounding

Table 37 details the use tissue tests on corn acres with fall applied nitrogen by percent of respondents.

**Table 37. Tissue test performed on any of your corn acres. (Q.35)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Have a Tissue Test on Corn Acres?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	33
Northwestern	None	67
Southwestern and West Central	All	7
Southwestern and West Central	Some	11
Southwestern and West Central	None	83
South Central	All	6
South Central	Some	15
South Central	None	79
Statewide	All	6
Statewide	Some	14
Statewide	None	80

\*Totals may not add due to rounding

Table 38 details the use basal stalk tests on corn acres with fall applied nitrogen by percent of respondents.

**Table 38. Basal stalk test performed on corn acres. (Q.36)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did you have a Basal Stalk Test on Corn Acres?</b>	<b>Percent of All Respondents</b>
Northwestern	All	0
Northwestern	Some	0
Northwestern	None	100
Southwestern and West Central	All	2
Southwestern and West Central	Some	3
Southwestern and West Central	None	95
South Central	All	2
South Central	Some	3
South Central	None	96
Statewide	All	2
Statewide	Some	3
Statewide	None	95

\*Totals may not add due to rounding

Table 39 details whether corn acres were stressed from the lack of nitrogen by percent of respondents.

**Table 39. Corn acres stressed from lack of nitrogen in 2011. (Q.37)**

<b>Nitrogen Best Management Practices Region</b>	<b>Were Any of Your Corn Acres Stressed from Lack of Nitrogen?</b>	<b>Percent of All Respondents</b>
Northwestern	Yes	52
Northwestern	Maybe	4
Northwestern	No	44
Southwestern and West Central	Yes	31
Southwestern and West Central	Maybe	16
Southwestern and West Central	No	53
South Central	Yes	21
South Central	Maybe	8
South Central	No	71
Statewide	Yes	28
Statewide	Maybe	12
Statewide	No	59

\*Totals may not add due to rounding

Table 40 details the use of a deep soil nitrate test on farm fields by percent of respondents.

**Table 40. Deep soil nitrate test (18-24 inches) on any of the farmers' fields. (Q.38)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did you have a Deep Soil Nitrate Test on Any of your Corn Acres?</b>	<b>Percent of All Respondents</b>
Northwestern	All	33
	Some	19
	None	48
Southwestern and West Central	All	12
	Some	13
	None	75
South Central	All	3
	Some	3
	None	94
Statewide	All	10
	Some	9
	None	81

\*Totals may not add due to rounding

Table 41 details the average corn yield by region and percent of respondents in each region.

**Table 41. Average corn yield for 2011 corn crop. (Q.39)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Corn Yield in 2011</b>	<b>Percent of All Respondents</b>
Northwestern	128	6
Southwestern and West Central	157	54
South Central	172	40
Statewide	161	100

\*Totals may not add due to rounding

## Sidedress Applications of Nitrogen

### Statewide Sidedress Applications and Management on Corn.

Information on sidedress nitrogen management was gathered on a farm by farm basis for the 2011 growing season. Table 42 summarizes the statewide results. Sidedress applications were gathered from respondents in the Irrigated and non-irrigated sandy soils BMP region and the Southeastern BMP region.

**Table 42. Summary of respondents and corresponding corn acres by county and BMP regions for all farmers who sidedressed nitrogen.**

County	Nitrogen Best Management Practices Region	Number of Respondents Sidedressing Nitrogen	Percent of Respondents Sidedressing Nitrogen	Percent of Acres Operated by Farmers with Sidedressed Nitrogen
Aitkin	IRR	*	*	*
Anoka	IRR	11	55	48
Becker	IRR	*	*	*
Benton	IRR	8	27	23
Cass	IRR	*	*	*
Chisago	IRR	9	38	39
Crow Wing	IRR	7	47	87
Hubbard	IRR	5	33	76
Isanti	IRR	13	68	88
Kanabec	IRR	*	*	*
Mille Lacs	IRR	6	29	45
Morrison	IRR	12	38	63
Otter Tail	IRR	5	17	79
Pine	IRR	*	*	*
Sherburne	IRR	11	55	84
Stearns	IRR	10	28	41
Todd	IRR	7	27	39
Wadena	IRR	6	27	64
Washington	IRR	5	22	17
Wright	IRR	5	17	12
<b>Totals</b>	<b>IRR</b>	<b>131</b>	<b>31</b>	<b>50</b>
Dakota	SE	8	36	27
Fillmore	SE	*	*	*
Goodhue	SE	*	*	*
Houston	SE	6	20	28
Olmsted	SE	*	*	*
Wabasha	SE	*	*	*
Winona	SE	5	11	2
<b>Totals</b>	<b>SE</b>	<b>24</b>	<b>10</b>	<b>9</b>
<b>State</b>	<b>ALL</b>	<b>155</b>	<b>24</b>	<b>35</b>

Table 43 details the percentages of respondents that sidedress nitrogen applications on corn acres.

