

Soil Technology Comparison

**Grid Sampling vs. Electrical Conductivity
vs. SoilOptix®**

By Dr. Viacheslav Adamchuk

Funded through OMAFRA New Directions Program

2015



Ministry of Agriculture,
Food and Rural Affairs

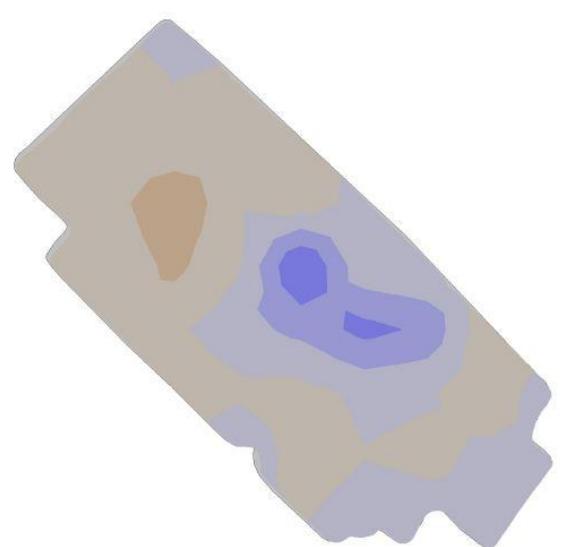
SOILOPTIX®
FIELD INTELLIGENCE



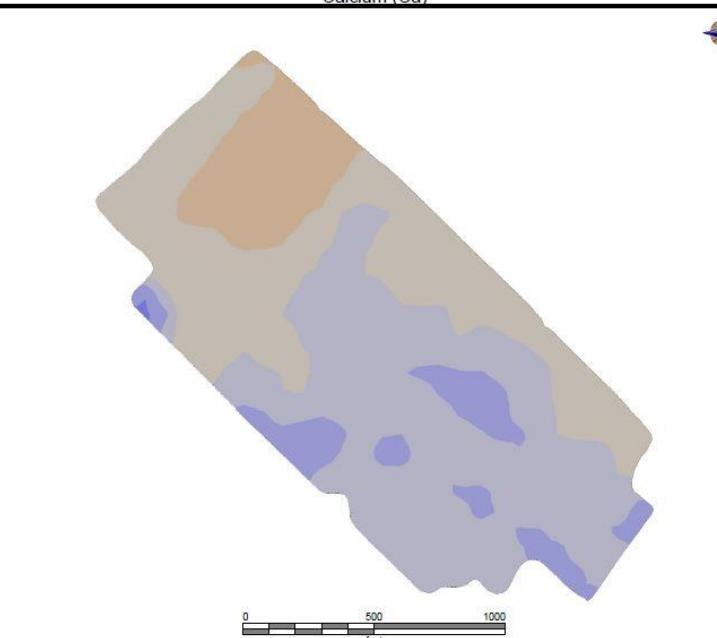
Technology Difference

| | Grid Sampling | EC – Zone Sampling | SoilOptix® |
|---------------------------|---|---|---|
| Measuring | <ul style="list-style-type: none">Soil Nutrients | <ul style="list-style-type: none">Electrical Conductivity | <ul style="list-style-type: none">Gamma Radiation |
| Frequency | <ul style="list-style-type: none">Every crop cycle | <ul style="list-style-type: none">Year 1 – EC surveyZone sample after (yearly or every crop cycle) | <ul style="list-style-type: none">Survey year one – good for 10 yearsSoil sample every year or every crop cycle |
| Collection Process | <ul style="list-style-type: none">Industry standard – 1 sample per 2.5acres | <ul style="list-style-type: none">40'-80' swath widthsSoil sample after zones have been determined | <ul style="list-style-type: none">40' swaths (narrower on special cases)Soil sample done immediately after survey of the field completeSample locations derived from in-field radiation variability |
| Data Resolution | <ul style="list-style-type: none">Statistics fill in data between points | <ul style="list-style-type: none">1 sample per zone3 – 7 Zones per field | <ul style="list-style-type: none">1 sample per 8 acres surveyed335 data points per acre |

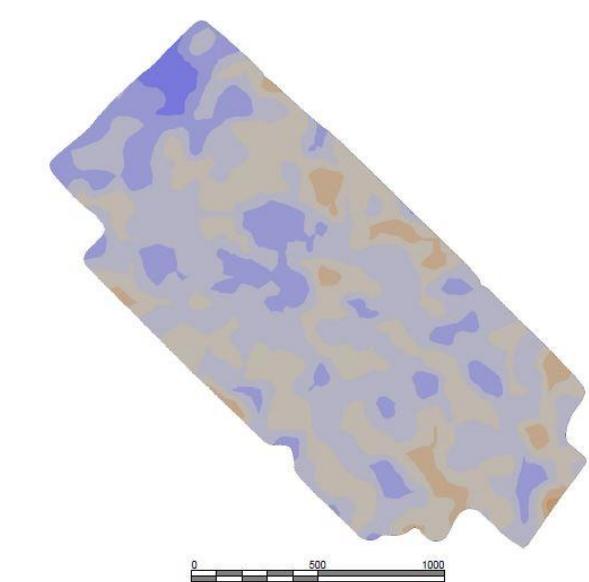
Zone Smart
Calcium (Ca)



Zone Smart
Calcium (Ca)



Zone Smart
Calcium (Ca)



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: One Acre Grid
Min: 1236.0 ppm
Max: 2995.0 ppm
Avg: 1741.9 ppm

| | |
|---------------------|----------|
| Above 2999.9 ppm | 0.00 ac |
| 2750.0 - 2999.9 ppm | 0.00 ac |
| 2500.0 - 2749.9 ppm | 0.00 ac |
| 2250.0 - 2499.9 ppm | 1.07 ac |
| 2000.0 - 2249.9 ppm | 4.46 ac |
| 1750.0 - 1999.9 ppm | 17.11 ac |
| 1500.0 - 1749.9 ppm | 27.15 ac |
| 1250.0 - 1499.9 ppm | 2.03 ac |
| 1000.0 - 1249.9 ppm | 0.00 ac |
| 750.0 - 999.9 ppm | 0.00 ac |
| 500.0 - 749.9 ppm | 0.00 ac |
| Below 500.0 ppm | 0.00 ac |

SOILOPTIX.
FIELD INTELLIGENCE

One Acre Grid

Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Zone Smart - Vents
Min: 1412.0 ppm
Max: 2427.0 ppm
Avg: 1752.2 ppm

| | |
|---------------------|----------|
| Above 2999.9 ppm | 0.00 ac |
| 2750.0 - 2999.9 ppm | 0.00 ac |
| 2500.0 - 2749.9 ppm | 0.00 ac |
| 2250.0 - 2499.9 ppm | 0.05 ac |
| 2000.0 - 2249.9 ppm | 4.48 ac |
| 1750.0 - 1999.9 ppm | 23.16 ac |
| 1500.0 - 1749.9 ppm | 17.91 ac |
| 1250.0 - 1499.9 ppm | 6.20 ac |
| 1000.0 - 1249.9 ppm | 0.00 ac |
| 750.0 - 999.9 ppm | 0.00 ac |
| 500.0 - 749.9 ppm | 0.00 ac |
| Below 500.0 ppm | 0.00 ac |

SOILOPTIX.
FIELD INTELLIGENCE

EC

Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Nutrients
Min: 934.1 ppm
Max: 2300.0 ppm
Avg: 1815.3 ppm

