

# 2016 KARTA Research

- Walter Lenhart
- Farm with dad , brother , & nephew
- Lenhart Farms Inc. is located in NC clay county
- Farm terraced rolling hills to river bottom
- Soil very from sand to loam then back to sand in 100 ft. or from loam to gumbo.

# Grant to test soil sampling

- Different soil sampling methods
- I have wondered if pulling samples around 1 spot in a grid sample was giving an accurate representation of the 2.5 acre grid.
- If there was another method that would be good to use

# I chose 4 methods

- 1: 2.5 acre grids 15 probes around center
- 2: 2.5 acre grids 18 probes spread over 9 points throughout grid
- 3: 5 acre grids 15 probes using EC data to determined sample points (like soil type) can be either zones or grids
- 4: 1 composite sample 18 probes through out field
- 5: I considered 1 random location within the 2.5 acre grid (Lucas suggestion) but did not get these pulled

# Those that provided support

- Colten Salm from CS Precision AG
- Lucas Haag
- Matt Hagney
- Kenny Beach
- A & L Laboratories
- Agleader SMS

# What I did

- Method 1 pulled 3 samples from 20ft of each corner of UTV and 3 from left side then mixed the 15 samples together
- Method 2 divided grid in to 9 parts and pulled 2 samples from each then mixed the 18 samples together

- Method 3 used a method from CS precision Ag. They use EC data to determine like areas consisting of about 5 acres. drive to that spot and pull the 15 probes around the UTV
- Method 4 drive to 9 locations and pull 2 probes each and combine them.
- Method 5 was to go to a different random point in each 2.5 acre grid and pull the 15 probes (sorry I didn't make the time to do this)

# The Costs

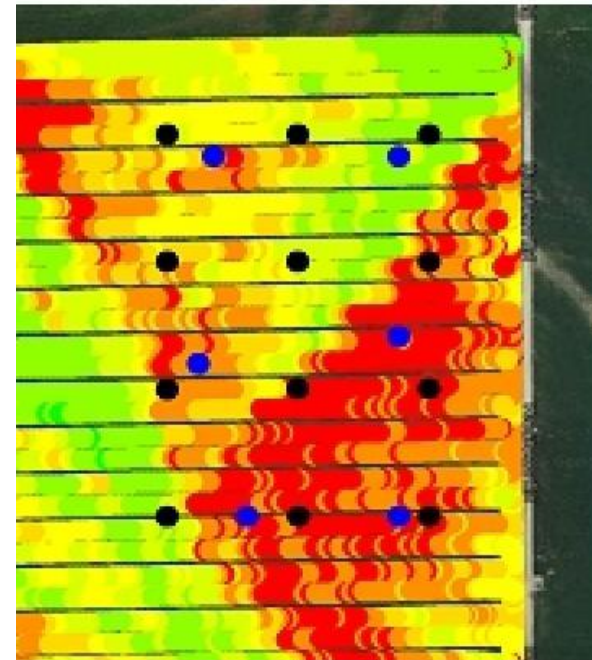
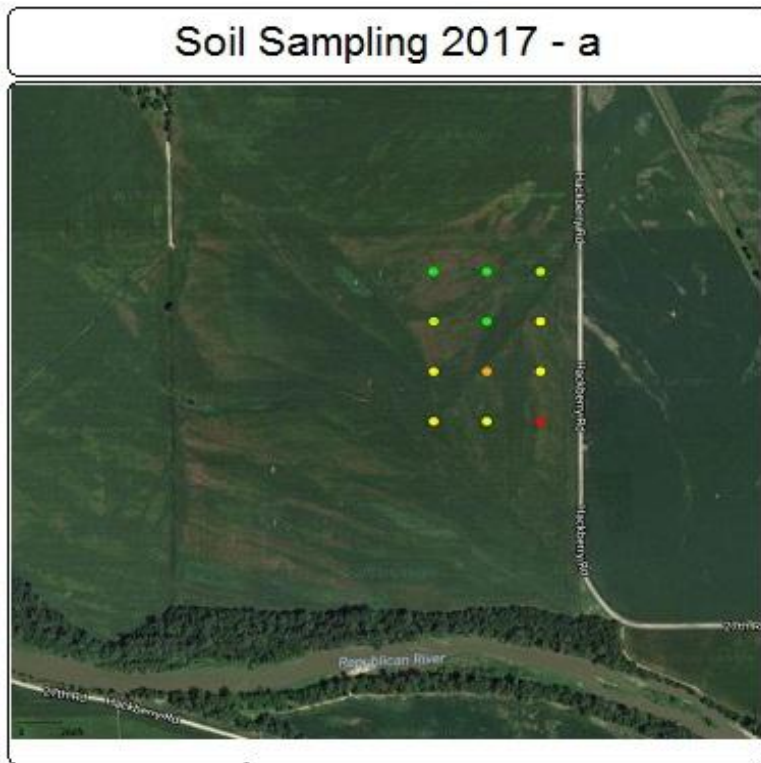
- 1 grid sampling one point \$7 to \$11 per acre
- 2 grid sampling through out the grid ?
- 3 EC and sampling on 5 acres \$10 to \$14 per acre
- 4 cost of 1 sample \$10 to \$27
- 5 same as 1

