Precision Planting

Soil Sensing Technology on the Planter

Starkville, MS
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PRESENTED BY

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Row Crop SHORT COURSE

MISSISSIPPI STATE UNIVERSITY EXTENSION

“Sensing” Technology

1. Furrow Environment Sensing
2. High Definition Zone Mapping
3. Controlling Seeding Rate
4. Controlling Genetics
5. Mechanical Issue Detection


PRACTICAL FARM RESEARCH
MULTI HYBRID PLANTING
JOHN DEERE

The Ability to “Sense”

1. Furrow Environment Sensing
2. Mechanical Issue Detection
3. High Definition Zone Mapping
4. Controlling Seeding Rate
5. Controlling Genetics

Spatial Variability

Are farmers interested in defining it?

We know it's been difficult in the past…

Can it be easier in the future?

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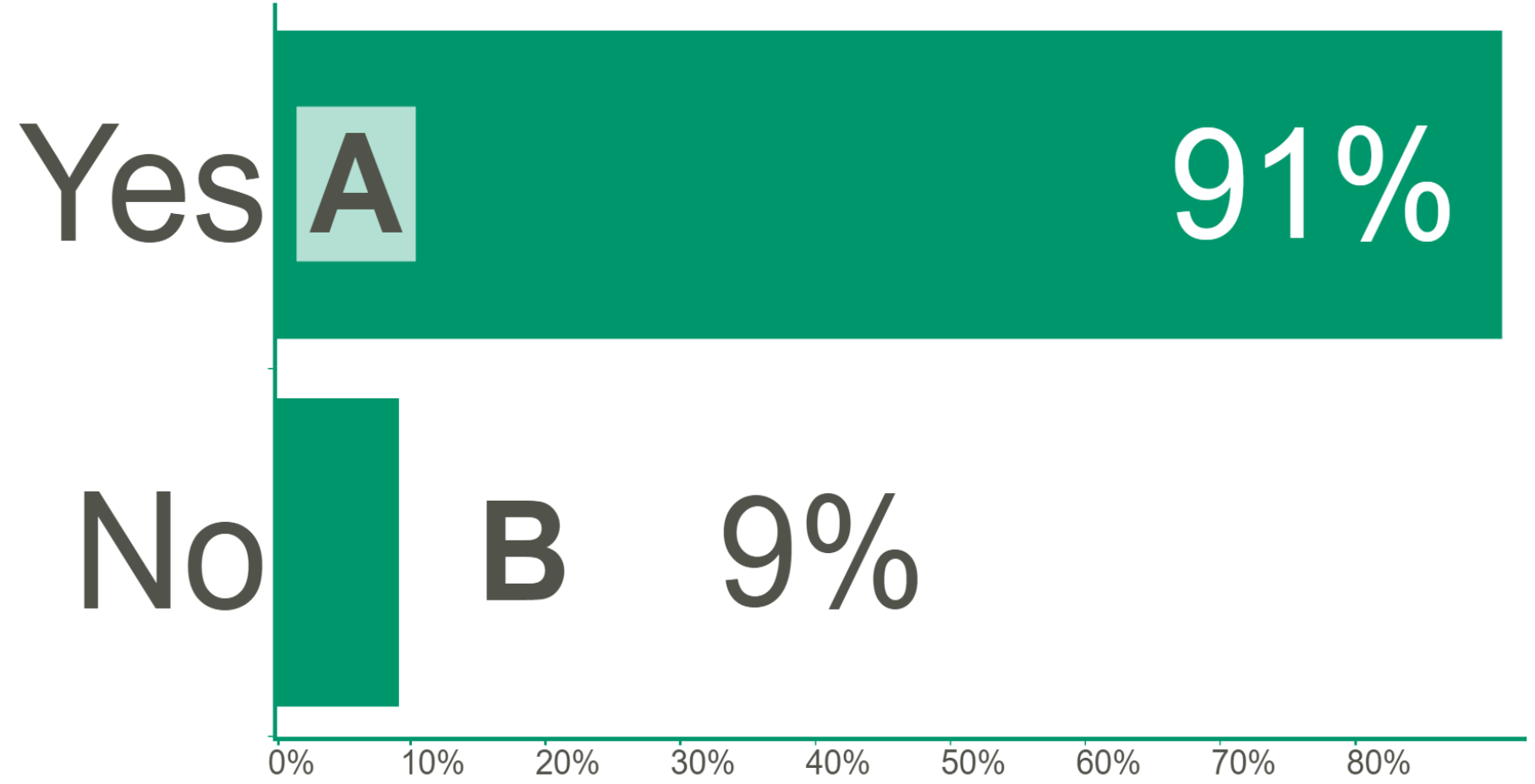
Do you have soil variability on your farms?



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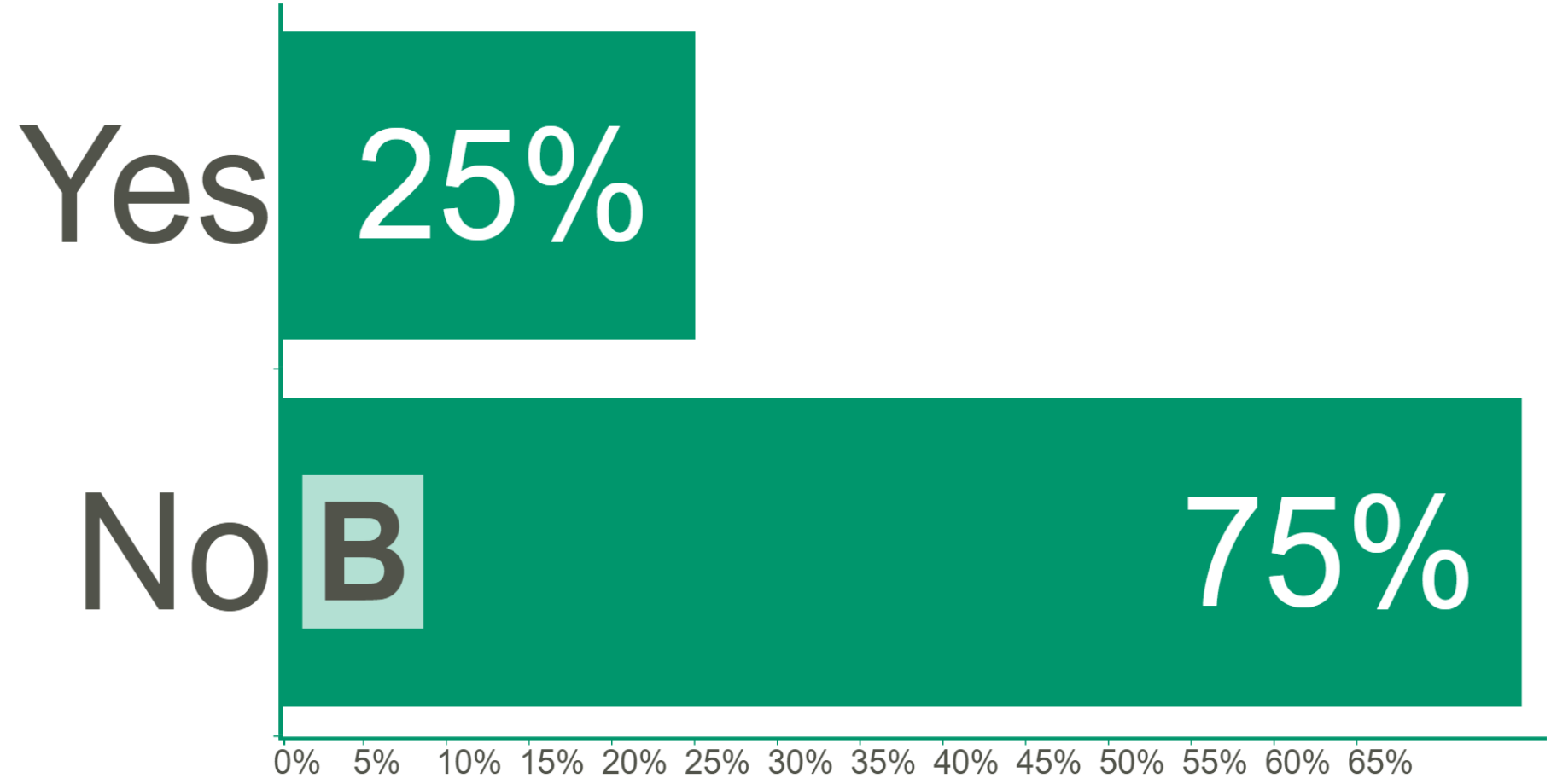
Have you created spatial management zones on your farm?



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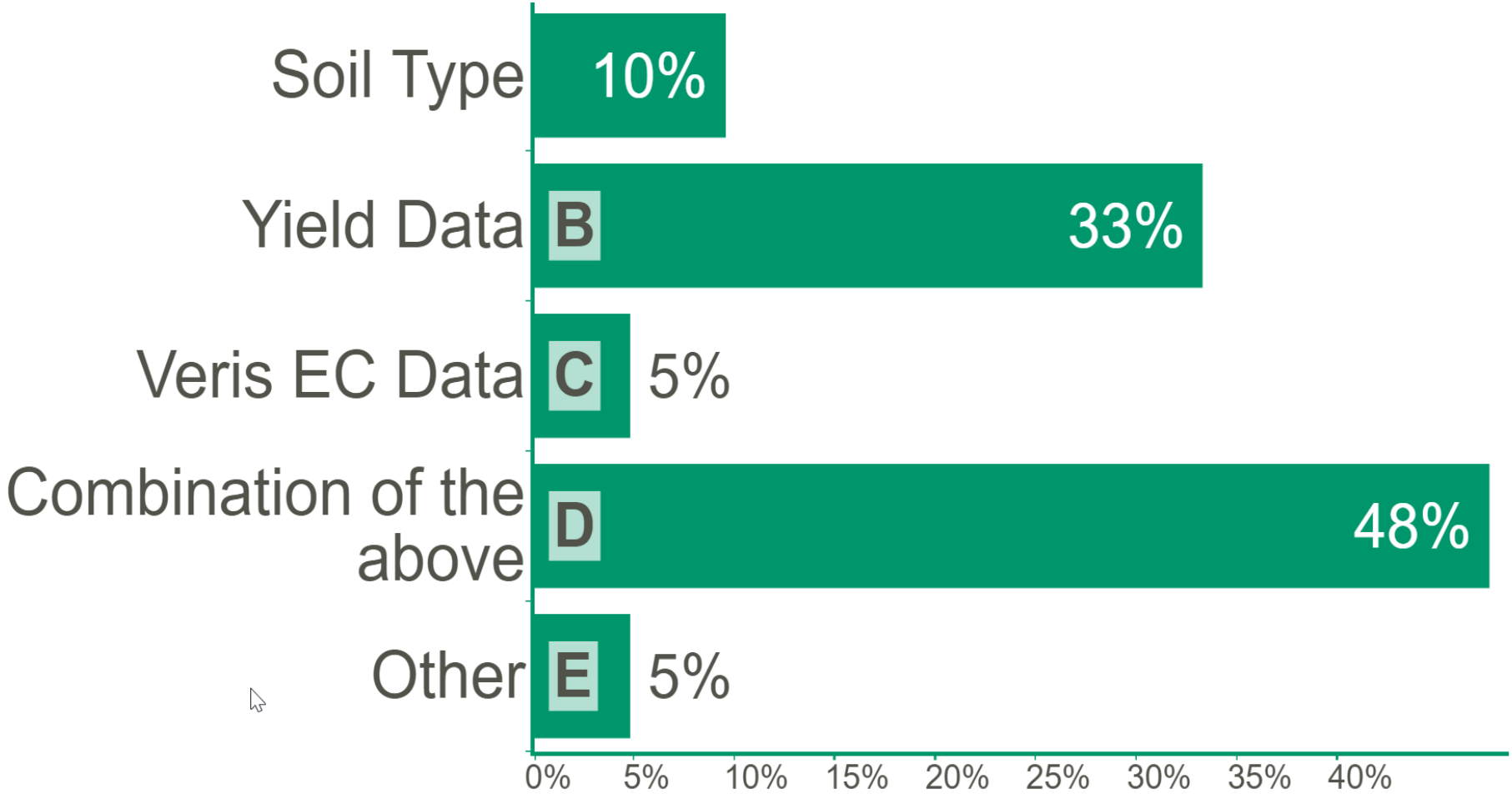
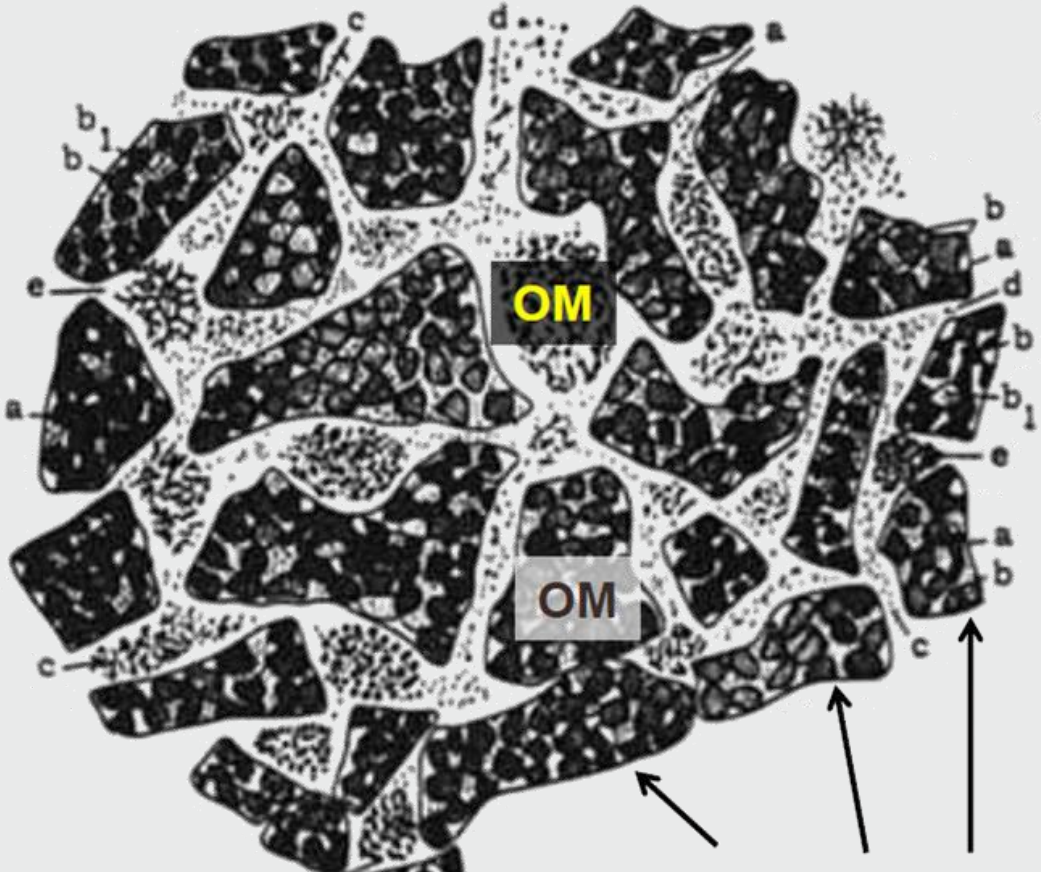
What datasets are you using to create spatial management zones on your farms?



