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# Progress Report

## 2022 South Dakota Nutrient Research and Education Council Invited Proposals

<b>Progress Report Title:</b>	Interim Report - Due July 1, 2022
<b>Applicant Name:</b>	Jason Clark
<b>Application Title:</b>	Combining Soil fertility and Soil Health to improve Corn Potassium, Phosphorus, and Sulfur Fertilizer Recommendations: Year 3
<b>Application ID:</b>	1821
<b>Review Deadline:</b>	07/1/2022 11:59 PM

## Interim Report - Due July 1, 2022

### Project

	Start Date	End Date
<b>Start and End Dates of Funding:</b>	01/1/2022	12/31/2022
<b>Title of Project:</b>	Combining Soil fertility and Soil Health to improve Corn Potassium, Phosphorus, and Sulfur Fertilizer Recommendations	
<b>Project Description:</b>	<p>Much of the data used to create the soil fertility recommendations for South Dakota in the South Dakota Fertilizer Recommendations Guide and Corn Best Management Practices manual is decades old. Over the past decade, more acres have been planted to corn and soybean creating a shift in crop rotations and yields have increased due to better genetics and improved agronomic practices, removing more nutrients from the soil. Further, soil health practices such as no-till, cover crops, and more diverse rotations are being promoted to improve soil structure, organic matter, nutrient cycling, and the overall health of the soils. There is also a growing interest in measuring these improvements by completing soil health tests. However, a strong connection between soil health measurements and crop yield and nutrient recommendations has not been made to aid producers in making management decisions. This project will address these issues by making the connections between traditional soil fertility tests, soil health tests, and nutrient recommendations. The information from this project will be used to help update current nutrient management recommendations based on measured soil properties and specific management practices.</p>	

### Publications

<b>Publication Title:</b>	NA
<b>Publication Date:</b>	06/30/2022
<b>Status:</b>	NA
<b>Publication Description:</b>	NA

## **Combining Soil fertility and Soil Health to improve Corn Potassium, Phosphorus, and Sulfur Fertilizer Recommendations**

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**Co-PIs:** Anthony Bly, David Karki, and David Clay SDSU AHPS Department

### **Summary**

Much of the data used to create the soil fertility recommendations for South Dakota in the South Dakota Fertilizer Recommendations Guide and Corn Best Management Practices manual is decades old. Over the past decade, more acres have been planted to corn and soybean creating a shift in crop rotations and yields have increased due to better genetics and improved agronomic practices, removing more nutrients from the soil. Further, soil health practices such as no-till, cover crops, and more diverse rotations are being promoted to improve soil structure, organic matter, nutrient cycling, and the overall health of the soils. There is also a growing interest in measuring these improvements by completing soil health tests. However, a strong connection between soil health measurements and crop yield and nutrient recommendations has not been made to aid producers in making management decisions. This project will address these issues by making the connections between traditional soil fertility tests, soil health tests, and nutrient recommendations. The information from this project will be used to help update current nutrient management recommendations based on measured soil properties and specific management practices.

### **Goals and Objectives**

The goal of this project is to update P, K, and S recommendations in South Dakota under different management practices. The specific objectives of this project are 1) Determine corn yield and nutrient uptake response to added P, K, and S fertilizers under various soil fertility and soil health conditions, and 2) Identify soil health measurements that can alone or in combination with traditional soil fertility measurements be used to improve P, K, and S fertilizer recommendations.