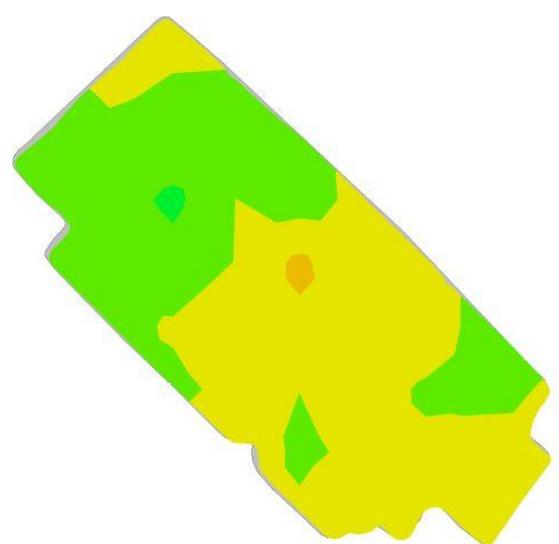
| | |
|---------------------|----------|
| Above 2999.9 ppm | 0.00 ac |
| 2750.0 - 2999.9 ppm | 0.00 ac |
| 2500.0 - 2749.9 ppm | 0.00 ac |
| 2250.0 - 2499.9 ppm | 0.83 ac |
| 2000.0 - 2249.9 ppm | 8.06 ac |
| 1750.0 - 1999.9 ppm | 23.72 ac |
| 1500.0 - 1749.9 ppm | 16.98 ac |
| 1250.0 - 1499.9 ppm | 2.18 ac |
| 1000.0 - 1249.9 ppm | 0.04 ac |
| 750.0 - 999.9 ppm | 0.00 ac |
| 500.0 - 749.9 ppm | 0.00 ac |
| Below 500.0 ppm | 0.00 ac |

SOILOPTIX.
FIELD INTELLIGENCE

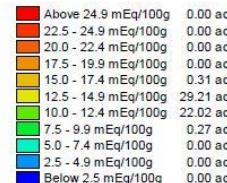
SoilOptix®

SOILOPTIX.
FIELD INTELLIGENCE

Zone Smart
Cation Exchange Capacity (CEC)



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: One Acre Grid
Min: 9.1 mEq/100g
Max: 17.6 mEq/100g
Avg: 12.6 mEq/100g



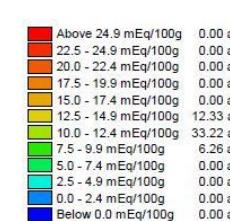
SOILOPTIX
FIELD INTELLIGENCE

One Acre Grid

Zone Smart
Cation Exchange Capacity (CEC)



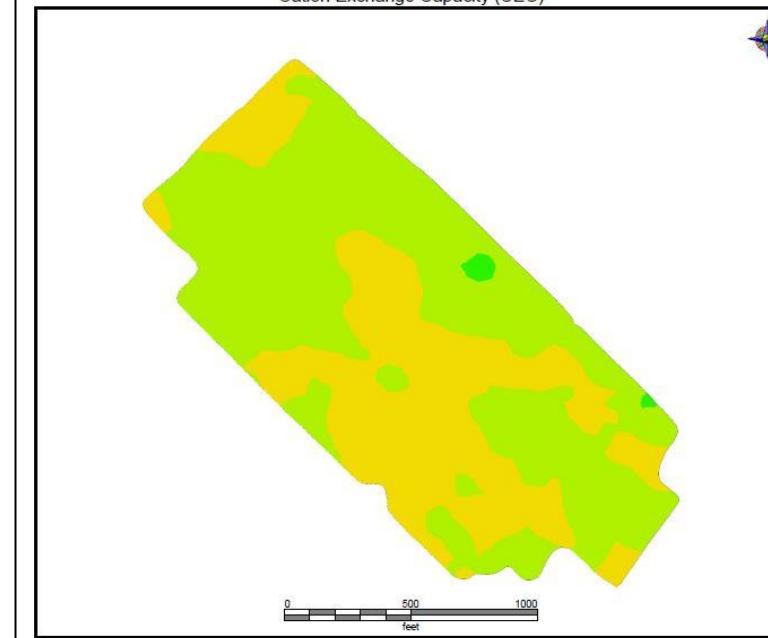
Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Zone Smart - Veris
Min: 8.9 mEq/100g
Max: 15.2 mEq/100g
Avg: 11.7 mEq/100g



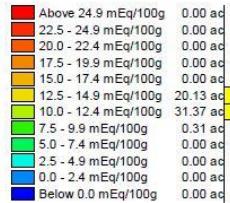
SOILOPTIX
FIELD INTELLIGENCE

EC

Zone Smart
Cation Exchange Capacity (CEC)



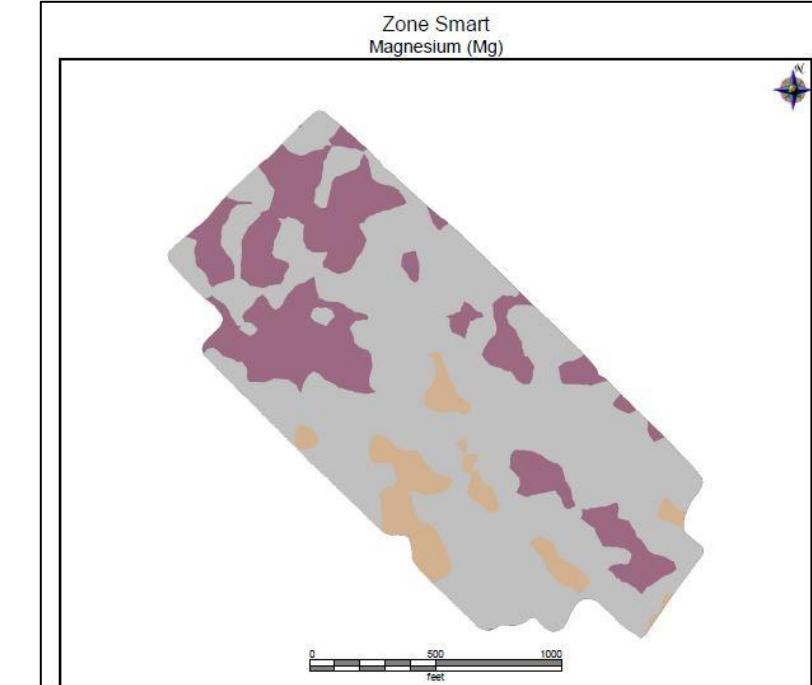
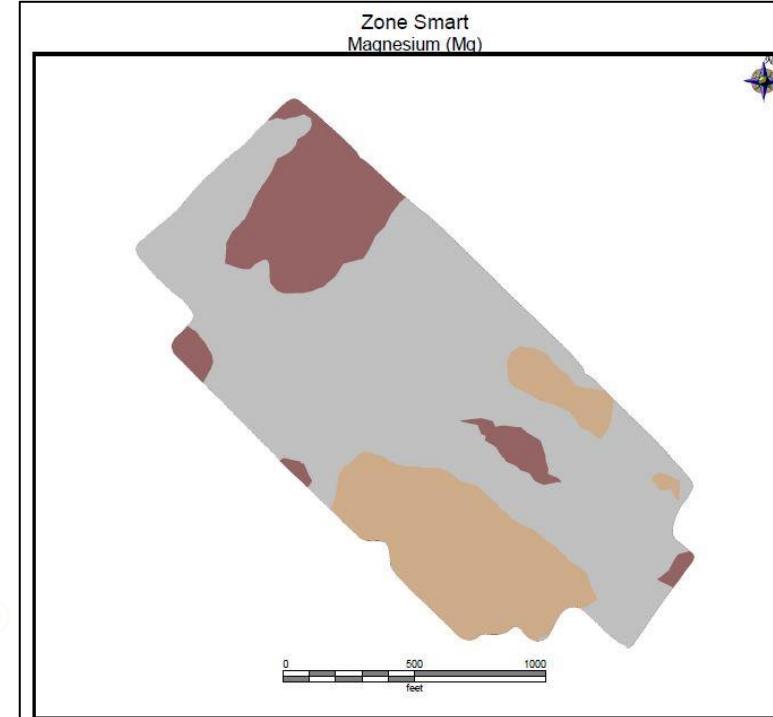
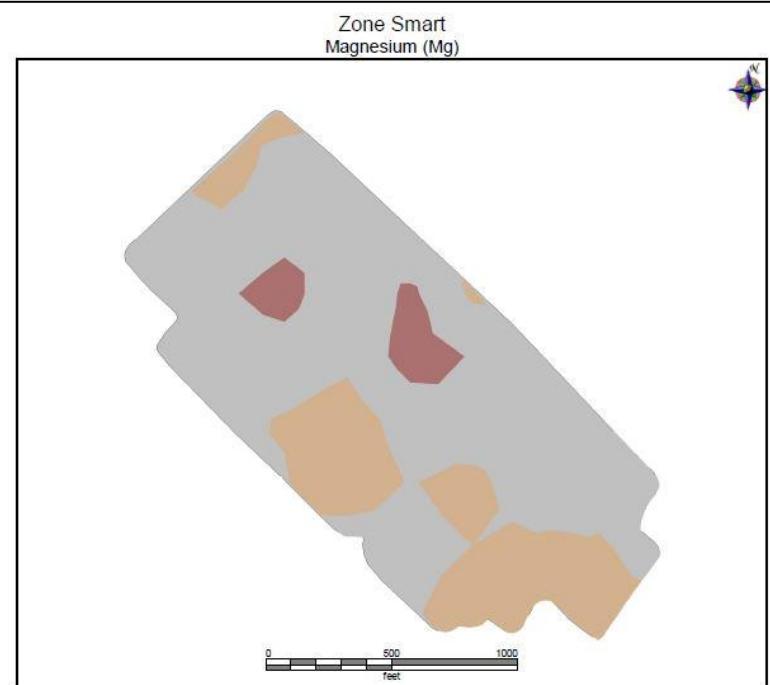
Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Nutrients
Min: 7.0 mEq/100g
Max: 15.2 mEq/100g
Avg: 12.2 mEq/100g