What about using Organic Matter to predict yield?

OM Is The Sponge Between Soil Minerals



Increase:

- Porosity
- Infiltration Rate
- Water use Efficiency
- Nutrient Use Efficiency
- Nutrient Retention
- Aggregation

Decrease:

- Compaction
- Crusting
- Runoff
- Erosion

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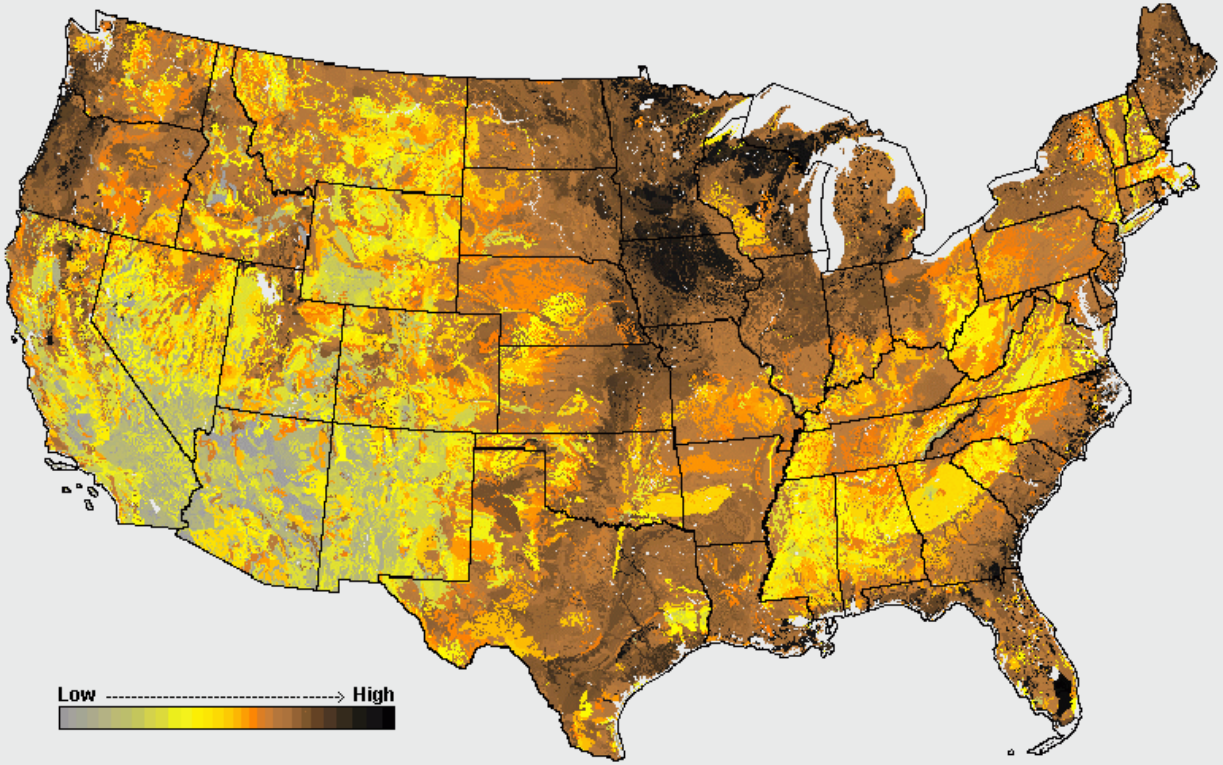
Soil OM – A Fingerprint Yield History



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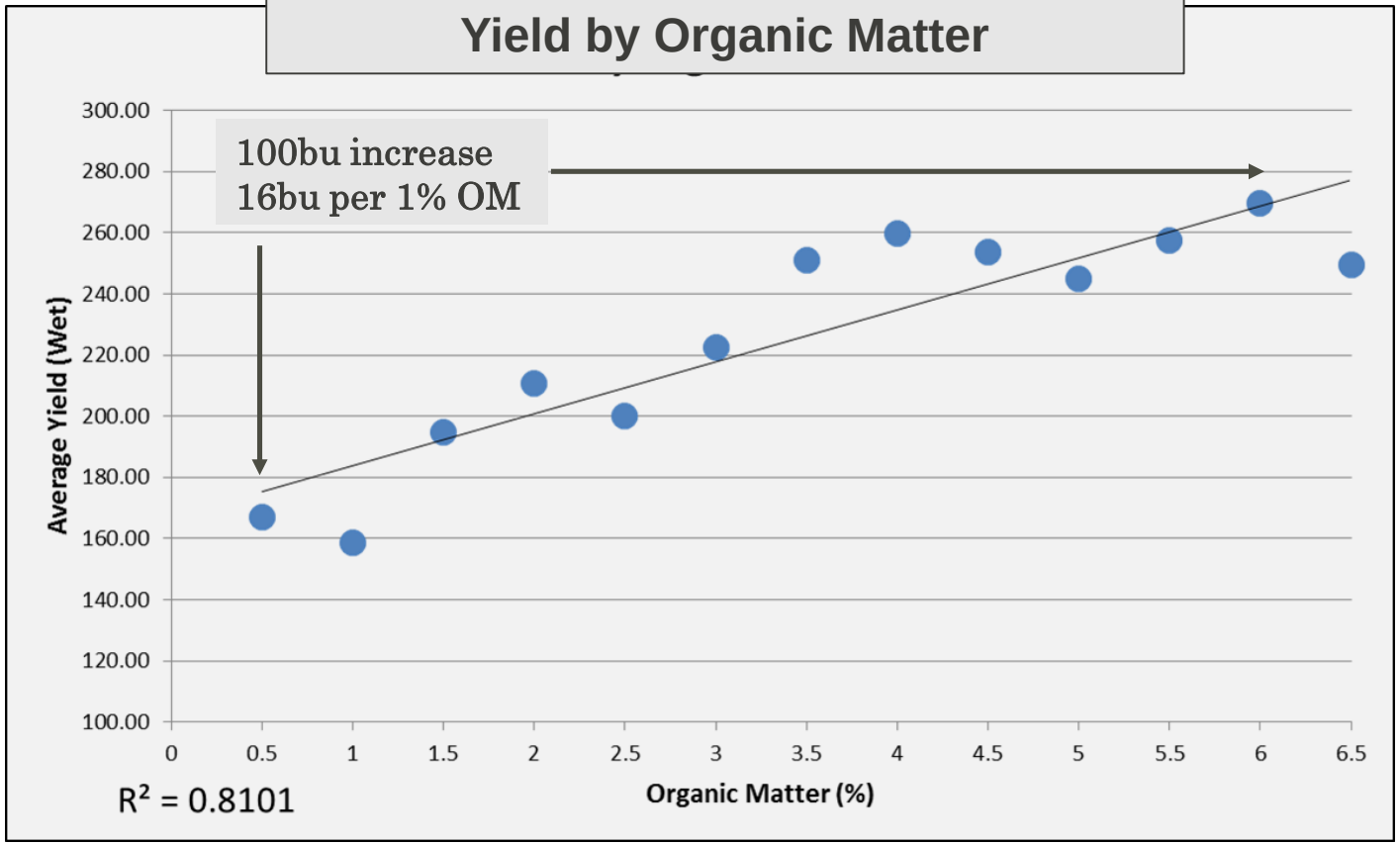
7330

2017 SmartFirmer Beta
Yield by Organic Matter



58 Fields
7 States:

Minnesota
Indiana
Illinois
Missouri
Wisconsin
North Dakota


10% OM
Loam
1.5% OM
Sandy
Loam
OM Has Amazing Water Retention Capacity
Every 1% Increase in OM
25,000 gal/A
More Available Water
Water Lost to Runoff

Furrow Sensing

OM is the Fingerprint of a Field
Can we scan or sense it?