**Table 43. Sidedress application of nitrogen for the 2011 crop year. (Q.40)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Sidedress Nitrogen for the 2011 Crop Year?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes	31
Irrigated and Non-irrigated Sandy Soils	No	69
Southeastern	Yes	10
Southeastern	No	90
Statewide	Yes	24
Statewide	No	76

\*Totals may not add due to rounding

Table 44 details the percentages of respondents that sidedress nitrogen and irrigate corn acres.

**Table 44. Farmers who sidedress nitrogen and also irrigate. (Q.41)**

<b>Nitrogen Best Management Practices Region</b>	<b>Do You Irrigate?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	11
Irrigated and Non-irrigated Sandy Soils	Some	12
Irrigated and Non-irrigated Sandy Soils	None	77
Southeastern	All	8
Southeastern	Some	17
Southeastern	None	75
Statewide	All	10
Statewide	Some	13
Statewide	None	77

\*Totals may not add due to rounding

Table 45 details the percentages of respondents that sidedressed urea nitrogen on corn acres in the past 5 years.

**Table 45. Sidedress application of urea in the past 5 years. (Q.42)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was Urea Applied Sidedress in the Past 5 Years?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	14
Irrigated and Non-irrigated Sandy Soils	Some	5
Irrigated and Non-irrigated Sandy Soils	None	82
Southeastern	All	2
Southeastern	Some	2
Southeastern	None	96
Statewide	All	10
Statewide	Some	4
Statewide	None	87

\*Totals may not add due to rounding

Table 46 details the percentages of respondents that sidedressed urea nitrogen in 2011 for the 2011 corn crop.

**Table 46. Sidedress urea applications this past year for the 2011 corn crop. (Q.43)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did you Apply Sidedress Urea For the 2011 Corn Crop?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	15
Irrigated and Non-irrigated Sandy Soils	Some	0
Irrigated and Non-irrigated Sandy Soils	None	84
Southeastern	All	3
Southeastern	Some	0
Southeastern	None	97
Statewide	All	10
Statewide	Some	0
Statewide	None	90

\*Totals may not add due to rounding

Table 47 details the percentages of respondents that used a nitrogen inhibitor with a sidedressed urea application to the corn crop.

**Table 47. Nitrogen inhibitor use with sidedress application of urea for the 2011 season. (Q.44).**

<b>Nitrogen Best Management Practices Region</b>	<b>Was a Nitrogen Inhibitor Used with the Sidedress Application of Urea For the 2011 Corn Crop?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	38
Irrigated and Non-irrigated Sandy Soils	Some	7
Irrigated and Non-irrigated Sandy Soils	None	56
Southeastern	All	17
Southeastern	Some	0
Southeastern	None	83
Statewide	All	36
Statewide	Some	6
Statewide	None	58

\*Totals may not add due to rounding

Table 48 details the percentages of respondents that incorporated sidedressed urea by BMP region.

**Table 48. Percentage of farmers incorporating sidedress applied urea. (Q.45)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Incorporate the Urea Fertilizer?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	31
Irrigated and Non-irrigated Sandy Soils	Some	8
Irrigated and Non-irrigated Sandy Soils	None	62
Southeastern	All	38
Southeastern	Some	25
Southeastern	None	38
Statewide	All	32
Statewide	Some	10
Statewide	None	59

\*Totals may not add due to rounding

Table 49 details the percentages of respondents that sidedressed urea using variable rate technology or more than one rate per field, such as using management zones.

**Table 49. Sidedress applications of urea applied using variable rate. (Q.46)  
(Please include fields that were zoned or applied at more than one rate as “Yes”)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was Any of the Applied Urea Applied Variable Rate?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	11
Irrigated and Non-irrigated Sandy Soils	Some	14
Irrigated and Non-irrigated Sandy Soils	None	74
Southeastern	All	0
Southeastern	Some	38
Southeastern	None	63
Southeastern	All	13
Statewide	Some	12
Statewide	None	75

\*Totals may not add due to rounding

Table 50 details the percentages of respondents that apply herbicides with or at the same time as sidedressed urea.

**Table 50. Percent of farmers sidedressing urea with or at the same time as a herbicide application. (Q.47)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Sidedress Application of Urea Applied at the Same Time as an Herbicide Application?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	2
Irrigated and Non-irrigated Sandy Soils	Some	0
Irrigated and Non-irrigated Sandy Soils	None	98
Southeastern	All	0
Southeastern	Some	13
Southeastern	None	88
Statewide	All	1
Statewide	Some	1
Statewide	None	97

\*Totals may not add due to rounding

Table 51 details the percentages of respondents that sidedressed urea and also have anhydrous ammonia available at their dealership.