SOILOPTIX
FIELD INTELLIGENCE

SoilOptix®

SOILOPTIX

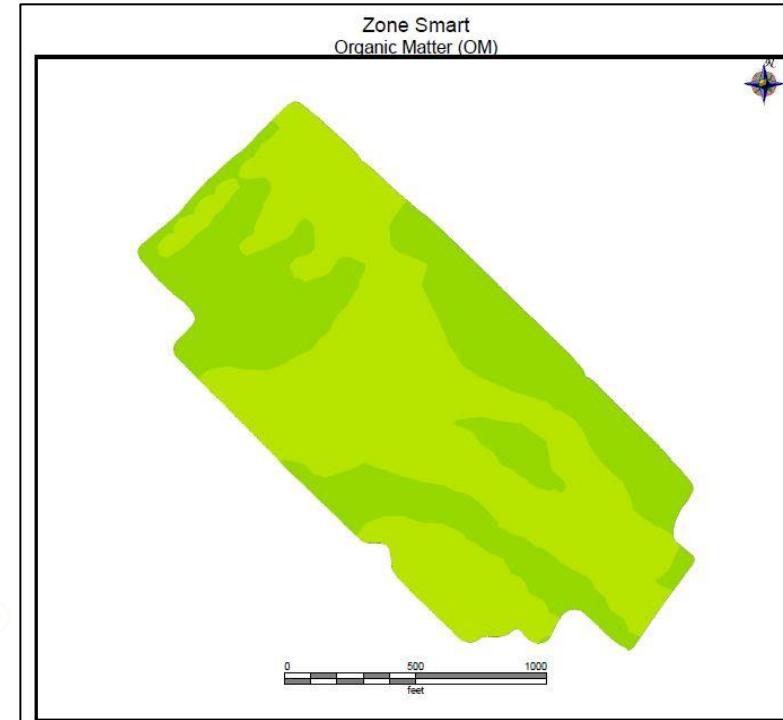


One Acre Grid

EC

SoilOptix®

SOILOPTIX



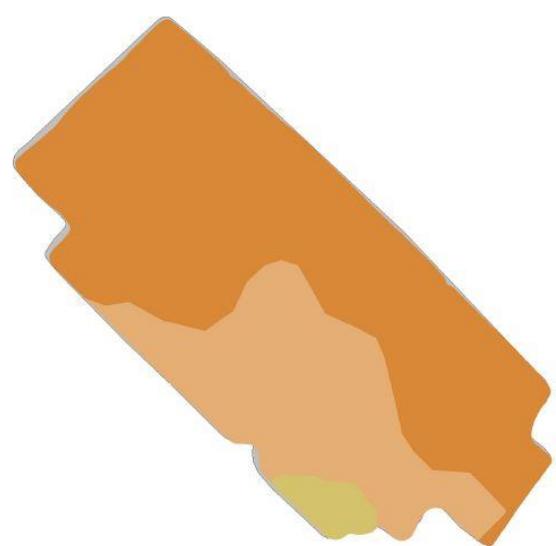
One Acre Grid

EC

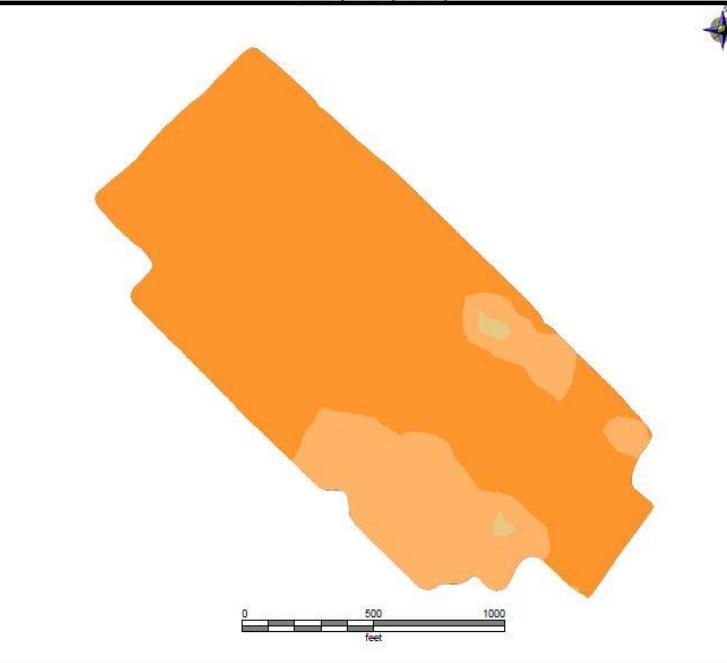
SoilOptix®

SOILOPTIX

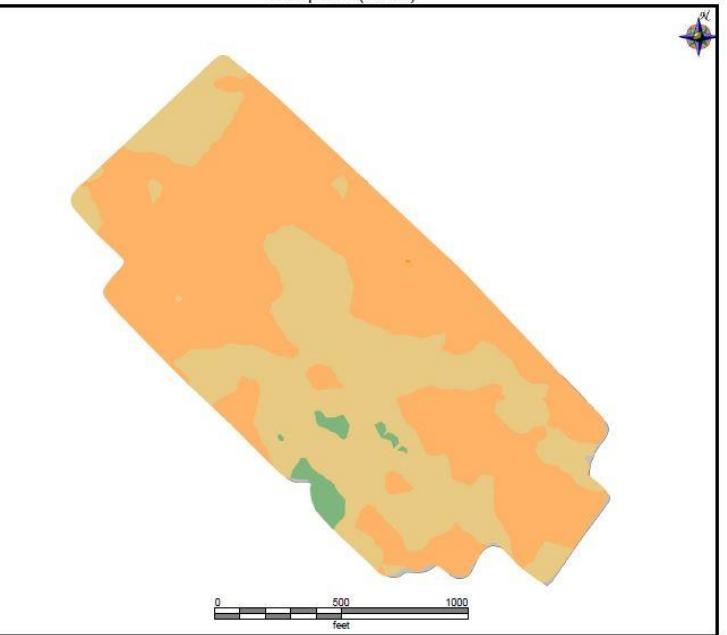
Zone Smart
Phosphorous (P)



Zone Smart
Phosphate (P2O5)



Zone Smart
Phosphate (P2O5)



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: One Acre Grid
Min: 15.0 ppm
Max: 70.0 ppm
Avg: 36.9 ppm

| | |
|-----------------|----------|
| Above 99.9 ppm | 0.00 ac |
| 80.0 - 99.9 ppm | 0.00 ac |
| 60.0 - 79.9 ppm | 1.51 ac |
| 40.0 - 59.9 ppm | 15.59 ac |
| 20.0 - 39.9 ppm | 34.70 ac |
| 15.0 - 19.9 ppm | 0.00 ac |

SOILOPTIX
FIELD INTELLIGENCE

One Acre Grid

Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Zone Smart - Vents
Min: 5.0 ppm
Max: 51.6 ppm
Avg: 13.1 ppm

| | |
|-----------------|----------|
| Above 89.9 ppm | 0.00 ac |
| 75.0 - 89.9 ppm | 0.00 ac |
| 60.0 - 74.9 ppm | 0.00 ac |
| 45.0 - 59.9 ppm | 0.00 ac |
| 30.0 - 44.9 ppm | 0.29 ac |
| 15.0 - 29.9 ppm | 10.59 ac |
| 0.0 - 14.9 ppm | 40.92 ac |
| Below 0.0 ppm | 0.00 ac |

