



Herbicide Selection and Management Practices Associated with Minnesota's 2008 Corn Production

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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 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 corn herbicides.

In Minnesota, the corn herbicide active ingredients atrazine and acetochlor (and their breakdown products) are detected frequently in groundwater and surface water resources. While atrazine does not exceed the applicable drinking water standards in groundwater, in 2001 and 2005 acetochlor concentrations in two southern Minnesota watersheds exceeded water quality standards to protect aquatic life. The MDA has invested considerable staff time in water monitoring, development of BMP education programs, and BMP assessment. Atrazine and acetochlor are the main focus of this survey. Phone enumerators located at NASS contacted over 4,000 producers in early 2009. From this pool, approximately 2,800 farmers who raised corn during the 2008 growing season shared valuable information on herbicide selection and management.

The general purpose of this survey was to ask farmers about fundamental herbicide use 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 surveys help MDA understand regulatory compliance, adoption of voluntary practices, potential informational roadblocks, and opportunities for future technical assistance.

Every other year, the MDA has partnered with NASS to produce a detailed report on pesticide use and rates used on the state's four major crops. Readers are encouraged to visit the most recent report, "2007 Pesticide Usage on Four Major Minnesota Crops" at <http://www.mda.state.mn.us/news/publications/chemfert/2007pesticideuse.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. The detailed information about herbicide use practices 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 herbicide information.

2008 Herbicide Use Practices Summary and Highlights

This report summarizes survey results for a number of important practices associated with herbicide use on Minnesota's 2008 corn acres. Over 2,700 producers participated in the telephone survey and herbicide information was collected for 722,007 corn acres, representing 9 percent of Minnesota's seven million corn acres. Survey questions focused on the 95 percent 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 herbicide BMPs). This is the third herbicide survey performed by the MDA and NASS to collect information on herbicide management practices on Minnesota corn acres.

Survey Design and Implementation

Ten Pesticide Monitoring Areas (noted as "PMA" throughout the report), 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. More information about PMA designations can be found at <http://www.mda.state.mn.us/chemicals/pesticides/~/media/Files/chemicals/2009gwmnetdesign.ashx> Regional pesticide use information is used to help design and implement specific water quality monitoring and pesticide educational programs.

NASS developed a sampling population of 7,000 farms by randomly drawing from its entire database of all corn growers in Minnesota. There were 2,765 farmers that raised corn in 2008 and that completed the survey. 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, survey results for PMA 2 and PMA 3 were not reported separately.

Introduction

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, 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 pilot¹ 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.

In neighboring North Dakota, the USDA, NASS, the North Dakota Field Office, and North Dakota State University Extension had already established a strong tradition in collecting statewide pesticide use by using NASS telephone enumerators. With the goal of expanding to a statewide scale while reducing costs, a second pilot² was developed. MDA and NASS used many techniques from the North Dakota program, but decided to expand the level of detail by including pesticide application rates. Historically, most mail or telephone style surveys have been unsuccessful at quantifying pesticide rates. Due to the numerous formulations, different application rates and units of measure (i.e. Active Ingredient [AI] can be expressed in pounds, ounces, pints or quarts), complications can quickly develop. Another major complicating factor may result due to the farmer using the services of a commercial pesticide applicator. If the farmer did not apply the product, the likelihood that the farmer would be familiar with the product and rate decreases significantly.

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

¹ “Expanded Minnesota Agricultural Statistics Pesticide Use Data”, 2003, by NASS and MDA.

² Unpublished data. From the September 20, 2003 EPA Report.

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 surveys are conducted using “Method Two” from the pilot project conducted in Douglas and Grant Counties.

Farmers are interviewed over the phone in April and May. 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 five to ten minutes.

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

Questions are 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 resistant corn varieties;
3. **Water resources.** Physical distances from ground water, surface water and buffers, and irrigation management plans; and
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 2008 cropping season (Q.2). The interview process ended if they had not produced field or silage corn. 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 1 is the NASS total corn acres for Minnesota (2008) 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 basis³.

³ “2007 Pesticide Usage on Four Major Minnesota Crops” found on the MDA website at: <http://www.mda.state.mn.us/news/publications/chemfert/2007pesticideuse.pdf>

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.⁴ 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 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 Respondents	2008 Planted Corn Acres	Surveyed Corn Acres	Percentage of Acres Surveyed
Clay	1	13	94,000	3,541	4%
Grant	1	14	108,500	7,266	7%
Mahnomen	1	8	**	2,530	**
Marshall	1	6	**	1,015	**
Norman	1	7	77,500	1,166	2%
Red Lake	1	5	12,300	672	5%
Roseau	1	8	8,700	800	9%
Traverse	1	21	122,500	14,089	12%
Wilkin	1	5	78,000	3,955	5%
Others	1	7	**	1,033	**
Totals/Averages	1	94	533,100	36,067	7%
Other PMAs (2,3)	2,3	14	**	1,068	**
Totals/Averages	2,3	14	**	1,068	**
Becker	4	21	**	4,128	**
Benton	4	33	57,400	7,689	13%
Crow Wing	4	10	**	1,126	**
Douglas	4	27	57,600	3,555	6%
Kandiyohi	4	36	151,500	9,184	6%
Morrison	4	85	93,200	13,342	14%
Otter Tail	4	118	148,000	19,706	13%
Pope	4	31	94,600	8,259	9%
Sherburne	4	12	27,200	1,346	5%
Stearns	4	157	205,000	22,452	11%
Todd	4	68	68,700	5,338	8%
Wadena	4	23	22,000	2,068	9%
Others	4	2	**	184	**
Totals/Averages	4	623	925,200	98,377	11%
Chisago	5	11	26,300	1,495	6%
Isanti	5	13	31,400	2,401	8%
Kanabec	5	15	12,200	2,442	20%
Mille Lacs	5	22	19,800	3,393	17%
Others	5	12	**	1,577	**
Totals/Averages	5	73	107,400	11,308	11%
Big Stone	6	11	84,800	2,900	3%
Chippewa	6	37	147,500	16,112	11%
Lac Qui Parle	6	53	164,500	21,426	13%
Stevens	6	31	152,500	17,018	11%
Swift	6	32	172,500	14,783	9%
Yellow Medicine	6	48	188,000	19,031	10%
Totals/Averages	6	212	90,9800	91,270	10%

