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**Innovation Grant Progress Report**

PROJECT TITLE: Economic Benefit of Variable Rate Nitrogen Programs

REPORTING PERIOD: 4/1/2019-7/1/2019

FARMER INNOVATOR: Sam Peterson

COLLABORATING ORGANIZATION/PERSON: Central Advantage GS (Eric Houska), Encirca (Mike Kline), Winfield R7, and 3P Farms

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1.) PROJECT ACTIVITIES COMPLETED DURING THE REPORTING PERIOD. (*Describe project progress specific to goals, objectives, and deliverables identified in your project proposal.*)

During the first quarter, lots of progress was made on the nitrogen trial. The proposed field of 65 acres was worked with a field cultivator on May 15th which applied 100 pounds of Nitrogen per acre via Anhydrous Ammonia. This is the total amount of Nitrogen that was applied pre-plant on the project area. Elemental sulfur was applied along with phosphorus and potassium in fall of 2018. The field was then planted on May 17th with Dekalb 54-38 RIB seed. It was planted at an average of 34,132 seeds per acre according to the greenstar display. After planting, the field had a slow start due to cold and wet conditions. After observing the plants for the first few weeks, stand counts were very good for corn on corn, averaging around 33,000 plants per acre. In mid-June, tissue samples, soil samples, and satellite images were captured in order to prepare the variable rate prescriptions for the trials. After the data was compiled and the 3 variable rate prescriptions were created, the field was topdressed using urea fertilizer on June 22, 2019.

2.) IDENTIFY ANY SIGNIFICANT FINDINGS AND RESULTS OF THE PROJECT TO DATE. (*There may be none to report at some stages of the project)*

During this period of the trial, some observation were made. Although the stand counts in the field showed a favorable amount of plants per acre, a lot of the plants were yellow in color and varied in size. This seemed to be a result of many factors. Too much rain in the month of May and June lead to nitrification and loss of our preplant nitrogen. Imperfect planting conditions in the corn on corn scenario may have also played a factor along with low temperatures. In theory this is a perfect situation where a split application of nitrogen should benefit the crop. Nitrate Now takes 12 inch deep soil grid samples and tests for nitrates in the soil to create a variable rate recommendation for the field. Grid sample results showed an average of 19.8 ppm NO3. This is a moderate-to-high amount of nitrates available for the plant. Nitrate Now used these results to create a variable rate prescription to apply an average of 62 pounds of nitrogen per acre with rates applied ranging from 0 to 110 pounds of additional nitrogen. R7’s program created a variable rate prescription that applied an average of 62 pounds of nitrogen with rates varying from 50 pounds of nitrogen to 95 pounds of nitrogen per acre. R7 uses tissue samples to find the amount of nitrogen being circulated within the plant to create a baseline and combines that with soil maps, fertility maps, and yield history to create a recommendation. Encirca uses weather models, soil fertility, and yield history to create their recommendation. Encirca applied an average of 140 pounds of nitrogen with rates varying from 150 pounds per acre to 62 pounds per acre. With this being drastically higher than the other two recommendations, Encirca will have to make up revenue with a fairly large yield boost to come out ahead because of the extra fertilizer costs. The flat rate check applied 75 pounds of nitrogen which was decided based strictly on what I thought was the most economical and what the field would need for total nitrogen to produce a healthy crop.

3.) CHALLENGES ENCOUNTERED. (*Describe any challenges that you encountered related to project progress specific to goals, objectives, and deliverables identified in the project proposal.*)

Spring of 2019 did not lend us any favors in planting the crop. Excess rainfall lead to a delayed planting period and a smaller window to plant. With those circumstances, the field was planted in less than ideal conditions. This could have been the cause of some of the uneven sized corn as explained in the results section. Unfortunately, a mistake was also made during planting and the field was variable rate planted instead of flat rated. Although the average seeds per acre applied is very close to the target rate it should have been flat applied to, the planting rate varied from 33000 plants per acre to 35500 plants per acre. This should not affect the nitrogen results because the replications are randomized in the passes across the field. In the past two years the field was flat rate planted to make sure all variables besides the nitrogen stayed constant.

4.) EDUCATION AND OUTREACH ACTIVITES. *(Describe any opportunities to engage with farmers, influencers or the media about your project.)*

I have been talking with farmers about the innovation grant project every chance I get. When I am out visiting with customers I sell seed to or do custom fertilizer application for I like to bring up the project and most farmers are very interested in the results I have had over the past two years.

5.) HOW CAN WE HELP? *(Please let us know how we can improve the experience or assist in your project if possible.)*