MinnesotaCorn
RESEARCH & PROMOTION COUNCIL

INNOVATION GRANT FINAL REPORT

PROJECT TITLE: Nitrate Testing Techniques after Corn Crop Removal for Fertilizer Application
REPORTING PERIOD: Final Report and Invoice due by January 31, 2020
FARMER INNOVATOR: Jacob Sharkey – Centrol Crop Consulting. Knudson Brother Partnership
COLLABORATING ORGANIZATION/PERSON: Dr. Jeff Strock – University of Minnesota
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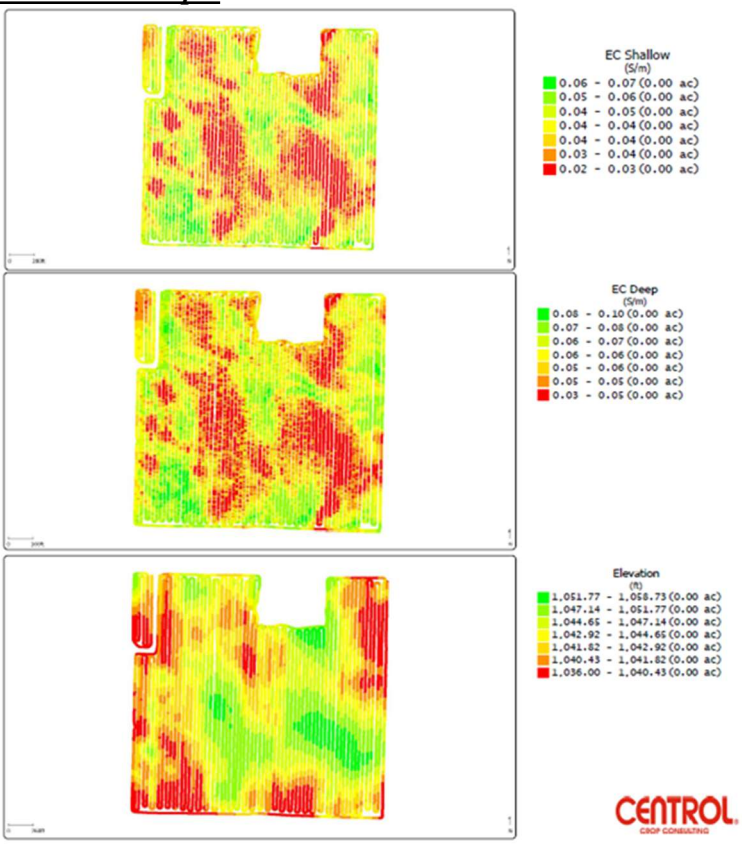
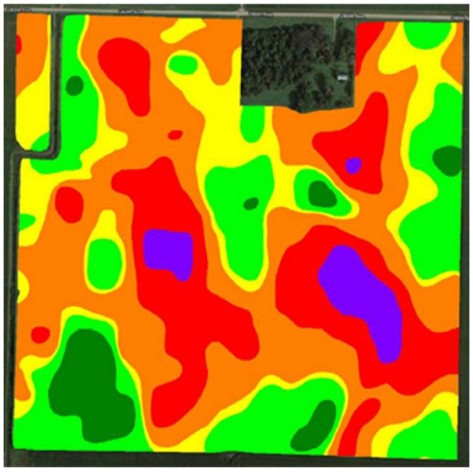
1.) PROJECT ACTIVITIES COMPLETED DURING THE REPORTING PERIOD. (*Describe project progress specific to goals, objectives, and deliverables identified in your project proposal.*)

Throughout the course of the project many different activities have been completed to come to the final conclusions I have made from the project. The first of these activities were completed in May 2019. In May the EM38 cart was ran across the field to determine the productivity zones for the field. These zones were used in the sampling process for the zone sampling technique. Below is the results compiled from the cart used…

Raw EM38 Maps:



Zones Created:



Fast forward to November 2019 when the sampling process began. In one total day all of the sampling was completed which consisted of first sampling the field according to 20-acre strips. This process took about 1 hour to complete the 7 samples. Next, I sampled the field according to the zones created from the EM38 cart. This process took about 1 hour, too. Lastly, the field was sampled according to 4.4-acre grids which I laid out the points for the field prior to arriving at the field that morning. This process took roughly 3-4 hours to complete due to the number of samples needing to be collected.

The sampling process went well. Upon receiving the results, I compiled them and reviewed the information with Dr. Jeff Strock to determine the trends, and analyze what we found when reviewing the 3 sampling techniques.

