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Midwestern Farm and Producer Surveys

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2021 Midwestern Producer Survey Descriptive Results

Tong Wang

Stephen Cheye

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2021 Midwestern Producer Survey Descriptive Results



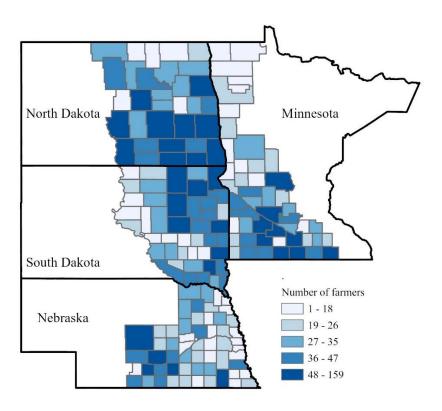
Prepared in June 2021 by:

Dr. Tong Wang, Associate Professor and Advanced Production Specialist, South Dakota State University and Stephen Cheye, M.S. student, South Dakota State University.

For questions or more information, please contact: <u>Tong.wang@sdstate.edu</u>

Methods

From July to September 2021, researchers from South Dakota State University, South Dakota School of Mines and Technology, North Dakota State University, University of Minnesota and University of Nebraska - Lincoln conducted a survey among farmers in four U.S. Midwestern states, namely North Dakota, South Dakota, Minnesota, and Nebraska. This survey aimed to better understand how farmers are using conservation practices and precision technologies and any issues with using them.



Our mailing sample consists of contact information for 1,500 randomly selected farmers who grew at least 100 acres of corn in primary corn grown regions of each state (See map above). In accordance with a modified Tailored Design Method (Dillman et al. 2014)¹, the 6,000 operations in the sample were contacted up to four times. An advance letter was sent to those in the final sample informing them about the project and including a link to answer the questionnaire online. Those who did not respond in the first wave were then mailed the paper questionnaires and return envelopes, followed by a reminder postcard about two weeks later, and a second paper copy of the survey and envelope about two weeks after that. To encourage responses, we also provided a \$2 bill token pre-incentive and entered respondents in a drawing with ten winners receiving \$100 gift cards. We have 5,473 eligible addresses after removing 101 non-deliverable addresses and 426 no longer farming farmers from the sample. The process achieved a response rate of 20.4% with 1,119 questionnaires received. Below we outline the descriptive results to the 2021 Midwestern agricultural producer survey.

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¹ Don A. Dillman, Jolene D. Smyth, and Leah Melani Christian. 2014. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*, 4th Edition. Hoboken, NJ: Wiley.

Section I: Farm Information

1. Where is most of your operated farmland located?

State: County: Zip code:

STATE	N	Percentage
MN	349	31.2%
SD	290	25.9%
ND	222	19.8%
NE	258	23.1%
Total	1,119	100

2. About how many miles is your largest field away from your home?

	Mean	Range
Distance (N= 1096)	8.13	0-140

3. Of your operated farmland in 2020, how many acres did you own and rent?

	ACRES OWNED			ACRES RENTED		
	Mean	Mean Range N			Range	N
Cropland (Excluding CRP)	640.5	0-14000	1,083	780.3	0- 11500	1,073
Pasture or rangeland	142.2	0-4800	1,033	153.9	0- 12000	1,015
CRP land	24.1	0- 3000	1,023	5.2	0-600	1,001

4. **In 2020**, about what percentage of your cropland is organic (either certified or non-certified)?

	0%	1-5%	6-10%	11-20%	21-30%	>30%
Certificated organic land (N= 1,062)	98.7%	0.1%	0.1%	0.3%	0.3%	0.6%
Non-certified organic land (N= 1,043)	90.6%	0.3%	0.5%	0.6%	0.4%	7.7%

5. My cropland acres are: Non-irrigated Partly irrigated All irrigated (N= 1,109)

	N	Percentage
Non-irrigated	869	78.4%
Partly irrigated	198	17.9%
All irrigated	42	3.8%

6. What are your typical corn and soybean yields?

CROPS	YIEL	D (BUSHELS/ACRE	2)
CROTS	Mean	Range	N
Corn	179.7	0- 900	1,096
Soybeans	51.7	0-800	1,096

7. **In 2020,** about what percentage of your cropland had the following issues?