Table 1 (continued). Summary of respondents and corresponding corn acres by county and PMAs.

County	Pesticide Monitoring Area (PMA)	Number of Respondents	2008 Planted Corn Acres [§]	Surveyed Corn Acres	Percentage of Acres Surveyed
Lincoln	7	45	107,000	13,479	13%
Lyon	7	46	182,000	14,762	8%
Murray	7	51	182,500	12,529	7%
Nobles	7	57	207,500	16,275	8%
Pipestone	7	41	106,000	8,144	8%
Rock	7	49	100,500	16,461	16%
Totals/Averages	7	289	885,500	81,650	10%
Blue Earth	8	44	190,000	15,961	8%
Brown	8	61	154,000	11,699	8%
Cottonwood	8	55	187,500	20,417	11%
Faribault	8	42	204,500	18,607	9%
Freeborn	8	39	187,500	14,718	8%
Jackson	8	76	185,000	25,711	14%
Le Sueur	8	36	94,200	10,385	11%
Martin	8	50	236,500	20,778	9%
McLeod	8	52	108,500	10,345	10%
Meeker	8	43	113,500	15,289	13%
Nicollet	8	53	127,000	18,274	14%
Redwood	8	65	229,000	22,774	10%
Renville	8	79	274,000	28,725	10%
Rice	8	50	78,800	7,871	10%
Sibley	8	66	146,500	17,004	12%
Steele	8	25	111,500	8,165	7%
Waseca	8	41	128,000	11,346	9%
Watonwan	8	24	127,000	7,388	6%
Wright	8	44	71,600	9,232	13%
Totals/Averages	8	945	2,954,600	294,689	10%
Dodge	9	31	119,000	11,467	10%
Fillmore	9	72	165,500	15,163	9%
Goodhue	9	65	148,000	14,651	10%
Houston	9	47	56,500	5,719	10%
Mower	9	49	187,000	13,604	7%
Olmsted	9	40	114,500	9,818	9%
Wabasha	9	52	85,400	12,034	14%
Winona	9	56	80,800	7,162	9%
Totals/Averages	9	412	956,700	89,618	9%
Anoka	10	6	**	176	**
Carver	10	28	59,400	4,691	8%
Dakota	10	27	91,100	6,766	7%
Hennepin	10	6	15,400	519	3%
Scott	10	18	37,500	3,035	8%
Washington	10	14	16,300	1,795	11%
Totals/Averages	10	99	21,9700	16,982	8%
State	All	2,765	7,700,000	722,007	9%

[§] Note: USDA/NASS Minnesota Corn Acreage Planted

** Not reported by NASS

Statewide Herbicide Applications and Management 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). Forty-eight (48%) of the respondents reported self applied, 42% of the respondents reported custom applied and 10% of the respondents reported 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 328 acres of corn while farmers who had pesticides custom applied averaged 173 acres of corn. Farmers who both self applied and custom applied herbicides raised an average of 382 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	93
1 – Northwest Red River	No	7
4 – Central Sands	Yes	93
4 – Central Sands	No	7
5 – East Central	Yes	89
5 – East Central	No	11
6 – West Central	Yes	94
6 – West Central	No	6
7 – Southwest	Yes	97
7 – Southwest	No	3
8 – South Central	Yes	96
8 – South Central	No	4
9 – Southeast	Yes	94
9 – Southeast	No	6
10 – Metro	Yes	86
10 – Metro	No	14
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
1 – Northwest Red River	Self Applied	60	380
1 – Northwest Red River	Custom Applied	23	183
1 – Northwest Red River	Both	17	671
4 – Central Sands	Self Applied	44	207
4 – Central Sands	Custom Applied	51	124
4 – Central Sands	Both	5	224
5 – East Central	Self Applied	57	157
5 – East Central	Custom Applied	37	158
5 – East Central	Both	6	395
6 – West Central	Self Applied	55	536
6 – West Central	Custom Applied	31	234
6 – West Central	Both	15	519
7 – Southwest	Self Applied	56	297
7 – Southwest	Custom Applied	32	221
7 – Southwest	Both	12	428
8 – South Central	Self Applied	49	388
8 – South Central	Custom Applied	39	210
8 – South Central	Both	12	374
9 – Southeast	Self Applied	41	301
9 – Southeast	Custom Applied	52	154
9 – Southeast	Both	8	280
10 – Metro	Self Applied	43	246
10 – Metro	Custom Applied	51	131
10 – Metro	Both	7	126
Statewide	Self Applied	48	328
Statewide	Custom Applied	42	173
Statewide	Both	10	382

