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Progress Report

2022 South Dakota Nutrient Research and Education Council Invited Proposals

Progress Report Title:	Interim Report - Due July 1, 2022
Applicant Name:	Peter Kovacs
Application Title:	Investigating Impact of Starter Fertilizer Placement on Plant Development, Grain Yield, and Nutrient Uptake – Year 2
Application ID:	1824
Review Deadline:	07/1/2022 11:59 PM

Interim Report - Due July 1, 2022

Project

	Start Date	End Date
Start and End Dates of Funding:	1/1/2022	12/31/2022

Title of Project: Investigating Impact of starter fertilizer placement on plant development, grain yield, and nutrient uptake – Year 2

Project Description: Starter fertilizer is often associated to promote early plant development and plant-to-plant uniformity especially for early planted crop or in no-till growing conditions. However, the yield impact and benefit of starter fertilizer is inconsistent. Approximately 60% of the producers are applying starter fertilizer in South Dakota according to a recent producer survey. The goal of the project is to compare the effect of starter fertilizer placement and plant development and yield effect. Specific objectives are 1) to determine if use of starter fertilizer increases grain yield throughout in SD (from north to south), 2) to determine if planting date influence the crop response to starter fertilizer 3) to determine the starter fertilizer impact on plant development and nutrient uptake. We will compare an early planting date with a normal/late planting date response with different starter fertilizer placement and product combination. Starter fertilizer will be placed in the following ways: in-furrow lower and higher rate, 2 x 2, and a combination of in-furrow lower rate and 2 x 2 compared to no starter fertilizer treatments. Early season plant development, nutrient uptake and grain yield will be determined.

Publications

Publication Title:	-
Publication Date:	07/1/2022
Status:	-
Publication Description:	.

Investigating Impact of starter fertilizer placement on plant development, grain yield, and nutrient uptake – Year 2
Progress Report June 2022

PI: Dr. Péter Kovács, SDSU Department of Agronomy, Horticulture & Plant Science
Email: peter.kovacs@sdstate.edu; Phone: (218) 280-2870
Co-PI: Dr. Jason Clark, Department of Agronomy, Horticulture & Plant Science

Summary

Starter fertilizer is often associated to promote early plant development and plant-to-plant uniformity especially for early planted crop or in no-till growing conditions. However, the yield impact and benefit of starter fertilizer is inconsistent. Approximately 60% of the producers are applying starter fertilizer in South Dakota according to a recent producer survey. The goal of the project is to compare the effect of starter fertilizer placement and plant development and yield effect. Specific objectives are 1) to determine if use of starter fertilizer increases grain yield throughout in SD (from north to south), 2) to determine if planting date influence the crop response to starter fertilizer 3) to determine the starter fertilizer impact on plant development and nutrient uptake. We will compare an early planting date with a normal/late planting date response with different starter fertilizer placement and product combination. Starter fertilizer will be placed in the following ways: in-furrow lower and higher rate, 2 x 2, and a combination of in-furrow lower rate and 2 x 2 compared to no starter fertilizer treatments. Early season plant development, nutrient uptake and grain yield will be determined.

Goal and objectives

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Progress update:

We have established this research at three locations. The first planting date treatments were planted on May 19th near Beresford, on May 23rd near Volga, and on May 24th near South Shore, while the second planting date treatments were planted on June 3rd, June 6th, and on June 15th near Volga, Beresford, and South Shore respectively.

We utilized two starter fertilizers (10-34-0 and 8-21-5 with and without additional Zn fertilizer). Starter fertilizer were placed in the following ways:

- in-furrow lower rate,

- in-furrow higher rate,
- 2 x 2, and a
- combination of in-furrow lower rate and 2 x 2 placements.

These fertilizer placements will be compared to an untreated control plot. In-furrow low-rate treatment provided approximately 9 lbs P_2O_5/ac (same amount for the two fertilizer types), the in-furrow high rate placement treatment provided approximately 14 lbs P_2O_5/ac, while the 2 x 2 starter placement provided 23 lbs P_2O_5/ac.

We are about to complete the V6 plant biomass sampling from both planting dates. These biomass samples are going to be processed and prepared for laboratory analysis.
We also captured individual plant information on growth stage of the plant and plant height at V3-V4 (3 or 4 fully developed leaf) growth stages, and we continue to measurement at V8-V9 growth stage to examine if there is early season plant growth development differences due to treatments.

Remainder of tasks to complete:

We continue to monitor crop development differences among treatments, and complete the end of season crop measurements and sampling later this year.

We will monitor and document:

- collect plant samples for biomass and nutrient uptake determination after physiological maturity,
- Grain yield and grain moisture at harvest will be determined through machine harvest,
- 1000 seed weight will be measured from grain samples collected during harvest.

Results will be communicated to stakeholders at upcoming field days, during extension and scientific meetings, and through development of peer reviewed scientific and extension publications. In addition, this project will train and mentor a graduate student, and undergraduate students who will assist during the project.

Investigating Impact of starter fertilizer placement on plant development, grain yield, and nutrient uptake – Year 2
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