**Table 51. Percent of farmers who sidedress urea, which have anhydrous ammonia available at the dealership. (Q.48)**

<b>Nitrogen Best Management Practices Region</b>	<b>Is Anhydrous Ammonia Available at Your Dealer?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes	56
Irrigated and Non-irrigated Sandy Soils	No	44
Southeastern	Yes	88
Southeastern	No	13
Statewide	Yes	60
Statewide	No	40

\*Totals may not add due to rounding

§ Percent was calculated using only those respondents who answered yes or no to the question.

Table 52 details the timing of any other commercial nitrogen source on corn acres sidedressed with urea by percent of respondents.

**Table 52. Application of commercial nitrogen at a time other than sidedress for urea applied fields. (Q.49)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply any Other Commercial Nitrogen on the Sidedressed Applied Urea Corn Acres?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes-Fall	0
Irrigated and Non-irrigated Sandy Soils	Yes-Spring	12
Irrigated and Non-irrigated Sandy Soils	No	88
Southeastern	Yes-Fall	0
Southeastern	Yes-Spring	50
Southeastern	No	50
Statewide	Yes-Fall	0
Statewide	Yes-Spring	16
Statewide	No	84

\*Totals may not add due to rounding

Table 53 details the percent of nitrogen applied during the sidedress application of anhydrous ammonia on corn acres with sidedressed anhydrous ammonia.

**Table 53. Percent of nitrogen applied during the sidedress application of anhydrous ammonia. (Q.50)**

<b>Nitrogen Best Management Practices Region</b>	<b>What Percentage of Nitrogen was Applied During the Sidedress Application?</b>
Irrigated and Non-irrigated Sandy Soils	63
Southeastern	42
Statewide	60

Table 54 details the percentages of respondents that sidedressed anhydrous ammonia nitrogen on corn acres in the past 5 years.

**Table 54. Sidedress application of anhydrous ammonia in the past 5 years. (Q.51)**

<b>Nitrogen Best Management Practices Region</b>	<b>Have You Sidedressed Anhydrous Ammonia in the Past 5 Years?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	16
Irrigated and Non-irrigated Sandy Soils	Some	11
Irrigated and Non-irrigated Sandy Soils	None	73
Southeastern	All	33
Southeastern	Some	4
Southeastern	None	63
Statewide	All	19
Statewide	Some	10
Statewide	None	72

\*Totals may not add due to rounding

Table 55 details the percentages of respondents that sidedressed anhydrous ammonia nitrogen in 2011 for the corn crop.

**Table 55. Sidedress application of anhydrous ammonia for the 2011 crop year. (Q.52)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Sidedress Anhydrous Ammonia for the 2011 crop?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes	7
Irrigated and Non-irrigated Sandy Soils	No	93
Southeastern	Yes	3
Southeastern	No	97
Statewide	Yes	5
Statewide	No	95

§ Percent was calculated using only those respondents who answered yes or no to the question

Table 56 details the percentages of respondents that used a nitrogen inhibitor with a sidedressed anhydrous ammonia application to the corn crop.

**Table 56. Anhydrous ammonia applications including N-serve. (Q.53)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did the Anhydrous Ammonia Application Include N-Serve?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes	15
Irrigated and Non-irrigated Sandy Soils	No	85
Southeastern	Yes	17
Southeastern	No	83
Statewide	Yes	15
Statewide	No	85

\*Totals may not add due to rounding

Table 57 details the percentages of respondents that sidedressed anhydrous ammonia using variable rate technology or more than one rate per field, such as using management zones.

**Table 57. Percent of farmers who applied anhydrous ammonia variable rate. (Includes fields that were zoned or applied at more than one rate) (Q.54)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was any of the Sidedressed Anhydrous Ammonia Applied Variable Rate?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	14
Irrigated and Non-irrigated Sandy Soils	Some	4
Irrigated and Non-irrigated Sandy Soils	None	82
Southeastern	All	17
Southeastern	Some	17
Southeastern	None	67
Statewide	All	15
Statewide	Some	6
Statewide	None	79

\*Totals may not add due to rounding

Table 58 details the percentages of respondents that apply herbicides with or at the same time as sidedressed anhydrous ammonia.

**Table 58. Percent of farmers applying herbicides with or at the same time as sidedressed anhydrous ammonia. (Q.55)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Sidedress Application of Anhydrous Ammonia Applied at the Same Time as an Herbicide Application?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	0
Irrigated and Non-irrigated Sandy Soils	Some	0
Irrigated and Non-irrigated Sandy Soils	None	100
Southeastern	All	33
Southeastern	Some	0
Southeastern	None	67
Statewide	All	6
Statewide	Some	0
Statewide	None	94

\*Totals may not add due to rounding

Table 59 details the timing of any other commercial nitrogen source on corn acres sidedressed with anhydrous ammonia by percent of respondents.