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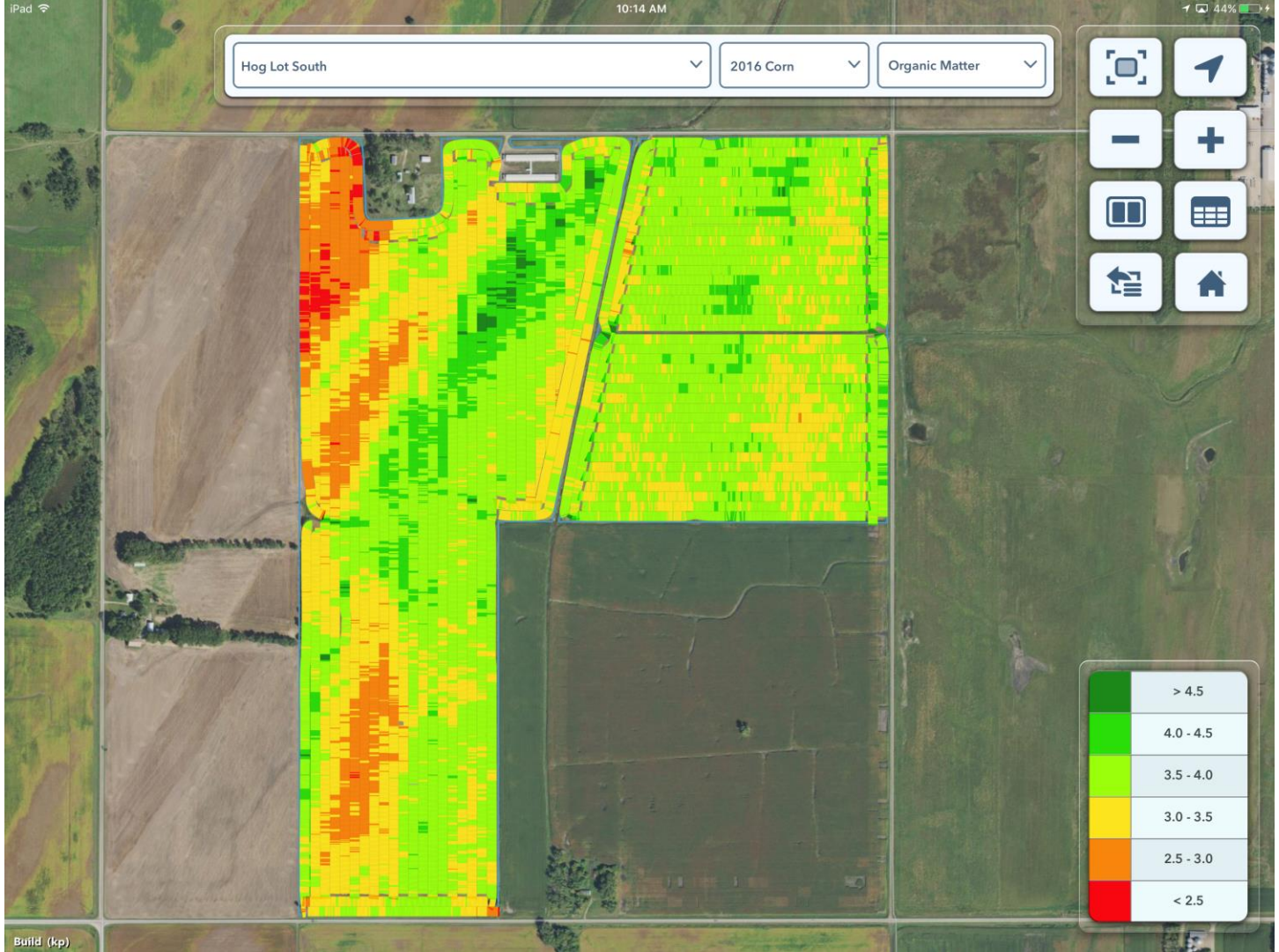
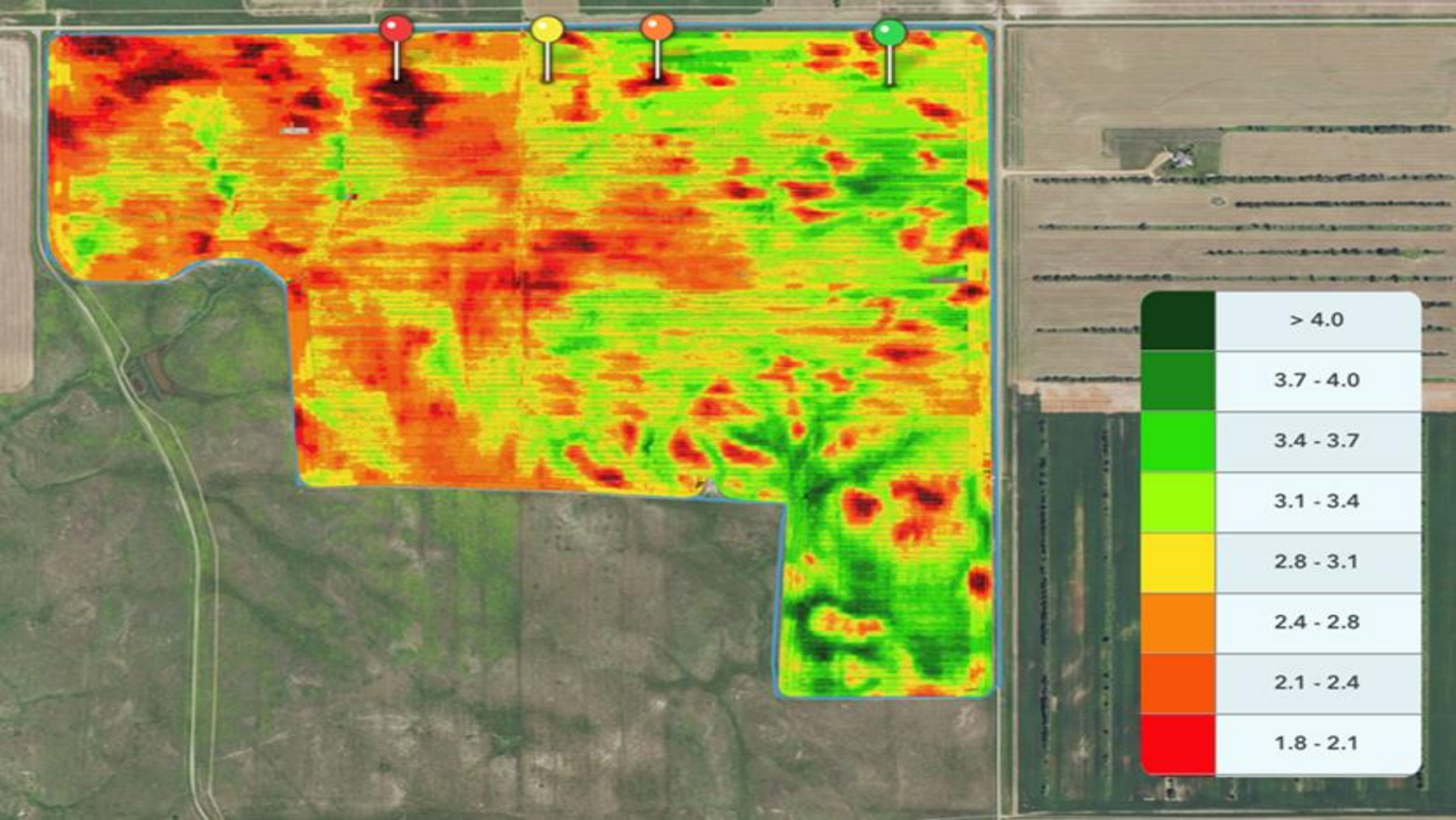
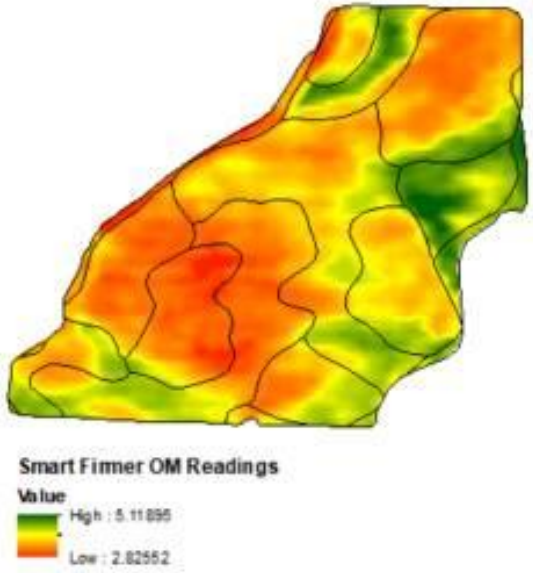
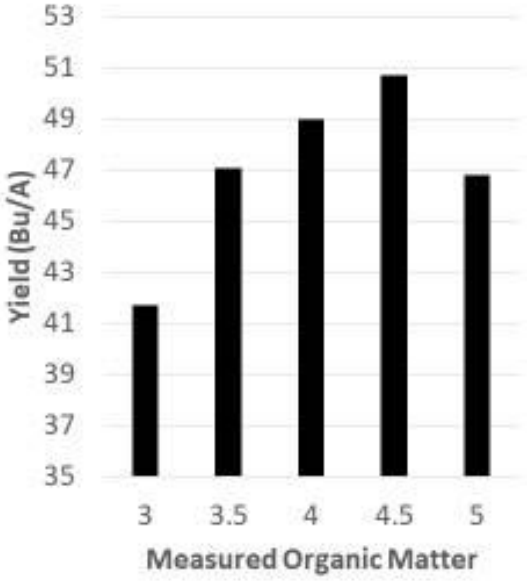

iPad
10:14 AM
44%
Hog Lot South
2016 Corn
Organic Matter
> 4.5
4.0 - 4.5
3.5 - 4.0
3.0 - 3.5
2.5 - 3.0
< 2.5
Build (kp)


> 4.0
3.7 - 4.0
3.4 - 3.7
3.1 - 3.4
2.8 - 3.1
2.4 - 2.8
2.1 - 2.4
1.8 - 2.1

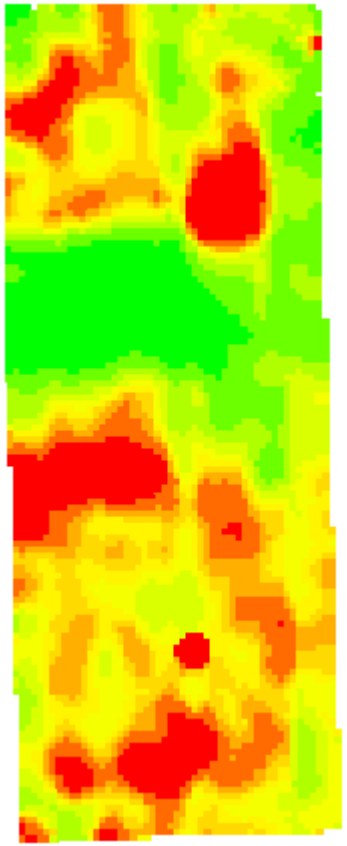
Smart Firmer Zones (East Allen Field)