Farmers were asked, “Do you know the active ingredients (AI) of the herbicides you used in 2008?” (Q.5). Based upon previous surveys, most farmers identified the product name (i.e. “Roundup”, etc.), but identifying the AI (i.e. glyphosate) was considerably more challenging. Of all statewide respondents (self-applicators and those that hired a custom applicator), 68% stated they knew the A.I. in their herbicide applications and 5% stated they knew some of the AI (Table 4). Seventy-eight percent of the farmers that applied the products themselves⁵ were able to

⁵ Farmers that applied pesticides themselves, referred to as “self-applicators,” includes farmers that self-apply and farmers that self-apply and custom apply (both), but not farmers who only had herbicides custom applied.

identify the AI. 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 2008?” (Q.5)

Pesticide Monitoring Area	Knew the Active Ingredients	Percent of All Respondents	Percent of “Self-Applicators”
1 – Northwest Red River	Yes	70	75
1 – Northwest Red River	No	29	24
1 – Northwest Red River	Some	1	1
4 – Central Sands	Yes	67	80
4 – Central Sands	No	29	17
4 – Central Sands	Some	4	3
5 – East Central	Yes	62	76
5 – East Central	No	32	15
5 – East Central	Some	6	10
6 – West Central	Yes	76	86
6 – West Central	No	20	10
6 – West Central	Some	4	4
7 – Southwest	Yes	69	78
7 – Southwest	No	24	16
7 – Southwest	Some	6	6
8 – South Central	Yes	68	76
8 – South Central	No	27	19
8 – South Central	Some	5	5
9 – Southeast	Yes	49	76
9 – Southeast	No	42	20
9 – Southeast	Some	8	4
10 – Metro	Yes	63	71
10 – Metro	No	33	24
10 – Metro	Some	4	4
Statewide	Yes	68	78
Statewide	No	27	18
Statewide	Some	5	4

*Totals may not add due to rounding

Producers were asked if they kept pesticide application records on the farm (Q.6). Sixty-eight percent of all statewide respondents kept all their herbicide records on the farm and 4% kept some records on the farm (Table 5). Eighty-six percent 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	76	85
1 – Northwest Red River	No	20	11
1 – Northwest Red River	Some	5	5
4 – Central Sands	Yes	61	81
4 – Central Sands	No	35	14
4 – Central Sands	Some	3	4
5 – East Central	Yes	69	88
5 – East Central	No	29	10
5 – East Central	Some	2	2
6 – West Central	Yes	75	91
6 – West Central	No	21	6
6 – West Central	Some	4	4
7 – Southwest	Yes	71	83
7 – Southwest	No	25	13
7 – Southwest	Some	4	4
8 – South Central	Yes	70	88
8 – South Central	No	26	9
8 – South Central	Some	3	3
9 – Southeast	Yes	62	86
9 – Southeast	No	34	11
9 – Southeast	Some	4	4
10 – Metro	Yes	68	89
10 – Metro	No	29	9
10 - Metro	Some	3	2
Statewide	Yes	68	86
Statewide	No	29	11
Statewide	Some	4	4

*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-three percent of all statewide respondents who applied herbicide themselves usually read the label. This percentage drops to 71% 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	83	91
1 – Northwest Red River	No	17	9
4 – Central Sands	Yes	64	94
4 – Central Sands	No	36	6
5 – East Central	Yes	68	90
5 – East Central	No	32	10
6 – West Central	Yes	84	96
6 – West Central	No	16	4
7 – Southwest	Yes	77	94
7 – Southwest	No	23	6
8 – South Central	Yes	73	94
8 – South Central	No	27	6
9 – Southeast	Yes	63	90
9 – Southeast	No	37	10
10 – Metro	Yes	64	93
10 – Metro	No	36	7
Statewide	Yes	71	93
Statewide	No	29	7

*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 at least **some** of their corn acres. A “No” response means they did not use atrazine on any of their corn acres. Table 7 details the responses to the question of whether atrazine was used and the percentage of farmers who knew if they applied atrazine (answered yes or no). Statewide, 20 percent of the respondents applied atrazine on some of their acres.

Table 7. “Was Atrazine applied on any of your corn acres in 2008, premixes included?” (Q.8)

Pesticide Monitoring Area	Atrazine Applied	Percent of All Respondents	Percent of Respondents who Knew[§]
1 – Northwest Red River	Yes	13	13
1 – Northwest Red River	No	85	87
1 – Northwest Red River	Don’t Know	2	
4 – Central Sands	Yes	16	17
4 – Central Sands	No	78	83
4 – Central Sands	Don’t Know	6	
5 – East Central	Yes	25	27
5 – East Central	No	66	73
5 – East Central	Don’t Know	9	
6 – West Central	Yes	13	13
6 – West Central	No	84	87
6 – West Central	Don’t Know	4	
7 – Southwest	Yes	15	16
7 – Southwest	No	79	84
7 – Southwest	Don’t Know	6	
8 – South Central	Yes	13	14
8 – South Central	No	83	86
8 – South Central	Don’t Know	3	
9 – Southeast	Yes	26	28
9 – Southeast	No	66	72
9 – Southeast	Don’t Know	8	
10 – Metro	Yes	21	23
10 – Metro	No	69	77
10 – Metro	Don’t Know	10	
Statewide	Yes	19	20
Statewide	No	76	80
Statewide	Don’t Know	5	

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

*Totals may not add due to rounding

Five percent (or 137 farmers) of the producers were not aware whether their herbicide package included atrazine (as an AI). Of this subgroup, 46% (or 63 farmers) knew the product(s) in their package. Of the farmers that knew the product name(s), it was determined that 48% (or 20 farmers) did apply a product within their herbicide package that contained atrazine.