SOILOPTIX
FIELD INTELLIGENCE

EC

Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Nutrients
Min: 14.0 ppm
Max: 57.6 ppm
Avg: 29.2 ppm

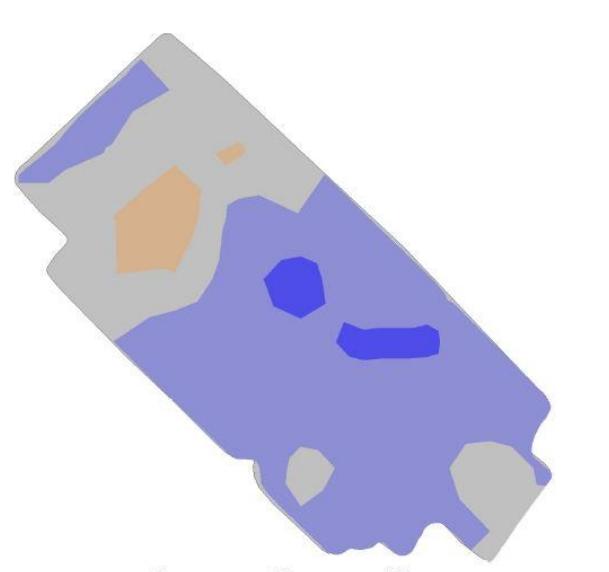
| | |
|-----------------|----------|
| Above 89.9 ppm | 0.00 ac |
| 75.0 - 89.9 ppm | 0.00 ac |
| 60.0 - 74.9 ppm | 0.00 ac |
| 45.0 - 59.9 ppm | 0.89 ac |
| 30.0 - 44.9 ppm | 20.62 ac |
| 15.0 - 29.9 ppm | 31.11 ac |
| 0.0 - 14.9 ppm | 0.00 ac |
| Below 0.0 ppm | 0.00 ac |

SOILOPTIX
FIELD INTELLIGENCE

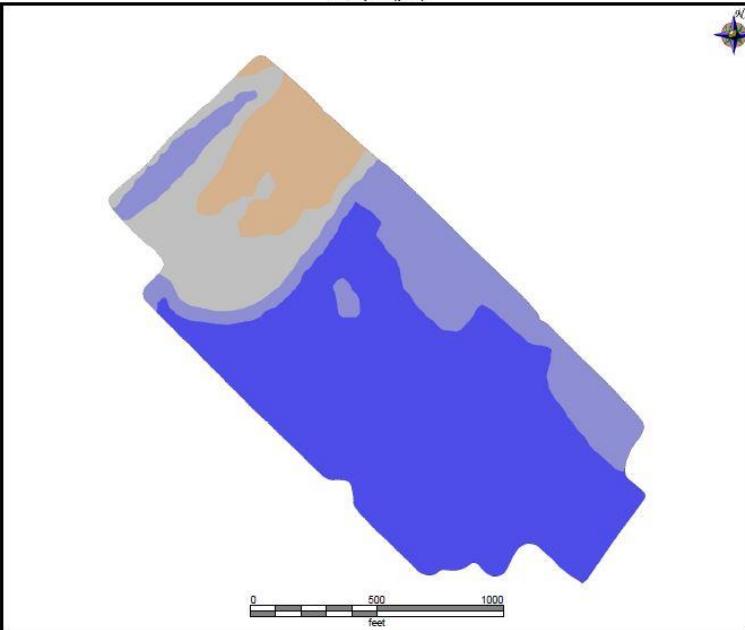
SoilOptix®

SOILOPTIX
FIELD INTELLIGENCE

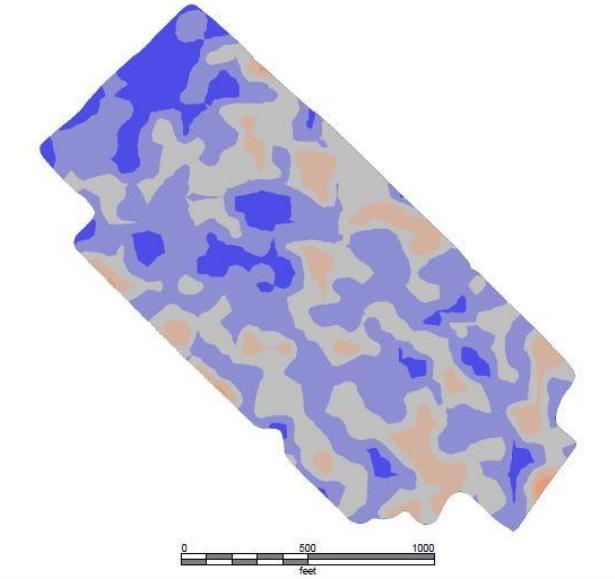
Zone Smart
Soil pH (pH)



Zone Smart
Soil pH (pH)



Zone Smart
Soil pH (pH)



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: One Acre Grid
Min: 6.5 pH
Max: 7.9 pH
Avg: 7.4 pH

| | |
|--------------|----------|
| Above 7.9 pH | 0.00 ac |
| 7.7 - 7.9 pH | 2.08 ac |
| 7.4 - 7.6 pH | 31.54 ac |
| 7.1 - 7.3 pH | 15.67 ac |
| 6.8 - 7.0 pH | 2.51 ac |
| 6.5 - 6.7 pH | 0.00 ac |
| Below 6.5 pH | 0.00 ac |

SOILOPTIX
FIELD INTELLIGENCE

One Acre Grid

Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: ZoneSmart_Veris
Min: 6.9 pH
Max: 7.9 pH
Avg: 7.6 pH

| | |
|--------------|----------|
| Above 7.9 pH | 0.00 ac |
| 7.7 - 7.9 pH | 29.34 ac |
| 7.4 - 7.6 pH | 10.22 ac |
| 7.1 - 7.3 pH | 7.04 ac |
| 6.8 - 7.0 pH | 5.20 ac |
| 6.5 - 6.7 pH | 0.00 ac |
| Below 6.5 pH | 0.00 ac |

SOILOPTIX
FIELD INTELLIGENCE

EC

Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Nutrients
Min: 6.5 pH
Max: 7.8 pH
Avg: 7.4 pH

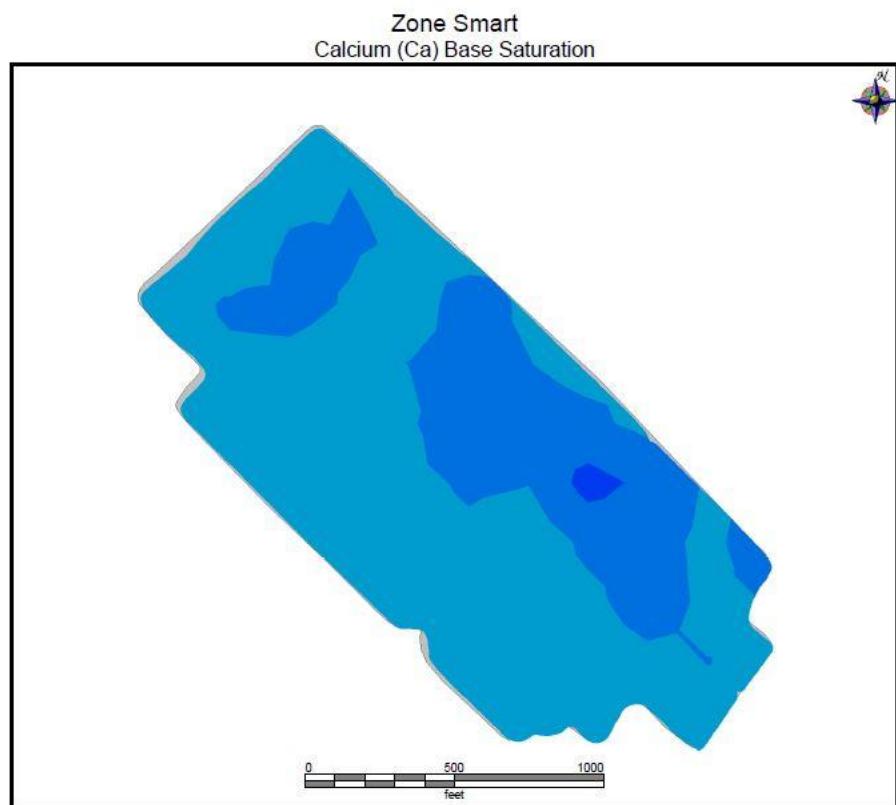
| | |
|--------------|----------|
| Above 7.9 pH | 0.00 ac |
| 7.7 - 7.9 pH | 5.85 ac |
| 7.4 - 7.6 pH | 23.62 ac |
| 7.1 - 7.3 pH | 17.53 ac |
| 6.8 - 7.0 pH | 4.69 ac |
| 6.5 - 6.7 pH | 0.11 ac |
| Below 6.5 pH | 0.00 ac |