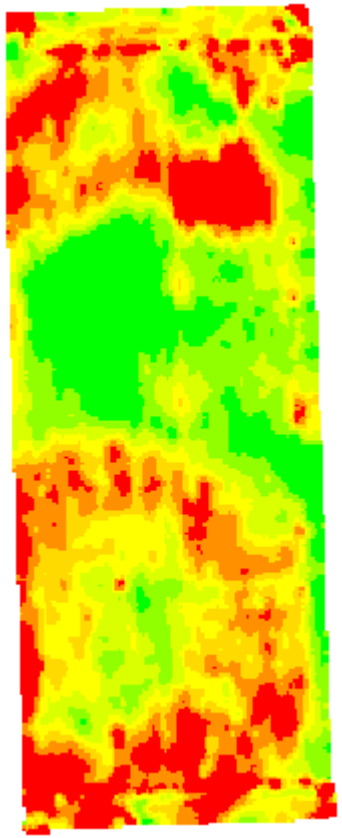




SmartFirmer Organic Matter Data

2018 OM Data





2018 Yield Data

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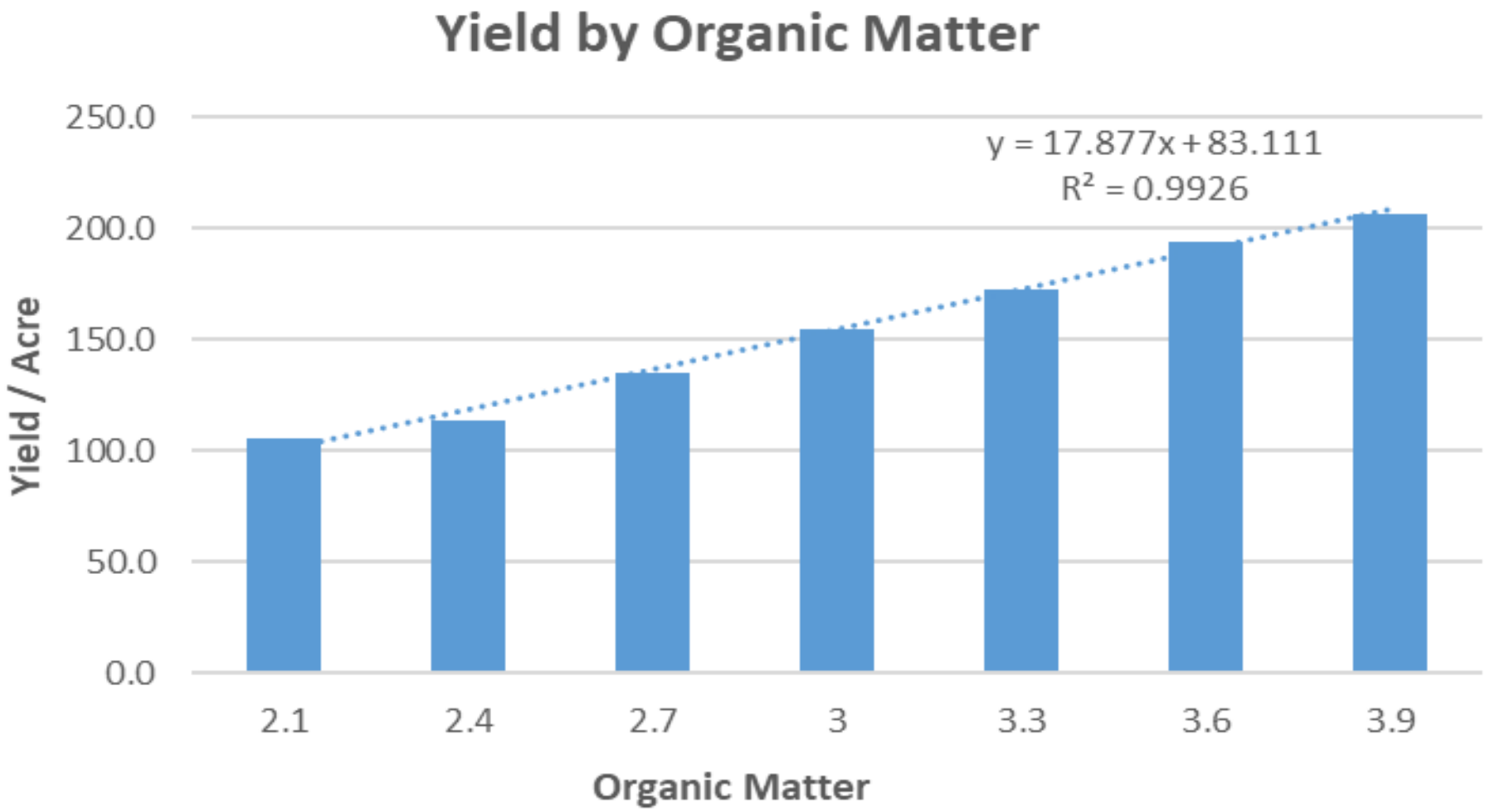
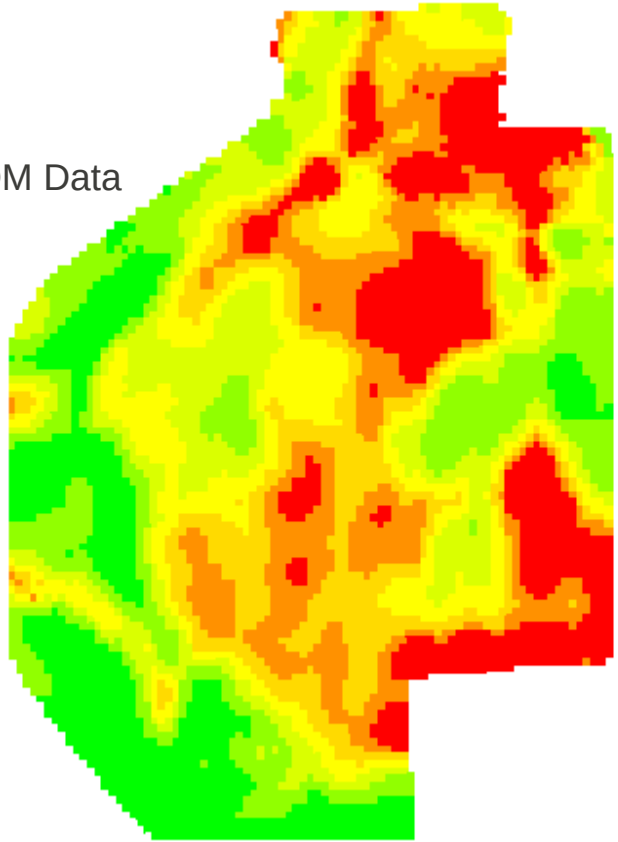
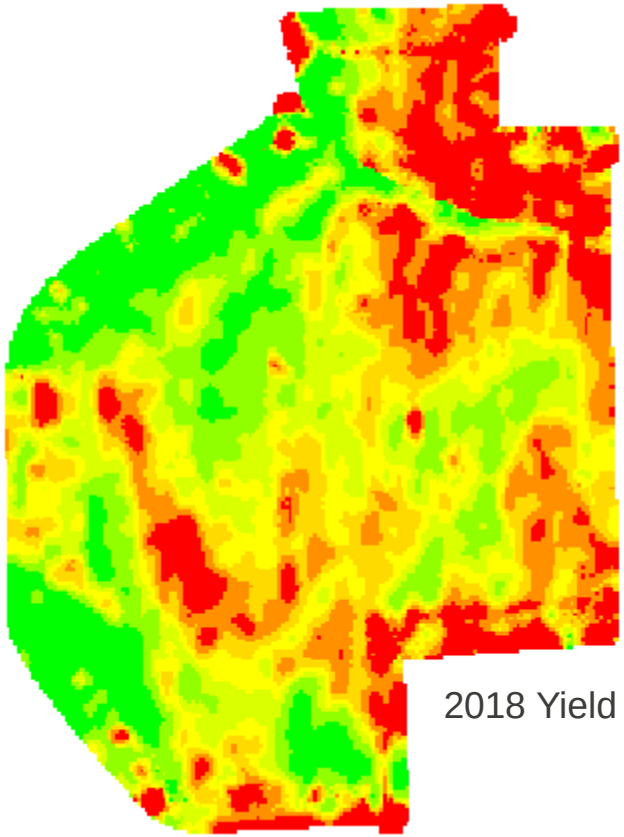

Yield by Organic Matter
y = 17.877x + 83.111
R² = 0.9926
250.0
200.0
150.0
100.0
50.0
0.0
Yield / Acre
2.1
2.4
2.7
3
3.3
3.6
3.9
Organic Matter