### **Results:**

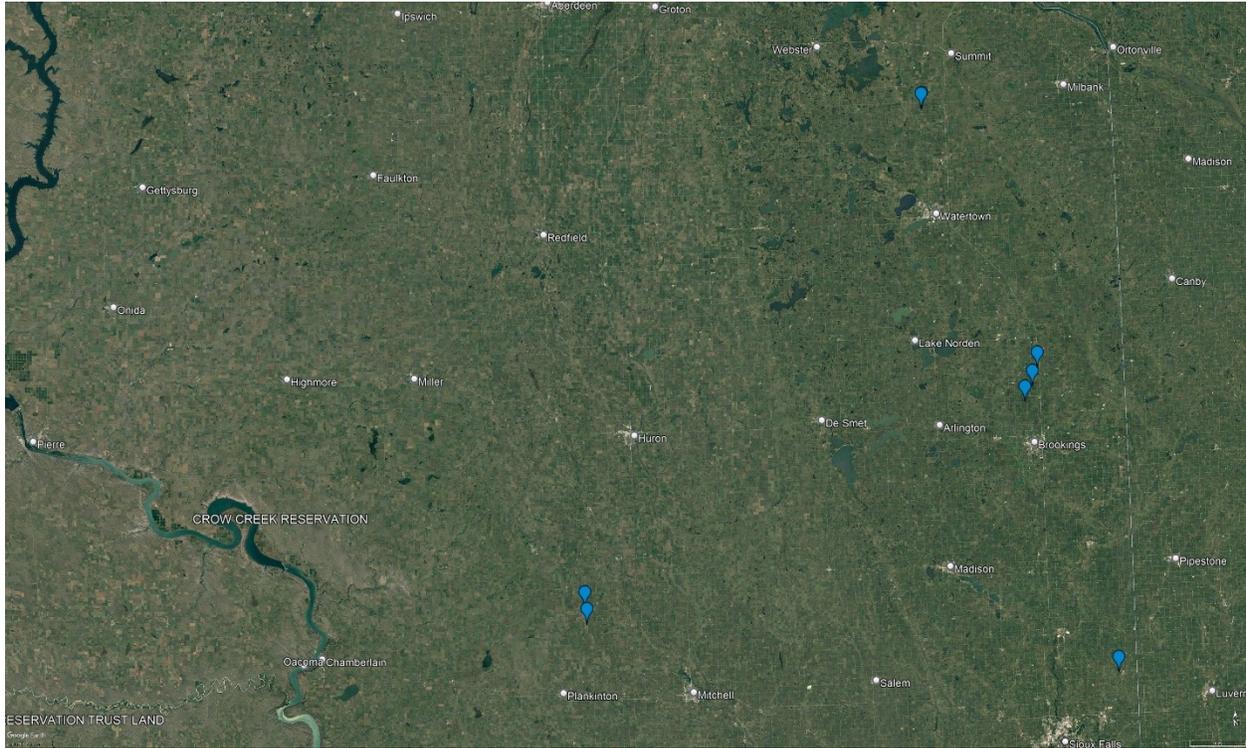
- Studies were established at 7 field sites in 2022 with 3 to 4 stamps in each field for a total of 28 stamps.
- Soil characterization, soil fertility, and soil health samples have been collected at each of these field sites. Soils are being processed and sent to commercial labs for analysis.

For the 2022 growing season treatments have been established on 7 fields throughout central and eastern South Dakota. These sites will be combined with previous site-years to evaluate soil health of various management practices and to evaluate relationships between soil health parameters and the crop's response to fertilizer application.

### **Impacts:**

- Knowledge of the relationship between phosphorus, potassium, and sulfur response to soil fertility and soil health measurements will be obtained for South Dakota.

- Knowledge will be increased of the relationship between soil health measurements and agricultural management practices
- Training of a graduate and several undergraduate students in soil fertility.
- Extension research report published with the Southeast Research Farm’s annual research report.



**Figure 1.** Seven field research sites throughout central and eastern South Dakota for the 2022 growing season.

**Budget:**

**Project Budget (As of June 1, 2022):**

Budget Category	Budget	Total Expenses	Available
Salaries	\$13,790.00	\$2,134.51	\$11,655.49
Benefits	\$3,907.00	\$469.59	\$3,437.41
Travel	\$6,000.00	\$0.00	\$6,000.00
Contractual	\$32,500.00	\$0.00	\$32,500.00
Supplies	\$5,000.00	\$411.53	\$4,588.47
Tuition remission	\$0.00	\$0.00	\$0.00
Capital Equipment	\$8,796.00	\$0.00	\$8,796.00
Non-Capital Equipment	\$0.00	\$113.00	-\$113.00
F&A (Indirect) Charges	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$69,993.00</b>	<b>\$3,128.63</b>	<b>\$66,864.37</b>