Herbicide Selection and Management Practices Associated with Minnesota's 2006 Corn Production

Minnesota Department of Agriculture
USDA, NASS, Minnesota Field Office

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Abstract

The Minnesota Department of Agriculture (MDA) is responsible for the development and promotion of Herbicide Best Management Practices (BMPs) which optimize production and profitability while protecting the state's water resources. The MDA is also responsible for monitoring pesticide use and 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 corn herbicides.

In Minnesota, atrazine and acetochlor can pose challenges to ground and surface water resources and MDA has invested considerable staff time in water monitoring, educational development and BMP assessment. These two products are also the main focus of this survey. Phone enumerators located at NASS contacted over 4,000 producers in early 2007. From this pool, approximately 2,900 farmers who raised corn during the 2006 growing season shared valuable information on herbicide selection and management.

The general purpose of this study was to determine some fundamental practices such as record keeping, reading the label, scouting, responsibility for making decisions on product selection and timing, and knowledge about physical characteristics (soil texture, depth to groundwater, use of buffer strips, etc). More specific questions related to atrazine and acetochlor included the use of split applications, reduced rates and incorporation.

These types of studies will help MDA understand the effectiveness of both regulatory and voluntary practices, potential informational roadblocks, and opportunities for future technical assistance.

Alternating each year, the MDA and NASS have also partnered to produce a detailed report on pesticide use and rates used on the state's four major crops. Readers are encouraged to visit the most recent report ("2005 Pesticide Usage on Four Major Minnesota Crops) by going to:

http://www.mda.state.mn.us/news/publications/chemfert/2005pesticideuse.pdf

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. This detailed herbicide use information 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. Similarly, the assistance of agricultural chemical dealers and cooperatives is much appreciated. 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 and agricultural chemical dealerships played a vital part in providing complete and detailed pesticide information.

2006 Herbicide Use Practices Summary and Highlights

This report summarizes a number of important practices associated with herbicide use on Minnesota's 2006 corn acres. Over 2,800 producers participated in the telephone survey and herbicide information was collected for 704,379 corn acres, representing 10% of Minnesota's seven million corn acres. Survey questions focused on the 98% of the respondents that used herbicides for weed control. The survey targeted a variety of practices including herbicide selection and associated management practices (e.g., MDA's best management practices for herbicide use). The report is the second pesticide survey performed by the MDA and NASS to collect herbicide management practices on Minnesota corn acres.

Survey Design and Implementation

Ten Pesticide Monitoring Areas (noted as "PMA" throughout the report), illustrated in Figure 1, were previously developed by MDA staff. Counties were clustered based on similarities in geology, soils, and crops. These areas also define the general boundaries of the monitoring regions used by the MDA water resource monitoring program. Regional pesticide use information will eventually be used to help design and implement specific water quality monitoring and pesticide educational programs.

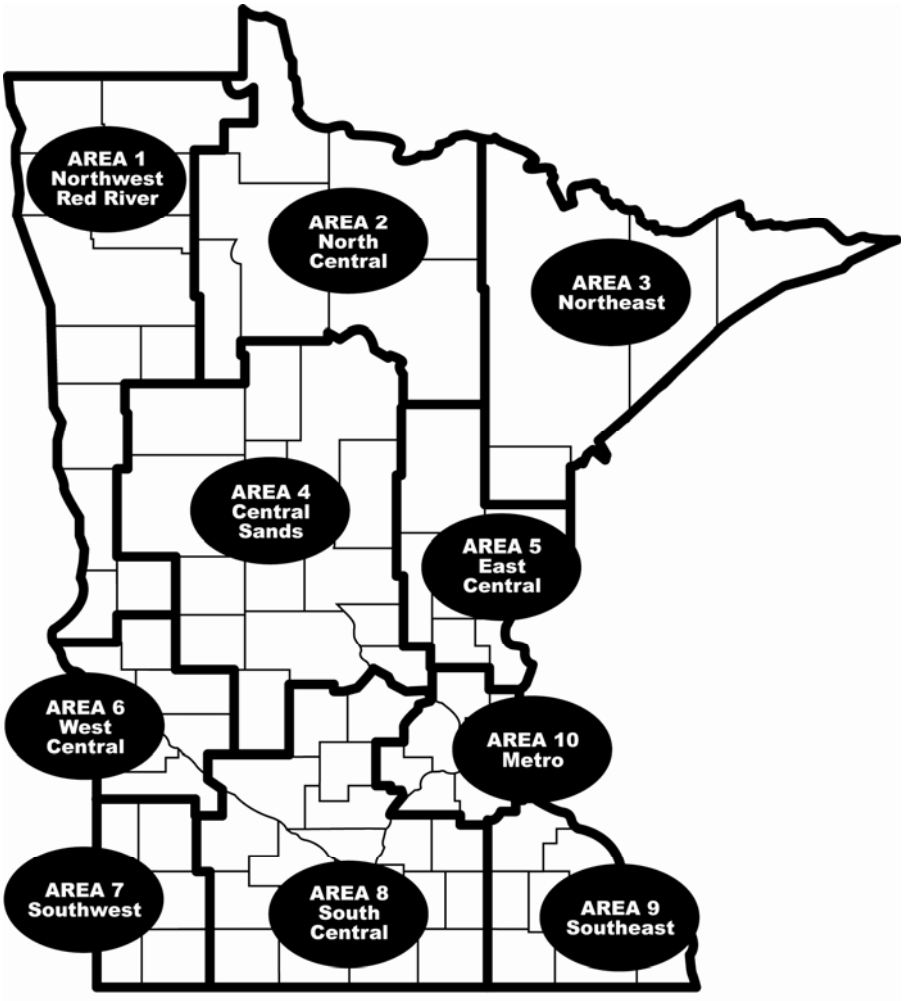


Figure 1. Geographical location of MDA's Pesticide Monitoring Areas (PMAs).

NASS developed a sampling population of 7,000 farms by randomly drawing from its entire database of all corn growers in Minnesota. Phone enumerators at NASS contacted 4,328 farmers of which, 3,491[1] provided information for the survey. There were 2,871 farmers that raised corn in 2006 and completed the survey. No information was collected from the remaining farmers that did not raise corn. The definition of "corn" for purposes of this report includes both grain and silage and excludes sweet corn and popcorn. All growers were asked four basic questions regarding herbicide selection and management. The remaining questions were for those farmers who used atrazine or acetochlor.

Due to the low intensity of row crop agriculture in portions of northern Minnesota, Area 2 and Area 3 were not reported.

Introduction

Data Collection Process and History

The Minnesota Department of Agriculture (MDA) is required by state law to monitor pesticide use. In pursuit of fulfilling that responsibility, the MDA began exploring the possibility of using the existing framework of the NASS 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 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[2] 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, useful information on primary sources of pesticide management information, scouting, timing, and other pesticide management related information was obtained.

[1] The balance of the 837 names either could not be contacted or were no longer farming.
[2] "*Expanded Minnesota Agricultural Statistics Pesticide Use Data*", 2003, by NASS and MDA.

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. ***"Pesticide Use and Pest Management Practices for Major Crops in North Dakota"*** is published on a four-year cycle. With the goal of expanding to a statewide scale while reducing costs, a second pilot[3] 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 out 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.

A second pilot tested two methods for collecting pesticide rate information was conducted in 2003. "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 any information that was provided. In neighboring Grant County, another 150 farm operators were contacted. In this county using "Method Two", if the farm records were incomplete, follow-up calls were made the pesticide dealer to complete the survey. The number of surveys with complete data sets was significantly increased with the additional assistance from the dealerships. Eighty-three (83) percent of the surveys were complete in Grant County compared to forty-six (46) in Douglas County. Equally impressive was the overall support by the local dealerships.

A statewide survey was conducted using the successful "Method Two" from the pilot project in Douglas and Grant Counties. "***2003 Pesticide Usage on Four Major Minnesota Crops***" was published in January of 2005. Corn, wheat, hay and soybeans were the crops surveyed and included data from 2,400 farmers and 1,000,000 acres of cropland across Minnesota.

Farmers were interviewed over the phone in April and May of 2007. These were "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 would typically last five to ten minutes.

Survey questions can be found in Appendix 1. Corresponding question numbers (noted as "Q" followed by the survey 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.

[3] Unpublished data. From the September 20, 2003 EPA Report.