# Location I chose

30 Acres river bottom

Back ground Veris deep  
9 black dots are center 2.5  
grids

6 blue dots are Veris grids





Samples from 10 feet apart



# Difference between samples 1 grid

Single location

**Spread out sample**

**sample**



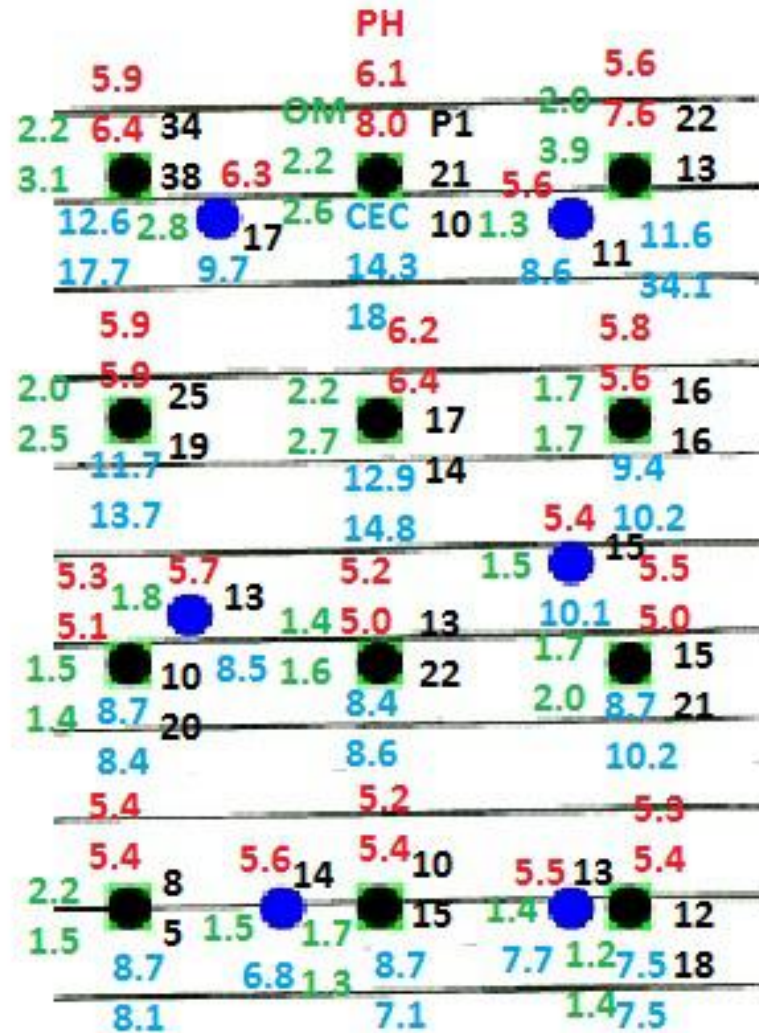
The 12 black dots are center of 2 ½ acre grid which the 2 types of samples were taken from

The 6 blue dots represent the samples from the EC sample locations data.

The red numbers are PH readings.  
 The green numbers are OM levels.  
 The blue numbers are CEC readings.

The black numbers are P1 levels.

The square dots have 2 readings the top reading is from the spread out sampling, the bottom is from the single point location.