	0%	1-5%	6-10%	11-20%	21-30%	>30%
Highly erodible land (N=1,077)	39.0%	30.6%	11.7%	6.2%	3.3%	9.1%
Slow draining soil (N= 1,067)	18.5%	28.8%	21.7%	13.1%	8.3%	9.6%
Saline or sodic conditions (N= 1,034)	41.0%	35.7%	12.1%	6.3%	3.3%	1.6%

8. **Over the past 10 years**, how has your farm changed (<u>including both owned and rented acres</u>)?

	Decreased by > 10%	Decreased by 5-10%	About the Same	Increased by 5-10%	Increased by >10%
Your cropland acres (N=1,107)	9.9%	7.6%	48.8%	15.4%	18.4%
Your grassland acres (N= 979)	5.1%	3.4%	79.1%	5.7%	6.7%
Your total farm acres (N= 1,078)	8.9%	6.6%	49.7%	15.4%	19.4%

Section II: Farm Management and Climate

9.	Please check the age range(s) of the primary decision-maker(s) on your farm (Please select all that
	apply if more than one person makes decisions) 1 if checked, otherwise leave blank
	1 18 to 30 years \square 31 to 40 years \square 41 to 50 years \square 51 to 70 years \square 71+ years

AGE RANGE	18 - 30	31 - 40	41 - 50	51 - 70	71+
N	42	144	176	699	149
Percentage	3.4%	11.9%	14.5%	57.8%	12.3%

10. When managing your farm, how do you rate the **importance of the following goals**:

GOALS	Not important	Slightly important	Somewhat important	Very Important	Extremely important
Maximizing crop yield (N= 1,088)	0.1%	2.1%	10.8%	50.4%	36.7%
Maximizing economic returns (N= 1,084)	0.1%	1.2%	6.4%	39.5%	52.9%
Diversifying revenue streams (N= 1,074)	4.2%	9.9%	38.6%	34.0%	13.3%
Optimizing input effectiveness (N= 1,074)	0.2%	2.3%	17.0%	55.2%	25.2%
Keeping pace with new technology (N= 1,083)	4.1%	15.2%	40.8%	31.1%	8.8%
Improving soil health (N= 1,080)	0.3%	1.9%	17.0%	52.6%	28.2%
Reducing environmental footprint (N=1,070)	4.3%	11.6%	36.9%	34.9%	12.3%
Achieving desirable work-life balance (N= 1,080)	2.9%	7.4%	30.7%	42.5%	16.5%

11. Do you feel these trends have affected your farm over **the last 10 years**?

TRENDS	Strongly Disagree	Disagree	Neutral (No idea)	Agree	Strongly Agree
Rising temperature (N= 1,083)	9.6%	19.2%	41.9%	24.5%	4.8%
More severe wet conditions (N= 1,084)	6.1%	17.0%	27.9%	40.3%	8.8%
More drought conditions (N= 1,086)	5.3%	18.1%	35.2%	33.9%	7.6%
More issues with pests (N= 1,085)	4.4%	15.5%	37.2%	35.7%	7.2%

12. Would you consider adding or keeping any of these practices within the next 5 years?

PRACTICES	Very unlikely	Unlikely	Neutral (No idea)	Likely	Very likely
Conservation tillage (no-till, strip-till, mulch-till) (N= 1,085)	6.5%	10.1%	14.2%	32.4%	36.8%
Cover crops (N= 1,082)	9.5%	16.5%	26.0%	33.4%	14.6%
Diversified crop rotation (3 or more crops) (N= 1,082)	5.9%	17.4%	27.5%	27.8%	21.4%
Controlled-release fertilizer (N= 1,084)	1.9%	6.8%	30.7%	42.9%	17.6%
Converting cropland to grassland (N= 1,086)	33.0%	36.7%	21.3%	7.1%	2.0%