Questions were grouped into four categories including:

1. **General information**. Who applied the product, label and active ingredients and record keeping.
2. **Scouting for weeds and related practices**. Scouting, mapping, weed type, density, and herbicide resistance corn varieties.
3. **Water resources**. Physical distances from ground water, surface water and buffers, and irrigation management plans.
4. **General practices.** Herbicide rotations and dealer involvement in herbicide management.

After obtaining some very general NASS information (Q.1), participants were then asked if they grew corn during the 2006 cropping season (Q.2). The interview process ended if there was no field or silage corn grown. Participants were then asked to identify the number of corn acres planted (Q.3). Table 1 includes the number of respondents and associated corn acres by county and Pesticide Monitoring Area. Also included in Table I is the NASS total corn acres for Minnesota (2006) and the percentage of acres surveyed.

Data Reporting and Limitations

The primary purpose of this survey was to obtain an understanding of basic herbicide management practices associated with corn production. Participants were asked to identify the herbicides used in very generic terms. Some knowledge of the herbicides used (i.e. soil applied, post-emergent, etc) is essential to understand the current management strategies associated with them. It is important to note that the MDA and its partners provide a highly detailed herbicide use and application rate report on a biennial basis[4].

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, corn 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.

[4] "2005 Pesticide Usage on Four Major Minnesota Crops" found on the MDA website at: http://www.mda.state.mn.us/news/publications/chemfert/2005pesticideuse.pdf

[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 1. Summary of respondents and corresponding corn acres by county and PMAs.

County	Pesticide Monitoring Area (PMA)	Number Of Respon-dents	2006 Planted Corn Acres	Surveyed Corn Acres	Percentage Of Acres Surveyed
Clay	1	14	47,300	2,688	6
Grant	1	20	101,000	9,018	9
Kittson	1	6	4,300	494	11
Mahnomen	1	9	20,900	2,930	14
Norman	1	17	41,200	4,393	11
Polk	1	9	26,500	2,005	8
Red Lake	1	6	7,000	636	9
Roseau	1	3	4,500	210	5
Traverse	1	17	118,000	12,946	11
Wilkin	1	11	56,200	3,097	6
Other Counties	1	3	6,600	250	4
Totals/Averages	**1**	**115**	**433,500**	**38,667**	**9**
Other PMAs (2,3)	6	14	0	867	**
Totals/Averages	**6**	**14**	****	**867**	****
Becker	4	25	26,000	2,770	11
Benton	4	42	58,900	7,941	13
Crow Wing	4	8	7,300	987	14
Douglas	4	28	52,600	3,912	7
Kandiyohi	4	57	145,400	18,233	13
Morrison	4	79	89,900	6,589	7
Otter Tail	4	77	135,800	15,126	11
Pope	4	33	94,300	8,648	9
Sherburne	4	9	26,600	1,566	6
Stearns	4	161	201,500	18,275	9
Todd	4	65	63,800	7,074	11
Wadena	4	16	20,500	2,248	11
Other Counties	4	10	**	652	**
Totals/Averages	**4**	**610**	**922,600**	**94,021**	**10**
Aitkin	5	5	**	176	**
Chisago	5	21	23,300	1,837	8
Isanti	5	18	27,900	4,429	16
Kanabec	5	24	12,400	1,355	11
Mille Lacs	5	26	20,900	1,658	8
Pine	5	20	17,000	1,147	7
Totals/Averages	**5**	**114**	**101,500**	**10,602**	**10**
Big Stone	6	19	80,000	4,136	5
Chippewa	6	27	140,600	12,034	9
Lac Qui Parle	6	47	162,500	17,717	11
Stevens	6	18	147,500	11,276	8
Swift	6	46	167,300	16,621	10
Yellow Medicine	6	41	185,200	15,063	8
Totals/Averages	**6**	**198**	**883,100**	**76,847**	**9**
Lincoln	7	45	99,600	9,620	10
Lyon	7	51	180,400	15,511	9
Murray	7	46	183,500	17,336	9
Nobles	7	67	201,800	16,176	8
Pipestone	7	37	106,300	9,241	9

County	Pesticide Monitoring Area (PMA)	Number Of Respon-dents	2006 Planted Corn Acres	Surveyed Corn Acres	Percentage Of Acres Surveyed
Rock	7	50	138,600	15,837	11
Totals/Averages	**7**	**296**	**910,200**	**83,721**	**9**
Blue Earth	8	58	181,000	19,501	11
Brown	8	68	154,500	13,826	9
Cottonwood	8	49	179,700	15,777	9
Faribault	8	53	201,700	21,592	11
Freeborn	8	59	180,000	17,413	10
Jackson	8	58	181,200	20,137	11
Lesueur	8	42	94,400	15,354	16
Martin	8	44	219,800	18,232	8
Mcleod	8	43	111,700	13,003	12
Meeker	8	45	114,700	10,097	9
Nicollet	8	47	122,100	10,152	8
Redwood	8	73	236,900	21,584	9
Renville	8	63	247,400	18,834	8
Rice	8	51	79,100	12,225	15
Sibley	8	65	145,500	17,955	12
Steele	8	39	106,000	12,054	11
Waseca	8	38	121,000	13,443	11
Watonwan	8	36	122,400	12,152	10
Wright	8	50	74,100	5,714	8
Totals/Averages	**8**	**981**	**2,873,200**	**289,045**	**10**
Dodge	9	32	111,900	9,812	9
Fillmore	9	78	158,800	14,367	9
Goodhue	9	76	145,000	24,322	17
Houston	9	54	54,200	6,688	12
Mower	9	38	183,800	10,458	6
Olmsted	9	57	110,900	12,935	12
Wabasha	9	49	81,800	6,681	8
Winona	9	53	79,200	10,381	13
Totals/Averages	**9**	**437**	**925,600**	**95,644**	**10**
Carver	10	33	58,800	3,393	6
Dakota	10	25	89,400	3,674	4
Hennepin	10	7	14,100	877	6
Scott	10	24	37,200	4,273	11
Washington	10	12	16,400	1,911	12
Other	10	5	**	837	**
Totals/Averages	**10**	**106**	**221,700**	**14,965**	**7**
State	**All**	**2,871**	**7,300,000**	**704,379**	**10**

Note: USDA/NASS Minnesota Corn Acreage Planted
**** Not reported by NASS**

Statewide Herbicide Applications on Corn

Ninety-four percent (94%) of the respondents reported using herbicides and those respondents managed 98% of the corn acres reported in this survey (Table 2). As previously stated, if herbicides were not used, the respondent's survey was then concluded.

Tables 3 through 30 contain information from all corn producers that used herbicides. Because, not all farmers answered every question, the sum of total acres and the sum of total respondents are sometimes less than the statewide averages.

Participants were then asked who made the application (Q. 4). Fifty percent (50%) of the acres were self applied, 40% of the acres were custom applied and 10% of the acres were both self applied and custom applied. Table 3 summarizes who applied the application and the responses are grouped by PMAs.

Farmers who applied their own herbicides averaged 323 acres of corn while farmers who had pesticides custom applied averaged 141 acres of corn. Farmers who both self applied and custom applied herbicides raised an averaged of 381 acres of corn.

Table 2. Percentage of respondents that used corn herbicides.

