Survey of South Dakota Producers' Current Nutrient Management Practices

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Summary

Crops grown and production practices have changed significantly in South Dakota (SD) in recent decades along with available technology. Knowledge of common nutrient management practices and how they vary across the state are needed to compare against new practices that may potentially both optimize production and protect the environment. A survey of crop producers will be conducted to document adoption rates of current nutrient management practices related to the four R's of nutrient management (Right: rate, application timing, placement, and source) and the growers' decision making process. The survey will be executed in conjunction with a sociologist at SDSU who has extensive experience conducting producer surveys throughout the Midwest and within the state of SD. This information will guide future extension educational programs, and the direction of soil fertility research that will ultimately benefit producers by providing research and educational programming that meets their needs.

Goal and objectives

The goal of this project is to accurately document the current nutrient management practices in SD to guide future soil fertility research and educational programming. The objectives to reach this goal include: 1) create a survey to gather representative information from SD crop producers about their usage of specific nutrient management practices, the reasons they use/don't use such practices, and producer/operation background information and 2) analyze and publish results in extension and scientific formats to provide information to crop producers, researchers, extension specialists, and other stakeholders that will aid them in the decision-making process regarding nutrient management practices, research, and extension programming.

Results

Objective 1: Create a survey to gather representative information from SD crop producers about their usage of specific nutrient management practices, the reasons they use/don't use such practices, and producer/operation background information

A survey regarding farmers crop nutrient management practices (rate, placement, product, and timing) and the factors that went into their decision making has been created and reviewed by SDSU researchers and extension faculty. Three-thousand advanced letters with an explanation of the survey were mailed at the beginning of June with a $2 bill as an incentive to complete the survey on-line. A paper copy of the survey was mailed out the week of June 17th along with a stamped and addressed return envelope to those producers who have not yet filled out the survey with the option of still filling out the survey on-line. To further remind producers to fill out the survey, a second paper copy of the survey was mailed at the end of June.

A separate link was also created that goes to a different version of the same survey that is open to all crop producers in South Dakota. News releases and advertising on the extension website were completed to encourage growers to fill out the voluntary survey. Data from these survey respondents will be kept separate from the randomly selected producers to not introduce bias into the results. We will analyze data from both survey versions and combine them if results from the non-random surveys do not create any bias.

Objective 2: Analyze and publish results in extension and scientific formats to provide information to crop producers, researchers, extension specialists, and other stakeholders that will aid them in the decision-making process regarding nutrient management practices, research, and extension programming.

To this point we have created the crop nutrient management survey. All survey materials was cleared before use with the South Dakota State University Institutional Review Board (IRB) for use on human subjects. The survey was then distributed in three waves to 3,000 SD crop producers where corn, soybean, and small grains constitute a high percentage of planted acres. Currently, the information from approximately 446 returned surveys (as well as 16 refusals, 56 bad addresses, and 326 retired/not farming individuals) has been entered into the survey answer database (Tables 1–3). The approximate response rate is 17%, not out of the range of current response rates to surveys. Tests on non-response bias will be conducted to determine and adjust for representativeness.

Table 1. Number of surveys sent to farmers in South Dakota and by each Ag District.

	Whole Survey	Central	East Central	North Central	Northeast	South Central	Southeast
Total Sample	3000	559	515	685	489	252	500

Table 2. Number of returned surveys in South Dakota and by each Ag District.

Response	Whole Survey Freq.	Freq. by Ag District					
		Central	East Central	North Central	Northeast	South Central	Southeast
Retired/not farming	**326**	56	52	82	44	30	62
Responded wave 1	**119**	27	16	24	26	11	15
Responded wave 2	**203**	45	34	37	30	20	37
Responded wave 3	**124**	25	21	36	10	7	25
Refusal	**16**	2	3	7	1	1	2
Bad mailing address	**56**	12	9	10	12	2	11
Total responses	**446**	**97**	**71**	**97**	**66**	**38**	**77**

Table 3. Survey response rate in South Dakota and by each Ag District.

Response Rate	In General	By Ag District					
		Central	East Central	North Central	Northeast	South Central	Southeast
Rate 1	17.0%	19.8%	15.6%	16.4%	15.2%	17.3%	18.0%
Rate 2	26.2%	28.0%	24.3%	26.5%	23.1%	27.2%	28.4%

Note: Rate 1 = (Responded wave1+Responded wave2+Responded wave3) /(Total Sample-Retired/ not farming-Bad mailling address)

Rate 2 = (Retired/ not farming+Responded wave1+Responded wave2+Responded wave3) /(Total Sample-Bad mailling address)

In the second year of this crop nutrient survey project, we will finish inputting results from returned surveys into our database, complete quality checks of input data, analyze results, and write reports, factsheets, and scientific journal articles. The current graduate student will also write and defend their thesis using data from the survey.

As part of analyzing the crop nutrient survey data, we will conduct descriptive analysis (e.g., frequencies, percentages) to provide basic information about nutrient management BMP usage and attitudes among producers. We will also use multivariate logistic regression or ordinary least squares regression (depending on how the variable(s) of interest is measured) to predict the environmental and decision-making factors that are associated with use of nutrient management BMPs and their relative importance while controlling for other extraneous factors.

Survey results will be incorporated into soil fertility extension programming through presentations and published articles as well as professional publications. Maps will be created to display results of where and what nutrient management practices are common for each crop and nutrient. These maps will be placed online through the extension website and in printed publications for producers and other stakeholders to visually assess current nutrient management practices. Maps from future surveys can also be made to overlay these maps to determine the change in nutrient management practices over time.

Impacts/Products

- Edem Avemegah, a graduate student, and an undergraduate student are being trained in rural sociology and survey techniques
- Creation of a Crop Nutrient Management Survey (**https://nmsurveysd.questionpro.com**)
- Publication entitled “An examination of Best Practices for Survey Research with Agricultural Producers” was submitted to Society & Natural Resources Journal and is now under review.

Budget

Project Budget (As of June 1, 2020)

Budget Category	Budget	Total Expenses	Available Balance
Salaries	23,668.00	19,491.00	4,177.00
Benefits	115.00	53.3	61.7
Travel	5,000.00	-	5,000.00
Contractual	5,000.00	39.01	4,960.99
Tuition remission	6,651.00	-	6,651.00
Total	**$28,249.00**	**$7,398.31**	**$20,850.69**

Covid-19 Impacts

- Quality checking of survey data has been slowed down due to the inability to access some surveys on campus during the time researchers were unable to come to campus.
- The descriptive analysis reports by cropping district and creation of interactive maps has been delayed.