**Table 59. Other sources of commercial nitrogen applications on corn acres with sidedress applied anhydrous ammonia. (Q.56)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply any Other Commercial Nitrogen on Corn Acres?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes-Fall	0
Irrigated and Non-irrigated Sandy Soils	Yes-Spring	21
Irrigated and Non-irrigated Sandy Soils	No	79
Southeastern	Yes-Fall	0
Southeastern	Yes-Spring	17
Southeastern	No	83
Statewide	Yes-Fall	0
Statewide	Yes-Spring	21
Statewide	No	79

\*Totals may not add due to rounding

Table 60 details the percentages of respondents that sidedressed 28% or other liquid nitrogen on corn acres in the past 5 years.

**Table 60. Sidedress application of 28% or other liquid nitrogen in the past 5 years (not anhydrous ammonia). (Q.57)**

<b>Nitrogen Best Management Practices Region</b>	<b>Have You Sidedressed 28% or Other Liquid Nitrogen in the Past 5 Years?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	13
Irrigated and Non-irrigated Sandy Soils	Some	4
Irrigated and Non-irrigated Sandy Soils	None	83
Southeastern	All	21
Southeastern	Some	8
Southeastern	None	71
Statewide	All	17
Statewide	Some	9
Statewide	None	74

\*Totals may not add due to rounding

Table 61 details the percentages of respondents that sidedressed 28% or other liquid nitrogen in 2011 for the corn crop.

**Table 61. Sidedress application of 28% or other liquid nitrogen for the 2011 crop year (not anhydrous ammonia). (Q.58)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Sidedress 28% or a Similar Nitrogen For the 2011 crop?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes	4
Irrigated and Non-irrigated Sandy Soils	No	96
Southeastern	Yes	2
Southeastern	No	98
Statewide	Yes	3
Statewide	No	97

§ Percent was calculated using only those respondents who answered yes or no to the question

\*Totals may not add due to rounding

Table 62 details the percentages of respondents that used a nitrogen inhibitor with a sidedressed 28% or other liquid nitrogen application to the corn crop.

**Table 62. Use of an inhibitor such as Instinct with the liquid 28% or similar nitrogen applications. (Q.59)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did the Liquid Nitrogen Application Include an Inhibitor such as Instinct?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	14
Irrigated and Non-irrigated Sandy Soils	Some	7
Irrigated and Non-irrigated Sandy Soils	None	79
Southeastern	All	0
Southeastern	Some	0
Southeastern	None	100
Statewide	All	11
Statewide	Some	6
Statewide	None	83

\*Totals may not add due to rounding

Table 63 details the percentages of respondents that incorporated 28% or other liquid nitrogen for the 2011 crop by BMP region.

**Table 63. Incorporation of the liquid 28% or similar nitrogen applications. (Q.60)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did you Incorporate the 28% or Similar Liquid Nitrogen Application?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	38
Irrigated and Non-irrigated Sandy Soils	Some	13
Irrigated and Non-irrigated Sandy Soils	None	50
Southeastern	All	75
Southeastern	Some	0
Southeastern	None	25
Statewide	All	45
Statewide	Some	10
Statewide	None	45

\*Totals may not add due to rounding

Table 64 details the percentages of respondents that sidedressed 28% or other liquid nitrogen using variable rate technology or more than one rate per field, such as using management zones.

**Table 64. Percent of farmers who applied 28% or a similar nitrogen product variable rate. (Includes fields that were zoned or applied at more than one rate) (Q.61)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was any of the Sidedressed 28% or Similar Nitrogen Product Applied Variable Rate?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	0
Irrigated and Non-irrigated Sandy Soils	Some	6
Irrigated and Non-irrigated Sandy Soils	None	94
Southeastern	All	0
Southeastern	Some	0
Southeastern	None	100
Statewide	All	0
Statewide	Some	5
Statewide	None	95

\*Totals may not add due to rounding

Table 65 details the percentages of respondents that apply herbicides with or at the same time as sidedressed 28% or other liquid nitrogen.

**Table 65. Percent of farmers applying herbicides with or at the same time as sidedressed 28% or similar nitrogen product. (Q.62)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Sidedress Application of 28% or Similar Nitrogen Product Applied at the Same Time as an Herbicide Application?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	13
Irrigated and Non-irrigated Sandy Soils	Some	6
Irrigated and Non-irrigated Sandy Soils	None	81
Southeastern	All	25
Southeastern	Some	0
Southeastern	None	75
Statewide	All	15
Statewide	Some	5
Statewide	None	80

\*Totals may not add due to rounding

Table 66 details the timing of any other commercial nitrogen source on corn acres 28% or other liquid nitrogen by percent of respondents.