Pesticide Monitoring Area	Do You Use Herbicides?	Percent of All Respondents
1 –Northwest Red River	Yes	91
1 – Northwest Red River	No	9
4 – Central Sands	Yes	91
4 – Central Sands	No	9
5 – East Central	Yes	97
5 – East Central	No	3
6 – West Central	Yes	96
6 – West Central	No	4
7 – Southwest	Yes	97
7 – Southwest	No	3
8 – South Central	Yes	95
8 – South Central	No	5
9 – South East	Yes	95
9 – South East	No	5
10 – Metro	Yes	98
10 - Metro	No	2
Statewide	**Yes**	**94**
Statewide	**No**	**6**

Table 3. "Did you: Apply herbicides yourself?, Have herbicides custom applied?, Both?" (Q.4)

Pesticide Monitoring Area	Application Type	Percent of Respondents	Average Corn Acres per Respondent
			Acres
1 – Northwest Red River	Self Applied	68	377
1 – Northwest Red River	Custom Applied	25	152
1 – Northwest Red River	Both	6	732
4 – Central Sands	Self Applied	45	211
4 – Central Sands	Custom Applied	49	108
4 – Central Sands	Both	6	280
5 – East Central	Self Applied	54	107
5 – East Central	Custom Applied	43	56
5 – East Central	Both	3	502
6 – West Central	Self Applied	60	480
6 – West Central	Custom Applied	27	159
6 – West Central	Both	13	477
7 – Southwest	Self Applied	59	316
7 – Southwest	Custom Applied	28	179
7 – Southwest	Both	13	412
8 – South Central	Self Applied	50	383
8 – South Central	Custom Applied	38	175
8 – South Central	Both	13	391
9 – South East	Self Applied	42	320
9 – South East	Custom Applied	48	138
9 – South East	Both	10	286
10 – Metro	Self Applied	47	166
10 – Metro	Custom Applied	49	107
10 - Metro	Both	4	328
Statewide	**Self Applied**	**50**	**323**
Statewide	**Custom Applied**	**40**	**141**
Statewide	**Both**	**10**	**381**

Farmers were asked if they knew the active ingredients (A.I.) in the herbicides they applied (Q.5). Based upon previous surveys, most farmers can identify the product name (i.e. "Roundup", etc), but identifying the A.I. (i.e. glyphosate) is considerably more challenging. Of all statewide respondents (self-applicators and those that hired a custom applicator), 58% stated they knew the A.I. in their herbicide applications and 6% stated they knew some of the A.I. (Table 4). Seventy-seven percent (77%) of the farmers that applied the products themselves stated that they were able to identify the A.I. It must be emphasized that farmers were asked these questions "on the spot" and were not given the opportunity to check their records during the telephone interview.

Table 4. "Do you know the active ingredients of the herbicides you used in 2006?"(Q.5)

Pesticide Monitoring Area	Knew the Active Ingredients	Percent of All Respondents	Percent of "Self-Applicators"
1 – Northwest Red River	Yes	72	24
1 – Northwest Red River	No	24	3
1 – Northwest Red River	Some	5	73
4 – Central Sands	Yes	59	77
4 – Central Sands	No	36	22
4 – Central Sands	Some	5	2
5 – East Central	Yes	60	70
5 – East Central	No	38	29
5 – East Central	Some	2	2
6 – West Central	Yes	69	79
6 – West Central	No	25	18
6 – West Central	Some	6	4
7 – Southwest	Yes	59	64
7 – Southwest	No	36	32
7 – Southwest	Some	6	4
8 – South Central	Yes	58	70
8 – South Central	No	36	24
8 – South Central	Some	7	6
9 – South East	Yes	49	68
9 – South East	No	42	24
9 – South East	Some	8	8
10 – Metro	Yes	54	67
10 – Metro	No	41	29
10 - Metro	Some	5	4
Statewide	**Yes**	**58**	**77**
Statewide	**No**	**36**	**26**
Statewide	**Some**	**6**	**5**

*Totals may not add due to rounding

Producers were asked if they kept pesticide application records on the farm (Q.6). Sixty-five percent (65%) of all statewide respondents kept all their herbicide records on the farm and 3% kept some records on the farm (Table 5). Eighty-eight percent (88%) of the farmers that applied their own herbicides kept records on the farm.

Table 5. "Do you keep herbicide application records on your farm?" (Q.6)

Pesticide Monitoring Area	Kept "On Farm" Pesticide Records	Percent of All Respondents	Percent of Self-Applicators
1 – Northwest Red River	Yes	75	85
1 – Northwest Red River	No	23	13
1 – Northwest Red River	Some	2	1
4 – Central Sands	Yes	67	82
4 – Central Sands	No	30	15
4 – Central Sands	Some	2	2
5 – East Central	Yes	68	82
5 – East Central	No	30	16
5 – East Central	Some	2	2
6 – West Central	Yes	81	93
6 – West Central	No	18	6
6 – West Central	Some	2	1
7 – Southwest	Yes	74	85
7 – Southwest	No	22	13
7 – Southwest	Some	4	2
8 – South Central	Yes	73	90
8 – South Central	No	24	6
8 – South Central	Some	3	3
9 – South East	Yes	71	90
9 – South East	No	25	9
9 – South East	Some	4	1
10 – Metro	Yes	63	84
10 – Metro	No	36	16
10 - Metro	Some	1	0
Statewide	**Yes**	**65**	**88**
Statewide	**No**	**32**	**10**
Statewide	**Some**	**3**	**2**

*Totals may not add due to rounding

Participants were asked about the practice of reading the label (Q.7) and the results are provided in Table 6. Ninety-five percent (95%) of all statewide respondents who applied herbicide themselves usually read the label**.** This percentage drops to 73% for farmers who hired custom applicators.

Table 6. "Do you usually read the label for pesticide products applied on your farm?" (Q.7)

Pesticide Management Area	Response to "Reading the Label"	Percent of All Respondents	Percent of Self-Applicators
1 – Northwest Red River	Yes	82	92
1 – Northwest Red River	No	18	8
4 – Central Sands	Yes	65	96
4 – Central Sands	No	31	4
5 – East Central	Yes	66	95
5 – East Central	No	34	5
6 – West Central	Yes	80	95
6 – West Central	No	20	5
7 – Southwest	Yes	80	92
7 – Southwest	No	20	8
8 – South Central	Yes	76	97
8 – South Central	No	24	3
9 – South East	Yes	68	95
9 – South East	No	32	5
10 – Metro	Yes	66	98
10 - Metro	No	34	2
Statewide	**Yes**	**73**	**95**
Statewide	**No**	**27**	**5**

*Totals may not add due to rounding

Participants were asked if they applied atrazine to their corn acres. A yes response means they did use atrazine on **some** of their corn acres. Table 7 details the farmer's responses to the question of whether atrazine was used and the percentage of farmers who knew if they applied atrazine (answered yes or no). A no response means they did not use atrazine on any of their corn acres. Statewide, 30% of the respondents applied atrazine on some of their acres.

Table 7. "Was Atrazine applied on any of your corn acres in 2006, premixes included?"(Q.8)

Pesticide Monitoring Area	Atrazine Applied	Percent of All Respondents	Percent of Respondents who Knew[6]
1 – Northwest Red River	Yes	25	25
1 – Northwest Red River	No	74	75
1 – Northwest Red River	Don't Know	2	
4 – Central Sands	Yes	22	24
4 – Central Sands	No	68	76
4 – Central Sands	Don't Know	10	
5 – East Central	Yes	31	35
5 – East Central	No	58	65
5 – East Central	Don't Know	12	
6 – West Central	Yes	23	24
6 – West Central	No	72	76
6 – West Central	Don't Know	5	
7 – Southwest	Yes	26	27
7 – Southwest	No	70	73
7 – Southwest	Don't Know	4	
8 – South Central	Yes	28	29
8 – South Central	No	67	71
8 – South Central	Don't Know	5	
9 – South East	Yes	38	43
9 – South East	No	52	57
9 – South East	Don't Know	10	
10 – Metro	Yes	38	43
10 – Metro	No	50	57
10 - Metro	Don't Know	12	
Statewide	**Yes**	**28**	**30**
Statewide	**No**	**65**	**70**
Statewide	**Don't Know**	**7**	

*Totals may not add due to rounding

[6] Percent of respondents who knew was calculated using only those respondents who answered yes or no to the question.

Seven percent (7% or 189 farmers) of the producers were not aware if their herbicide package included atrazine. Of this subgroup, 51% (96 farmers) knew the product(s). Of the farmers that knew the product(s), 46% (44 farmers) did apply atrazine. This was determined by providing the A.Is that were in the product(s) stated by the farmers.

Tables 8-9 pertain to the farmers applying atrazine. Included are those farmers who answered, "yes" to the question: "Was atrazine applied on any of your corn acres?". Farmers who answered, "I don't know" were included, because they later determined to have applied atrazine through identification of the product name. These farmers were classified through Q8, Q9, and Q10.

