

On-the-Go Variable Rate Nitrogen Assessment on Corn

Ottawa Rideau Regional Partner Grant – Final Report

Purpose:

This Project was conducted to establish a return on investment (ROI) for Crop Sensing Technology within a standing corn crop in the V6 – V8 Stages. We are making an effort to educate our local organizations about the power of this new technology, to help eliminate the fear of trying new things and thinking outside the box. We are looking to establish a Correlation between Crop Health and nitrogen use efficiency (NUE) in Eastern Ontario and help to improve crop health with environmentally sound practices. We are comparing these new field practices with older standards in grower best management practices (BMP).

2013 Methods:

In 2013 4 plots were established with multiple growers, on different farms, and fields across our county. Within those plots we had a minimum of 2 replications, comparing the following treatments:

1. no side dress nitrogen(0-N) application,
2. allowing the GreenSeeker System to determine the optimum application rate based on the Sensors on the toolbar.

Next we will look at the application data from the GreenSeeker system and determine the average nitrogen application per pass and apply the next repetition pass with the fixed rate based on the GreenSeeker recommendation, from there we will apply a fixed rate based on the standard side dress grower rate base on a PSN Test or OMAFRA N Calculator (whichever is available at that time)

2013 Summary:

This is the 2nd season that we have a set of results on this project. Utilizing the 2 main variables (\$3.00 bu/Corn and \$2.25/gal UAN 32%) that we had at the time of the application of the nitrogen side dress, the GreenSeeker was able to:

1. detect the variability in the field, on the fly.
2. fairly accurately assess the Nitrogen use Efficiency (NUE) and
3. adjust the rate quick enough to apply the correct amount of product where it was needed and thus showing a return on investment.

Granted this was a smaller return in the 2013 growing season then in the 2012 growing season, but where we would have blanket applied this field based on the OMAFRA or PSNT recommendation we would have spent more on the side dress nitrogen and had more yield at the end of the season, but not more money in the bank. Year 2 of this project is showing very positive results towards this technology, and On-the-Go Variable Rate Crop Sensing should be considered throughout more regions.

2014 Methods

In the 2014 growing season, we worked with different operators to push the window into the late V8 stage of corn. Timing was difficult as the weather was a factor and 6 of the planned plots were not completed. In the end we setup 5 plots with 5 growers, 2 of the

4C Lazidee Farms Ltd Plot 1 Armstrongs

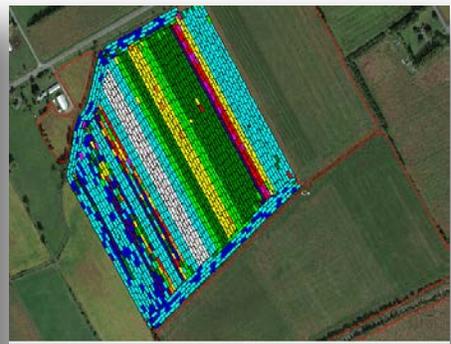
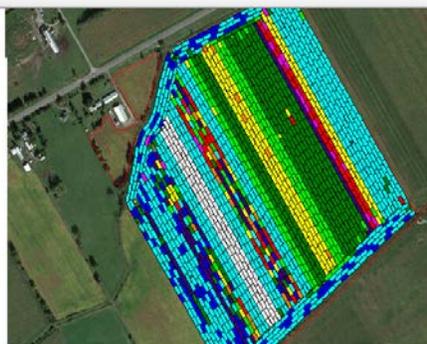
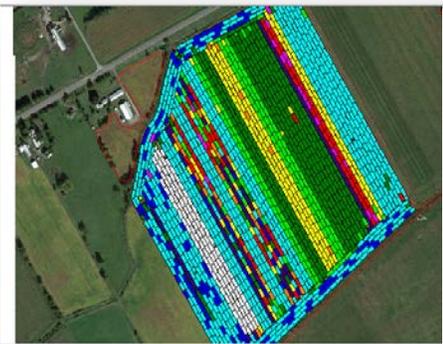


Croplan 3699 VT2P	37.81 ac	
Croplan 3699 VT2P Black Earth	3.38 ac	
Croplan 3699 VT2P GreenSeeker Fixed Rate	10.86 ac	
Croplan 3899 VT2P	7.11 ac	
Croplan 3899 VT2P Black Earth	10.94 ac	
Seed Corn Variety Trial	8.93 ac	
Seed Hoppers: Wheat Seed	0.35 ac	
VCroplan 3699 VT2P GreenSeeker Variable	11.95 ac	