SOILOPTIX
FIELD INTELLIGENCE

SoilOptix®

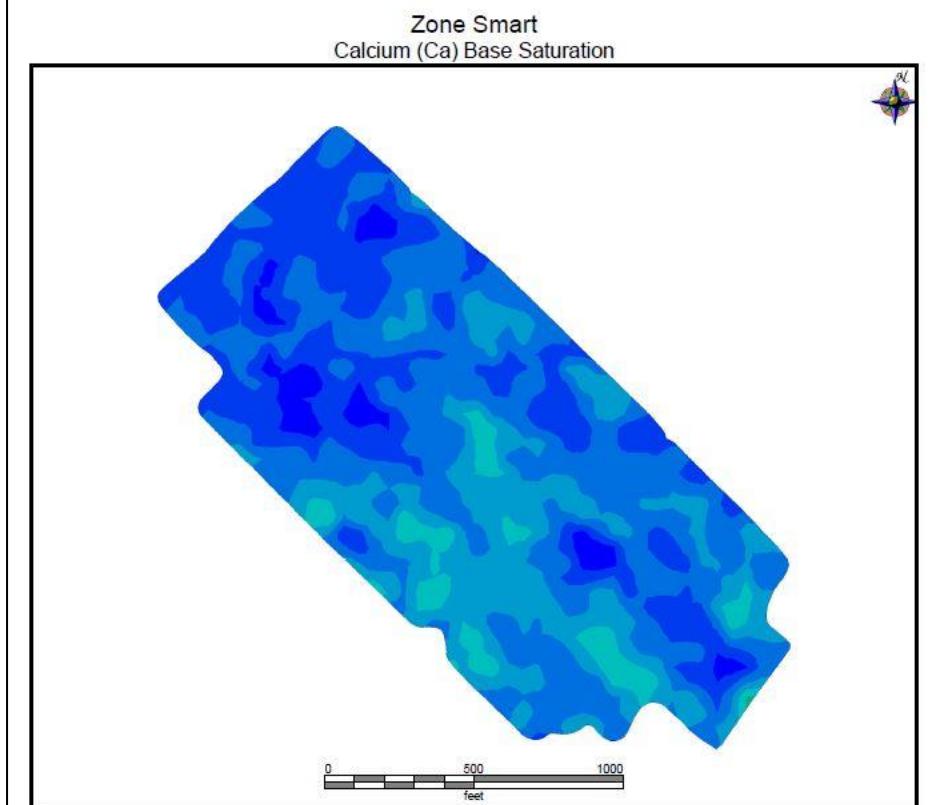
SOILOPTIX
FIELD INTELLIGENCE

Zone Smart
Calcium (Ca) Base Saturation



One Acre Grid

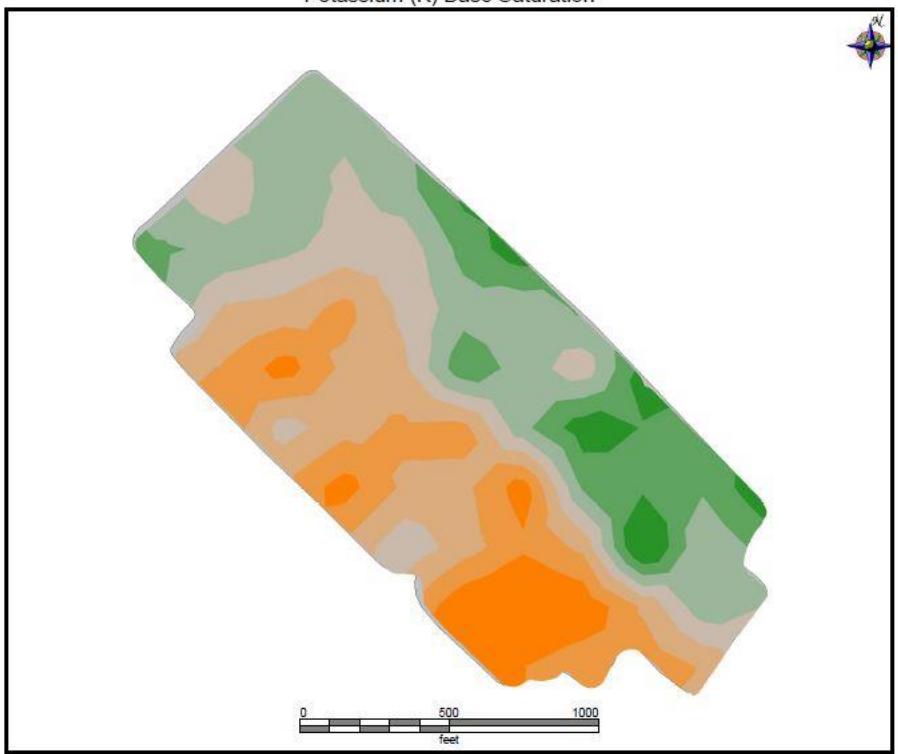
Zone Smart
Calcium (Ca) Base Saturation



SoilOptix®

SOILOPTIX
FIELD INTELLIGENCE

Zone Smart
Potassium (K) Base Saturation



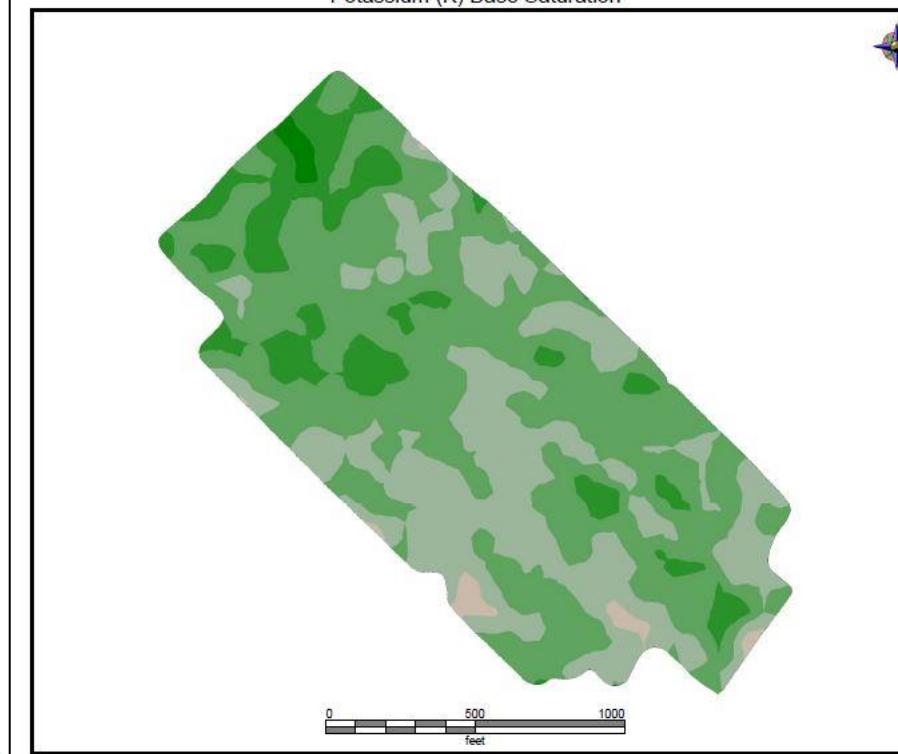
Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: One Acre Grid
Min: 1.6 %
Max: 6.2 %
Avg: 3.7 %