Composite sample

PH 5.5 P1 14 CEC 7.4 OM 1.7

# Differences in the 2.5 acre grids

- Sample 1 in the NW corner seem to have the most variance of the methods.
- The north samples and 1 other varied a lot in PH levels the rest were close together.
- The P1 levels varied a lot between methods.

# Differences between 2.5s and the EC locations

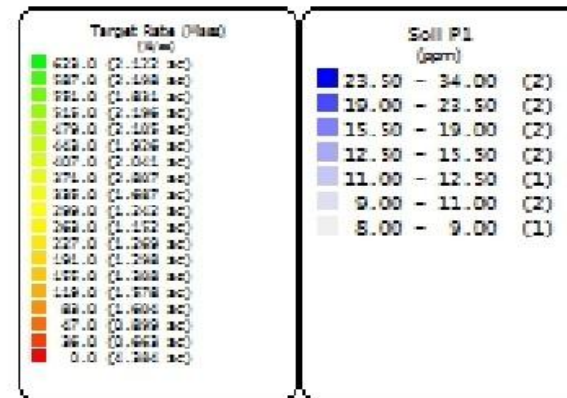
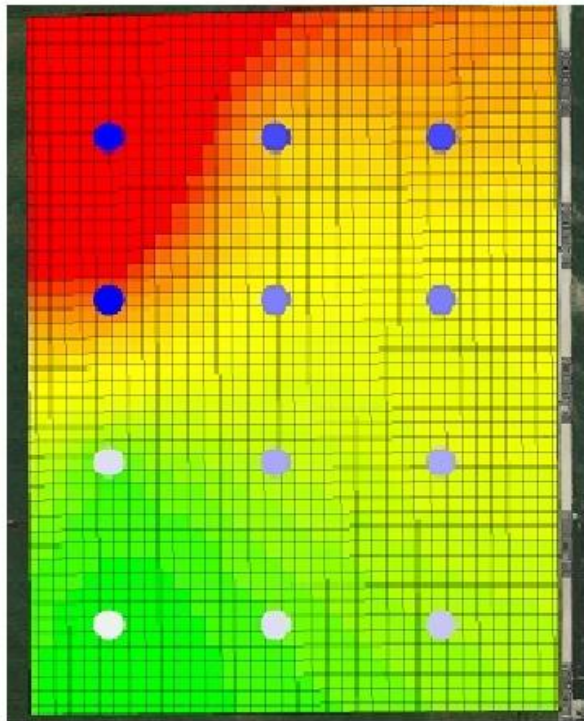
- The EC seem to be a closer match to the levels of the spread out sampling.

Difference between composite and others

Close match to south half of samples

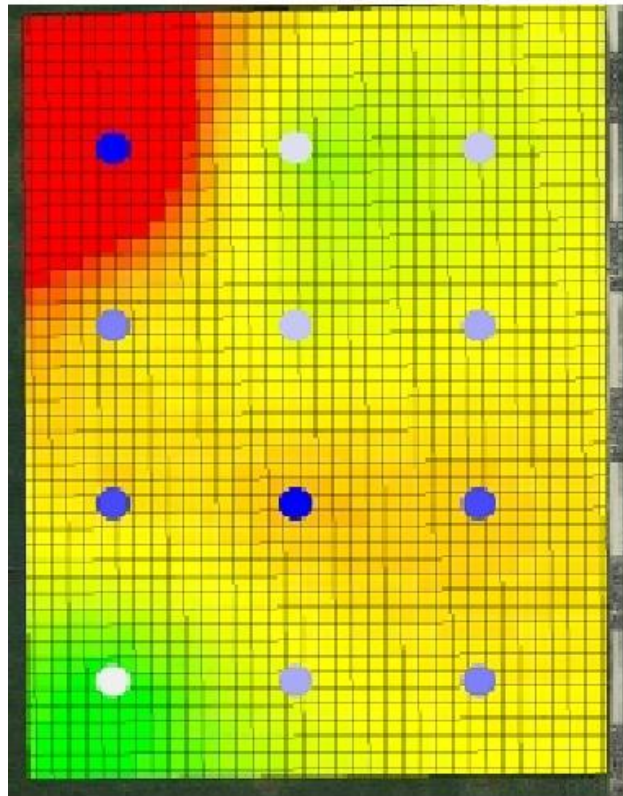
P1 ppm & 11-52-0 rates to bring levels to 25 ppm using the spread through out grid sampling

Rates ranging from none to 623# with 13 acres over 400#.



