Soil Sensing Technology on the Planter

Starkville, MS
Dec 4, 2018
1. Furrow Environment Sensing  
2. High Definition Zone Mapping  
3. Controlling Seeding Rate  
4. Controlling Genetics  
5. Mechanical Issue Detection
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?
Do you have soil variability on your farms?

Yes: 91%

No: 9%
Have you created spatial management zones on your farm?

Yes: 25%
No: 75%
<table>
<thead>
<tr>
<th>Dataset</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Type</td>
<td>10%</td>
</tr>
<tr>
<td>Yield Data</td>
<td>33%</td>
</tr>
<tr>
<td>Veris EC Data</td>
<td>5%</td>
</tr>
<tr>
<td>Combination of the above</td>
<td>48%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
</tr>
</tbody>
</table>
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

Precision Planting
Soil OM – A Fingerprint Yield History

OM Is A Soil Fingerprint
2017 SmartFirmer Beta
Yield by Organic Matter

58 Fields
7 States:
- Minnesota
- Indiana
- Illinois
- Missouri
- Wisconsin
- North Dakota

100bu increase
16bu per 1% OM

Average Yield (Wet)

R² = 0.8101

Organic Matter (%)
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?
Smart Firmer Zones
(East Allen Field)
SmartFirmer Organic Matter Data

2018 OM Data

2018 Yield Data
Yield by Organic Matter

Yield / Acre

Organic Matter

y = 17.877x + 83.111
R² = 0.9926
SmartFirmer Organic Matter Data

2018 OM Data

2018 Yield Data
Sometimes it feels like there are so many things we cannot control in farming.

But it's important to remember the things that we can control.
One of the most important decisions we can control…….
3 Major Components of Multi-Genetic Planting

- Appropriate Genetics
- Spatial Management Zones
- Equipment
Multi-Genetic Planting

Offensive Zone:
Hybrid = AgriGold 6442STX RIB

Defensive Zone:
Hybrid = AgriGold 6542STX RIB
2018 Multi-Genetic Corn Planting Results

Defensive Zone (Lower Yielding)
- Defensive Hybrid: 167 Bu
- Offensive Hybrid: 136 Bu
- +31 Bu Win @ $3.50/Bu = $108.50/A

Offensive Zone (High Yielding)
- Offensive Hybrid: 210 Bu
- Defensive Hybrid: 191 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
Furrow Sensing

OM is the Fingerprint of a Field
Can we scan or sense it?
Uniform Moisture 95%
Sensing Technology?
Uniform Moisture 95%
Definition: 3 day seed weight gain in that moisture

Are we placing seed into moisture as we plant across the field?
2018 Planting Depth Study: Yield

Yield / Acre

-7.8 Bu/A.
-4.4 Bu/A.
-3.7 Bu/A.
-6.9 Bu/A.
-9.9 Bu/A.
-15.3 Bu/A.

Planting Depth

1.25"
1.5"
1.75"
2"
2.25"
2.5"
2.75"
2018 Planting Depth Study: Revenue Loss

Revenue Loss/Acre

- 1.25" : $(10.00)
- 1.5" : $(15.40)
- 1.75" : $(12.95)
- 2" : $(24.15)
- 2.25" : $(24.15)
- 2.5" : $(34.65)
- 2.75" : $(53.55)

Low Furrow Moisture
High Furrow Moisture
Furrow Sensing

OM is the Fingerprint of a Field
Can we scan or sense it?
Clean Furrow 98%
**Definition:** Absence of crop residue
**Range:** 0 - 100%
**Goal:** Above 95%
Seed Trench Residue Mgt Study
Does Residue in the Furrow = Yield Loss?
Every 1 % Clean Furrow Decrease = \(-1.1\) Bu/A. Yield Loss
OM is the Fingerprint of a Field
Can we scan or sense it?
**Definition:** Real-time soil temperature during planting

**Range:** 32F - 100F.
Fast response.

**Goal:** Above 50F
The Ability to “Sense”

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Mechanical Issue Detection
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™
Thank You

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