



# Grids vs Zones Can't We Just Get Along?

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#### A Little History



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• 65	66	67	68	69	70	71	72	73
	57	58	59	60	61	62	63	64
	49	50	51	52	53	54	55	56
	41	42	43	44-	45	46	47	48
	1.	34	35	36	37	38	39	40
-	26	27	28	29	30	31	32	33
	18	19	20	21	22	23	24	_25
	10	11	12	13	14	15	16	17
NA	2	3	4	5	6	7	8	9



### A Little History



Zone Soil Color рΗ Dark 8.0 Green Light 8.2 Green Yellow 8.5 Orange 8.6 8.6 Red





**Field Zones** 



# Do Grids Have a Place?

- Can grid sampling help us understand relatively "non-mobile" soil parameters?
  - Phosphorus
  - Soil pH
  - Potassium
  - Salinity
  - CaCO3
- Is it appropriate to grid sample:
  - Once every 10-15 years to make sure we understand the variability of nonmobile nutrients
  - On land that we recently purchase?
  - To help us figure out why an area of a field is consistently lower yielding



# **Differences Between Grids and Zones**

#### Grids:

- More detailed information
- •Assumes the sampling will determine the variability
- •Can apply nutrients according to their individual geographical distribution

#### Zones:

- Fairly quick, easy, and economical
- •Assumes that all the variability can be described by imagery, yield data, and/or other data
- •Assumes that all nutrients have the same geographical distribution





#### **Management Zones**



#### **Correlation Coefficient Between Images**



> 0.7 = Strong Correlation



3.9	15.28	26.47	37.85	49.05
		Iron-(ppm)		

Layer Name	Soil pH 0-6"
Soil pH 0-6"	1.0
Olsen P	-0.511
Soil Fe	-0.916



# Yield Data and Management Zone Correlation

	<b>T</b>			
Layer Name	Management Zones	2009 Corn Yield	2014 Soybean Yield	2015 Corn Yiel
Management Zones	1.0	0.941	0.546	0.667
2009 Corn Yield	0.937	1.0	0.556	0.644
2014 Soybean Yield	0.547	0.556	1.0	0.549
2015 Corn Yield	0.668	0.644	0.549	1.0

**Management Zones** 







### Correlation Between Grid Sampling, Yield Data, Management Zones

2015 Grid Data	Zone Image	2009 Corn Yield	2014 Soybean Yield	2015 Corn Yield
Soil pH 0-6	-0.302	-0.140	0.031	-0.055
Soil pH 6-24	-0.235	-0.080	0.056	-0.007
Organic Matter	0.464	0.503	0.390	0.387
Potassium	0.395	0.325	0.111	0.153
Phosphorus	0.095	0.002	-0.159	-0.104
Nitrogen 0-24	0.241	0.152	0.043	0.049
CEC	-0.042	0.108	0.136	0.112
CaCO3 0-6	-0.173	-0.113	-0.208	-0.139
CaCO3 6-24	0.058	0.203	0.181	0.178
Sodium	-0.086	0.047	0.005	0.01
Salts 0-6	0.126	0.195	0.152	0.083
Salts 6-24	0.166	0.266	0.225	0.168

#### Correlation Between Grid Sampling, Yield Data, Management Zones



4.09 13.59 22.95 32.45 41.81 Olsen Phosphorus zones-(lbs/Acre)



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**Management Zones** 











88 164 238.8 314.8 389.6 Potassium zones-(ppm)

# **Predicting Spatial Variability of Nutrients**

Grid sampling and soil type comparison of P and K levels at Thomasboro, 1992. (Franzen and Peck, 1995)

Sampling Procedure and Nutrient	% of Soil Test Values +/- 5lb/A P or 15 lb/A K	% of Soil Test Values +/- 10 lb/A P or 30 lb/A K
1 acre grid Phosphorus	36.0	77.5
Soil Type Phosphorus	29.6	72.3
1 acre grid Potassium	60.5	88.5
Soil Type Potassium	54.9	83.4



# **Predicting Spatial Variability of Nutrients**

North Dakota sites correlation (r) of nitrate-N and P with topography and grid sampling estimates of original grid sampled locations. (Franzen and Peck, 1995)

Nutrient	Site	Topography	1 acre Grid	2.5 acre Grid	5 acre Grid
Nitrate-N <	Mandan	0.76	0.29	0.44	0.23
<	Valley City	0.35	0.50	0.21	0.21
<	Colfax	0.32	0.62	0.45	0.06
	Gardner	0.31	0.39	0.23	0.04
Phosphorus <b>c</b>	Mandan	0.58	0.58	0.22	0.58
<	Valley City	0.33	0.75	0.68	0.09
<	Colfax	0.16	0.62	0.37	0.17
	Gardner	0.40	0.44	0.34	0.56



### Correlation Between Grid Sampling and Management Zones





# Where is Zone or Grid Sampling Best?

Zonesewalandith Type









# Where is Zone or Grid Sampling Best?

Photeisloidings











### Conclusion

- There is more variability in these fields than we realize even the fields that are flat with consistent soil types
  - Yes! Variability exists in the Red River Valley!
- Zone sampling remains to be the most economical soil sampling for year in and year out practice. This is probably best for soil mobile nutrients such as Nitrogen.
- •Grid Sampling is NOT dead! However, Grid Sampling is probably most appropriate to be used when:
  - Make sure we understand the variability in a field
  - Help troubleshoot an areas in a field that is consistently yielding lower
  - Grid sampling is probably most appropriate for non-mobile soil nutrients such as P, K, soil pH





#### **Literature Cited**

Franzen, D.W. and T.R. Peck. 1995. Chapter 38. pp. 535-551. <u>Sampling for Site-Specific Application.</u> In: Site-Specific Management for Agricultural Systems. P. Robert et al., (ed.). ASA- CSSA-SSSA, Madison, WI.

Walters, D.T. 1995. Comparing the performance of preplant and presidedress soil nitrate tests for the north-central region. *In* Rehm, G., Program Chairman and Editor. 1995. Proceedings of the Twenty-Fifth North Central extension-Industry Soil Fertility Conference. Nov. 15-16, 1995. Potash & Phosphate Institute, Manhattan, KS.

Schmitt, M.A., G.W. Randall, and G.W. Rehm. 2002. A soil nitrogen test option for N recommendations with corn. Univ. of Minn. Ext. 612-624-1222. <u>http://www.extension.umn.edu/agriculture/nutrient-management/nitrogen/soil-nitrogen-test-option-for-n-recommendations/</u>.