Table 8. "Was Atrazine incorporated on any of your corn acres in 2006, premixes included?" (Q.11)

Pesticide Monitoring Area	Was Atrazine Incorporated?	Percent of Respondents
1 – Northwest Red River	Yes	15
1 – Northwest Red River	No	85
4 – Central Sands	Yes	15
4 – Central Sands	No	85
5 – East Central	Yes	21
5 – East Central	No	79
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	16
7 – Southwest	No	84
8 – South Central	Yes	14
8 – South Central	No	86
9 – South East	Yes	17
9 – South East	No	83
10 – Metro	Yes	15
10 - Metro	No	85
Statewide	**Yes**	**15**
Statewide	**No**	**85**

*Totals may not add due to rounding

Table 9. "Was Atrazine split applied on any of your corn acres in 2006, premixes included?" (Q.12)

Pesticide Monitoring Area	Was Atrazine Split Applied	Percent of Respondents
1 – Northwest Red River	Yes	4
1 – Northwest Red River	No	96
4 – Central Sands	Yes	8
4 – Central Sands	No	92
5 – East Central	Yes	12
5 – East Central	No	88
6 – West Central	Yes	11
6 – West Central	No	89
7 – Southwest	Yes	8
7 – Southwest	No	92
8 – South Central	Yes	10
8 – South Central	No	90
9 – South East	Yes	10
9 – South East	No	90
10 – Metro	Yes	2
10 - Metro	No	98
Statewide	**Yes**	**9**
Statewide	**No**	**91**

*Totals may not add due to rounding

Editors Note. Some confusion may have existed on this question. The intent was to determine whether a field received two applications of atrazine. Some farmers may have interpreted the term 'split application' to mean an application of atrazine followed by an application of a different pesticide rather than a second application of atrazine.

Table 10. "Was Acetochlor applied on any of your corn acres in 2006, premixes included?"(Q.13)

Pesticide Monitoring Area	Acetochlor Applied	Percent of All Respondents	Percent of Respondents who Knew[7]
1 – Northwest Red River	Yes	5	6
1 – Northwest Red River	No	80	94
1 – Northwest Red River	Don't Know	15	
4 – Central Sands	Yes	9	11
4 – Central Sands	No	73	89
4 – Central Sands	Don't Know	18	
5 – East Central	Yes	5	6
5 – East Central	No	78	94
5 – East Central	Don't Know	17	
6 – West Central	Yes	3	3
6 – West Central	No	81	97
6 – West Central	Don't Know	17	
7 – Southwest	Yes	7	8
7 – Southwest	No	77	92
7 – Southwest	Don't Know	16	
8 – South Central	Yes	12	15
8 – South Central	No	68	85
8 – South Central	Don't Know	20	
9 – South East	Yes	10	14
9 – South East	No	64	86
9 – South East	Don't Know	26	
10 – Metro	Yes	8	10
10 – Metro	No	72	90
10 - Metro	Don't Know	20	
Statewide	**Yes**	**9**	**11**
Statewide	**No**	**71**	**89**
Statewide	**Don't Know**	**19**	

*Totals may not add due to rounding

Editors Note. Nineteen percent (19% or 523 farmers) of the producers were not aware if their herbicide package included acetochlor. Of this subgroup, 69% (359 farmers) were able to identify the product name. Of the farmers that knew the product, 42% (150 farmers) did apply acetochlor. This was determined by providing the [AI's] in the products stated to have been applied by the farmers.

[7] Percent of respondents who knew was calculated using only those respondents who answered yes or no to the question.

Tables 11-12 pertain to the farmers applying acetochlor. Included are those farmers who answered, "yes" to the question: "Was acetochlor applied on any of your corn acres?". Farmers who answered, "I don't know" were included, but later were determined to have applied acetochlor through identification of the product name. These farmers were classified through Q13, Q14, and Q15.

Due to the straight forward interpretation of the remaining tables, only a minimal amount of supporting information is provided under the "Editors Notes".

Table 11. "Was Acetochlor incorporated on any of your corn acres in 2006, premixes included?" (Q.16)

Pesticide Monitoring Area	Was Acetochlor Incorporated?	Percent of Respondents
1 – Northwest Red River	Yes	83
1 – Northwest Red River	No	17
4 – Central Sands	Yes	22
4 – Central Sands	No	78
5 – East Central	Yes	38
5 – East Central	No	63
6 – West Central	Yes	71
6 – West Central	No	29
7 – Southwest	Yes	47
7 – Southwest	No	53
8 – South Central	Yes	42
8 – South Central	No	58
9 – South East	Yes	34
9 – South East	No	66
10 – Metro	Yes	40
10 - Metro	No	60
Statewide	**Yes**	**39**
Statewide	**No**	**61**

*Totals may not add due to rounding

Table 12. "Was Acetochlor split applied on any of your corn acres in 2006, premixes included?" (Q.17)

Pesticide Monitoring Area	Was Acetochlor Split Applied	Percent of Respondents
1 – Northwest Red River	Yes	0
1 – Northwest Red River	No	100
4 – Central Sands	Yes	12
4 – Central Sands	No	88
5 – East Central	Yes	12
5 – East Central	No	88
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	0
7 – Southwest	No	100
8 – South Central	Yes	5
8 – South Central	No	95
9 – South East	Yes	7
9 – South East	No	93
10 – Metro	Yes	10
10 – Metro	No	90
Statewide	**Yes**	**7**
Statewide	**No**	**93**

*Totals may not add due to rounding

Editors Note. Some confusion may have existed on this question. The intent was to determine whether a field received two applications of acetochlor. Some farmers may have interpreted the term 'split application' to mean an application of acetochlor followed by an application of a different pesticide rather than second application of acetochlor.

Herbicide Program Decisions

Questions 18-21 are related to who makes certain herbicide decisions. Only farmers who applied atrazine or acetochlor answered these questions. Of the 2,871 farmers surveyed, 1,041, (36%) applied either atrazine or acetochlor. The following questions were answered by those 1,041 farmers who applied atrazine or acetochlor.

Table 13. "Who decides what products to apply?" (Q.18)

Pesticide Monitoring Area	Who Decides What Product to Apply?	Percent of All Respondents
1 – Northwest Red River	Farmer	48
1 – Northwest Red River	Dealer/Consultant	23
1 – Northwest Red River	Both	29
4 – Central Sands	Farmer	27
4 – Central Sands	Dealer/Consultant	26
4 – Central Sands	Both	47
5 – East Central	Farmer	45
5 – East Central	Dealer/Consultant	26
5 – East Central	Both	29
6 – West Central	Farmer	42
6 – West Central	Dealer/Consultant	11
6 – West Central	Both	47
7 – Southwest	Farmer	45
7 – Southwest	Dealer/Consultant	10
7 – Southwest	Both	44
8 – South Central	Farmer	49
8 – South Central	Dealer/Consultant	10
8 – South Central	Both	42
9 – South East	Farmer	25
9 – South East	Dealer/Consultant	15
9 – South East	Both	60
Statewide	**Farmer**	**39**
Statewide	**Dealer/Consultant**	**15**
Statewide	**Both**	**47**

*Totals may not add due to rounding

Table 14. "Who decides when to apply the herbicides?" (Q.19)

Pesticide Monitoring Area	Who Decides When to Apply Herbicides?	Percent of All Respondents
1 – Northwest Red River	Farmer	48
1 – Northwest Red River	Dealer/Consultant	29
1 – Northwest Red River	Both	23
4 – Central Sands	Farmer	51
4 – Central Sands	Dealer/Consultant	20
4 – Central Sands	Both	29
5 – East Central	Farmer	71
5 – East Central	Dealer/Consultant	8
5 – East Central	Both	21
6 – West Central	Farmer	62
6 – West Central	Dealer/Consultant	9
6 – West Central	Both	29
7 – Southwest	Farmer	61
7 – Southwest	Dealer/Consultant	9
7 – Southwest	Both	30
8 – South Central	Farmer	62
8 – South Central	Dealer/Consultant	10
8 – South Central	Both	28
9 – South East	Farmer	44
9 – South East	Dealer/Consultant	15
9 – South East	Both	41
Statewide	**Farmer**	**56**
Statewide	**Dealer/Consultant**	**13**
Statewide	**Both**	**31**

*Totals may not add due to rounding

Table 15. "Who scouts your fields?" (Q.20)