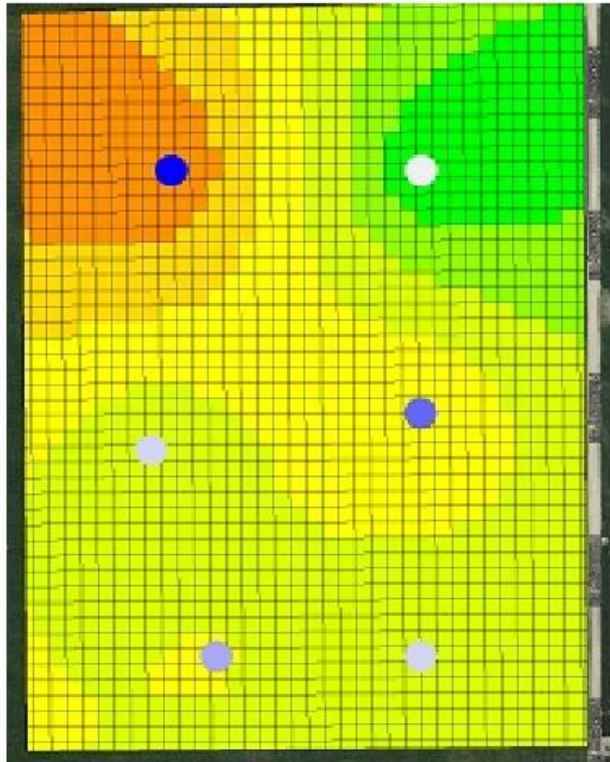
# P1 ppm & 11-52-0 rates to bring levels to 25 ppm using 1 location sampling

Rates ranging from none to 694# with about 13 acres in the 200 to 300# range.



Target Rate (lb/ac)		Soil P1 (ppm)	
0.0	(1.000 ac)	21.50 - 35.00	(2)
10.0	(1.000 ac)	19.50 - 21.50	(2)
20.0	(1.000 ac)	17.00 - 19.50	(2)
30.0	(1.000 ac)	14.50 - 17.00	(2)
40.0	(1.000 ac)	11.50 - 14.50	(2)
50.0	(1.000 ac)	7.50 - 11.50	(1)
60.0	(1.000 ac)	5.00 - 7.50	(1)
70.0	(1.000 ac)		
80.0	(1.000 ac)		
90.0	(1.000 ac)		
100.0	(1.000 ac)		
110.0	(1.000 ac)		
120.0	(1.000 ac)		
130.0	(1.000 ac)		
140.0	(1.000 ac)		
150.0	(1.000 ac)		
160.0	(1.000 ac)		
170.0	(1.000 ac)		
180.0	(1.000 ac)		
190.0	(1.000 ac)		
200.0	(1.000 ac)		
210.0	(1.000 ac)		
220.0	(1.000 ac)		
230.0	(1.000 ac)		
240.0	(1.000 ac)		
250.0	(1.000 ac)		
260.0	(1.000 ac)		
270.0	(1.000 ac)		
280.0	(1.000 ac)		
290.0	(1.000 ac)		
300.0	(1.000 ac)		
310.0	(1.000 ac)		
320.0	(1.000 ac)		
330.0	(1.000 ac)		
340.0	(1.000 ac)		
350.0	(1.000 ac)		
360.0	(1.000 ac)		
370.0	(1.000 ac)		
380.0	(1.000 ac)		
390.0	(1.000 ac)		
400.0	(1.000 ac)		
410.0	(1.000 ac)		
420.0	(1.000 ac)		
430.0	(1.000 ac)		
440.0	(1.000 ac)		
450.0	(1.000 ac)		
460.0	(1.000 ac)		
470.0	(1.000 ac)		
480.0	(1.000 ac)		
490.0	(1.000 ac)		
500.0	(1.000 ac)		
510.0	(1.000 ac)		
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620.0	(1.000 ac)		
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640.0	(1.000 ac)		
650.0	(1.000 ac)		
660.0	(1.000 ac)		
670.0	(1.000 ac)		
680.0	(1.000 ac)		
690.0	(1.000 ac)		
694.0	(1.000 ac)		