**Table 66. Other commercial nitrogen applications on corn acres with sidedress applied 28% or similar nitrogen product. (Q.63)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply any Other Commercial Nitrogen on Corn Acres?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	No	88
Irrigated and Non-irrigated Sandy Soils	Yes-Fall	0
Irrigated and Non-irrigated Sandy Soils	Yes-Spring	13
Southeastern	No	50
Southeastern	Yes-Fall	0
Southeastern	Yes-Spring	50
Statewide	No	80
Statewide	Yes-Fall	0
Statewide	Yes-Spring	20

\*Totals may not add due to rounding

Table 67 details respondent use of plant sensors such as GreenSeeker, Crop Circle, SAP meters or other similar devices on corn acres applied with sidedress applied nitrogen by percent of respondents.

**Table 67. Nitrogen applications based on plant sensors such as GreenSeeker, Crop Circle, SPAD meters or other similar devices. (Q.64)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was the Sidedress Application of Nitrogen Based on Plant Sensors Such as GreenSeeker, Crop Circle, SPAD Meters or Other Similar Devices?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	2
Irrigated and Non-irrigated Sandy Soils	Some	1
Irrigated and Non-irrigated Sandy Soils	None	98
Southeastern	All	0
Southeastern	Some	0
Southeastern	None	100
Statewide	All	1
Statewide	Some	1
Statewide	None	98

\*Totals may not add due to rounding

Table 68 details the use of starter on any corn acres with sidedress applied nitrogen by percent of respondents.

**Table 68. Application of a starter or pop-up. (Q.65)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply a Starter or Pop-up?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	76
Irrigated and Non-irrigated Sandy Soils	Some	5
Irrigated and Non-irrigated Sandy Soils	None	19
Southeastern	All	92
Southeastern	Some	8
Southeastern	None	0
Statewide	All	78
Statewide	Some	6
Statewide	None	16

\*Totals may not add due to rounding

Table 69 details the type of starter used on any corn acres with sidedress applied nitrogen by percent of respondents.

**Table 69. Type of starter used on corn applied with sidedressed nitrogen (Q.66)**

<b>Nitrogen Best Management Practices Region</b>	<b>What Type of Starter Did You Apply?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Liquid	26
Irrigated and Non-irrigated Sandy Soils	Dry	74
Southeastern	Liquid	29
Southeastern	Dry	71
Statewide	Liquid	27
Statewide	Dry	73

\*Totals may not add due to rounding

Table 70 details the manure applications on corn acres with sidedress applied nitrogen by percent of respondents.

**Table 70. Manure applications on corn acres with sidedress applied nitrogen. (Q.67)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did You Apply Manure on Acres with Sidedress Applied Nitrogen?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	15
Irrigated and Non-irrigated Sandy Soils	Some	37
Irrigated and Non-irrigated Sandy Soils	None	48
Southeastern	All	29
Southeastern	Some	25
Southeastern	None	46
Statewide	All	17
Statewide	Some	35
Statewide	None	48

\*Totals may not add due to rounding

Table 71 details the average nitrogen rate for corn acres following soybeans with sidedress applied nitrogen and no manure applied by percent of respondents.

**Table 71. On corn acres without manure, the average total nitrogen rate per acre applied on corn acres following soybeans. (Q.68)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Total Nitrogen Rate per Acre Applied on Corn Acres Following Soybeans</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	141	84
Southeastern	148	16
Statewide	142	100

\*Totals may not add due to rounding

Table 72 details the average nitrogen rate for corn acres following corn with sidedress applied nitrogen and no manure applied by percent of respondents.

**Table 72. On your corn acres without manure, the average total nitrogen rate per acre applied on corn acres following corn. (Q.69) (Q.36)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Total Nitrogen Rate per Acre Applied on Corn Acres Following Corn</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	149	85
Southeastern	170	15
Statewide	152	100

\*Totals may not add due to rounding

Table 73 details the average nitrogen rate for corn acres following alfalfa with sidedress applied nitrogen and no manure applied by percent of respondents.

**Table 73. On your corn acres without manure, the average total nitrogen rate per acre applied on corn acres following alfalfa. (Q.70)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Total Nitrogen Rate per Acre Applied on Corn Acres Following Alfalfa</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	100	75
Southeastern	97	25
Statewide	99	100

\*Totals may not add due to rounding

Table 74 details the use tissue tests on corn acres with sidedress applied nitrogen by percent of respondents.

**Table 74. Tissue test performed on corn acres. (Q.71)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was There a Tissue Test on Corn Acres?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	2
Irrigated and Non-irrigated Sandy Soils	Some	5
Irrigated and Non-irrigated Sandy Soils	None	93
Southeastern	All	4
Southeastern	Some	4
Southeastern	None	92
Statewide	All	3
Statewide	Some	5
Statewide	None	93

\*Totals may not add due to rounding

Table 75 details the use basal stalk tests on corn acres with sidedress applied nitrogen by percent of respondents.