Pesticide Monitoring Area	Who Scouts Your Fields?	Percent of All Respondents
1 – Northwest Red River	Farmer	45
1 – Northwest Red River	Dealer/Consultant	35
1 – Northwest Red River	Both	19
1 – Northwest Red River	Field Not Scouted	0
4 – Central Sands	Farmer	45
4 – Central Sands	Dealer/Consultant	26
4 – Central Sands	Both	25
4 – Central Sands	Field Not Scouted	4
5 – East Central	Farmer	63
5 – East Central	Dealer/Consultant	21
5 – East Central	Both	13
5 – East Central	Field Not Scouted	3
6 – West Central	Farmer	69
6 – West Central	Dealer/Consultant	16
6 – West Central	Both	15
6 – West Central	Field Not Scouted	0
7 – Southwest	Farmer	61
7 – Southwest	Dealer/Consultant	16
7 – Southwest	Both	21
7 – Southwest	Field Not Scouted	2
8 – South Central	Farmer	59
8 – South Central	Dealer/Consultant	20
8 – South Central	Both	20
8 – South Central	Field Not Scouted	1
9 – South East	Farmer	46
9 – South East	Dealer/Consultant	21
9 – South East	Both	32
9 – South East	Field Not Scouted	0
10 – Metro	Farmer	58
10 – Metro	Dealer/Consultant	22
10 – Metro	Both	18
10 - Metro	Field Not Scouted	2
Statewide	**Farmer**	**55**
Statewide	**Dealer/Consultant**	**21**
Statewide	**Both**	**23**
Statewide	**Field Not Scouted**	**1**

*Totals may not add due to rounding

Table 16. "Who determines if applications setbacks or restrictions are appropriate on your farm?" (Q.21)

Pesticide Monitoring Area	Who Determines Setbacks?	Percent of All Respondents
1 – Northwest Red River	Farmer	45
1 – Northwest Red River	Dealer/Consultant	32
1 – Northwest Red River	Both	19
1 – Northwest Red River	Neither	3
4 – Central Sands	Farmer	38
4 – Central Sands	Dealer/Consultant	31
4 – Central Sands	Both	30
4 – Central Sands	Neither	1
5 – East Central	Farmer	55
5 – East Central	Dealer/Consultant	26
5 – East Central	Both	18
5 – East Central	Neither	0
6 – West Central	Farmer	49
6 – West Central	Dealer/Consultant	13
6 – West Central	Both	36
6 – West Central	Neither	2
7 – Southwest	Farmer	53
7 – Southwest	Dealer/Consultant	14
7 – Southwest	Both	32
7 – Southwest	Neither	1
8 – South Central	Farmer	52
8 – South Central	Dealer/Consultant	20
8 – South Central	Both	27
8 – South Central	Neither	1
9 – South East	Farmer	42
9 – South East	Dealer/Consultant	27
9 – South East	Both	29
9 – South East	Neither	2
10 – Metro	Farmer	49
10 – Metro	Dealer/Consultant	27
10 – Metro	Both	22
10 - Metro	Neither	2
Statewide	**Farmer**	**47**
Statewide	**Dealer/Consultant**	**23**
Statewide	**Both**	**28**
Statewide	**Neither**	**1**

*Totals may not add due to rounding

Scouting For Weeds and Related Practices:

Table 17. "Has someone mapped weed infestations in any of your fields in the last three years?" (Q.23)

Pesticide Monitoring Area	Weed Infestations Mapped Last 3 Years	Percent of Respondents
1 – Northwest Red River	Yes	29
1 – Northwest Red River	No	71
4 – Central Sands	Yes	19
4 – Central Sands	No	81
5 – East Central	Yes	11
5 – East Central	No	89
6 – West Central	Yes	18
6 – West Central	No	82
7 – Southwest	Yes	15
7 – Southwest	No	85
8 – South Central	Yes	19
8 – South Central	No	81
9 – South East	Yes	23
9 – South East	No	77
10 – Metro	Yes	11
10 - Metro	No	89
Statewide	**Yes**	**19**
Statewide	**No**	**81**

*Totals may not add due to rounding

Table 18. "Do you choose herbicides based on type of weeds and/or density of weeds?" (Q.24)

Pesticide Monitoring Area	Herbicide Choice Based on Weeds	Percent of Respondents
1 – Northwest Red River	Yes	93
1 – Northwest Red River	No	7
4 – Central Sands	Yes	97
4 – Central Sands	No	3
5 – East Central	Yes	92
5 – East Central	No	8
6 – West Central	Yes	93
6 – West Central	No	7
7 – Southwest	Yes	93
7 – Southwest	No	7
8 – South Central	Yes	95
8 – South Central	No	5
9 – South East	Yes	94
9 – South East	No	6
10 – Metro	Yes	98
10 - Metro	No	2
Statewide	**Yes**	**94**
Statewide	**No**	**6**

*Totals may not add due to rounding

Water Resources and Soil Resources:

Table 19. "Do you know the soil texture of your farm?" (Q.25)

Pesticide Monitoring Area	Soil Texture Known of Farm Soils	Percent of Respondents
1 – Northwest Red River	Yes	97
1 – Northwest Red River	No	3
4 – Central Sands	Yes	92
4 – Central Sands	No	8
5 – East Central	Yes	97
5 – East Central	No	3
6 – West Central	Yes	96
6 – West Central	No	4
7 – Southwest	Yes	88
7 – Southwest	No	12
8 – South Central	Yes	83
8 – South Central	No	17
9 – South East	Yes	87
9 – South East	No	13
10 – Metro	Yes	86
10 - Metro	No	14
Statewide	**Yes**	**88**
Statewide	**No**	**12**

*Totals may not add due to rounding

Table 20. “Do you know the organic matter level of your farms soils?” (Q.26)

Pesticide Monitoring Area	Organic Matter Known of Farm Soils	Percent of Respondents
1 – Northwest Red River	Yes	87
1 – Northwest Red River	No	13
4 – Central Sands	Yes	63
4 – Central Sands	No	37
5 – East Central	Yes	45
5 – East Central	No	55
6 – West Central	Yes	80
6 – West Central	No	20
7 – Southwest	Yes	65
7 – Southwest	No	35
8 – South Central	Yes	75
8 – South Central	No	25
9 – South East	Yes	70
9 – South East	No	30
10 – Metro	Yes	70
10 - Metro	No	30
Statewide	**Yes**	**70**
Statewide	**No**	**30**

*Totals may not add due to rounding

Table 21. “Do you know the depth to the water table in your field?” (Q.27)

Pesticide Monitoring Area	Knowledge of Depth to the Water Table	Percent of Respondents
1 – Northwest Red River	Yes	45
1 – Northwest Red River	No	55
4 – Central Sands	Yes	37
4 – Central Sands	No	63
5 – East Central	Yes	32
5 – East Central	No	68
6 – West Central	Yes	51
6 – West Central	No	49
7 – Southwest	Yes	32
7 – Southwest	No	68
8 – South Central	Yes	33
8 – South Central	No	67
9 – South East	Yes	34
9 – South East	No	64
10 – Metro	Yes	32
10 – Metro	No	68
Statewide	**Yes**	**35**
Statewide	**No**	**65**

*Totals may not add due to rounding

Editors Note: Respondents might not have known the exact depth to the groundwater, but still may have known that the depth to groundwater exceeded 30 feet. Table 22 details those responses.

Table 22. "Is the water table at a depth greater than 30 feet?" (Q.28)

Pesticide Monitoring Area	"Yes" Response Percent of Respondents	"No" Response Percent of Respondents	Don't Know Response Percent of Respondents
1 – Northwest Red River	51	26	23
4 – Central Sands	48	28	24
5 – East Central	32	42	26
6 – West Central	60	20	20
7 – Southwest	42	17	41
8 – South Central	40	28	32
9 – South East	44	26	30
10 – Metro	52	22	26
Other	55	20	25
Statewide	**47**	**26**	**27**

*Totals may not add due to rounding

Editors Note: Respondents who answered, "Yes" to question 28 were then asked, "How was the depth primarily determined?". Figure 2 details their responses.