GreenSeeker Variable Rate

Yield Variety Report

2014 Corn	Area (ac)	Moisture (%)	Yield (bu/ac)	Total Yield (bu)
A8.A9.11				
Croplan 3899 VT2P	7.10	17.75	188.52	1,330.13
Croplan 3699 VT2P	37.44	19.01	178.31	6,676.67
Seed Hoppers: Wheat S	0.07	18.77	23.00	1.68
Croplan 3899 VT2P Blax	10.74	17.40	191.27	2,053.30
Croplan 3899 VT2P Blax	3.32	17.48	183.73	609.25
VCroplan 3699 VT2P Gr	11.94	17.90	181.77	2,169.92
Croplan 3899 VT2P Gre	10.78	17.77	179.67	1,936.78
Seed Corn Variety Trial	8.67	17.54	183.24	1,587.05
Total	90.05	18.22	181.83	16,374.57



	Min	Max	Avg	Std Dev	Total
Cross Track Error	-0.21	1.24	0.02	0.15	2.38
Elevation	260.51	263.04	262.36	0.95	30,433.05
GPS Quality	4	4	4	0	464
NDVI	0.599	0.780	0.710	0.030	82,362
Rate UAN	0.00	38.16	27.36	5.91	3,172.69
Speed	0.0	5.0	4.6	0.8	539.2

	Min	Max	Avg	Std Dev	Total
Cross Track Error	-0.50	0.20	-0.01	0.07	-1.08
Elevation	260.34	263.34	262.49	0.66	27,298.95
GPS Quality	4	4	4	0	416
NDVI	0.567	0.722	0.690	0.049	71,795
Rate UAN	16.59	30.95	23.69	6.01	2,807.59
Speed	3.0	5.7	5.2	0.5	542.1

	Min	Max	Avg	Std Dev	Total
Cross Track Error	0.30	1.40	0.00	0.15	0.45
Elevation	260.30	263.44	262.26	0.69	37,241.41
GPS Quality	4	4	4	0	500
NDVI	0.580	0.757	0.680	0.042	96,594
Rate UAN	20.32	38.31	31.31	5.23	4,045.42
Speed	3.6	5.6	4.8	0.3	687.3

UAN Rate Rep 1	27.35 GPA	UAN Rate Rep 2	26.96 GPA	UAN Rate Rep 3	31.31 GPA 1
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Average UAN Variable 28.45 GPA	Net Yield Gain 2.0 Bu/Acre
Standard Fixed Rate 28.00 GPA	Net ROI \$6.60 / Acre

Crop Advances: Field Crop Reports

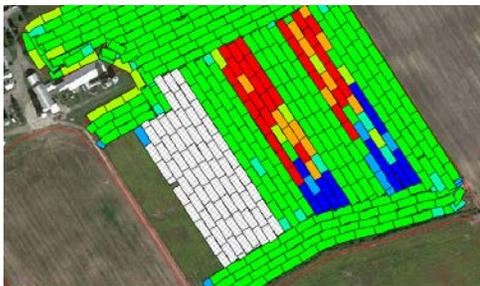
plots were with NH3 and unfortunately the harvest for those 2 growers didn't allow for a weight wagon or yield monitor to accurately capture the harvest information, we were however able to capture the data for the other 3 plots.

4C Lazidee Farms Plot 2 Home Farm

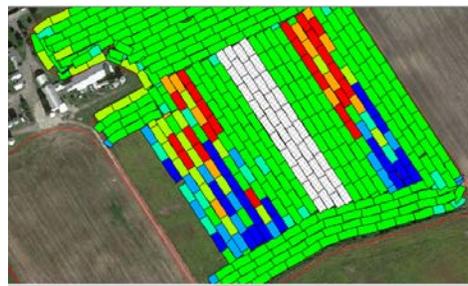


■ Croplan 3699 VT2P	2.67 ac
■ Croplan 3737 VT2P	11.61 ac
■ Croplan 3737 VT2P GreenSeeker Variable	7.14 ac
■ Croplan 3899 VT2P	2.68 ac