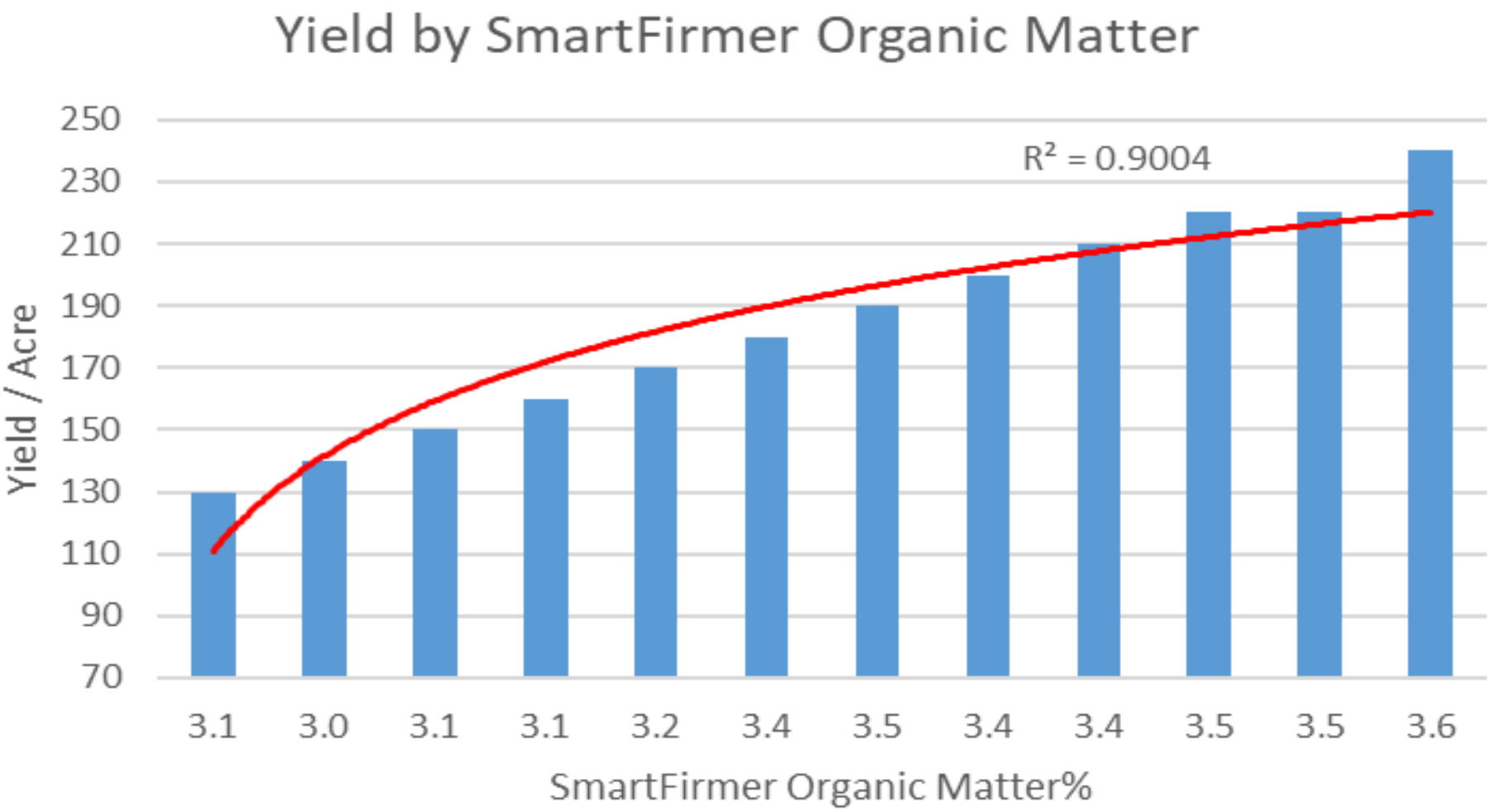
SmartFirmer Organic Matter Data

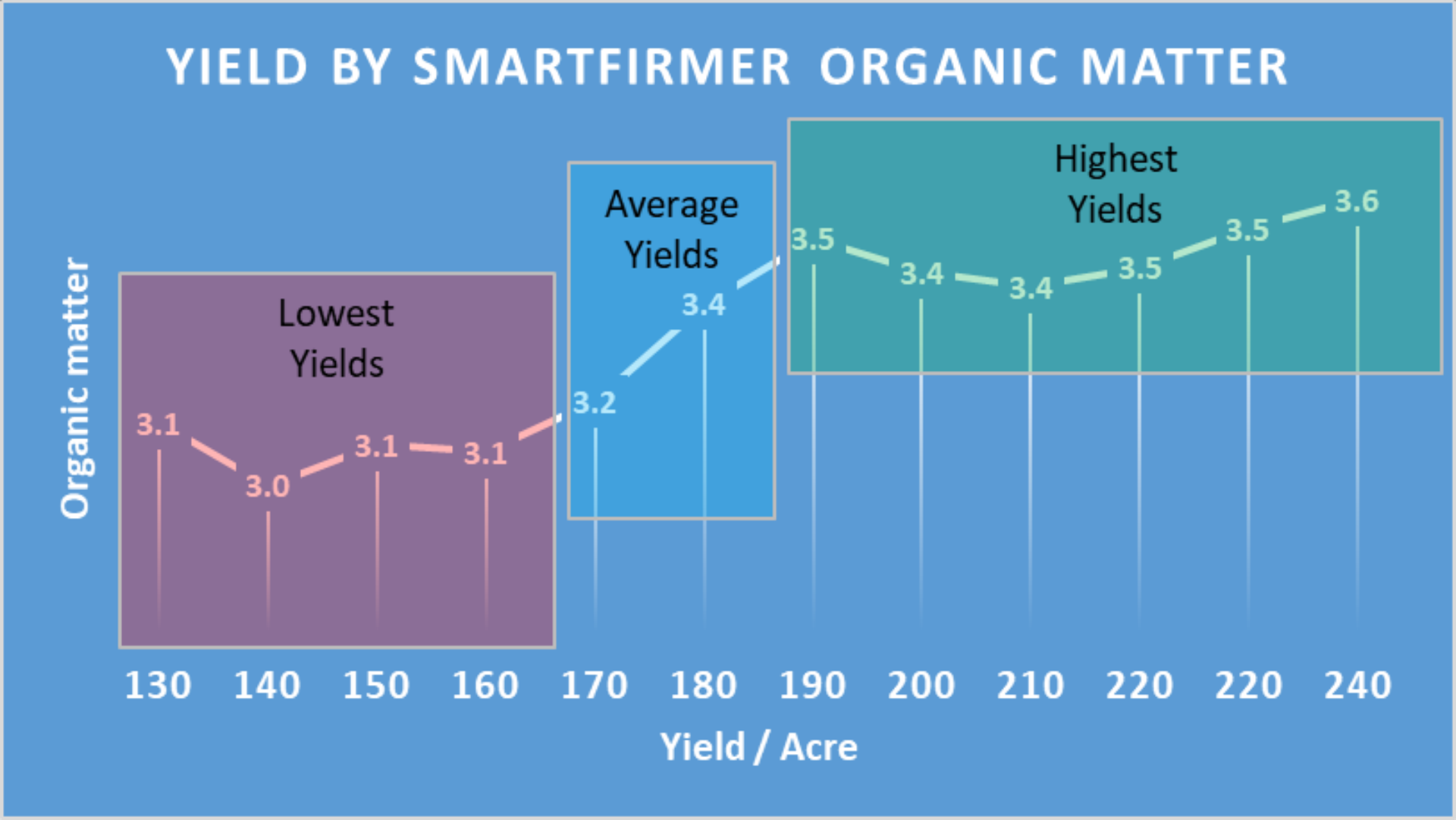
2018 OM Data

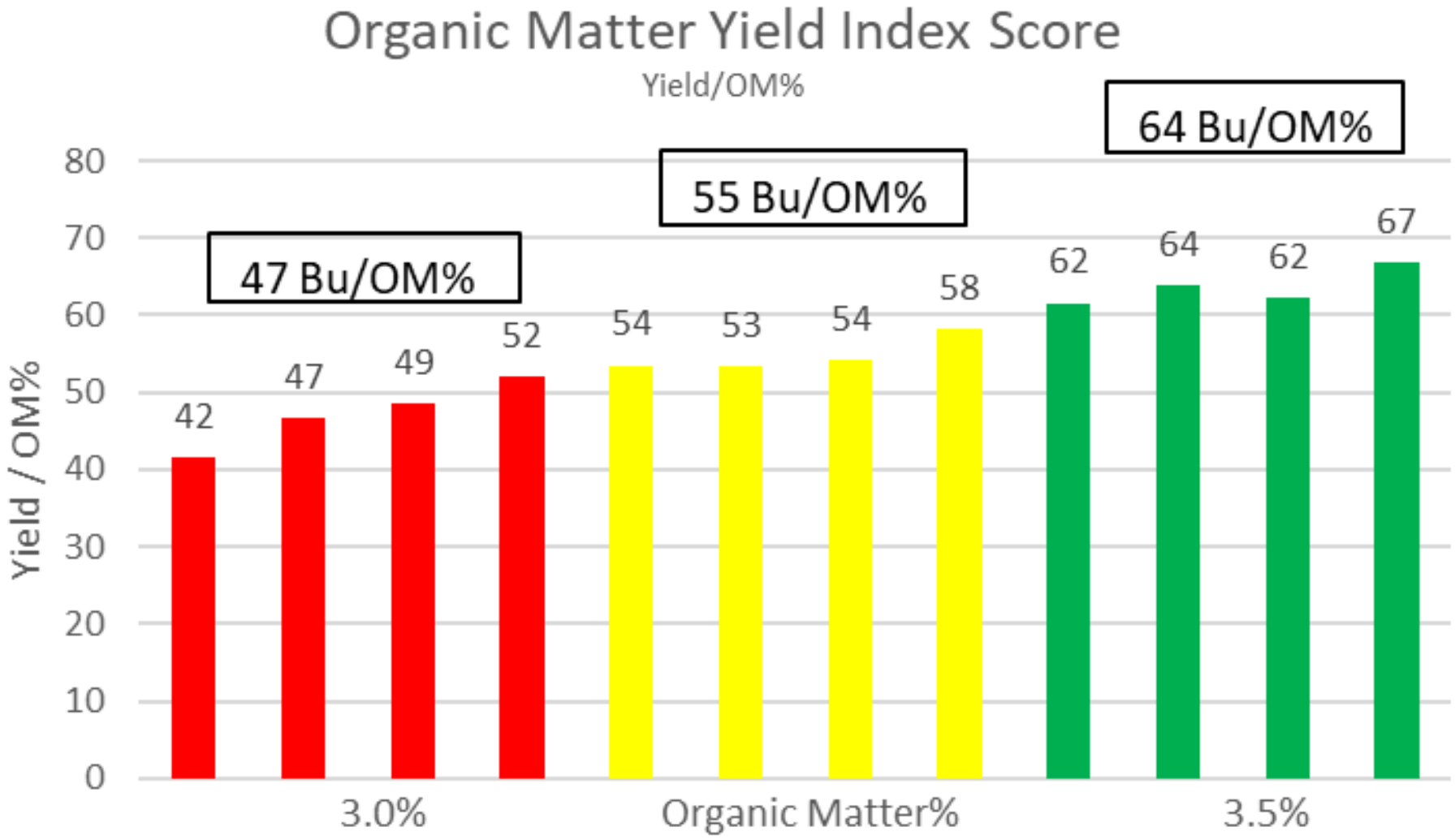




2018 Yield Data


Yield by SmartFirmer Organic Matter
250
230
210
190
170
150
130
110
90
70
Yield / Acre
R² = 0.9004
3.1
3.0
3.1
3.1
3.2
3.4
3.5
3.4
3.4
3.5
3.5
3.6
SmartFirmer Organic Matter%


YIELD BY SMARTFIRMER ORGANIC MATTER
Organic matter
Lowest Yields
Average Yields
Highest Yields
3.1
3.0
3.1
3.1
3.2
3.4
3.5
3.4
3.4
3.5
3.5
3.6
130
140
150
160
170
180
190
200
210
220
220
240
Yield / Acre


Organic Matter Yield Index Score
Yield/OM%
64 Bu/OM%
55 Bu/OM%
47 Bu/OM%
80
70
60
50
40
30
20
10
0
Yield / OM%
42
47
49
52
54
53
54
58
62
64
62
67
3.0%
Organic Matter%
3.5%

Control……..?

Sometimes It feels like there are so many things we cannot control in farming

But its important to remember the things that we can control

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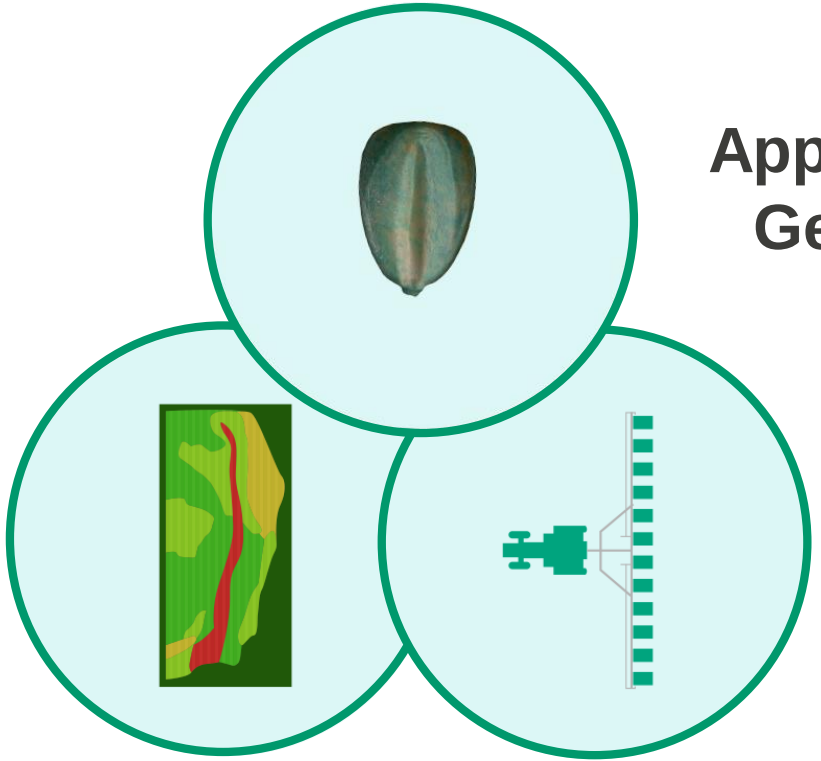
One of the most important decisions we can control…….

3 Major Components of Multi-Genetic Planting



Appropriate Genetics

Spatial Management Zones

Equipment

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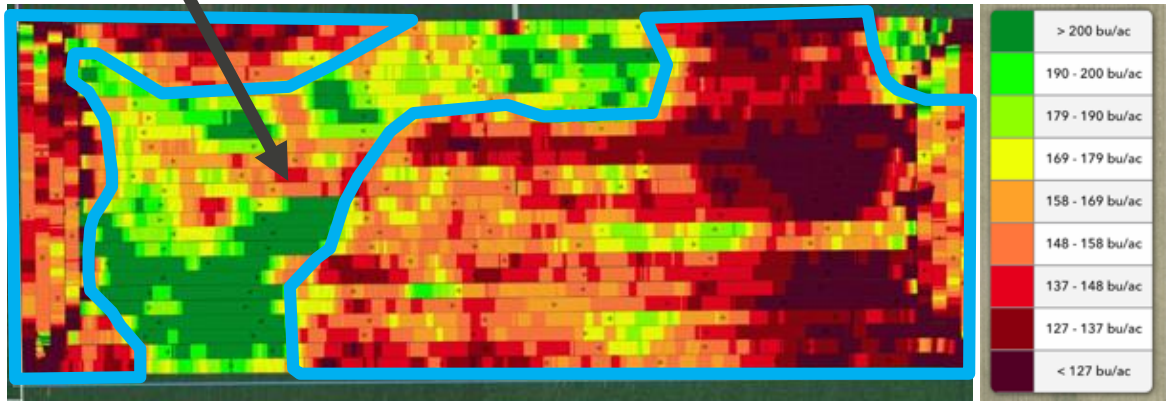
Multi-Genetic Planting

Offensive Zone:

Hybrid = AgriGold 6442STX RIB

Defensive Zone:

Hybrid = AgriGold 6542STX RIB



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2018 Multi-Genetic Corn Planting Results

Defensive Zone (Lower Yielding)

Defensive Hybrid	167 Bu
Offensive Hybrid	136 Bu
	+31 Bu

+31 Bu Win @ $3.50/Bu= $108.50/A

Offensive Zone (High Yielding)

Offensive Hybrid	210 Bu
Defensive Hybrid	191 Bu
	+19 Bu

+19 Bu Win @ $3.50/Bu= $66.50/A

Avg. Yield Gain = 25 Bu/A Avg. Revenue Gain =$87.50/A

$1000/Row 16 Row Planter Investment = 183 acre Break-even

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vSet Select
vSet Select

Furrow Sensing

OM is the Fingerprint of a Field
Can we scan or sense it?

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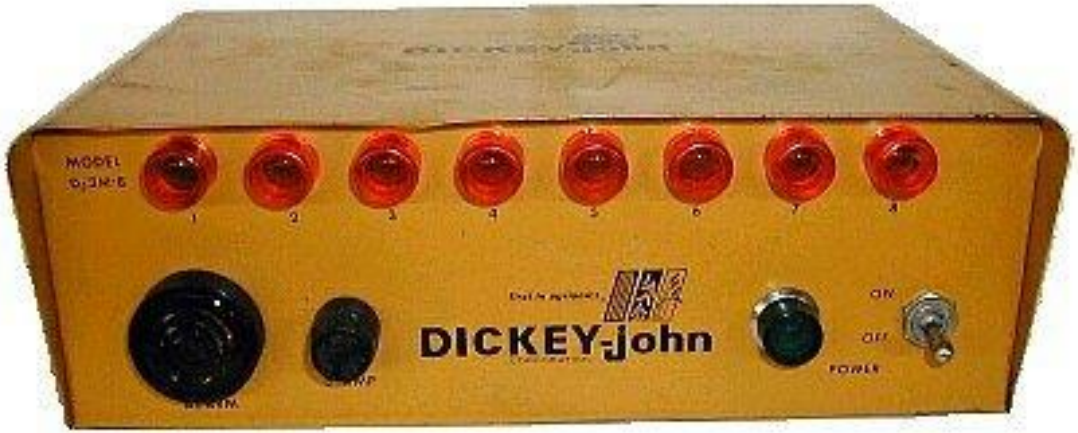
Uniform Moisture **95%**

Sensing Technology?