**Table 75. Basal stalk test performed on corn acres. (Q.72)**

<b>Nitrogen Best Management Practices Region</b>	<b>Was There a Basal Stalk Test on Corn Acres?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	1
Irrigated and Non-irrigated Sandy Soils	Some	1
Irrigated and Non-irrigated Sandy Soils	None	98
Southeastern	All	0
Southeastern	Some	0
Southeastern	None	100
Statewide	All	1
Statewide	Some	1
Statewide	None	98

\*Totals may not add due to rounding

Table 76 details whether corn acres were stressed from the lack of nitrogen by percent of respondents.

**Table 76. Acres stressed from lack of nitrogen. (Q.73)**

<b>Nitrogen Best Management Practices Region</b>	<b>Were Any Corn Acres Stressed from Lack of Nitrogen?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	Yes	21
Irrigated and Non-irrigated Sandy Soils	Maybe	10
Irrigated and Non-irrigated Sandy Soils	No	69
Southeastern	Yes	0
Southeastern	Maybe	4
Southeastern	No	96
Statewide	Yes	18
Statewide	Maybe	9
Statewide	No	73

\*Totals may not add due to rounding

Table 77 details the use of a deep soil nitrate test on farm fields by percent of respondents.

**Table 77. Deep soil nitrate test (18-24 inches) on any field. (Q.74)**

<b>Nitrogen Best Management Practices Region</b>	<b>Did you perform a Deep Soil Nitrate Test on Corn Acres?</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	All	4
Irrigated and Non-irrigated Sandy Soils	Some	2
Irrigated and Non-irrigated Sandy Soils	None	94
Southeastern	All	4
Southeastern	Some	0
Southeastern	None	96
Statewide	All	4
Statewide	Some	2
Statewide	None	94

\*Totals may not add due to rounding

Table 78 details the average corn yield by region and percent of respondents in each region.

**Table 78. Average corn yield for 2011. (Q.75)**

<b>Nitrogen Best Management Practices Region</b>	<b>Average Corn Yield in 2011</b>	<b>Percent of All Respondents</b>
Irrigated and Non-irrigated Sandy Soils	125	84
Southeastern	168	16
Statewide	132	100

\*Totals may not add due to rounding

## Appendix 1. Survey Form

# 2011 Fall Fertilizer BMP's Report

## Fall and Sidedress Questions for the 2011 Crop Season

### Fall Questions

**Intro1**, I am going to begin asking some questions about your farming practices on your CORN acres.

**Question1**. Did you fall apply any nitrogen for the 2011 crop year? (1=Yes, 2= do not know, 3=no)

**Question2. Irrig.** Do you irrigate? (1=all, 2=some, 3=none)

**Question3. Urea\_5year.** Have you fall applied Urea in the past 5 years? (1=all, 2=some, 3=none)

**Question4. Urea\_2012.** Did you apply Urea this past fall for next year's 2012 corn crop? (1=Yes, 2=Do not Know, 3=No).

**Question5. Urea\_ Date.** What was the average date of Urea application this past fall (2011)?

**Question6. Urea\_2011.** Did you apply Urea fertilizer in the fall of 2010 for the 2011 season? (1=all, 2=some, 3=none).

**Intro2.** All questions now focus on the fall Urea application 2010 for the 2011 season.

**Question7. Urea\_Inc.** Did you incorporate the Urea fertilizer? (1=all, 2=some, 3=none).

**Question8. Urea\_var.** Was any of the applied Urea applied variable rate? (Please include fields that were zoned or applied at more than one rate as 'Yes'). (1=all, 2=some, 3=none)

**Question9. Urea\_MAP.** Did the fall application of Urea include a phosphorus source such as MAP/DAP? (1=all, 2=some, 3=none)

**Question10. Urea\_MAP\_Var.** Was any of the fall applied MAP/DAP applied variable rate (please include fields that were zoned or applied at more than one rate as "Yes"). (1=all, 2=some, 3=none).

**Question 11. Urea\_Herb.** Did the fall application of Urea include or was applied at the same time as an herbicide application? (1=all, 2=some, 3=none)

**Question 12. Ure\_AA.** Does the location at which you purchased the Urea also have Anhydrous Ammonia available? (1=yes, 2=do not know, 3=no)

**Question 13. Urea\_Till\_1.** What type of tillage did you do before the fall application of Urea on the majority of your fields? (1=conventional, 2=mulch, 3=minimum, 4=none, 5=ridge)

**Question 14. Urea\_till\_2.** What type of tillage did you do use to incorporate the fall application of Urea on the majority of your fields? (1=conventional, 2=mulch, 3=minimum, 4=none, 5=ridge).

**Question 15. Urea\_OtherN.** Did you apply any other commercial nitrogen on corn acres with fall applied Urea? (1=no, 2=yes-spring, 3=yes-side)

**Question 16. AA\_5Yr.** Have you fall-apply Anhydrous Ammonia this past fall for next year's 2012 corn crop? (1=all, 2=some, 3=none).