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 if they were later determined to have applied atrazine through identification of the product name. These farmers were classified through Q.8, Q.9, and Q.10.

Table 8. “Was Atrazine incorporated on any of your corn acres in 2008, premixes included?” (Q.11)

Pesticide Monitoring Area	Was Atrazine Incorporated?	Percent of Respondents
1 – Northwest Red River	Yes	9
1 – Northwest Red River	No	91
4 – Central Sands	Yes	21
4 – Central Sands	No	79
5 – East Central	Yes	35
5 – East Central	No	65
6 – West Central	Yes	27
6 – West Central	No	73
7 – Southwest	Yes	24
7 – Southwest	No	76
8 – South Central	Yes	19
8 – South Central	No	81
9 – Southeast	Yes	25
9 – Southeast	No	75
10 – Metro	Yes	16
10 – Metro	No	86
Statewide	Yes	22
Statewide	No	78

*Totals may not add due to rounding

Table 9. "Was Atrazine split applied on any of your corn acres in 2008, premixes included?" (Q.12)

Pesticide Monitoring Area	Was Atrazine Split Applied	Percent of Respondents
1 – Northwest Red River	Yes	0
1 – Northwest Red River	No	100
4 – Central Sands	Yes	4
4 – Central Sands	No	96
5 – East Central	Yes	0
5 – East Central	No	100
6 – West Central	Yes	11
6 – West Central	No	89
7 – Southwest	Yes	4
7 – Southwest	No	96
8 – South Central	Yes	5
8 – South Central	No	95
9 – Southeast	Yes	5
9 – Southeast	No	95
10 – Metro	Yes	0
10 – Metro	No	100
Statewide	Yes	4
Statewide	No	96

*Totals may not add due to rounding

Table 10. “Was Acetochlor applied on any of your corn acres in 2008, premixes included?” (Q.13)

Pesticide Monitoring Area	Acetochlor Applied	Percent of All Respondents	Percent of Respondents who Knew[§]
1 – Northwest Red River	Yes	4	5
1 – Northwest Red River	No	91	95
1 – Northwest Red River	Don't Know	5	
4 – Central Sands	Yes	9	10
4 – Central Sands	No	80	90
4 – Central Sands	Don't Know	11	
5 – East Central	Yes	5	5
5 – East Central	No	82	95
5 – East Central	Don't Know	14	
6 – West Central	Yes	7	7
6 – West Central	No	84	93
6 – West Central	Don't Know	9	
7 – Southwest	Yes	9	10
7 – Southwest	No	80	90
7 – Southwest	Don't Know	11	
8 – South Central	Yes	12	14
8 – South Central	No	76	86
8 – South Central	Don't Know	12	
9 – Southeast	Yes	11	13
9 – Southeast	No	73	87
9 – Southeast	Don't Know	16	
10 – Metro	Yes	10	13
10 – Metro	No	69	87
10 – Metro	Don't Know	21	
Statewide	Yes	10	11
Statewide	No	78	89
Statewide	Don't Know	12	

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

*Totals may not add due to rounding

Editor’s Note. Twelve percent (or 311 farmers) of the producers were not aware if their herbicide package included acetochlor. Of this subgroup, 55% (or 171 farmers) identified the product name. Of the farmers that knew the product, 50% (or 85 farmers) did apply acetochlor. This was determined by providing the AIs in the products stated to have been applied by the farmers.

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 when they were determined to have applied acetochlor through identification of the product name. These farmers were classified through Q.13, Q.14, and Q.15.

Due to the straight-forward nature of the remaining tables, only a minimal amount of supporting information was provided under the “Editor’s Notes”.

Table 11. “Was Acetochlor incorporated on any of your corn acres in 2008, premixes included?” (Q.16)

Pesticide Monitoring Area	Was Acetochlor Incorporated?	Percent of Respondents
1 – Northwest Red River	Yes	75
1 – Northwest Red River	No	25
4 – Central Sands	Yes	26
4 – Central Sands	No	74
5 – East Central	Yes	0
5 – East Central	No	100
6 – West Central	Yes	74
6 – West Central	No	26
7 – Southwest	Yes	70
7 – Southwest	No	30
8 – South Central	Yes	57
8 – South Central	No	43
9 – Southeast	Yes	29
9 – Southeast	No	71
10 – Metro	Yes	30
10 – Metro	No	70
Statewide	Yes	47
Statewide	No	53

*Totals may not add due to rounding

Table 12. “Was Acetochlor split applied on any of your corn acres in 2008, 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	1
4 – Central Sands	No	99
5 – East Central	Yes	0
5 – East Central	No	100
6 – West Central	Yes	0
6 – West Central	No	100
7 – Southwest	Yes	1
7 – Southwest	No	99
8 – South Central	Yes	2
8 – South Central	No	98
9 – Southeast	Yes	2
9 – Southeast	No	98
10 – Metro	Yes	0
10 – Metro	No	100
Statewide	Yes	2
Statewide	No	98