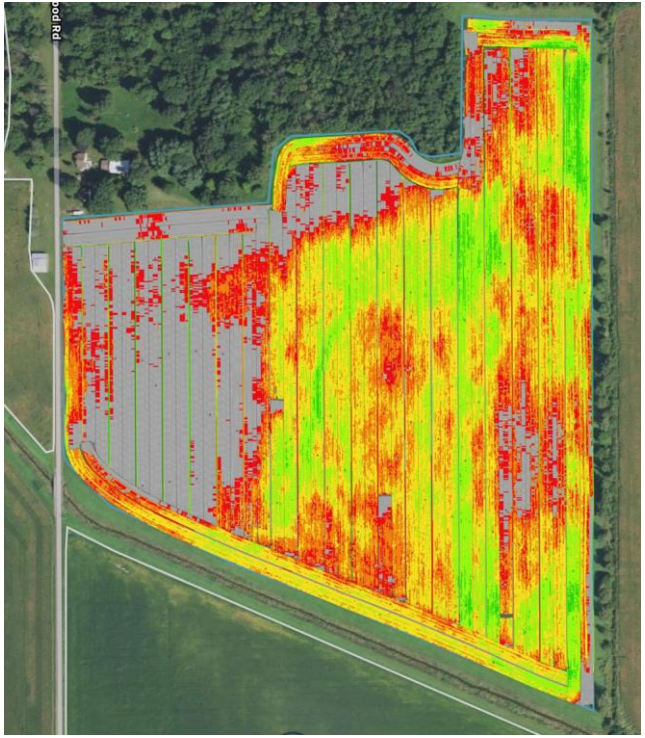
Precision Planting®

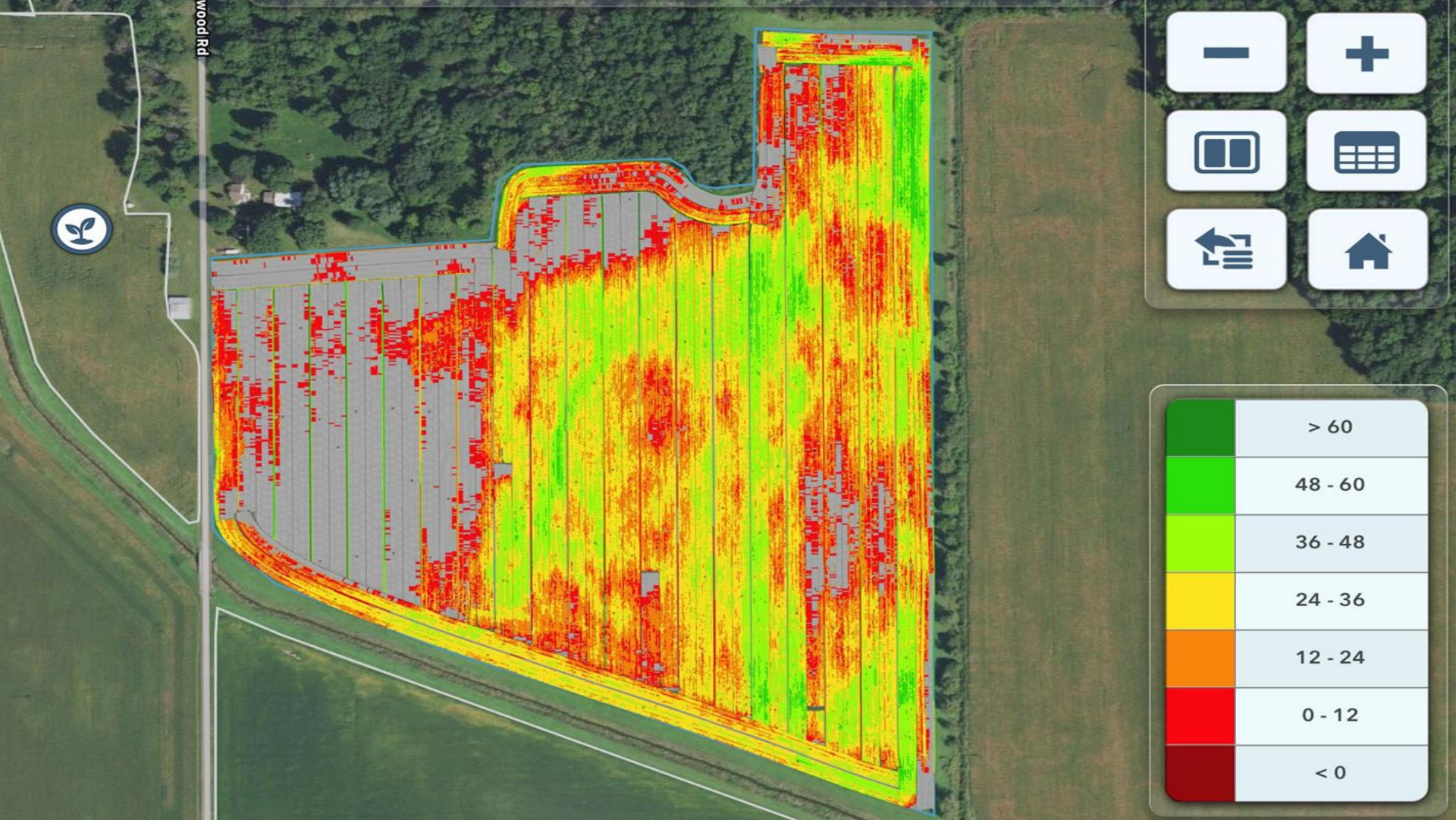
Uniform Moisture **95%**

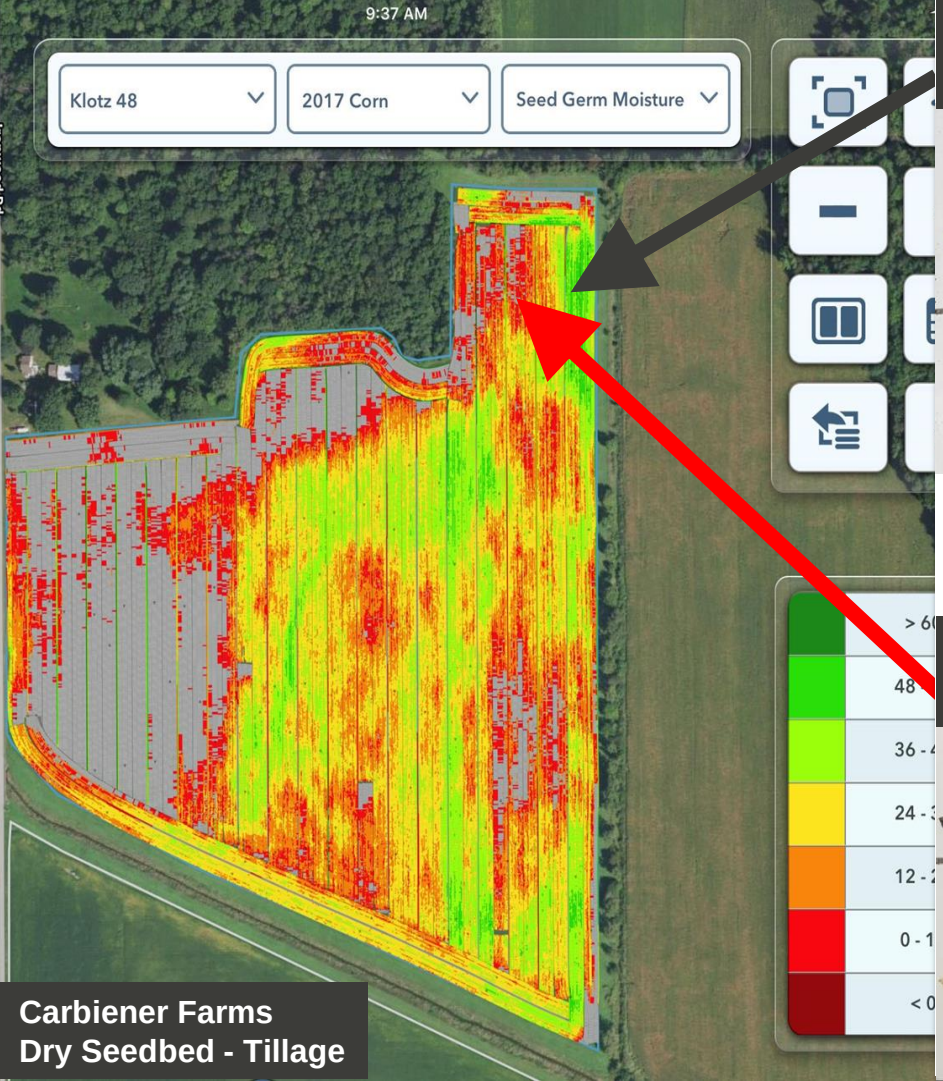
Furrow Moisture

Definition: 3 day seed weight gain in that moisture

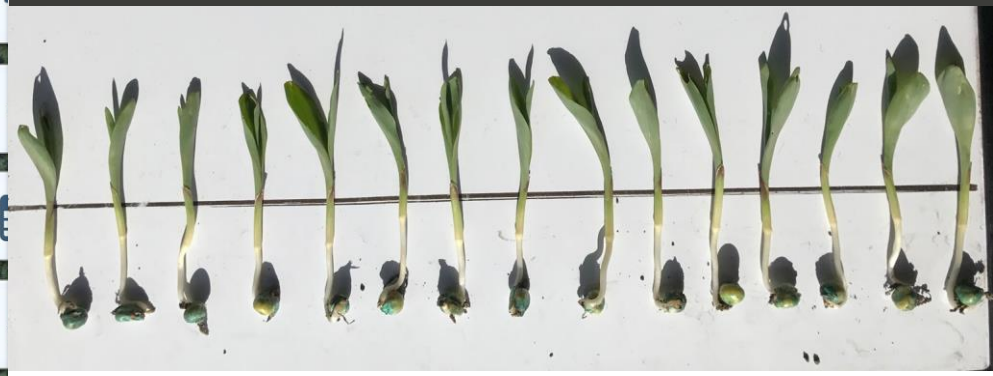
Are we placing seed into moisture as we plant across the field?