**Question 17. AA\_PastFall.** Did you fall apply Anhydrous Ammonia this past fall for next year's 2012 corn crop? (1=yes, 2=do not know, 3=no).

**Question 18. AA\_Date.** What was the average date of Anhydrous Ammonia applications this past fall of 2011? (Date of application).

**Question 19. AA\_2010.** Did you fall-apply any Anhydrous Ammonia fertilizer in the fall of 2010 for the 2011 season? (1=all, 2=some, 3=none).

**Intro3.** All questions now focus on the fall application of Anhydrous Ammonia in 2010 for the 2011 season.

**Question 20. AA\_Nserve.** Did the Anhydrous Ammonia application include N-serve? (1=yes, 2=do not know, 3=no).

**Question 21. AA\_Herb.** Did you fall apply herbicides on corn acres applied with Anhydrous Ammonia? Fields (1=all, 2=some, 3=none).

**Question 22. AA\_Var.** Was any of the fall applied Anhydrous Ammonia applied variable rate? (Please include fields that were zoned or applied at more than one rate as "Yes") Fields DK, RF (1=all, 2=some, 3=none).

**Question 23. AA\_MAP.** Did you fall apply a phosphorus source such as MAP/DAP on corn acres applied with Anhydrous Ammonia? (1=all, 2=some, 3=none).

**Question 24. AA\_MAP\_Var.** Was any of the fall applied MAP/DAP applied variable rate? (Please include fields that were zoned or applied at more than one rate as “Yes”). (1=all, 2=some, 3=none).

**Question 25. AA\_Till.** What type of tillage did you do before the fall application of Anhydrous Ammonia on the majority of your fields? (1=conventional, 2=Mulch, 3=Minimum, 4=none, 5=ridge)

**Question 26. AA\_OtherN.** Did you apply any other commercial nitrogen on corn acres with fall applied Anhydrous Ammonia? (1=no, 2=yes-spring, 3=yes-side)

**Question 27. Starter.** Did you apply a starter fertilizer? (1=all, 2=some, 3=none).

**Question 28. Starter\_Type.** What kind of starter was it? (1=liquid, 2=Dry)

**Question 29. ESN.** Did you fall apply ESN? (1=all, 2=some, 3=none).

**Question 30. Agrotain.** Was Agrotain or Super U used? (1=all, 2=some, 3=none).

**Question 31. Manure.** Did you apply manure on acres to be planted to corn in 2011? (1=all, 2=some, 3=none).

**Question 32. N\_After\_Lb.** On your corn acres without manure, average total nitrogen rate applied on corn acres following soybeans pound per acre. (average total N)

**Question 33. N\_AfterCN\_Lb.** On your corn acres without manure, average total nitrogen rate applied on corn acres following corn pound per acre. (average total N)

**Question 34. N\_AfterAF\_Lb.** On your corn acres without manure, average total nitrogen rate applied on corn acres following alfalfa pound per acre. (average total N).

**Question 35. Tissue.** Did you have a tissue test performed on any of your corn acres? (1=all, 2=some, 3=none).

**Question 36. Basal.** Did you have a basal stalk test perform on any of your corn acres? (1=all, 2=some, 3=none).

**Question 37. Stress.** Were any of your corn acres stressed from lack of nitrogen this year? (1=Yes, 2=maybe, 3=no).

**Question 38. Nitrate\_Test.** Did you have a deep soil nitrate test (18-24 inches) on any of your fields? (1=all, 2=some, 3=none)

**Question 39. CornYld.** What was your average corn yield for 2011? (average corn yield)

## Sidedress Questions

**Intro1**, I am going to begin asking some questions about your farming practices on your CORN acres.

**Question40. Sidedress.** Do you sidedress any fertilizer? (1=Yes, 2= do not know, 3=no)

**Question41. Sidedress.** Do you irrigate? (1=all, 2=some, 3=none)

**Question42. Sidedress urea\_5Year.** Did you sidedress Urea on your corn acres in the past 5 years? (1=all, 2=some, 3=none)

**Question43. Sidedress urea\_2011.** Did you sidedress Urea for the 2011 crop year? (1=Yes, 2=Do not Know, 3=No).

**Intro2** All questions now focus on the Urea sidedress application for the 2011 season.

**Question44. Sidedress Stab.** Did the sidedress application include a nitrogen stabilizer such as Agrotain, Super U, ESN or Instinct? (1=all, 2=some, 3=none)

**Question45. Sidedress urea\_Inc.** Did you incorporate the sidedress application of urea fertilizer? (1=all, 2=some, 3=none)

**Question46. Sidedress urea\_Var.** Was any of the sidedressed urea applied variable rate? (Please include fields that were zoned or applied at more than one rate, such as greenseeker, as 'Yes'). (1=all, 2=some, 3=none)

**Question47. Sidedress urea\_Herb.** Did the sidedress application of urea include or was applied at the same time as an herbicide application? (1=all, 2=some, 3=none)

**Question48. Sidedress\_AA.** Does the location at which you purchased the urea also have Anhydrous Ammonia available? (1=Yes, 2=Do not Know, 3=No).