Section III: Precision Agriculture (PA) Technology

13. Please rate the importance of these factors to your adoption decisions of precision technologies.

FACTORS	Not important	Slightly important	Somewhat important	Very Important	Extremely important
Optimizing input usage (fertilizer/pesticide/irrigation, etc.) (N= 1,077)	1.8%	2.6%	18.7%	54.2%	22.8%
Improving profitability (N= 1,081)	0.9%	0.9%	10.4%	47.9%	39.9%
Finding field areas that need attention (N= 1,071)	1.4%	4.6%	25.9%	51.4%	16.8%
Saving labor time/costs (N= 1,081)	2.2%	5.3%	25.5%	47.6%	19.4%
Enabling intercropping practices (N= 1,072).	27.9%	22.6%	35.7%	10.6%	3.2%
Reducing fatigue during planting/harvest (N= 1,078)	10.3%	14.1%	36.2%	29.3%	10.1%
Keeping records for carbon credits (N= 1,075)	34.2%	23.2%	30.1%	9.9%	2.6%
Helping the environment (N= 1,079)	5.7%	10.3%	30.5%	41.2%	12.3%
Getting kids into farming (N= 1,083)	12.0%	9.1%	22.4%	35.6%	20.8%

14. Please rate your view on the following statements about precision agriculture (PA) technologies.

STATEMENTS	Strongly Disagree	Disagree	Neutral (No idea)	Agree	Strongly Agree
Limited information about the best PA technologies for my farm/region (N= 1,073)	4.9%	21.8%	48.6%	22.3%	2.4%
Limited on-farm research and demonstration (N= 1,073)	3.5%	18.6%	45.3%	29.7%	2.9%
Not sure whether soil conditions on my farm will benefit from PA (N= 1,073)	6.3%	32.0%	38.4%	21.1%	2.2%
Cost of PA equipment too high (N= 1,077)	2.4%	8.7%	26.0%	46.3%	16.5%
Cost of PA service fee too high (N= 1,077)	2.3%	6.7%	29.6%	44.6%	16.8%
Lack of compatibility among different brands (N= 1,072)	1.5%	5.4%	42.5%	38.3%	12.3%
PA technology too time-consuming to learn (N= 1,071)	5.6%	27.2%	40.6%	22.5%	4.1%
Not confident in prescription maps and agronomic recommendations (N= 1,074)	8.1%	35.6%	34.2%	18.1%	4.1%
Not sure how to use PA data effectively (N= 1,075)	5.3%	23.7%	37.7%	28.8%	4.5%
Lack of strong, reliable internet connectivity (N= 1,074)	11.6%	25.9%	28.9%	24.9%	8.9%
Concerned over data privacy (N= 1,075)	5.1%	12.1%	33.3%	32.2%	17.3%

15. Please tell us how many years you have been using these precision agriculture (PA) technologies.

PRECISION AGRICULTURE TECHNOLOGIES	Not adopted	< 3 years	3-5 years	6-10 years	10+ years	Dis- adopted
Auto-steering and guidance (N= 1,100)	24.4%	6.2%	11.6%	22.6%	35.2%	0%
Automatic section control (N= 1,089)	40.0%	7.7%	11.4%	22.3%	17.9%	0.1%
Satellite/aerial imagery (N= 1,088)	42.1%	12.4%	17.2%	15.0%	13.0%	0.4%
UAV or drone imagery (N= 1,092)	73.8%	14.6%	6.9%	3.1%	1.3%	0.4%
Yield monitoring and mapping (N= 1,093)	28.2%	8.9%	14.3%	19.4%	28.9%	0.4%
Management zones (N= 1,086)	54.0%	9.1%	11.1%	13.2%	12.0%	0.6%
Sensors for N management (N= 1,089)	87.6%	4.8%	3.3%	2.1%	1.8%	0.4%
Sensor-based variable rate (VR) technology (N= 1,085)	75.4%	6.9%	6.5%	6.8%	3.9%	0.5%
Prescription-based VR technology (N= 1,084)	51.9%	9.5%	12.8%	12.7%	12.4%	0.7%
VR seeding application (N= 1,085)	57.7%	8.0%	12.2%	12.4%	9.2%	0.6%
VR fertilizer/lime application (N= 1,088)	45.6%	11.0%	13.6%	15.4%	13.4%	0.9%
VR pesticide application (N= 1,086)	85.2%	3.8%	3.1%	3.4%	4.0%	0.6%
VR irrigation application (N= 1,077)	91.8%	1.7%	1.5%	2.3%	1.8%	0.9%

16. On average, how do you rate your **profit change** after adopting the following PA practices? (If you have NOT adopted the practice yet, please rate your perceived change).