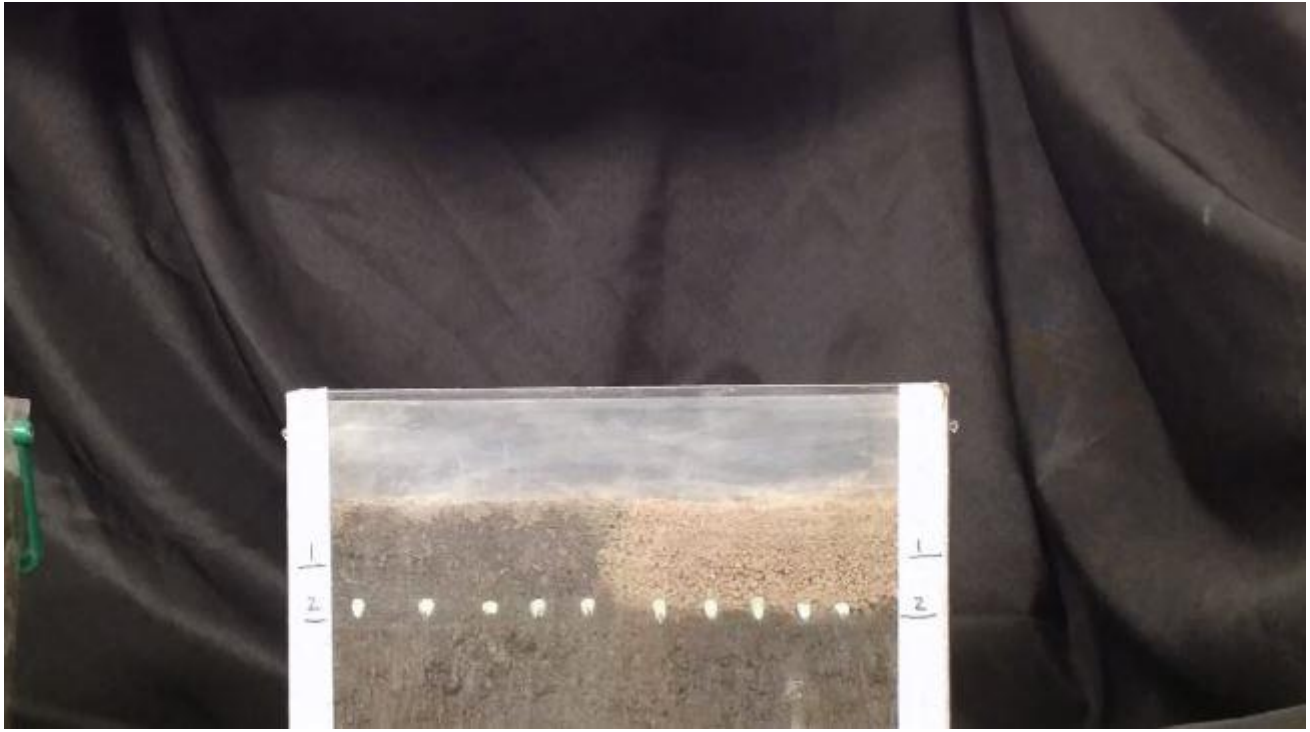

Wood Rd
> 60
48 - 60
36 - 48
24 - 36
12 - 24
0 - 12
< 0

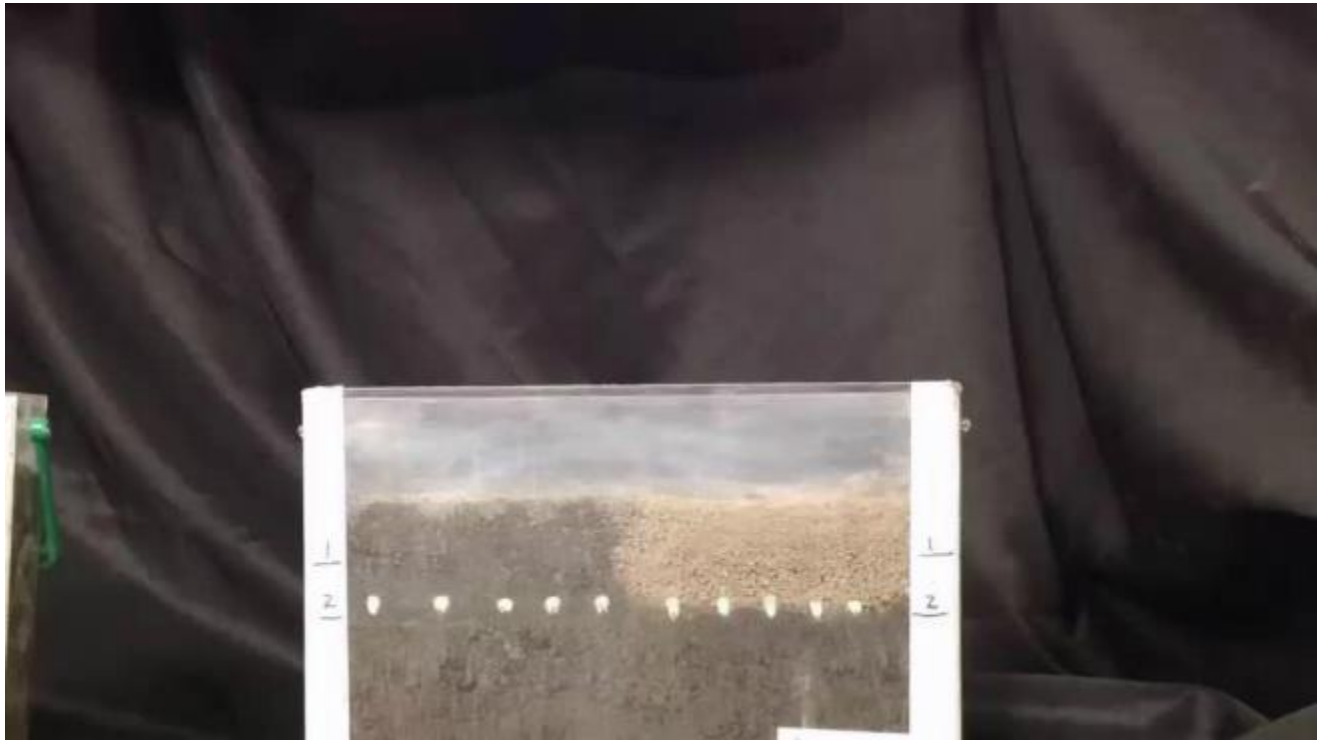


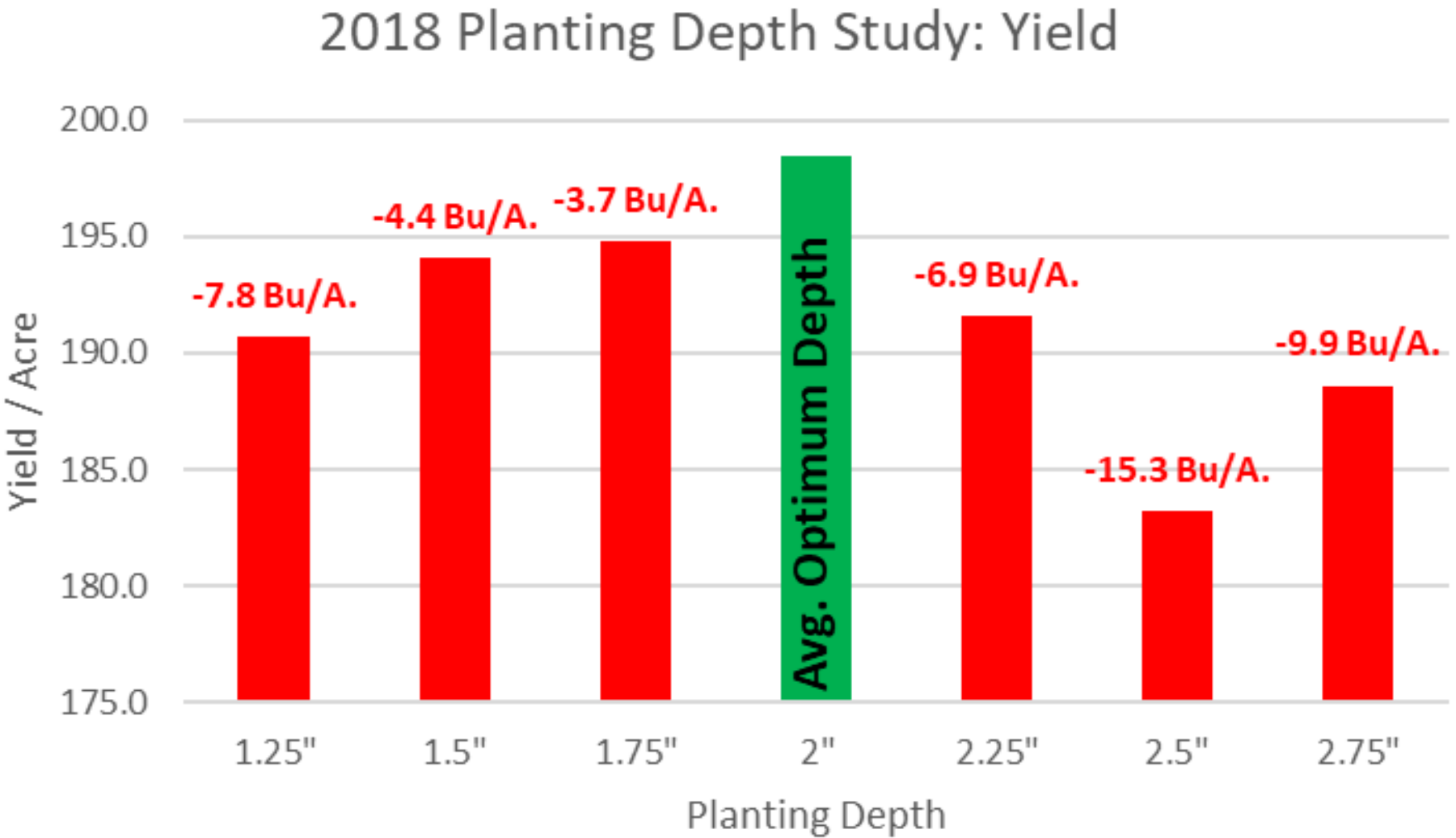
45% Furrow Moisture

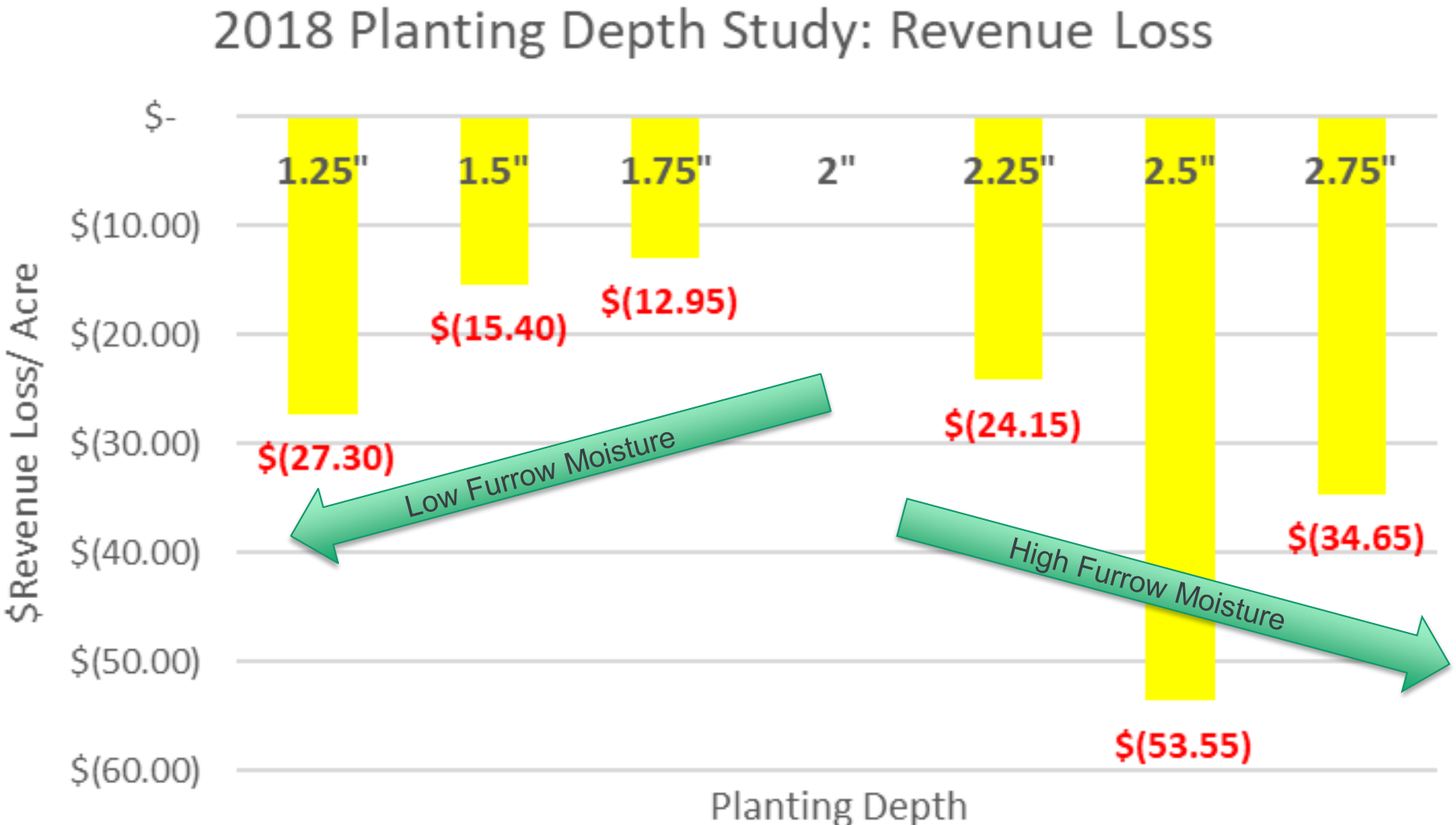


10% Furrow Moisture




1
2
1
2


2018 Planting Depth Study: Yield
200.0
195.0
190.0
185.0
180.0
175.0
Yield / Acre
-7.8 Bu/A.
-4.4 Bu/A.
-3.7 Bu/A.
Avg. Optimum Depth
-6.9 Bu/A.
-15.3 Bu/A.
-9.9 Bu/A.
1.25"
1.5"
1.75"
2"
2.25"
2.5"
2.75"
Planting Depth


2018 Planting Depth Study: Revenue Loss
$-
$(10.00)
$(20.00)
$(30.00)
$(40.00)
$(50.00)
$(60.00)
$Revenue Loss/ Acre
1.25"
1.5"
1.75"
2"
2.25"
2.5"
2.75"
$(27.30)
$(15.40)
$(12.95)
$(24.15)
$(53.55)
$(34.65)
Low Furrow Moisture
High Furrow Moisture
Planting Depth


Precision Planting


Precision Planting

Furrow Sensing

OM is the Fingerprint of a Field
Can we scan or sense it?