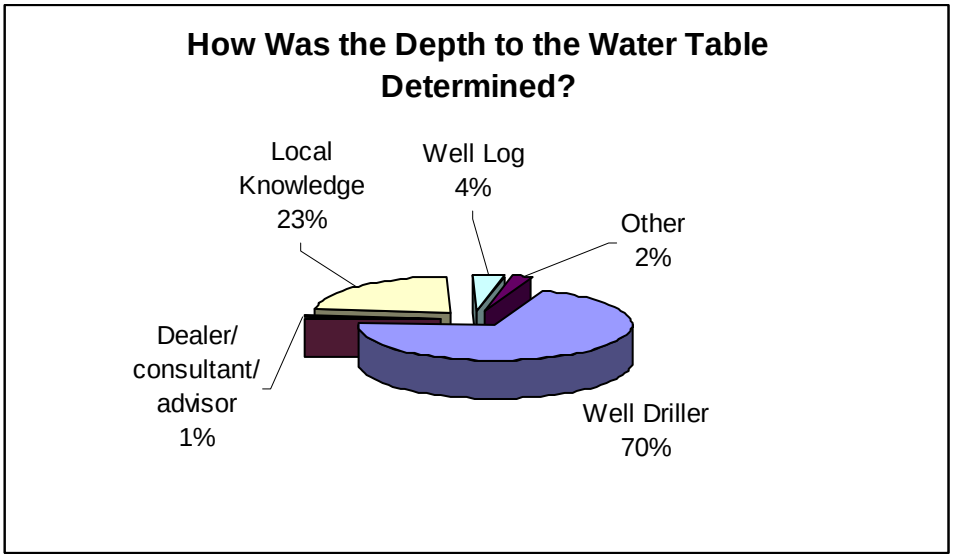


Figure 2. Information sources used to determine water table depth (Q.28i)

Table 23. "Are any streams, lakes or other surface waters immediately adjacent to or in your corn fields?" (Q.29)

Pesticide Monitoring Area	Surface Water Adjacent to or in Field	Percent of Respondents
1 – Northwest Red River	Yes	39
1 – Northwest Red River	No	61
4 – Central Sands	Yes	31
4 – Central Sands	No	69
5 – East Central	Yes	26
5 – East Central	No	74
6 – West Central	Yes	40
6 – West Central	No	60
7 – Southwest	Yes	36
7 – Southwest	No	64
8 – South Central	Yes	42
8 – South Central	No	58
9 – South East	Yes	29
9 – South East	No	71
10 – Metro	Yes	25
10 - Metro	No	75
Statewide	**Yes**	**36**
Statewide	**No**	**64**

*Totals may not add due to rounding

Editors Note: Respondents who answered, “Yes” to question 29 were then asked if there were filter strips or vegetative buffers on or next to any of those acres. Table 24 details their responses

Table 24. “Are there filter strips or vegetative buffers on any of these acres?” (Q.29A)

Pesticide Monitoring Area	Filter Strips or Buffers	Percent of Respondents
1 – Northwest Red River	Yes	100
1 – Northwest Red River	No	0
4 – Central Sands	Yes	88
4 – Central Sands	No	12
5 – East Central	Yes	80
5 – East Central	No	20
6 – West Central	Yes	85
6 – West Central	No	15
7 – Southwest	Yes	91
7 – Southwest	No	9
8 – South Central	Yes	89
8 – South Central	No	11
9 – South East	Yes	90
9 – South East	No	10
10 – Metro	Yes	91
10 - Metro	No	9
Statewide	**Yes**	**90**
Statewide	**No**	**10**

*Totals may not add due to rounding

Editors Note: Respondents who answered, “Yes” to question 29a in regards to having filter strips or vegetative buffers were then asked if filter strips or vegetative buffers were part of a conservation program. Table 25 details their responses.

Table 25. “Were they required as part of a conservation program?”(Q.29Ai)

Editors Note: Data summary of only producers responding “Yes” to question 29.

Pesticide Monitoring Area	Response	Percent of Respondents
1 – Northwest Red River	Yes	17
1 – Northwest Red River	No	83
4 – Central Sands	Yes	13
4 – Central Sands	No	87
5 – East Central	Yes	13
5 – East Central	No	87
6 – West Central	Yes	5
6 – West Central	No	95
7 – Southwest	Yes	19
7 – Southwest	No	81
8 – South Central	Yes	20
8 – South Central	No	80
9 – South East	Yes	19
9 – South East	No	81
10 – Metro	Yes	20
10 - Metro	No	80
Statewide	**Yes**	**17**
Statewide	**No**	**83**

*Totals may not add due to rounding

Table 26. "Do you irrigate corn?" (Q30)

Pesticide Monitoring Area	Irrigation	Percent of Respondents
1 – Northwest Red River	Yes	10
1 – Northwest Red River	No	90
4 – Central Sands	Yes	15
4 – Central Sands	No	85
5 – East Central	Yes	0
5 – East Central	No	100
6 – West Central	Yes	11
6 – West Central	No	89
7 – Southwest	Yes	1
7 – Southwest	No	99
8 – South Central	Yes	1
8 – South Central	No	99
9 – South East	Yes	0
9 – South East	No	100
10 – Metro	Yes	11
10 - Metro	No	89
Statewide	**Yes**	**5**
Statewide	**No**	**95**

*Totals may not add due to rounding

Table 27. "Do you have an irrigation water management plan?" (Q.31)

Pesticide Monitoring Area	Irrigation Water Management Plan	Percent of Respondents
Statewide	**Yes**	**63**
Statewide	**No**	**37**

*Totals may not add due to rounding

Editors Note. Only 5% (46) of the farmers used irrigation on corn acres. Due to the small numbers of farmers irrigating, only statewide data is reported.

Figure 3. "What type of tillage did you use before planting on the majority of your corn aces?" (Q.32)

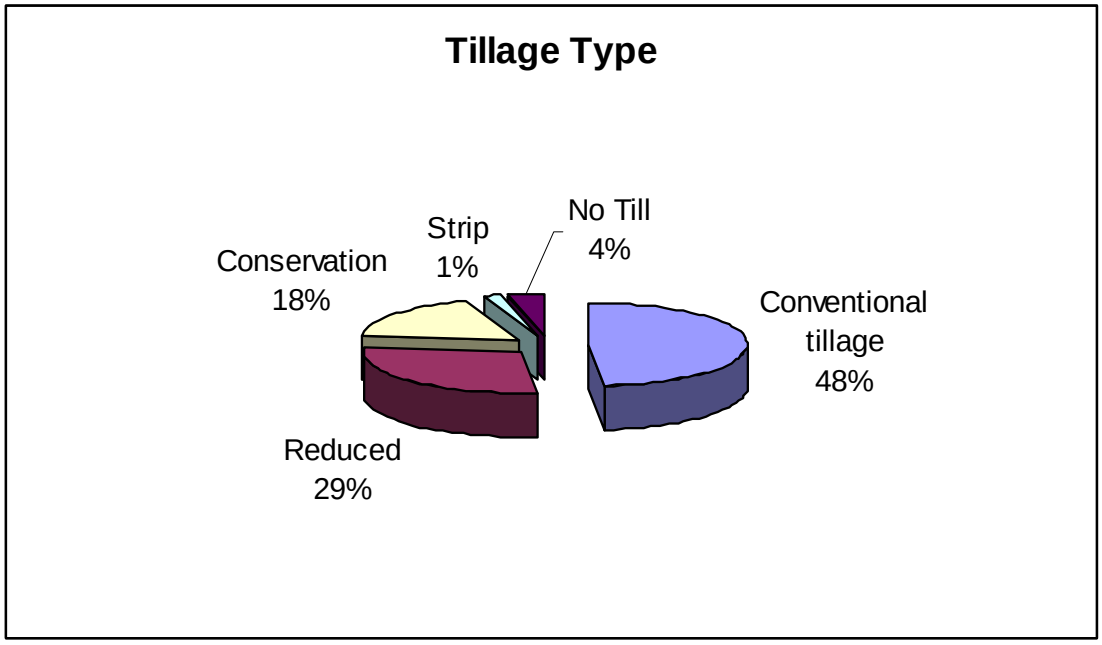


Table 28. "Do you use precision applications for herbicides (variable rate applications)?" (Q.33)

Pesticide Monitoring Area	Variable Rate Applications	Percent of Respondents
1 – Northwest Red River	Yes	19
1 – Northwest Red River	No	81
4 – Central Sands	Yes	26
4 – Central Sands	No	74
5 – East Central	Yes	24
5 – East Central	No	76
6 – West Central	Yes	17
6 – West Central	No	83
7 – Southwest	Yes	31
7 – Southwest	No	69
8 – South Central	Yes	32
8 – South Central	No	68
9 – South East	Yes	29
9 – South East	No	71
10 – Metro	Yes	23
10 - Metro	No	77
Statewide	**Yes**	**28**
Statewide	**No**	**72**

Table 29. "In general, do you alternate use of herbicide products to keep weeds from becoming resistant to herbicides?" (Q.34)