PRECISION AGRICULTURE TECHNOLOGIES	Reduced by >10%	Reduced by 5%-10%	Little change (within 5%)	Increased by 5%-10%	Increased by >10%	No Idea
Auto-steering and guidance (N= 1,068)	1.4%	1.9%	31.8%	31.3%	13.4%	20.2%
Automatic section control (N= 1,056)	1.4%	2.5%	22.4%	31.3%	14.0%	28.3%
UAV or drone imagery (N= 1,035)	2.4%	1.1%	37.6%	6.5%	1.3%	51.2%
Satellite/aerial imagery (N= 1,044)	2.0%	0.8%	38.0%	13.2%	4.2%	41.8%
VR seeding application (N= 1,044)	1.9%	1.1%	21.1%	29.4%	10.0%	36.6%
VR fertilizer/lime application (N= 1,054)	1.9%	1.6%	17.7%	31.1%	15.6%	32.1%
VR pesticide application (N= 1,037)	1.8%	1.5%	28.9%	12.0%	4.1%	51.7%
VR irrigation application (N= 1,027)	2.6%	0.9%	23.8%	8.3%	3.7%	60.8%

17. Please check your likelihood of using the following PA technologies in **the next 5 years**.

PRECISION AGRICULTURE TECHNOLOGIES	Very Unlikely	Unlikely	Somewhat Likely	Likely	Very Likely
Auto-steering and guidance (N= 1,084)	12.4%	5.4%	7.7%	11.6%	62.9%
Automatic section control (N= 1,078)	14.3%	11.0%	11.3%	11.7%	51.7%
Satellite/aerial imagery (N=1,077)	15.2%	13.7%	21.5%	18.3%	31.3%
UAV or drone imagery (N= 1,075)	18.9%	23.3%	26.3%	15.7%	15.8%
Yield monitoring and mapping (N= 1,081)	11.0%	7.0%	12.0%	20.1%	49.9%
Management zones (N= 1,072)	15.0%	14.9%	21.6%	20.3%	28.2%
Sensors for N management (N= 1,073)	19.5%	26.6%	31.2%	14.5%	8.2%
Prescription based VR technology (N= 1,074)	17.8%	17.7%	18.8%	17.4%	28.3%
Sensor based VR technology (N= 1,066)	20.7%	27.0%	29.6%	11.8%	10.8%
VR seeding application (N= 1,074)	17.0%	17.1%	18.6%	17.8%	29.5%
VR fertilizer/lime application (N= 1,076)	15.4%	13.7%	17.4%	19.6%	33.9%
VR pesticide application (N= 1,071)	23.2%	28.7%	25.2%	12.4%	10.6%
VR irrigation application (N= 1,058)	53.4%	22.5%	11.3%	5.5%	7.4%

18. How often do you use electronic devices (computers, tablets, smart phones, etc.) for general agricultural purposes?

	Daily	Weekly	Monthly	Yearly	Never
N	819	141	41	22	72
Percentage	74.8%	12.9%	3.7%	2.0%	6.6%

19. How much has PA data/technology changed the way you farm?

	Not at all	A little	Somewhat	Greatly
N	175	237	369	314
Percentage	16.0%	21.6%	33.7%	28.7%

20. Please rate how valuable these resources are when you make PA use decisions.

RESOURCES	Not Important	Slightly Important	Somewhat Important	Very Important	Extremely Important
Machinery dealers (N= 1,074)	16.2%	11.6%	27.0%	33.5%	11.7%
Software dealers (N= 1,068)	26.2%	15.8%	28.1%	23.3%	6.6%
Fertilizer companies (N= 1,069)	20.4%	16.9%	30.3%	25.6%	6.7%
University extension (N= 1,067)	22.3%	21.5%	32.2%	18.3%	5.7%
Agricultural consultants (N= 1,074)	16.8%	13.1%	27.8%	31.9%	10.4%
Other farmers (N= 1,070)	13.4%	14.9%	34.8%	28.0%	9.0%

Section IV: Farm Management and Chemical Usage

21. How many years have you been using the following practices? Please check the relevant box if you have not adopted or have dis-adopted these practices.