SOILOPTIX
FIELD INTELLIGENCE

One Acre Grid

Zone Smart
Potassium (K) Base Saturation



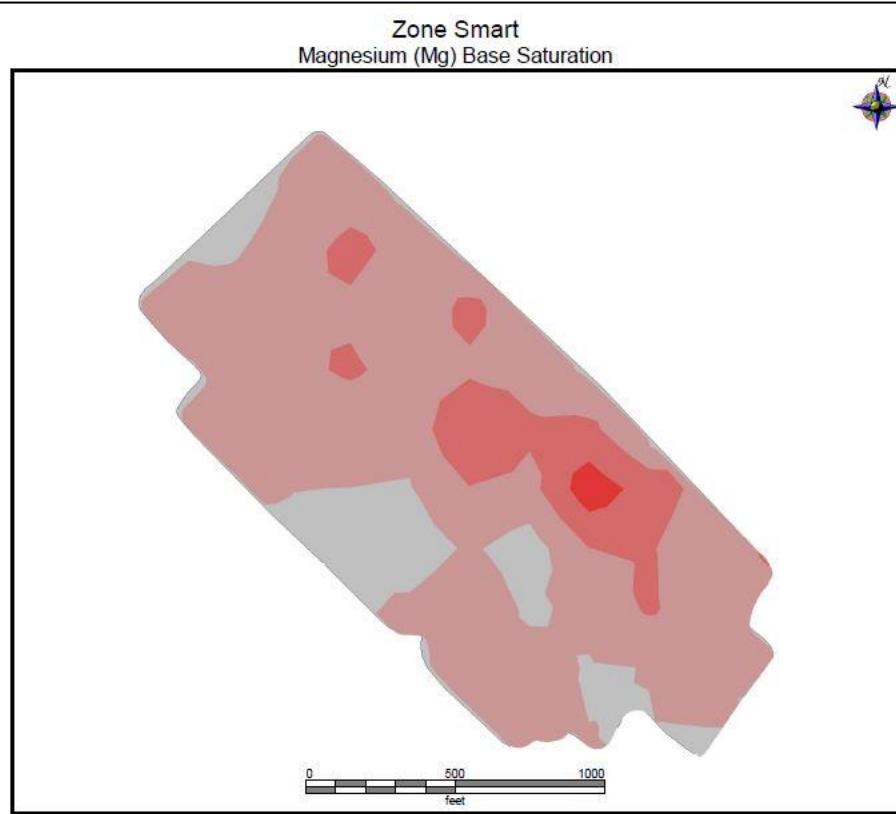
Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Nutrients
Min: 1.7 %
Max: 4.2 %
Avg: 2.9 %



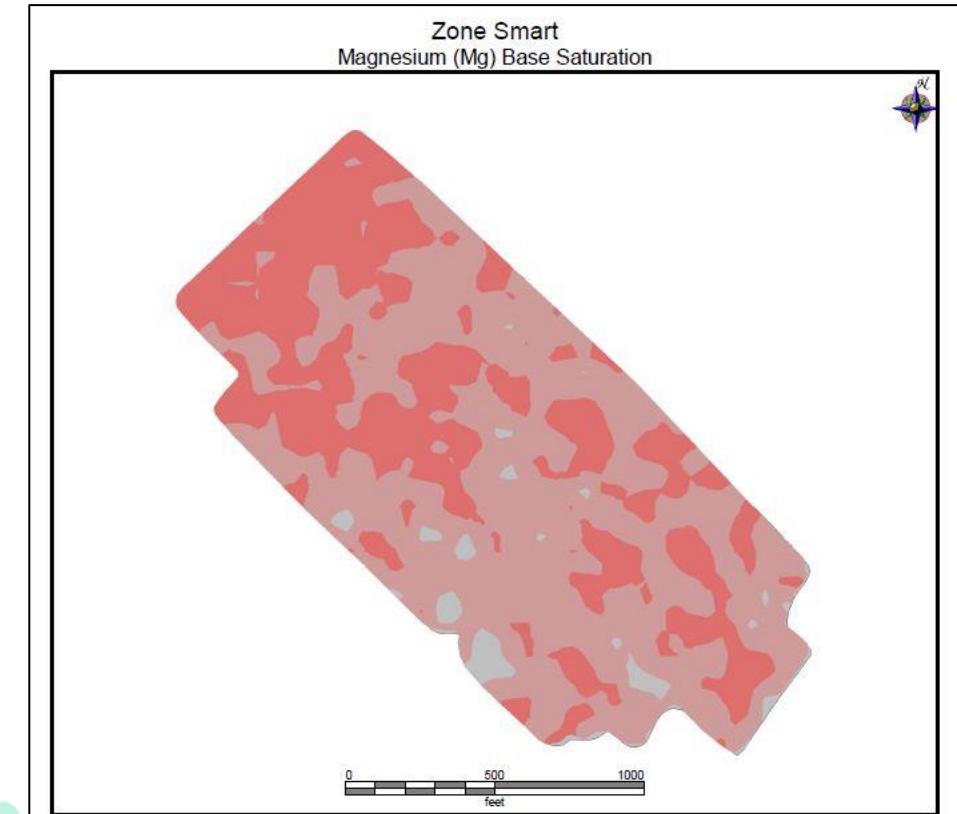
SOILOPTIX
FIELD INTELLIGENCE

SoilOptix®

SOILOPTIX



One Acre Grid

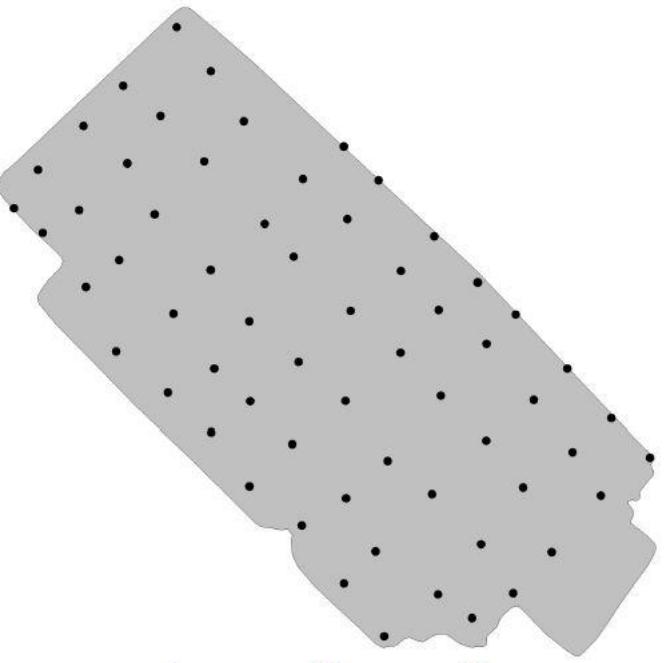


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SOILOPTIX

Survey Maps

Zone Smart
SampleID

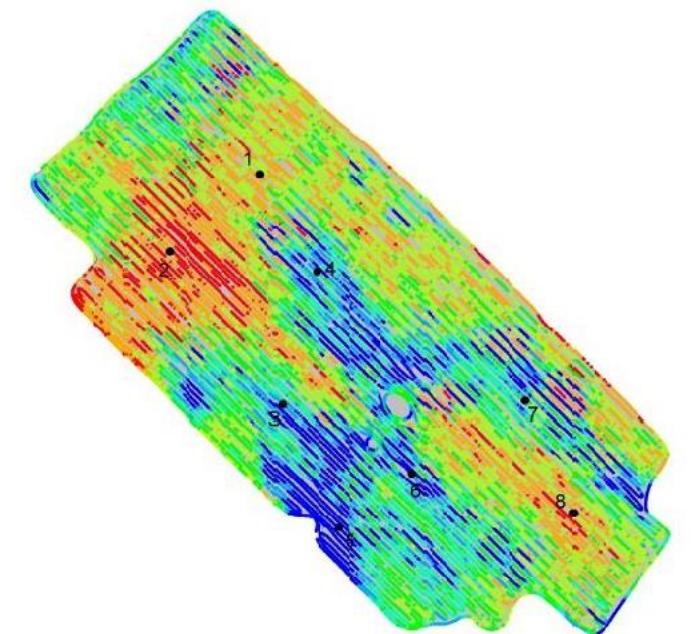


Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: One Acre Grid
Min: 1.000
Max: 62.000
Avg: 31.500