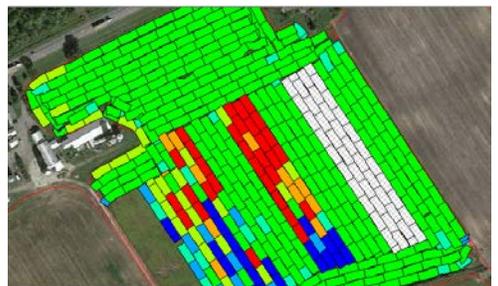
2014 Corn	Area (ac)	Moisture (%)	Yield (bu/ac)	Total Yield (bu)
HOME 1 2 10				
Croplan 3899 VT2P	2.62	21.69	156.62	409.69
Croplan 3699 VT2P	2.74	22.37	152.36	417.65
Croplan 3737 VT2P	11.81	18.71	160.61	1,897.14
Croplan 3737 VT2P Cre	7.19	18.75	173.74	1,248.52
Total	24.35	19.42	163.13	3,973.00



	Min	Max	Avg	Std Dev	Total
Cross Track Error	-0.24	4.63	0.06	0.54	4.52
Elevation	271.21	274.10	272.55	0.65	20,714.17
GPS Quality	4	4	4	0	304
NDVI	0.000	0.744	0.656	0.096	48.662
Rate UAN	11.62	40.01	27.85	6.98	2,116.34
Speed	0.2	5.6	4.5	0.9	353.0



	Min	Max	Avg	Std Dev	Total
Cross Track Error	-0.31	0.03	-0.03	0.09	-3.25
Elevation	271.22	272.70	271.66	0.37	10,896.49
GPS Quality	4	4	4	0	160
NDVI	0.503	0.745	0.620	0.054	27.217
Rate UAN	10.54	37.31	22.89	7.94	915.43
Speed	3.8	5.5	4.9	0.5	197.1

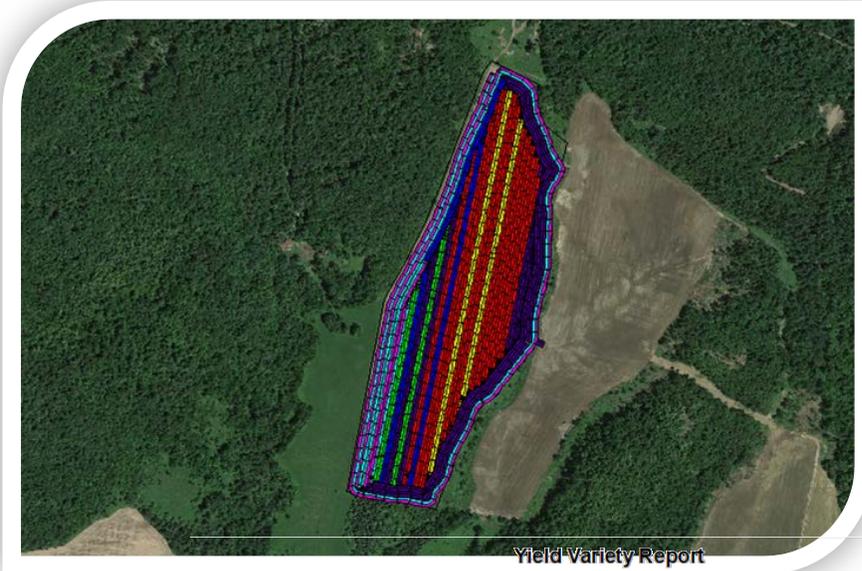


	Min	Max	Avg	Std Dev	Total
Cross Track Error	-0.25	1.04	0.05	0.24	2.32
Elevation	270.81	272.02	271.38	0.34	11,940.82
GPS Quality	4	4	4	0	176
NDVI	0.417	0.735	0.656	0.072	28.819
Rate UAN	11.21	38.04	25.91	7.96	1,140.09
Speed	4.5	5.8	5.1	0.4	223.1

<p>Average UAN Variable 25.55 GPA</p> <p>Standard Fixed Rate 28.00 GPA</p> <p>Savings of 2.45 GPA</p>	<p>Net Yield Gain 13.13 Bu/Acre</p> <p>Net ROI \$54.96 / Acre</p>
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Crop Advances: Field Crop Reports

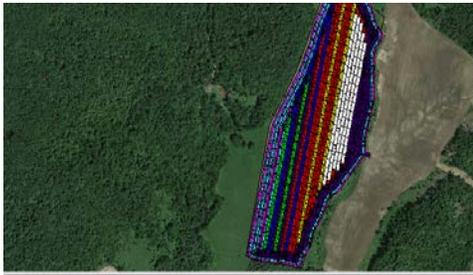
Tranquility Agriculture Ltd.