*Totals may not add due to rounding

Herbicide Program Decisions

Questions 18-21 were related to herbicide decisions. Only farmers who applied atrazine or acetochlor answered these questions. Of the 2,765 farmers surveyed, 706 (26 percent) applied either atrazine or acetochlor. The following questions were answered by those 706 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	38
1 – Northwest Red River	Dealer/Consultant	15
1 – Northwest Red River	Both	46
4 – Central Sands	Farmer	33
4 – Central Sands	Dealer/Consultant	23
4 – Central Sands	Both	43
5 – East Central	Farmer	20
5 – East Central	Dealer/Consultant	25
5 – East Central	Both	55
6 – West Central	Farmer	39
6 – West Central	Dealer/Consultant	23
6 – West Central	Both	39
7 – Southwest	Farmer	42
7 – Southwest	Dealer/Consultant	16
7 – Southwest	Both	41
8 – South Central	Farmer	45
8 – South Central	Dealer/Consultant	14
8 – South Central	Both	41
9 – Southeast	Farmer	31
9 – Southeast	Dealer/Consultant	20
9 – Southeast	Both	48
10 – Metro	Farmer	23
10 – Metro	Dealer/Consultant	19
10 – Metro	Both	58
Statewide	Farmer	38
Statewide	Dealer/Consultant	18
Statewide	Both	44

*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	57
1 – Northwest Red River	Dealer/Consultant	17
1 – Northwest Red River	Both	26
4 – Central Sands	Farmer	56
4 – Central Sands	Dealer/Consultant	23
4 – Central Sands	Both	21
5 – East Central	Farmer	55
5 – East Central	Dealer/Consultant	15
5 – East Central	Both	30
6 – West Central	Farmer	55
6 – West Central	Dealer/Consultant	20
6 – West Central	Both	25
7 – Southwest	Farmer	62
7 – Southwest	Dealer/Consultant	12
7 – Southwest	Both	26
8 – South Central	Farmer	61
8 – South Central	Dealer/Consultant	14
8 – South Central	Both	25
9 – Southeast	Farmer	51
9 – Southeast	Dealer/Consultant	18
9 – Southeast	Both	31
10 – Metro	Farmer	42
10 – Metro	Dealer/Consultant	23
10 – Metro	Both	35
Statewide	Farmer	57
Statewide	Dealer/Consultant	17
Statewide	Both	26

*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	54
1 – Northwest Red River	Dealer/Consultant	15
1 – Northwest Red River	Both	31
1 – Northwest Red River	Field Not Scouted	0
4 – Central Sands	Farmer	49
4 – Central Sands	Dealer/Consultant	30
4 – Central Sands	Both	20
4 – Central Sands	Field Not Scouted	1
5 – East Central	Farmer	55
5 – East Central	Dealer/Consultant	30
5 – East Central	Both	15
5 – East Central	Field Not Scouted	0
6 – West Central	Farmer	64
6 – West Central	Dealer/Consultant	23
6 – West Central	Both	14
6 – West Central	Field Not Scouted	0
7 – Southwest	Farmer	59
7 – Southwest	Dealer/Consultant	19
7 – Southwest	Both	21
7 – Southwest	Field Not Scouted	1
8 – South Central	Farmer	58
8 – South Central	Dealer/Consultant	20
8 – South Central	Both	20
8 – South Central	Field Not Scouted	2
9 – Southeast	Farmer	51
9 – Southeast	Dealer/Consultant	27
9 – Southeast	Both	21
9 – Southeast	Field Not Scouted	1
10 – Metro	Farmer	6
10 – Metro	Dealer/Consultant	41
10 – Metro	Both	53
10 – Metro	Field Not Scouted	0
Statewide	Farmer	55
Statewide	Dealer/Consultant	24
Statewide	Both	21
Statewide	Field Not Scouted	1

*Totals may not add due to rounding

Table 16. “Who determines if application 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	46
1 – Northwest Red River	Dealer/Consultant	31
1 – Northwest Red River	Both	23
1 – Northwest Red River	Neither	0
4 – Central Sands	Farmer	41
4 – Central Sands	Dealer/Consultant	34
4 – Central Sands	Both	22
4 – Central Sands	Neither	2
5 – East Central	Farmer	60
5 – East Central	Dealer/Consultant	35
5 – East Central	Both	5
5 – East Central	Neither	0
6 – West Central	Farmer	45
6 – West Central	Dealer/Consultant	30
6 – West Central	Both	25
6 – West Central	Neither	0
7 – Southwest	Farmer	59
7 – Southwest	Dealer/Consultant	19
7 – Southwest	Both	21
7 – Southwest	Neither	1
8 – South Central	Farmer	52
8 – South Central	Dealer/Consultant	24
8 – South Central	Both	22
8 – South Central	Neither	2
9 – Southeast	Farmer	47
9 – Southeast	Dealer/Consultant	28
9 – Southeast	Both	23
9 – Southeast	Neither	2
10 – Metro	Farmer	38
10 – Metro	Dealer/Consultant	27
10 – Metro	Both	35
10 – Metro	Neither	0
Statewide	Farmer	49
Statewide	Dealer/Consultant	27
Statewide	Both	22
Statewide	Neither	2

*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	0
1 – Northwest Red River	No	100
4 – Central Sands	Yes	21
4 – Central Sands	No	79
5 – East Central	Yes	0
5 – East Central	No	100
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	18
7 – Southwest	No	82
8 – South Central	Yes	17
8 – South Central	No	83
9 – Southeast	Yes	14
9 – Southeast	No	86
10 – Metro	Yes	15
10 - Metro	No	85
Statewide	Yes	16
Statewide	No	84