SOILOPTIX.
FIELD INTELLIGENCE

One Acre Grid

Zone Smart
Count



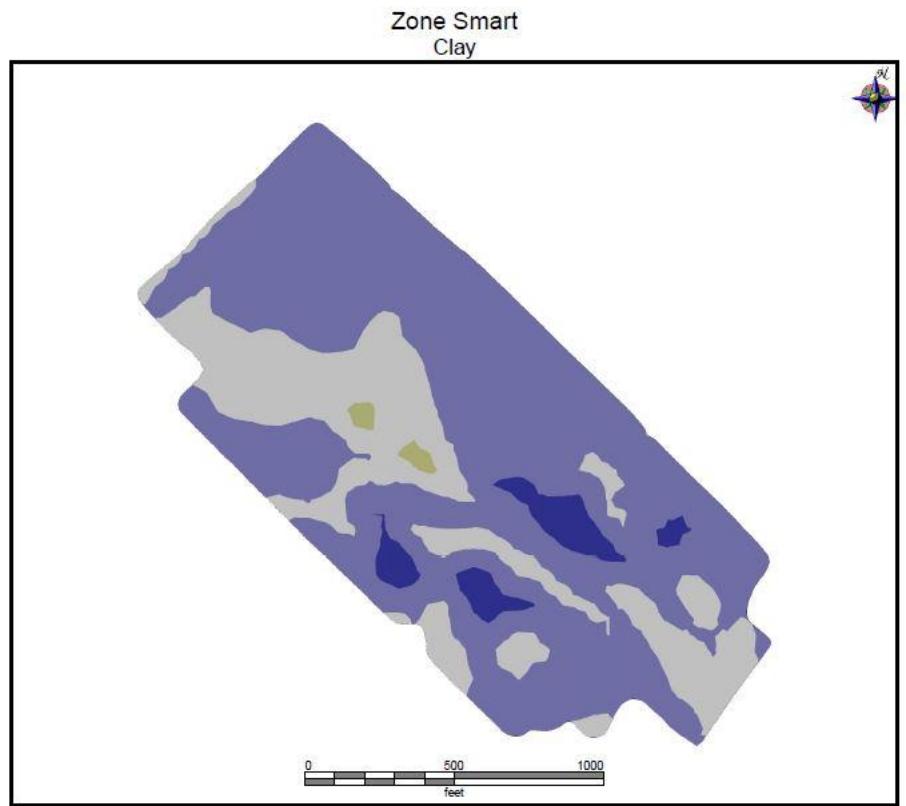
Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Survey
Min: 264.182
Max: 428.545
Avg: 371.416



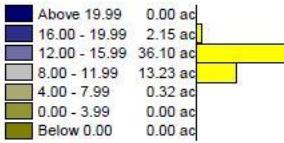
SOILOPTIX.
FIELD INTELLIGENCE

SoilOptix® SOILOPTIX.

Zone Smart
Clay



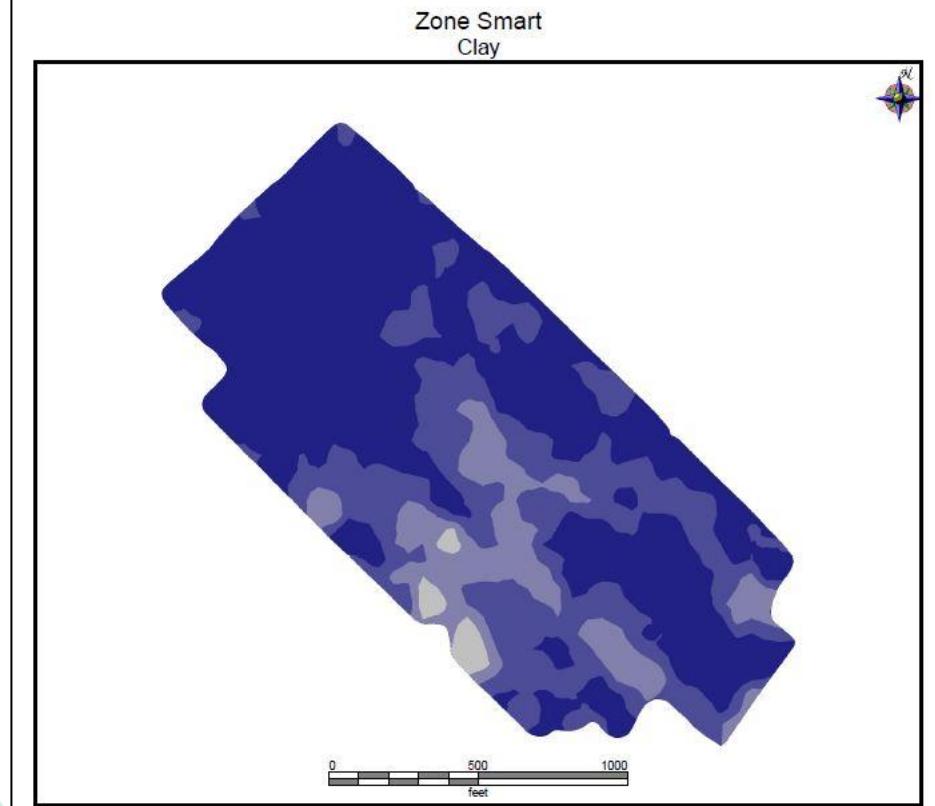
Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: ZoneSmart_Veris
Min: 7.00
Max: 19.00
Avg: 13.28



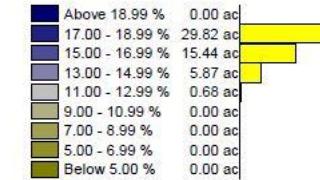
SOILOPTIX
FIELD INTELLIGENCE

EC

Zone Smart
Clay



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Texture
Min: 9.58 %
Max: 19.00 %
Avg: 17.03 %



SOILOPTIX
FIELD INTELLIGENCE

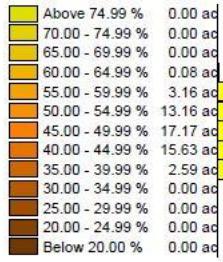
SoilOptix®

SOILOPTIX
FIELD INTELLIGENCE

Zone Smart
Sand



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Zone Smart - Veris
Min: 37.00 %
Max: 62.00 %
Avg: 47.34 %



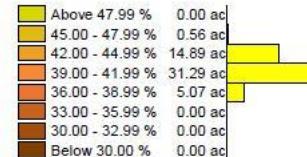
SOILOPTIX
FIELD INTELLIGENCE

EC

Zone Smart
Sand



Client: SoilOptix
Farm: Zone Smart
Field: Zone Smart
Name: Combined Texture
Min: 35.84 %
Max: 47.72 %
Avg: 41.16 %