PRACTICES	Not adopted	< 3 years	3-5 years	6-10 years	10+ years	Dis- adopted
No tillage (N= 1,086)	41.3%	5.3%	6.5%	8.6%	34.7%	3.6%
Reduced tillage (strip-till, mulch-till) (N= 1,080)	39.1%	6.3%	6.2%	11.9%	33.7%	2.8%
Cover crops (N= 1,082)	52.8%	17.3%	12.6%	8.1%	7.3%	1.9%
Diversified crop rotation (3 or more crops) (N= 1,081)	46.3%	6.8%	4.2%	5.2%	34.1%	3.5%
Integrated crop and livestock management (N= 1,073)	55.2%	4.4%	3.6%	6.5%	27.0%	3.3%
Field edge conservation management (buffer strips, windbreaks, etc.) (N= 1,082)	51.4%	7.8%	8.3%	5.6%	25.7%	1.2%

22. A well-managed cropland can sequester about 1 ton of carbon per acre per year. At the following carbon credit values, would you consider <u>changing your farm management practices</u> to store more carbon or reduce greenhouse gas emissions?

CARBON CREDIT	No	Not sure	Yes
\$10/ton (N= 1,028)	55.5%	41.4%	3.1%
\$20/ton (N= 1,019)	48.5%	47.5%	4.0%
\$30/ton (N= 1,019)	33.8%	55.3%	11.0%
\$40/ton (N= 1,018)	33.0%	54.8%	22.2%
\$50/ton (N= 1,027)	15.6%	45.3%	39.1%
\$70/ton (N= 1,024)	10.7%	39.2%	50.1%

23. What are the types of nitrogen fertilizer used on your farm?

NITROGEN FERTILIZER	N	Percentage
Chemical fertilizer only	472	43.3%
Manure fertilizer only (non-organic)	8	0.7%
Both chemical and manure fertilizers	606	55.6%
Organic fertilizer only	5	0.5%
Total	1,091	100%

24. Please specify the <u>nitrogen fertilizer usage for corn production</u> on your farm.

NITROGEN FERTILIZER USAGE	CHEMICAL NITROGEN FERTILIZER (Units: lbs. N/Acre)		F	URE NITROC FERTILIZER nits: lbs. N/Acre		
	Mean	Range	N	Mean	Range	N
Past Usage (2015)	283.7	0-128,000	940	236.6	0-128,000	928
Current Usage (2020)	304.6	0-135,000	939	274.4	0-135,000	925
Target Usage (2025)	302.5	0-137,000	931	334.7	0-137,000	924

Note: In the Table above, we found some answers were likely entered erroneously. Therefore, we resummarized the results below and only kept the reasonable N usage values (Between 8 and 17 observations that exceeded 300 lbs. N/acre were deleted):

NITROGEN FERTILIZER USAGE	CHEMICAL NITROGEN FERTILIZER (Units: lbs. N/Acre)		NITROGEN FERTILIZER		F	JRE NITRO ERTILIZER its: lbs. N/Acr	
	Mean	Range	N	Mean	Range	N	
Past Usage (2015)	144.4	0-300	932	25.7	0-300	912	
Current Usage (2020)	155.7	0-300	925	30.2	0-300	908	
Target Usage (2025)	140.7	0-300	919	29.8	0-300	910	

25. If your nitrogen use has changed over time, please check all applicable reasons for such change.

REASONS	N	Percentage
Soil Nutrient Test Data	619	55.3%
Cover Crops	194	17.3%
Change in Yield Goals	640	57.2%
Diversified Crop Rotation	246	22.0%
Precision Nutrient Application	295	26.4%
Continuous Cropping	168	15.0%
Livestock Integration	193	17.2%
Not applicable	150	13.4%
Total	1,119	100%