1.5g carb 4.5 Fertilizer	6.61 ac	
3.25 g Fertilizer .75 gal Carbon	2.84 ac	
DK3447 Seed	3.42 ac	
Fertilizer 4 gal	1.69 ac	
P8673 GreenSeeker Fixed	2.52 ac	
P8673 GreenSeeker Variable	11.05 ac	
P8673 Seed	3.39 ac	

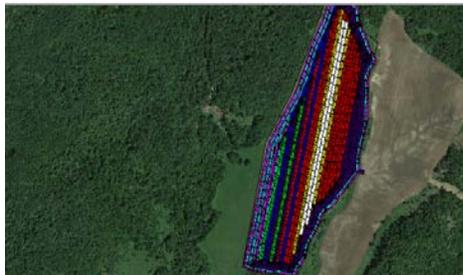
Yield Variety Report

2014 Corn	Area (ac)	Moisture (%)	Yield (bu/ac)	Total Yield (bu)
35				
P8673 GreenSeeker Va	10.93	27.14	161.09	1,760.49
P8673 GreenSeeker Fix	2.07	26.39	157.64	326.00
1.5g carb 4.5 Fertilizer	6.61	25.82	132.62	876.98
3.25 g Fertilizer .75 gal t	2.85	26.96	155.83	444.06
DK3447 Seed	3.34	28.83	138.35	462.28
Fertilizer 4 gal	1.69	27.71	155.41	261.99
P8673 Seed	3.20	25.66	114.99	368.21
Total	30.69	26.90	146.64	4,500.00



	Min	Max	Avg	Std Dev	Total
Cross Track Error	0.22	7.19	0.28	0.76	24.05
Elevation	329.45	355.42	343.45	5.65	30,567.30
GPS Quality	4	4	4	0	356
NDVI	0.397	0.821	0.717	0.090	63,789
Rate TANK 1: LIQUID 32% N	0.00	42.36	18.23	7.96	1,676.79
Speed	0.6	6.6	4.2	1.1	463.3

UAN 18.23 GPA Variable



	Min	Max	Avg	Std Dev	Total
Cross Track Error	-3.08	0.61	-0.02	0.43	-1.62
Elevation	330.94	366.45	344.77	6.95	10,942.24
GPS Quality	4	4	4	0	220
NDVI	0.103	0.837	0.260	0.044	41,362
Rate TANK 1: LIQUID 32% N	10.44	34.53	18.83	6.27	1,035.70
Speed	0.2	4.5	4.0	0.8	200.4

UAN 18.83 GPA Variable



	Min	Max	Avg	Std Dev	Total
Cross Track Error	6.58	0.13	-0.15	1.13	-10.78
Elevation	327.45	370.83	345.04	11.16	24,497.06
GPS Quality	4	4	4	0	264
NDVI	0.505	0.860	0.740	0.062	52,583
Rate TANK 1: LIQUID 32% N	0.00	40.36	15.64	8.5	1,235.95
Speed	1.6	5.0	4.2	0.8	287.0

UAN 15.64 GPA Variable

**Average UAN Variable 17.56 GPA
Standard Fixed Rate 30.00 GPA
Savings of 12.43 GPA**

**Net Yield Gain 3.45 Bu/Acre
Net ROI \$40.89 / Acre**

2014 Field Summary

This growing season was very challenging with sidedress application of Nitrogen as weather was offering a few new challenges. Temperatures were low and ground was saturated with water. With the 3 plots of Data that we were able to get complete, all 3 showed either a reduction of N except for 1 rep which showed a slight increase in N. Soil and field variability is a large factor in N application and the variable rate N on the go with Crop Sensing technology is showing a positive increase over flat rate. In all of the Plots and side by sides the GreenSeeker showed a ROI and increase in yield

This Concludes our Project

We at Ottawa Carleton Soil and Crop are very impressed with this technology and the simplicity of operation within the Field and the Data that we were able to collect because of it. The Growers who participated have a greater understanding of the operations day to day and have all seen the ROI potential for this type of system, for better improving Crop Health and application of Nitrogen Sidedress at V6 – V8. Although other projects have been completed with other organizations and Research plots, we feel that we can detect field variability and apply the correct corresponding rate of Nitrogen that the plant requires.

Acknowledgements:

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