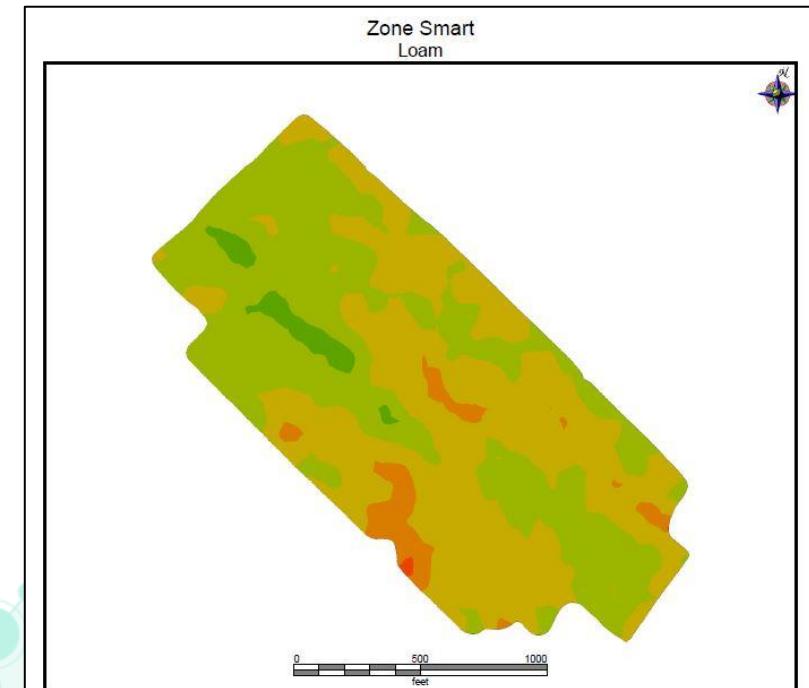
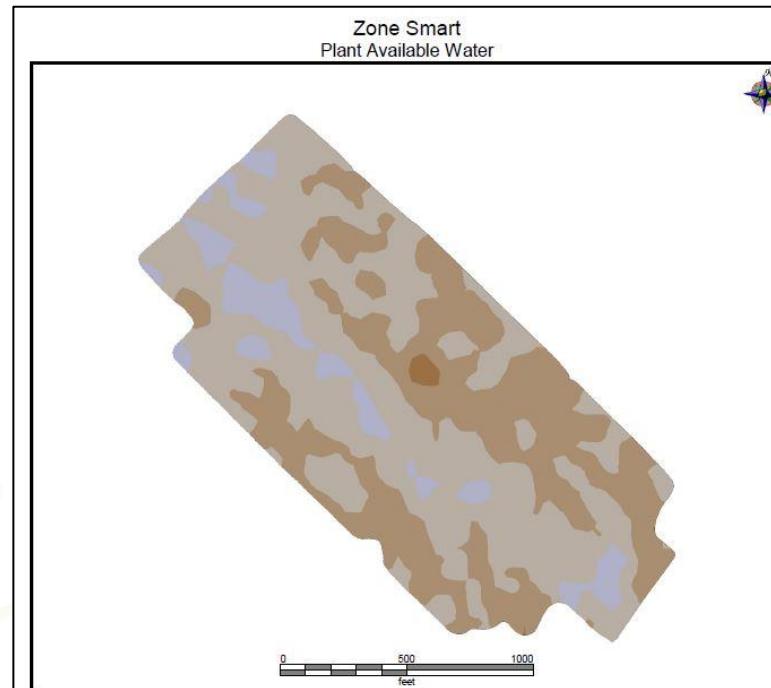
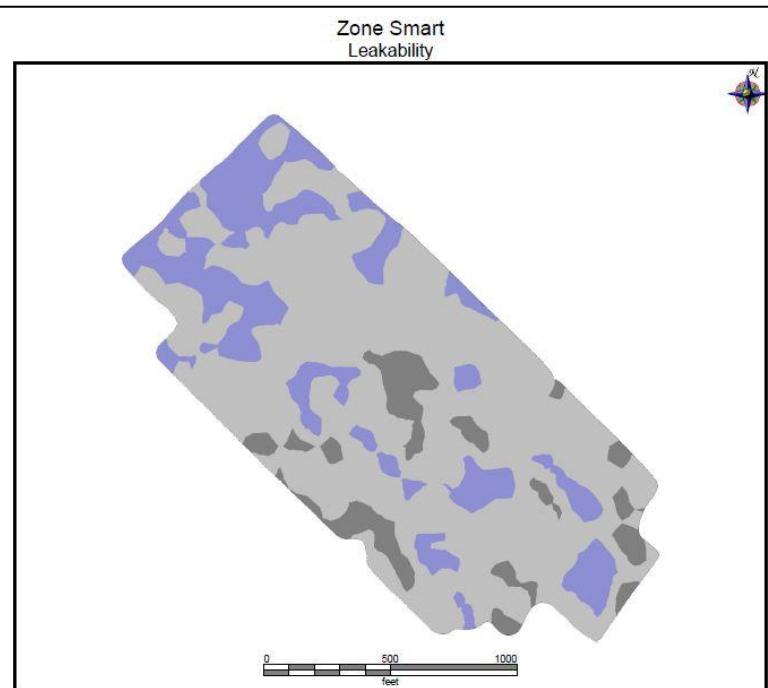


SOILOPTIX
FIELD INTELLIGENCE

SoilOptix®

SOILOPTIX
FIELD INTELLIGENCE

Additional SoilOptix® Layers



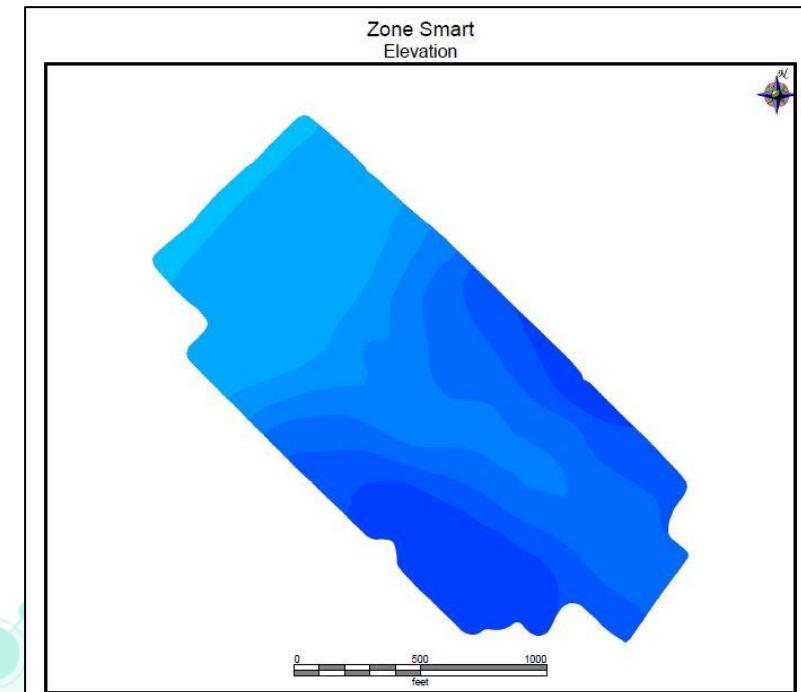
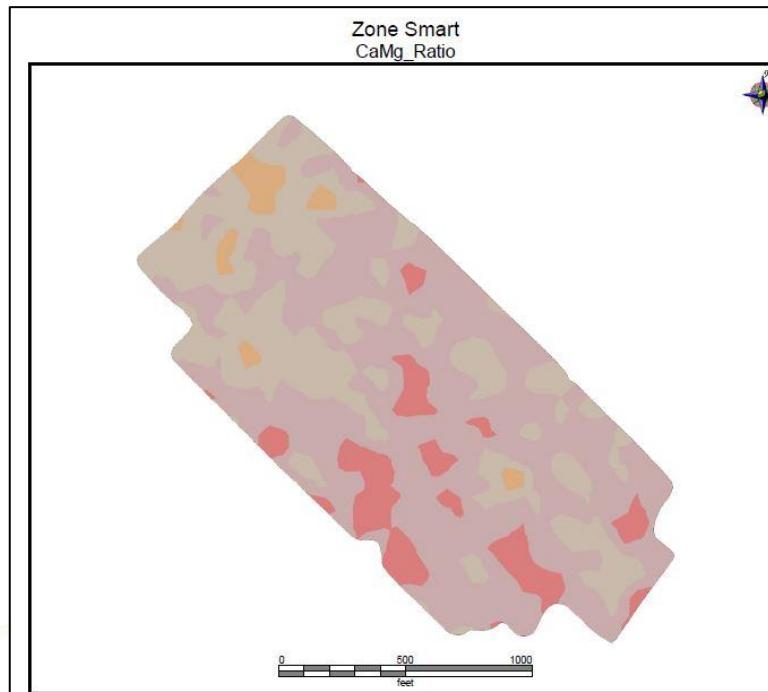
SoilOptix®

SoilOptix®

SoilOptix®

SOILOPTIX FIELD INTELLIGENCE

Additional SoilOptix® Layers



SoilOptix®

SoilOptix®

SoilOptix®

SOILOPTIX FIELD INTELLIGENCE

Why SoilOptix®?

- Highest definition soil nutrient and texture maps available
 - 335 data points per acre
 - More precise data for VRA prescriptions
- Over 30 different data layers offered
- Pre-calibrated sensor - Easy to use; Optimizes field time
- Measures stable isotopes
 - Minimal interference from soil moisture
 - Survey in up to 5 inches of light snow
 - No interference caused by field vegetation/residue