*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	77
1 – Northwest Red River	No	23
4 – Central Sands	Yes	92
4 – Central Sands	No	8
5 – East Central	Yes	80
5 – East Central	No	20
6 – West Central	Yes	91
6 – West Central	No	9
7 – Southwest	Yes	90
7 – Southwest	No	10
8 – South Central	Yes	93
8 – South Central	No	7
9 – Southeast	Yes	93
9 – Southeast	No	7
10 – Metro	Yes	100
10 - Metro	No	0
Statewide	Yes	92
Statewide	No	8

*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	69
1 – Northwest Red River	No	31
4 – Central Sands	Yes	93
4 – Central Sands	No	7
5 – East Central	Yes	70
5 – East Central	No	30
6 – West Central	Yes	86
6 – West Central	No	14
7 – Southwest	Yes	86
7 – Southwest	No	14
8 – South Central	Yes	85
8 – South Central	No	15
9 – Southeast	Yes	86
9 – Southeast	No	14
10 – Metro	Yes	96
10 - Metro	No	4
Statewide	Yes	87
Statewide	No	13

*Totals may not add due to rounding

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

Pesticide Monitoring Area	Organic Matter Known of Farm Soils	Percent of Respondents
1 – Northwest Red River	Yes	62
1 – Northwest Red River	No	38
4 – Central Sands	Yes	62
4 – Central Sands	No	38
5 – East Central	Yes	40
5 – East Central	No	60
6 – West Central	Yes	82
6 – West Central	No	18
7 – Southwest	Yes	74
7 – Southwest	No	26
8 – South Central	Yes	78
8 – South Central	No	22
9 – Southeast	Yes	65
9 – Southeast	No	35
10 – Metro	Yes	77
10 - Metro	No	23
Statewide	Yes	71
Statewide	No	29

*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	46
1 – Northwest Red River	No	54
4 – Central Sands	Yes	43
4 – Central Sands	No	57
5 – East Central	Yes	40
5 – East Central	No	60
6 – West Central	Yes	45
6 – West Central	No	55
7 – Southwest	Yes	34
7 – Southwest	No	66
8 – South Central	Yes	40
8 – South Central	No	60
9 – Southeast	Yes	30
9 – Southeast	No	70
10 – Metro	Yes	50
10 – Metro	No	50
Statewide	Yes	39
Statewide	No	61

*Totals may not add due to rounding

Editor’s Note: Respondents that answered, “No” were then asked whether they believed 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	54	15	31
4 – Central Sands	60	18	22
5 – East Central	50	30	20
6 – West Central	41	27	32
7 – Southwest	45	23	32
8 – South Central	40	28	32
9 – Southeast	55	22	33
10 – Metro	73	15	12
Statewide	49	25	26

*Totals may not add due to rounding

Editor’s Note: Respondents who answered, “Yes”, to question 28 were then asked, “How was the depth primarily determined?” Figure 1 details their responses.

Figure 1. Information sources used to determine water table depth (Q.28)

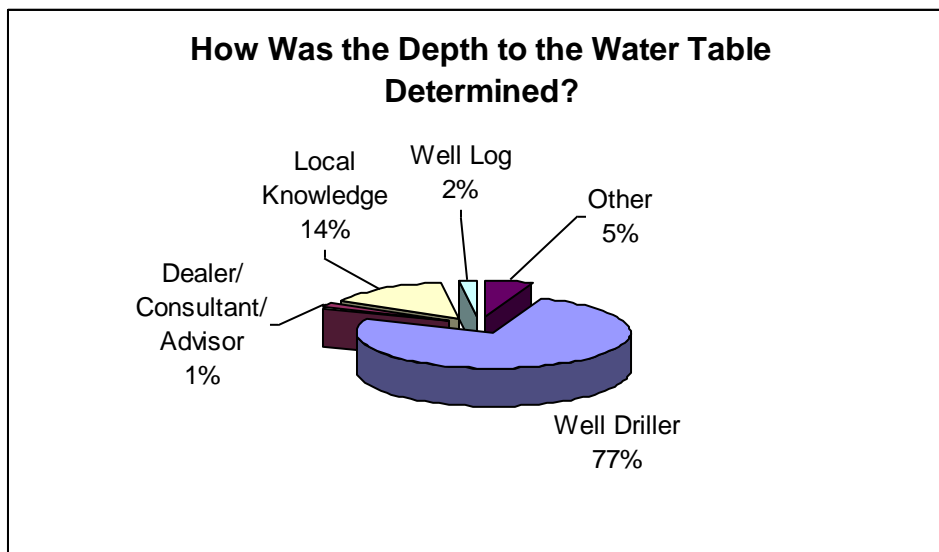


Table 23. “Are any streams, lakes, or other surface waters immediately adjacent to or in your corn fields?” (Q.29)

Pesticide Monitoring Area	Surface Water Adjacent to or in Field	Percent of Respondents
1 – Northwest Red River	Yes	38%
1 – Northwest Red River	No	62%
4 – Central Sands	Yes	28%
4 – Central Sands	No	72%
5 – East Central	Yes	40%
5 – East Central	No	60%
6 – West Central	Yes	36%
6 – West Central	No	64%
7 – Southwest	Yes	33%
7 – Southwest	No	67%
8 – South Central	Yes	47%
8 – South Central	No	53%
9 – Southeast	Yes	28%
9 – Southeast	No	72%
10 – Metro	Yes	31%
10 - Metro	No	69%
Statewide	Yes	36%
Statewide	No	64%

*Totals may not add due to rounding

Editor’s Note: Respondents who answered, “Yes” to question 29 were then asked, “Are there filter strips or vegetative buffers on any of these acres?” Table 24 details their responses.