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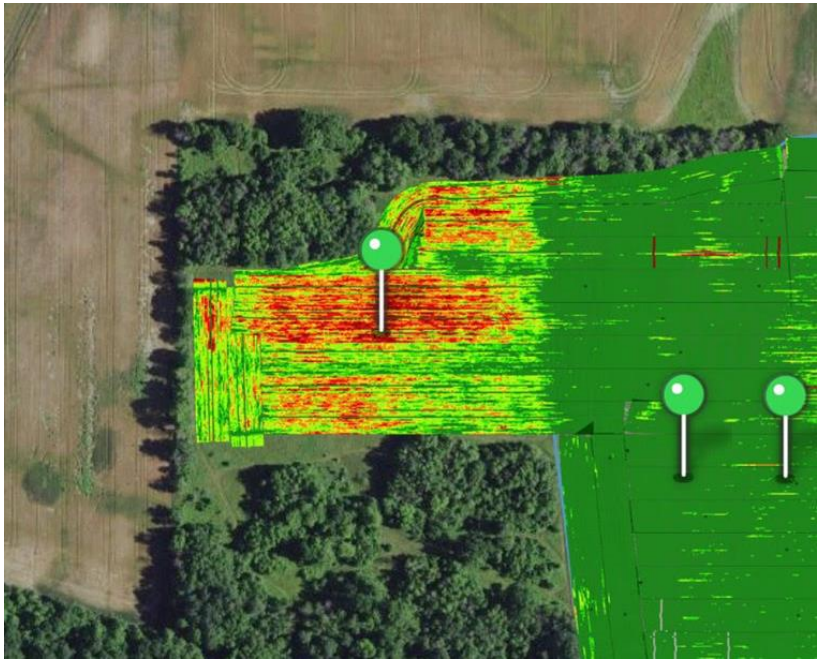
Clean Furrow **98%**

Clean Furrow

Definition: Absence of crop residue
Range: 0 - 100%
Goal: Above 95%




CleanSweep
Precision Planting

Seed Trench Residue Mgt Study

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Does Residue in the Furrow = Yield Loss?

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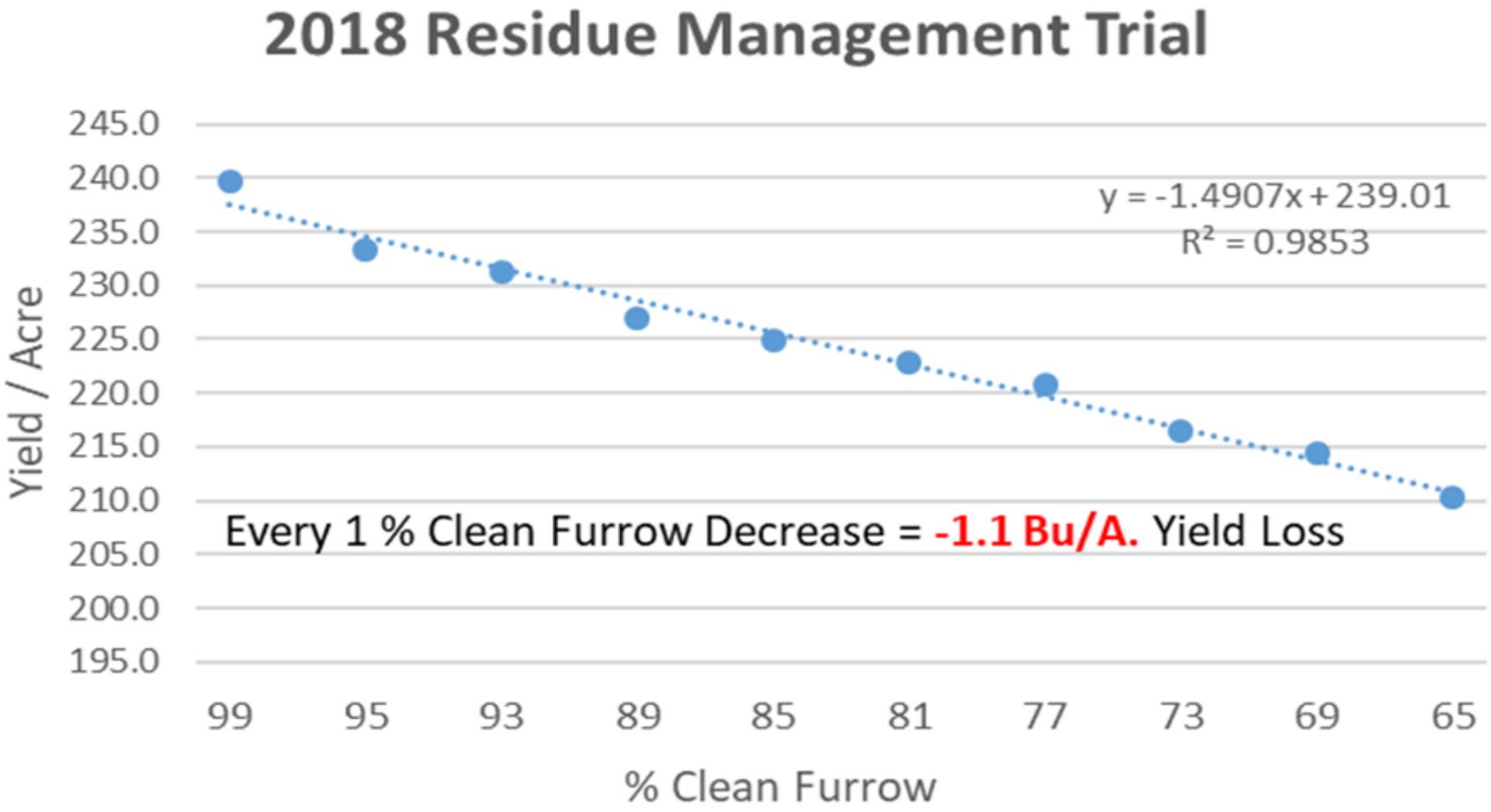

2018 Residue Management Trial
245.0
240.0
235.0
230.0
225.0
220.0
215.0
210.0
205.0
200.0
195.0
Yield / Acre
y = -1.4907x + 239.01
R² = 0.9853
Every 1 % Clean Furrow Decrease = -1.1 Bu/A. Yield Loss
99
95
93
89
85
81
77
73
69
65
% Clean Furrow

Furrow Sensing

OM is the Fingerprint of a Field
Can we scan or sense it?

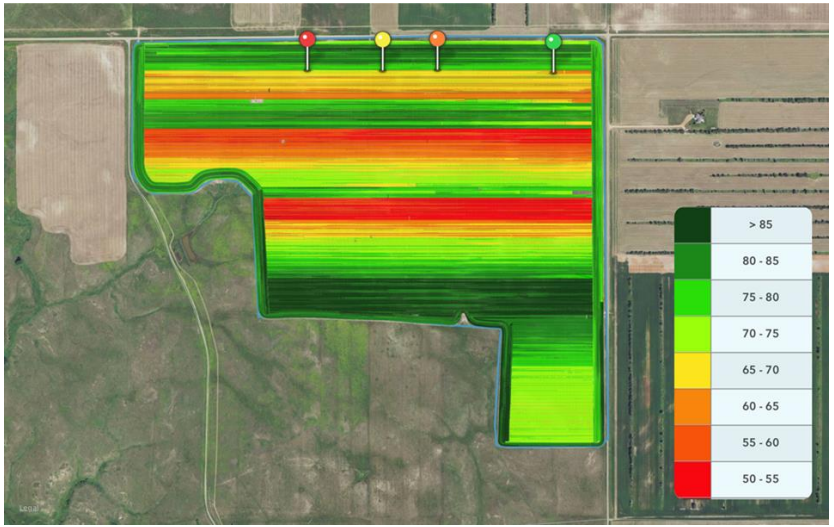
Precision Planting®

Soil Temperature

Definition: Real-time soil temperature during planting

Range: 32F - 100F. Fast response.

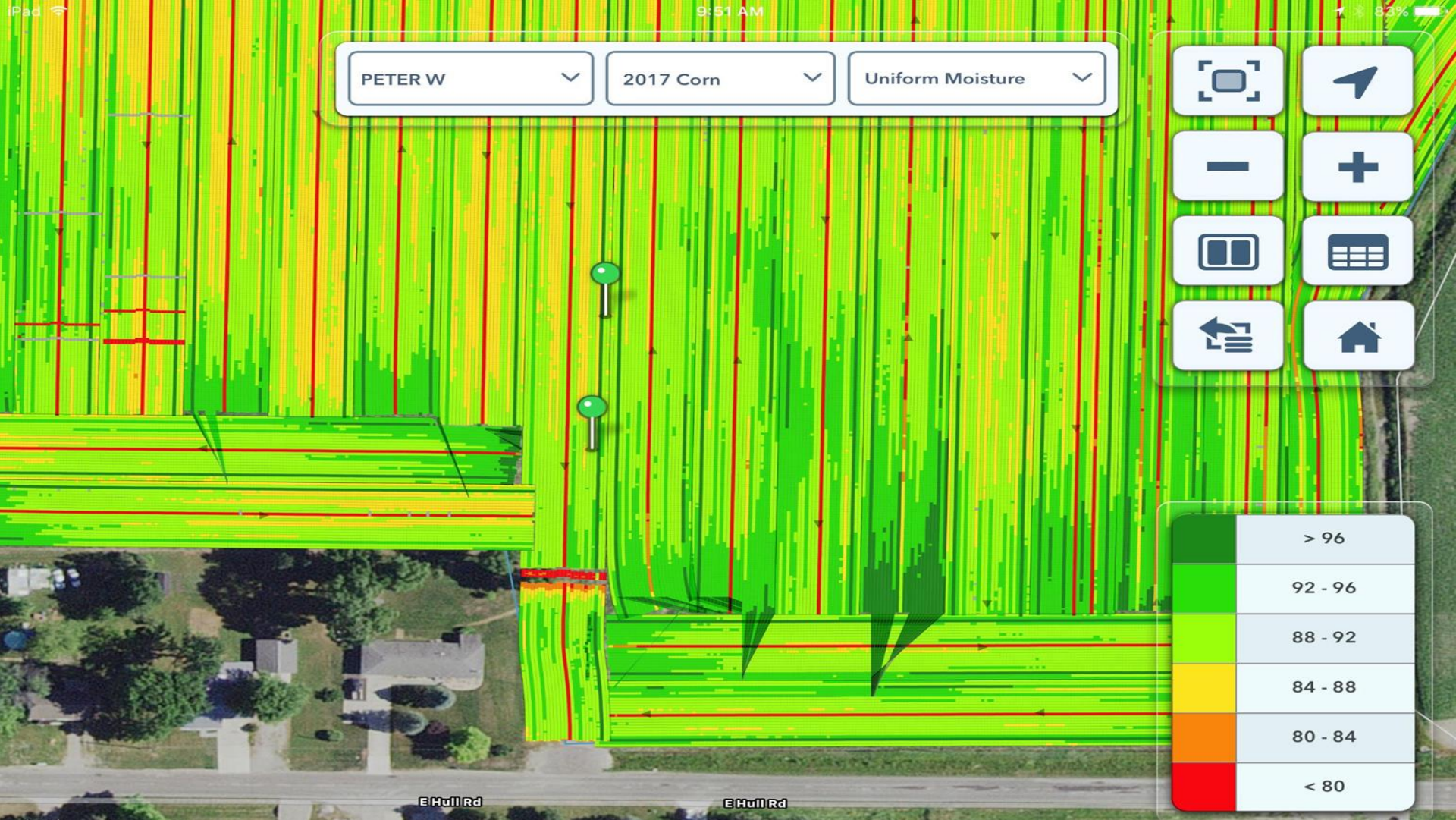
Goal: Above 50F



The Ability to “Sense”

1. Furrow Environment Sensing
2. **Mechanical Issue Detection**
3. High Definition Zone Mapping
4. Controlling Seeding Rate
5. Controlling Genetics

Mechanical Issue Detection


PETER W
2017 Corn
Uniform Moisture
> 96
92 - 96
88 - 92
84 - 88
80 - 84
< 80
E Hull Rd
E Hull Rd

Gauge Wheels Plugged (Uniform Furrow)

Mechanical Issue Detection

Mechanical Issue Detection

The Ability to “Sense”

1. **Mechanical Issue Detection**

   Could be valuable aspect for a considerable amount of farmers

SmartFirmer™

Precision Planting®


Precision Planting

Thank You

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@jwebsterag

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