Pesticide Monitoring Area	Response to Using Alternative Herbicide	Percent of Respondents
1 – Northwest Red River	Yes	94
1 – Northwest Red River	No	6
4 – Central Sands	Yes	89
4 – Central Sands	No	11
5 – East Central	Yes	89
5 – East Central	No	11
6 – West Central	Yes	96
6 – West Central	No	4
7 – Southwest	Yes	92
7 – Southwest	No	8
8 – South Central	Yes	92
8 – South Central	No	8
9 – South East	Yes	88
9 – South East	No	12
10 – Metro	Yes	89
10 - Metro	No	11
Statewide	**Yes**	**91**
Statewide	**No**	**9**

*Totals may not add due to rounding

Table 30. "Did you reduce from previous applications, the rate per acre of any corn herbicide?" (Q.35)

Pesticide Monitoring Area	Reduced Rate from Previous Applications	Percent of Respondents
1 – Northwest Red River	Yes	58
1 – Northwest Red River	No	42
4 – Central Sands	Yes	44
4 – Central Sands	No	56
5 – East Central	Yes	62
5 – East Central	No	38
6 – West Central	Yes	38
6 – West Central	No	62
7 – Southwest	Yes	42
7 – Southwest	No	58
8 – South Central	Yes	46
8 – South Central	No	54
9 – South East	Yes	53
9 – South East	No	47
10 – Metro	Yes	44
10 - Metro	No	56
Statewide	**Yes**	**47**
Statewide	**No**	**53**

*Totals may not add due to rounding

Table 31. "Did you select an herbicide with a different mode of action to reduce weed resistance to herbicides?" (Q.36)

Pesticide Monitoring Area	Selected Herbicide with Different Mode of Action to Reduce Weed Resistance	Percent of Respondents
1 – Northwest Red River	Yes	74
1 – Northwest Red River	No	26
4 – Central Sands	Yes	71
4 – Central Sands	No	29
5 – East Central	Yes	62
5 – East Central	No	38
6 – West Central	Yes	85
6 – West Central	No	15
7 – Southwest	Yes	76
7 – Southwest	No	24
8 – South Central	Yes	82
8 – South Central	No	18
9 – South East	Yes	72
9 – South East	No	18
10 – Metro	Yes	66
10 - Metro	No	34
Statewide	**Yes**	**76**
Statewide	**No**	**24**

*Totals may not add due to rounding

Table 32. "Did you choose a particular herbicide to reduce impacts to surface water or groundwater?" (Q.37)

Pesticide Monitoring Area	Chose Herbicide to Reduce Impact to Surface or Ground Water	Percent of Respondents
1 – Northwest Red River	Yes	33
1 – Northwest Red River	No	67
4 – Central Sands	Yes	43
4 – Central Sands	No	57
5 – East Central	Yes	31
5 – East Central	No	69
6 – West Central	Yes	53
6 – West Central	No	47
7 – Southwest	Yes	45
7 – Southwest	No	55
8 – South Central	Yes	53
8 – South Central	No	47
9 – South East	Yes	53
9 – South East	No	47
10 – Metro	Yes	50
10 - Metro	No	50
Statewide	**Yes**	**49**
Statewide	**No**	**51**

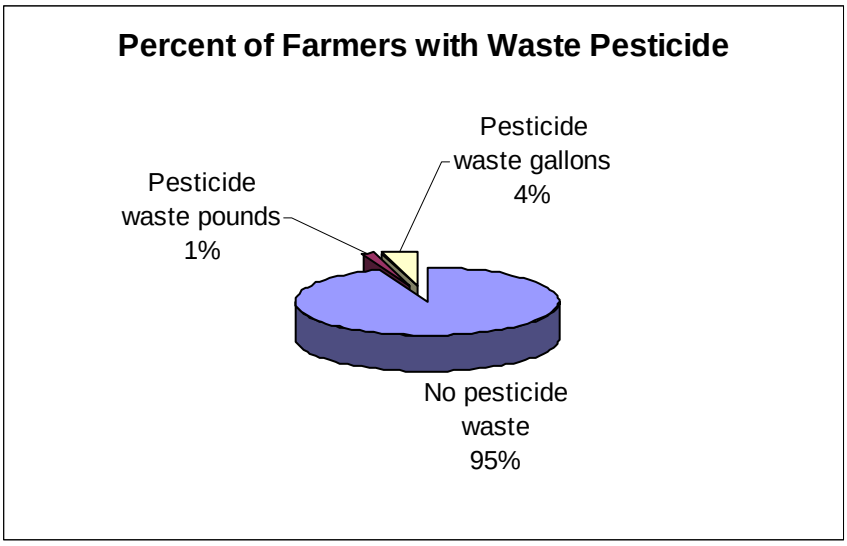
*Totals may not add due to rounding

Table 33. “Did you band herbicide applications to reduce use?” (Q.38)

Pesticide Monitoring Area	Banded Herbicide Applications to Reduce Use	Percent of Respondents
1 – Northwest Red River	Yes	10
1 – Northwest Red River	No	90
4 – Central Sands	Yes	7
4 – Central Sands	No	93
5 – East Central	Yes	5
5 – East Central	No	95
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	12
7 – Southwest	No	88
8 – South Central	Yes	10
8 – South Central	No	90
9 – South East	Yes	5
9 – South East	No	95
10 – Metro	Yes	9
10 - Metro	No	91
Statewide	**Yes**	**8**
Statewide	**No**	**92**

*Totals may not add due to rounding

Figure 4. "Do you currently have pesticides that require disposal?" (Q.39)



Editor's Note: Surveyed farmers reported having 263 pounds of pesticides in solid form and 255 gallons of pesticides in liquid form on their farms that currently require disposal.

Figure 5. "Are you aware of the empty container recycling programs or events in your area?" (Q.41)

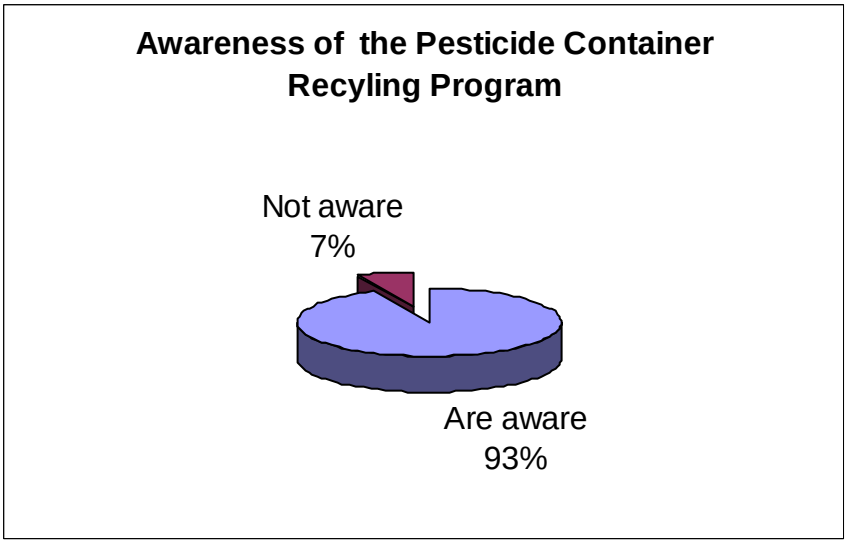
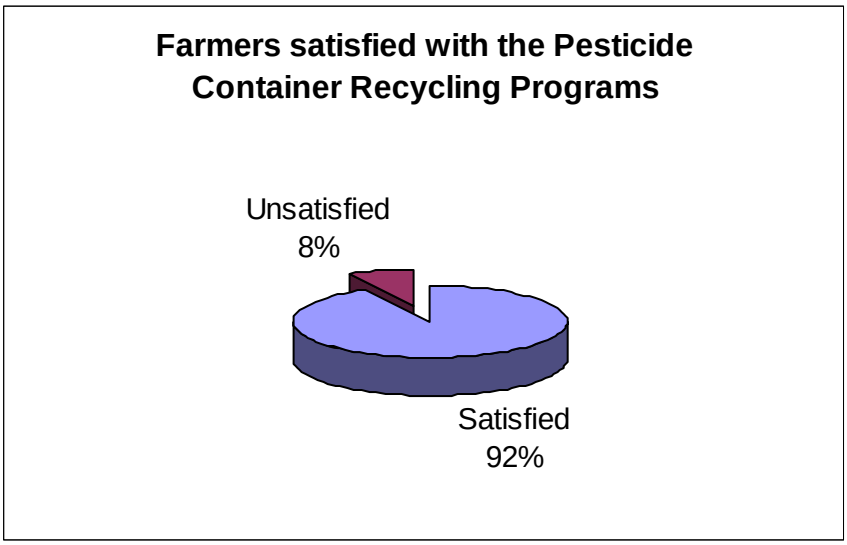


Figure 6. "Are you satisfied with the current pesticide container recycling programs in your area?" (Q.42)



Appendix 1. Survey Form

MINNESOTA
AGRICULTURAL
STATISTICS
SERVICE

P.O. Box 7068
St. Paul, MN 55107-7068
Telephone: 651-296-2230 or 1-800-453-7502
FAX: 651-296-3185 or 1-800-839-2186

Annual Pesticide Survey: Herbicide Applications and Practices on Corn In Planning for or During the 2006 Growing Season

Please make necessary corrections in name and address on the label.