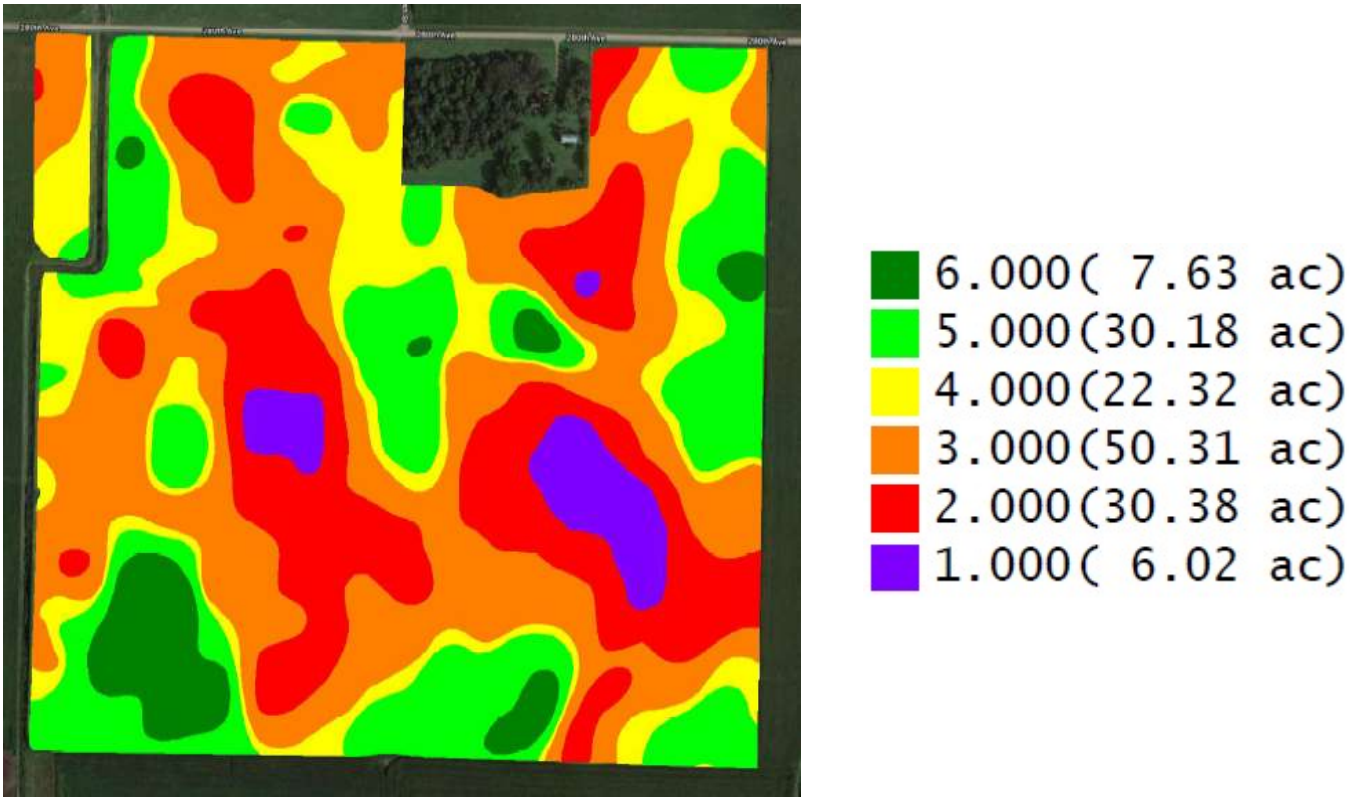
2.) IDENTIFY ANY SIGNIFICANT FINDINGS AND RESULTS OF THE PROJECT. (*This could include photo documentation of the project at various stages if you haven't already provided these as well as final relevant images of the project at completion. Any data analysis (<u>especially Level 3 Grants</u>), graphics or record of observations throughout the growing season or during the field day event are also anticipated.)*

There were many findings we found when reviewing the data. I truly wish the growing season was not as wet as it was. Nitrates in the soil profile were overall extremely low across all 3 of the soil sampling techniques.

20 Acres Strips: Results varied from 12 nitrates left in the 0-48” profile on up to there being 19 nitrates left in the 0-48” profile. Below you will find a chart explaining the results. Given that this technique is not meant to create a variable rate map, the nitrates did not vary much across the field like I have experienced in past years.