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

Pesticide Monitoring Area	Filter Strips or Buffers	Percent of Respondents
1 – Northwest Red River	Yes	60
1 – Northwest Red River	No	40
4 – Central Sands	Yes	95
4 – Central Sands	No	5
5 – East Central	Yes	75
5 – East Central	No	25
6 – West Central	Yes	88
6 – West Central	No	13
7 – Southwest	Yes	87
7 – Southwest	No	13
8 – South Central	Yes	88
8 – South Central	No	12
9 – Southeast	Yes	95
9 – Southeast	No	5
10 – Metro	Yes	100
10 - Metro	No	1
Statewide	Yes	89
Statewide	No	11

*Totals may not add due to rounding

Editor’s Note: Respondents who answered “Yes” to question 29a in regards to having filter strips or vegetative buffers were then asked, “Were they required as part of a conservation program?” Table 25 details their responses.

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

Pesticide Monitoring Area	Response	Percent of Respondents
1 – Northwest Red River	Yes	0
1 – Northwest Red River	No	100
4 – Central Sands	Yes	23
4 – Central Sands	No	77
5 – East Central	Yes	17
5 – East Central	No	83
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	25
7 – Southwest	No	75
8 – South Central	Yes	28
8 – South Central	No	72
9 – Southeast	Yes	47
9 – Southeast	No	53
10 – Metro	Yes	13
10 - Metro	No	88
Statewide	Yes	28
Statewide	No	72

*Totals may not add due to rounding

Table 26. “Do you irrigate corn?” (Q.30)

Pesticide Monitoring Area	Irrigation	Percent of Respondents
1 – Northwest Red River	Yes	8
1 – Northwest Red River	No	92
4 – Central Sands	Yes	18
4 – Central Sands	No	82
5 – East Central	Yes	5
5 – East Central	No	95
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	1
7 – Southwest	No	99
8 – South Central	Yes	2
8 – South Central	No	98
9 – Southeast	Yes	0
9 – Southeast	No	100
10 – Metro	Yes	23
10 - Metro	No	77
Statewide	Yes	6
Statewide	No	94

*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	74
Statewide	No	26

*Totals may not add due to rounding

Editor’s Note. Only six percent (or 42) of the farmers used irrigation on corn acres. Due to the small numbers of farmers irrigating, only statewide data is reported.

Figure 2. “What type of tillage did you use before planting on the majority of your corn aces?” (Q.32)

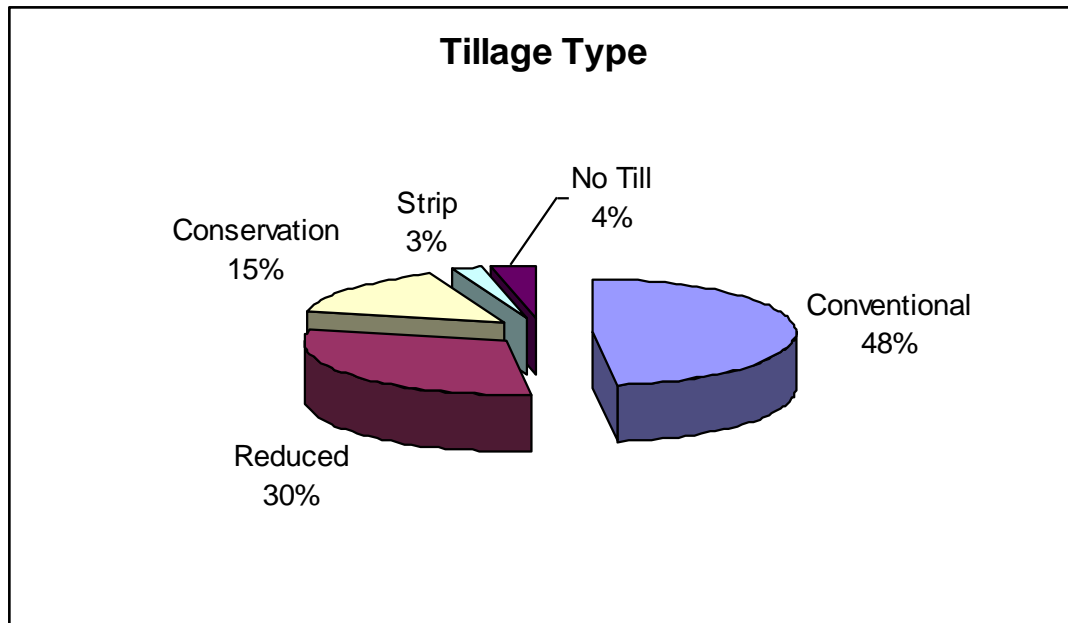


Table 28. “Do you use precision applications for herbicides (variable rate applications)?” (Q.33)

Pesticide Monitoring Area	Variable Rate Applications	Percent of Respondents
1 – Northwest Red River	Yes	15
1 – Northwest Red River	No	85
4 – Central Sands	Yes	37
4 – Central Sands	No	63
5 – East Central	Yes	40
5 – East Central	No	60
6 – West Central	Yes	24
6 – West Central	No	57
7 – Southwest	Yes	36
7 – Southwest	No	64
8 – South Central	Yes	33
8 – South Central	No	67
9 – Southeast	Yes	35
9 – Southeast	No	65
10 – Metro	Yes	27
10 - Metro	No	73
Statewide	Yes	34
Statewide	No	66