IDENTIFICATION (NASS use only)

1. On land operated by the farm, ranch, or individual(s) listed on the label:

a. Were crops grown or hay cut at anytime during 2006?..... ☐ **YES** ☐ **NO**

b. Is any land in this operation in government programs such as CRP, WRP, etc? ☐ **YES** ☐ **NO**

c. Have or will grains or oilseeds be stored on this operation at anytime during 2004, or do you have storage facilities used for storing grain?..... ☐ **YES** ☐ **NO**

*If **NO** for all items, go to back page, Change in Operation*

d. Have or will there be any hogs, cattle, sheep, horses, or other livestock, or poultry on this operation at anytime during 2006?..... ☐ **YES** ☐ **NO**

2. Did you grow corn on your operation in 2006?
(Exclude sweet corn and popcorn)

☐ **YES** ☐ **NO -** conclude interview

3. How many corn acres were planted for field corn in 2006?

GENERAL INFORMATION

4. On your 2006 corn acres, did you:

Apply herbicides yourself?	1☐	Enter Code
Have herbicides custom applied?	2☐	
Both?	3☐	
Don't use herbicides [conclude interview]	4☐	

5. Do you know the active ingredients of the herbicides you used on corn acres in 2006?

☐ Yes = 1 ☐ No = 2 ☐ Some = 3

6. Do you keep herbicide application records on your farm?

☐ Yes = 1 ☐ No = 2 ☐ Some = 3

7. Do you usually read the label for pesticide products applied on your farm?

☐ Yes = 1 ☐ No = 2

Atrazine specific questions

8. Was Atrazine applied on any of your corn acres in 2006, premixes included?

☐ Yes = 1 (go to 11) ☐ No = 2 (go to 13) ☐ Don't Know = 3

9. Do you know the products applied to your corn acres in 2006?

☐ Yes = 1 ☐ No = 2 (go to 13)

10. Were any of the following products applied on your corn acres in 2006?
**Computer list of products used

☐ Yes = 1 ☐ No = 2 (go to 13)

11. Was Atrazine incorporated on any of your corn acres in 2006, premixes included?

☐ Yes = 1 ☐ No = 2 ☐ I Don' Know = 4

12. Was Atrazine split-applied on any of your corn acres in 2006, premixes included?

☐ Yes = 1 ☐ No = 2 ☐ I Don' Know = 4

Acetochlor specific questions

13. Was Acetochlor applied on any of your corn acres in 2006, premixes included?

☐ Yes = 1 (go to 16) ☐ No = 2 (go to 18) ☐ Don't Know = 3

14. Do you know the products applied to your corn acres in 2006?
☐ Yes = 1 ☐ No = 2 (go to 18)

15. Were any of the following products applied on your corn acres in 2006?
**Computer list of products used
☐ Yes = 1 ☐ No = 2 (go to 18)

16. Was Acetochlor incorporated on any of your corn acres in 2006, premixes included?

☐ Yes = 1 ☐ No = 2 ☐ Don't Know = 3

17. Was Acetochlor split-applied on any of your corn acres in 2006, premixes included?

☐ Yes = 1 ☐ No = 2 ☐ Don't Know = 3

What Decisions do you and or your Fertilizer Dealer or Crop Consultant make in regard to your <u>Herbicide</u> program?

18. Who decides what products to apply?

I do (the farmer)?	1☐	
Dealer/Crop consultant?	2☐	Enter Code
Both together?	3 ☐	

19. Who decides when to apply the herbicides?

I do (the farmer)?	1☐	
Dealer/Crop consultant?	2☐	Enter Code
Both together?	3 ☐	

20. Who scouts your fields?

I do (the farmer)?	1☐	
Dealer/Crop consultant?	2☐	Enter Code
Both together?	3 ☐	
Fields not Scouted?	4 ☐	

21. Setbacks or restrictions are part of many pesticide labels. Who determines if applications setbacks or restrictions are appropriate on your farm?

I do (the farmer)?	1☐	
Dealer/Crop consultant?	2☐	Enter Code
Both together?	3 ☐	
Neither?	4 ☐	

<u>SCOUTING FOR WEEDS and RELATED PRACTICES</u>

23. Has someone mapped weed infestations in any of your corn fields in the last three years?

☐ Yes = 1 ☐ No = 2

24. Do you choose herbicides based on type of weeds and/or density of weeds?

☐ Yes = 1 ☐ No = 2

WATER RESOURCES and SOIL RESOURCES

25. Do you know the soil texture of your farm?

☐ Yes = 1 ☐ No = 2

26. Do you know the organic matter level of your farms soils?

☐ Yes = 1 ☐ No = 2

27. Do you know the depth to the water table in your fields?

☐ Yes = 1 ☐ No = 2

28. Is the water table at a depth greater than 30 feet?

☐ Yes = 1 ☐ No = 2 (go to 29) ☐ Don't know = 3 (go to 29)

If yes, how was the depth primarily determined? (check one)

Well driller for drinking water	1 ☐	
Local knowledge	2 ☐	Enter Code
A dealer, consultant or crop advisor	3 ☐	
Well log	4 ☐	
None of the above	5 ☐	

29. Are any streams, lakes or other surface waters immediately adjacent to or in your corn fields?

☐ Yes = 1 ☐ No = 2 (if no go to 30)

29a. Are there filter strips or vegetative buffers on any of these acres?

☐ Yes = 1 ☐ No = 2 (if no go to 30)

i. If YES, were they required as part of a conservation program?
☐ Yes = 1 ☐ No = 2

30. Do you irrigate corn?
☐ Yes = 1 ☐ No = 2 (if no go to 32)
If, yes,
31. Do you have an irrigation water management plan?

☐ Yes = 1 ☐ No = 2

32. What type of tillage did you use before planting on the majority of your corn acres? (Fall and Spring)

Conventional < 15 residue	1☐	Enter Code
Reduced Tillage 15 – 30?	2☐	
Conservation Tillage > 30?	3☐	
Strip Tillage	4☐	
No Tillage	5☐	

Now were going to talk about GENERAL PRACTICES for corn acres only

33. Do you use precision applications for herbicides (variable rate applications)?

☐ Yes = 1 ☐ No = 2

34. In general, do you alternate use of herbicide products to keep weeds from becoming resistant to herbicides?

☐ Yes = 1 ☐ No = 2

35. Did you reduce from previous applications, the rate per acre of any corn herbicide?

☐ Yes = 1 ☐ No = 2

36. Did you select an herbicide with a different mode of action to reduce weed resistance to herbicides?

☐ Yes = 1 ☐ No = 2

37. Did you choose a particular herbicide to reduce impacts to surface water or groundwater?

☐ Yes = 1 ☐ No = 2

38.Did you band herbicide applications to reduce use?

☐ Yes = 1 ☐ No = 2

Pesticide recycling questions:

The next questions are for all pesticides,

39. Do you currently have pesticides that require disposal?

☐ Yes = 1 ☐ No = 2 (Go to 41)

If yes,

40. How many pounds or gallons? _____

☐ Pounds 1 ☐ Gallons

41. Are you aware of the empty pesticide container recycling programs or events in your area?

☐ Yes = 1 ☐ No = 2 (End Survey)

If yes,

42. Are you satisfied with the current pesticide container recycling programs in your area?

☐ Yes = 1 ☐ No = 2