P1 levels & 11-52-0 rates to bring levels to 25 ppm using EC determined points as a grid



Rates range from 300# to 515# with 15 acre at 443#

Target Rate (lb/ac)	Soil P1 (ppm)
515.0 ( 2.812 ac)	16.00 - 17.00 (1)
479.0 ( 2.586 ac)	14.50 - 16.00 (1)
443.0 (15.110 ac)	13.50 - 14.50 (1)
407.0 ( 8.158 ac)	12.00 - 13.50 (2)
371.0 ( 2.582 ac)	11.00 - 12.00 (1)
335.0 ( 3.043 ac)	
299.0 ( 0.021 ac)	



P1 levels & 11-52-0 rates to bring levels to 25 ppm from the composite sample

- A P1 level of 14ppm
- A flat rate of 407# pr acre

## Comparing total pounds of 11-52-0 to raise P1 levels to 25 ppm in 1 year

Method 1 is using sample spread out in the 2.5 acre grid.

**10827 # of 11-52-0**

Method 2 is from 1 location in the 2.5 acre grid.

**10540 # of 11-52-0**

Method 3 is from the EC based sampling.

**14652 # of 11-52-0**

Method 4 Composite

**13934 # of 11-52-0**

Method	Total #	Avg. Rate	Min Rate	Max Rate
Spread	10827	316 #/A.	0 #/A	623#/A
Single	10540	308 #/A	0 #/A	694#/A
EC	14652	428 #/A	299#/A	515#/A
Com.	13934	407# / A		

# Costs to bring the 34 acres soil P1 levels to 25PPM

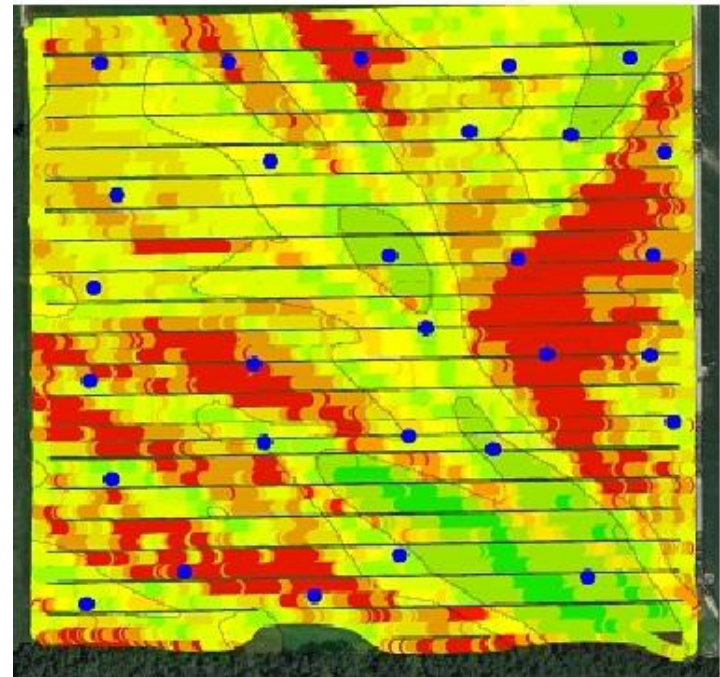
- If 11-52-0 cost \$400 a ton.
- Method 1 \$2165 or \$63.67 per acre
- Method 2 \$2108 or \$62.00 per acre
- Method 3 \$2930 or \$86.17 per acre
- Method 4 \$2786 or \$81.96 per acre
  
- If spreader has to run 35# min. it adds \$32 or \$1 per acre to method 1 & 2

# Conclusion

- Multiple samples is better than one sample.
- You need to know your field.
- Suggest on borders of other fields try splitting grid in 2 parts (  $\frac{1}{2}$  next to neighbor a  $\frac{1}{2}$  away from neighbor).
- Single point grids able to return to same spot and retest.
- Is EC data worth fewer samples? (uses for population or multi hybrid planting)
- Would zones be better?
- I think this needs more testing.
- Other nutrients add value to better sampling .

# Another method to use

- Use the EC to determined zones
- Combine samples in the zones for application rates
- Works best on large fields



I want to thank KARTA for  
grant.

**Questions**