26. Please rate your agreement or disagreement with the following statements.

STATEMENTS	Strongly Disagree	Disagree	Neutral (No idea)	Agree	Strongly Agree
Conservation practices that reduce soil erosion make economic sense for my farm. (N= 1,087)	1.8%	1.9%	11.0%	52.7%	32.6%
Conservation practices will help me better cope with extreme weather events. (N= 1,087)	1.5%	4.5%	20.0%	51.1%	23.0%
Extreme weather events have become more frequent in my local area. (N= 1,091)	4.6%	14.9%	28.9%	38.6%	13.1%
Farmers' primary task should be profit-maximization. (N= 1,083)	1.6%	19.8%	27.9%	39.5%	11.3%
Farmers need to use farm practices that minimize soil erosion. (N= 1,090)	0.6%	1.2%	8.8%	61.3%	28.2%
I enjoy walking my fields on a regular basis. (N= 1,087)	0.7%	6.0%	19.5%	58.1%	15.7%
I can distinguish pests from beneficial insects. (N= 1,083)	1.1%	9.2%	29.7%	51.3%	8.6%
I am willing to change management practices to reduce fertilizer and pesticide use. (N= 1,085)	1.1%	4.2%	30.2%	54.1%	10.3%
I am willing to trade short-term economic returns for longer-term ecological credits. (N= 1,084)	3.3%	12.1%	48.6%	31.1%	4.9%
I am willing to implement conservation practices even if they involve additional costs. (N= 1,086)	3.3%	17.2%	38.8%	35.7%	5.0%
I always consider the influence of my management practices on my neighbors' farm. (N= 1,083)	2.9%	11.8%	35.6%	44.4%	5.4%
I plan to pass on my farmland to the next generation. (N= 1,087)	1.6%	2.9%	16.5%	40.5%	38.6%
My neighbor farms' management practices affect my own farming management decisions. (N= 1,083)	6.6%	19.9%	34.3%	32.4%	6.8%
My neighbor farms' practices (e.g., drainage tile, herbicide usage) negatively affect my farm. (N= 1,086)	7.6%	26.2%	34.7%	24.5%	6.9%
Receiving carbon credit payment is worth a great deal to me. (N= 1,083)	7.4%	14.5%	59.4%	14.4%	4.3%

SECTION V: About You and Your Farm

27. In what year were you born?

	Mean	Range	Percentage
Age	58.9	20-95	1,078

28. What is your gender?

	Male	Female
What is your gender? (N= 1,093)	97.7%	2.3%

29. What is the highest level of school you have completed?

LEVEL OF SCHOOL	N	PERCENTAGE
1. High school or less	287	26.2%
2. 4-year college degree	467	42.7%
3. Some college/technical school	298	27.2%
4. Advanced degree (Masters, etc.)	43	3.9%
Total	1,095	100

30. Have you completed an agricultural major in college (e.g., agronomy, animal science, agricultural business)?

	Yes	No
Have you completed an agricultural major in college (e.g., agronomy, animal science, agricultural business)? (N= 1,090)	28.3%	71.7%

31. In 2020, what percentage of your total household income came from off-farm employment?

	N	PERCENTAGE
Less than 20%	544	50.1%
21% to 40%	192	17.7%
41% to 60%	152	14.0%
61% to 80%	85	7.8%
81% or more	114	10.5%
Total	1,087	100%

32. Approximately how many years have you been making farm management decisions?

	Mean	Range	N
Years	34.5	1-75	1,065

33. Please indicate the level of your gross farm/ranch sales in a typical year.

LEVEL OF YOUR GROSS FARM/RANCH SALES	N	PERCENTAGE
Less than \$50,000	23	2.2%
From \$50,000 up to \$99,999	80	7.8%
From \$100,000 up to \$249,999	225	21.8%
From \$250,000 up to \$499,999	238	23.1%
From \$500,000 up to \$999,999	263	25.5%
\$1 million or more	201	19.5%
Total	1,030	100%

34. Please indicate the liability to asset ratio (total debt divided by total asset value) for your farming operation.

LIABILITY TO ASSET RATIO	N	Percentage
0%	225	22.3%
1 - 20%	367	36.4%
21 - 40%	262	26.0%
41 - 60%	122	12.1%
61 - 80%	23	2.3%
More than 80%	9	0.9%
Total	1,008	100%