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	85
1 – Northwest Red River	No	15
4 – Central Sands	Yes	85
4 – Central Sands	No	15
5 – East Central	Yes	90
5 – East Central	No	10
6 – West Central	Yes	86
6 – West Central	No	14
7 – Southwest	Yes	92
7 – Southwest	No	8
8 – South Central	Yes	89
8 – South Central	No	11
9 – Southeast	Yes	89
9 – Southeast	No	11
10 – Metro	Yes	92
10 - Metro	No	8
Statewide	Yes	88
Statewide	No	12

*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	23
1 – Northwest Red River	No	77
4 – Central Sands	Yes	51
4 – Central Sands	No	49
5 – East Central	Yes	50
5 – East Central	No	50
6 – West Central	Yes	55
6 – West Central	No	45
7 – Southwest	Yes	48
7 – Southwest	No	52
8 – South Central	Yes	50
8 – South Central	No	50
9 – Southeast	Yes	50
9 – Southeast	No	50
10 – Metro	Yes	62
10 - Metro	No	38
Statewide	Yes	50
Statewide	No	50

*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	77
1 – Northwest Red River	No	23
4 – Central Sands	Yes	68
4 – Central Sands	No	32
5 – East Central	Yes	60
5 – East Central	No	40
6 – West Central	Yes	80
6 – West Central	No	20
7 – Southwest	Yes	66
7 – Southwest	No	34
8 – South Central	Yes	77
8 – South Central	No	23
9 – Southeast	Yes	79
9 – Southeast	No	21
10 – Metro	Yes	62
10 - Metro	No	38
Statewide	Yes	74
Statewide	No	26

*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	31
1 – Northwest Red River	No	69
4 – Central Sands	Yes	45
4 – Central Sands	No	55
5 – East Central	Yes	40
5 – East Central	No	60
6 – West Central	Yes	57
6 – West Central	No	43
7 – Southwest	Yes	47
7 – Southwest	No	53
8 – South Central	Yes	53
8 – South Central	No	47
9 – Southeast	Yes	52
9 – Southeast	No	48
10 – Metro	Yes	38
10 - Metro	No	62
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	0
1 – Northwest Red River	No	100
4 – Central Sands	Yes	10
4 – Central Sands	No	90
5 – East Central	Yes	5
5 – East Central	No	95
6 – West Central	Yes	7
6 – West Central	No	93
7 – Southwest	Yes	1
7 – Southwest	No	99
8 – South Central	Yes	9
8 – South Central	No	91
9 – Southeast	Yes	7
9 – Southeast	No	93
10 – Metro	Yes	0
10 - Metro	No	100
Statewide	Yes	7
Statewide	No	93

*Totals may not add due to rounding

Appendix 1. Survey Form

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

MINNESOTA
AGRICULTURAL
STATISTICS
SERVICE

Annual Pesticide Survey: Herbicide Applications and Practices on Corn in Planning for or During the 2008 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 2008?

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

d. Have or will there be any hogs, cattle, sheep, horses, or other livestock, or poultry on this operation at anytime during 2008?

YES NO

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

Did you grow corn on your operation in 2008?

(Exclude sweet corn and popcorn)

YES NO - conclude interview

3. How many corn acres were planted for field corn in 2008?

GENERAL INFORMATION

4. On your 2008 corn acres, did you:

Apply herbicides yourself? 1

Have herbicides custom applied? 2

Both? 3

Don't use herbicides [conclude interview] 4

Enter Code

5. Do you know the active ingredients of the herbicides you used on corn acres in 2008?

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 2008, 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 2008?

Yes = 1 No = 2 (go to 13)

10. Were any of the following products applied on your corn acres in 2008?

**Computer list of products used

Yes = 1 No = 2 (go to 13)

11. Was Atrazine incorporated on any of your corn acres in 2008, premixes included?

Yes = 1 No = 2 I Don' Know = 4

12. Was Atrazine split-applied on any of your corn acres in 2008, premixes included?

Yes = 1 No = 2 I Don' Know = 4

Acetochlor specific questions

13. Was Acetochlor applied on any of your corn acres in 2008, 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 2008?

Yes = 1 No = 2 (go to 18)

15. Were any of the following products applied on your corn acres in 2008?

**Computer list of products used

Yes = 1 No = 2 (go to 18)

16. Was Acetochlor incorporated on any of your corn acres in 2008, premixes included?

Yes = 1 No = 2 Don't Know = 3

17. Was Acetochlor split-applied on any of your corn acres in 2008, 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 Herbicide 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

SCOUTING FOR WEEDS and RELATED PRACTICES

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	<input type="checkbox"/>	<u>Enter Code</u>
Local knowledge		2	<input type="checkbox"/>	
A dealer, consultant or crop advisor		3	<input type="checkbox"/>	
Well log		4	<input type="checkbox"/>	
None of the above		5	<input type="checkbox"/>	

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 <input type="checkbox"/> | } <u>Enter Code</u> |
| Reduced Tillage 15 – 30? | 2 <input type="checkbox"/> | |
| Conservation Tillage > 30? | 3 <input type="checkbox"/> | |
| Strip Tillage | 4 <input type="checkbox"/> | |
| No Tillage | 5 <input type="checkbox"/> | |

Now we are 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