Sample Zone	0-6" (lb/ac)	6-24" (lb/ac)	24-48" (lb/ac)	Total N (lb/ac)
1	5	6	4	15
2	5	3	4	12
3	5	6	8	19
4	5	3	4	12
5	4	6	4	14
6	6	9	4	19
7	5	6	4	15

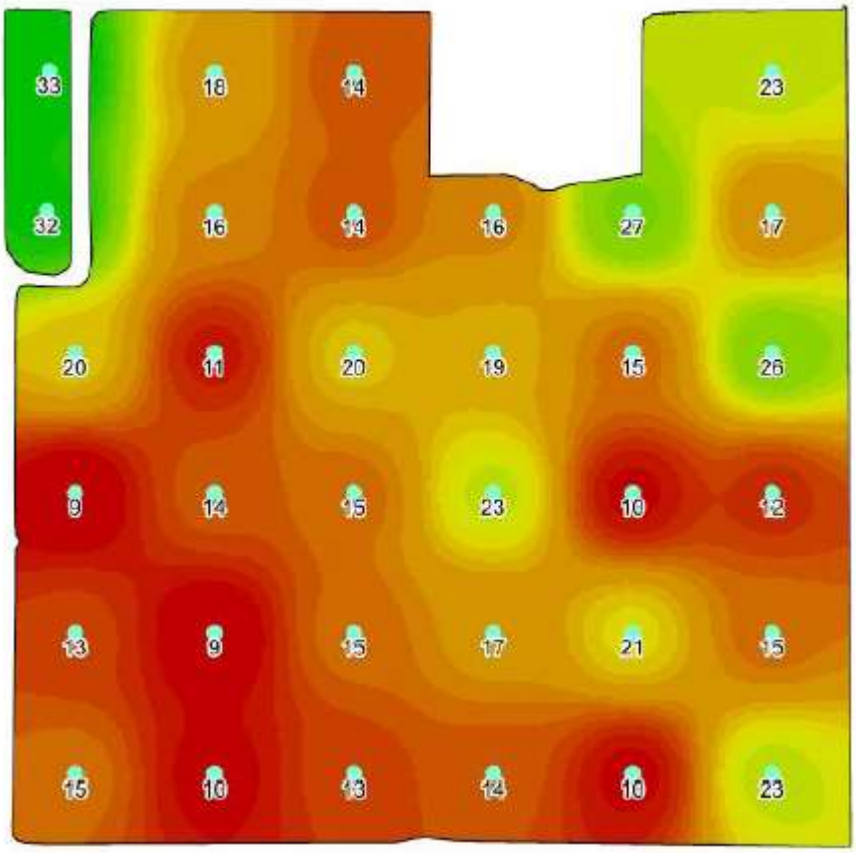
Zone Sampling Technique: Results on this sampling technique varied from 11 nitrates left in the 0-48" profile on up to there being 17 nitrates left in the 0-48" profile. This technique I would be able to apply these results to a variable rate spread for nitrogen. But, looking at the results I wish there would be more variation between low productivity zones and high productivity zones. Zone 6 on the zone map below is the highest productive ground – Zone 1 is lowest productive zone.



Sample Zone	0-6" (lb/ac)	6-24" (lb/ac)	24-48" (lb/ac)	Total N (lb/ac)
1	5	3	4	12
2	4	9	4	17
3	4	3	4	11
4	4	3	4	11
5	5	3	4	12
6	4	3	4	11

4.4 Acre Grid Technique: This technique showed the largest variation among the three techniques used in the project. Nitrates varied in the 0-48" profile from 9 nitrates on up to 33 nitrates across the field. The sampling process also took the longest to gather the samples which in a time crunched Fall season this can get growers aggravated waiting to work up the field with their tillage equipment. But, for the results gathered it was well worth it for the time taken.

You will notice the ridge of heightened nitrates from the SE corner of the field heading to the NW… This ridge corresponds right along with the zone 2 on the zone sample technique. Between the techniques the trends still stick out.



Overall, when I reviewed the results with the farmer, Knudson Brothers Partnership, we decided the Zone sampling technique was the sampling technique that fit their farm the best. Not only because of the results gathered from the sampling; but, was because we are using this exact productivity zone for Variable Rate Planting and Yield Goal Determination. These zones are helping us determine how aggressive we want to be with our inputs on the field found through the results gathered with the EM38 cart. We also use the results from the 4.4 acre grid. The results we use are with the phosphorus, potassium and zinc levels found in the field. Therefore, using them together we are bringing together both productivity and fertility when creating the variable rate fertilizer spread on this field which we felt was the best approach possible.

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

All goals, objectives and deliverables were finished smoothly. Only challenge that affected the project was Mother Nature. If the moisture would have been a lot less through the season the project findings would have been a lot different.

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

Talking with farmers and media at the Ag Expo in Mankato, Minnesota was great exposure for my project. Had a lot of engaging conversations throughout the day and was a nice experience.

5.) HOW CAN WE HELP? *(Please let us know how we can improve the experience for the next generation of projects.)*

I thought it went very well through the whole process.