Using Agronomic Data for Seeding Decisions
Personal Background

- IA farm – ISU – wholesale fertilizer sales – 3 years, retail dealership – 8 years.
- Business consulting – transitioning to charge for agronomic services - led to creation of Premier Crop
Presentation outline

- Share who is Premier Crop and what we do
- Share examples of how growers and advisors are using data analysis to make better agronomic seeding decisions
- Agronomic Seed decision - timeline
- Share some ideas on the future
Premier Crop’s mission - To assist growers and their trusted agronomic advisors in creating real value from their geo-referenced agronomic data by converting data to knowledge supporting improved production decisions in an economic and sustainable manner.
Premier Crop background

• Started with the 1999 crop year (in our 18th crop year).
• Historically have marketed through select retailers and advisors. An agronomy company that looks like a software company
• Own our software. Web-based. Unlimited geography but primarily Midwest focused.
• Any layer – agronomic, economic, weather, etc.
Premier Crop Customers

• Our customers are some of the largest and most successful precision ag programs in their market areas.
• Many are considered the industry leaders in precision ag and offering quality agronomic advice to growers.
• Premier Crop is their behind-the-scenes technology provider
GPS technology has allowed us to begin to measure spatial variability of many layers of agronomic data across our fields.

Many growers are accumulating reams of data with notebooks full of maps and hard drives full of computer files.
### Field Top Ten

Premier Crop Systems | Demo Data | Penny-Pinching Paul | Home Farm | North of Crib | 2009

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**Correlation to Dry Yield**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium (K)</td>
<td>0.42</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>0.41</td>
</tr>
<tr>
<td>Organic Matter (OM)</td>
<td>0.36</td>
</tr>
<tr>
<td>Corn Suitability Rating (CSR)</td>
<td>0.35</td>
</tr>
<tr>
<td>Calcium (Ca)</td>
<td>0.35</td>
</tr>
<tr>
<td>Base Saturation - K</td>
<td>0.34</td>
</tr>
<tr>
<td>CEC</td>
<td>0.26</td>
</tr>
<tr>
<td>pH</td>
<td>0.19</td>
</tr>
<tr>
<td>Texture</td>
<td>0.18</td>
</tr>
<tr>
<td>Planting Speed</td>
<td>0.15</td>
</tr>
</tbody>
</table>

**Yield by Soil Type**

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Avg CSR</th>
<th>Avg Yield</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahaska</td>
<td>95</td>
<td>258</td>
<td>64.1</td>
</tr>
<tr>
<td>Otley</td>
<td>84</td>
<td>248</td>
<td>60.3</td>
</tr>
<tr>
<td>Colo</td>
<td>75</td>
<td>242</td>
<td>17.1</td>
</tr>
<tr>
<td>Gara</td>
<td>19</td>
<td>242</td>
<td>11.6</td>
</tr>
<tr>
<td><strong>Entire Field</strong></td>
<td><strong>83</strong></td>
<td><strong>251</strong></td>
<td><strong>153.1</strong></td>
</tr>
</tbody>
</table>

---

Yield ranges:
- 181.2 to 232.83 [15.28 acres]
- 232.83 to 245.08 [30.52 acres]
- 245.08 to 251.5 [30.59 acres]
- 251.5 to 257.72 [30.6 acres]
- 257.72 to 263.3 [30.54 acres]
- 263.3 to 328.48 [15.48 acres]
### Yield by Hybrid - Primary Soil Test Attributes

<table>
<thead>
<tr>
<th>Company</th>
<th>Variety</th>
<th>Avg pH</th>
<th>Avg P</th>
<th>Avg K</th>
<th>Avg OM</th>
<th>Avg CEC</th>
<th>Avg Yield</th>
<th>Havy Mois</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crows</td>
<td>4688VT3</td>
<td>6.64</td>
<td>37</td>
<td>260</td>
<td>3.04</td>
<td>18.47</td>
<td>251</td>
<td>24.4</td>
<td>153.1</td>
</tr>
<tr>
<td>Entire Field</td>
<td></td>
<td>6.64</td>
<td>37</td>
<td>260</td>
<td>3.04</td>
<td>18.47</td>
<td>251</td>
<td>24.4</td>
<td>153.1</td>
</tr>
</tbody>
</table>