**Question49. Sidedress\_OtherN.** Did you apply any other commercial nitrogen on corn acres with sidedressed urea? (1=no, 2=yes-fall, 3=yest-spring)

**Question50. Sidedress urea\_Percent.** What percentage of the nitrogen applied to the field was applied in the sidedress application (average)? (percent average)

**Question51. Sidedress AA\_5yr.** Have you sidedressed Anhydrous Ammonia in the past 5 years? (1=all, 2=some, 3=none)

**Question52. Sidedress AA\_2011.** Did you sidedress Anhydrous Ammonia for the 2011 corn crop?" (1=yes, 2=do not know, 3=no)

**Question53. Sidedress AA\_Stab.** Did the sidedress application include a nitrogen stabilizer such as N-serve? : (1=yes, 2=do not know, 3=no)

**Question54. Sidedress AA\_Var.** Was any of the Anhydrous Ammonia applied variable rate? (Please include fields that were zoned or applied at more than one rate, such as greenseeker, as 'yes') (1=all, 2=some, 3=none)

**Question55. Sidedress AA\_Herb.** Did the sidedress application of Anhydrous Ammonia include or was applied at the same time as an herbicide application? (1=all, 2=some, 3=none)

**Question56. Sidedress AA\_OtherN.** Did you apply any another commercial nitrogen on corn acres with sidedressed Anhydrous Ammonia? (1=no, 2=yes-fall, 3=yes spring)

**Question57. Sidedress Liq\_5Yr.** Have you sidedressed 28% or other liquid nitrogen in the past 5 years? (1=all, 2=some, 3=none)

**Question58. Sidedress Liq\_2011.** Did you sidedress any 28% or other liquid nitrogen for the 2011 crop year? (1=yes, 2=do not know, 3=no)

**Intro3** All questions now focus on the sidedress application for the 2011 season."

**Question59. Sidedress Liq\_Stab.** Did the sidedress application include a nitrogen stabilizer such as Instinct? (1=all, 2=some, 3=none)

**Question60. Sidedress Liq.** Did you incorporate the sidedress application of 28% or other liquid nitrogen? (1=all, 2=some, 3=none)

**Question61. Sidedress Liq\_Var.** Was any of the sidedressed nitrogen applied variable rate? (Please include fields that were zoned or applied at more than one rate, such as greenseeker, as 'yes'.) (1=all, 2=some, 3=none)

**Question62. Sidedress Liq\_Herb.** Did the sidedress application of 28% or other liquid nitrogen include or was applied at the same time as an herbicide application? (1=all, 2=some, 3=none)

**Question63. Sidedress Liq\_OtherN.** Did you apply any other commercial nitrogen on corn acres with sidedressed 28% or other liquid nitrogen?" (1=no, 2=yes-fall, 3=yes spring)

**Question64. Sidedress N\_Sensor.** Was the sidedress application of nitrogen based on a plant sensor such as GreenSeeker, Crop Circle, SPAD meter, or other similar device? (1=all, 2=some, 3=none)

**Question65. Sidedress N\_Starter.** Did you apply a starter or Pop-Up? (1=all, 2=some, 3=none)

**Question66. Sidedress N\_Starter\_Type.** What kind of starter was it? (1-liquid, 2 dry)

**Question67. Sidedress N\_Manure.** Did you apply manure on acres planted to corn in 2011? (1=all, 2=some, 3=none)

**Question68. Sidedress N\_AfterSB\_Lb.** On your corn acres without manure, what was the average total nitrogen rate applied on corn acres following soybeans? (N rate)

**Question69. Sidedress N\_AfterCN\_Lb.** On your corn acres WITHOUT manure, what was the average total nitrogen rate per acre applied on corn acres following corn? (N rate)

**Question70. Sidedress N\_AfterAF\_Lb.** Average total nitrogen rate applied on corn acres following alfalfa? (N rate)

**Question71. Sidedress Tissue.** Did you have a tissue test performed on any of your corn acres? (1=all, 2=some, 3=none)

**Question72. Sidedress Basal.** Did you have a basal stalk test performed on any of your corn acres? (1=all, 2=some, 3=none)

**Question73. Sidedress Stress.** Was any of your corn stressed from lack of nitrogen this year? (1=yes, 2=maybe, 3=no)

**Question74. Sidedress Nitrate\_Test.** Did you have a deep soil nitrate test (18-24 inches) on any of your fields? (1=all, 2=some, 3=none)

**Question75. Sidedress CornYld.** What was your average corn yield for 2011? (Corn yield)