### Primary Soil Test Attributes by Yield Range

<table>
<thead>
<tr>
<th>Dry Yield Range</th>
<th>Avg Yield</th>
<th>Avg pH</th>
<th>Avg P</th>
<th>Avg K</th>
<th>Avg OM</th>
<th>Avg CEC</th>
<th>Acres</th>
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</thead>
<tbody>
<tr>
<td>181-233</td>
<td>225</td>
<td>6.67</td>
<td>27</td>
<td>236</td>
<td>2.85</td>
<td>17.84</td>
<td>15.3</td>
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<tr>
<td>233-245</td>
<td>240</td>
<td>6.55</td>
<td>26</td>
<td>238</td>
<td>2.95</td>
<td>18.10</td>
<td>30.6</td>
</tr>
<tr>
<td>245-252</td>
<td>248</td>
<td>6.53</td>
<td>29</td>
<td>247</td>
<td>3.00</td>
<td>18.30</td>
<td>30.6</td>
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<tr>
<td>252-258</td>
<td>255</td>
<td>6.56</td>
<td>34</td>
<td>259</td>
<td>3.07</td>
<td>18.59</td>
<td>30.6</td>
</tr>
<tr>
<td>258-266</td>
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<td>6.83</td>
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<td>288</td>
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<td>18.82</td>
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<tr>
<td>266-328</td>
<td>273</td>
<td>6.83</td>
<td>60</td>
<td>295</td>
<td>3.13</td>
<td>19.17</td>
<td>15.5</td>
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<tr>
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<td>6.64</td>
<td>37</td>
<td>260</td>
<td>3.04</td>
<td>18.47</td>
<td>153.1</td>
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</table>

### Secondary Soil Test Attributes by Yield Range

<table>
<thead>
<tr>
<th>Dry Yield Range</th>
<th>Avg Yield</th>
<th>Avg Ca</th>
<th>Avg Mg</th>
<th>Avg S</th>
<th>Avg Zn</th>
<th>% K Sat</th>
<th>Ca:Mg Sat</th>
<th>Acres</th>
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</thead>
<tbody>
<tr>
<td>181-233</td>
<td>225</td>
<td>2357</td>
<td>464</td>
<td>N/A</td>
<td>N/A</td>
<td>3.51</td>
<td>3.06</td>
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<tr>
<td>233-245</td>
<td>240</td>
<td>2371</td>
<td>454</td>
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<td>30.6</td>
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<tr>
<td>245-252</td>
<td>248</td>
<td>2402</td>
<td>447</td>
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<td>N/A</td>
<td>3.53</td>
<td>3.19</td>
<td>30.6</td>
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<tr>
<td>252-258</td>
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<td>447</td>
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<td>445</td>
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<td>N/A</td>
<td>3.93</td>
<td>3.56</td>
<td>30.6</td>
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<td>266-328</td>
<td>273</td>
<td>2710</td>
<td>464</td>
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<td>N/A</td>
<td>3.93</td>
<td>3.50</td>
<td>15.5</td>
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<td>3.66</td>
<td>3.29</td>
<td>153.1</td>
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</table>
**Applied Nutrients / Ac by Yield Range (AVGs include zero rate areas)**

<table>
<thead>
<tr>
<th>Dry Yield Range</th>
<th>Avg Yield</th>
<th>Avg N</th>
<th>Avg P</th>
<th>Avg K</th>
<th>Avg Lime</th>
<th># N/Bu</th>
<th>Ndex™</th>
<th>Acres</th>
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</thead>
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<td>181-233</td>
<td>225</td>
<td>220</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0.98</td>
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<td>233-245</td>
<td>240</td>
<td>220</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0.92</td>
<td>261</td>
<td>30.5</td>
</tr>
<tr>
<td>245-252</td>
<td>249</td>
<td>220</td>
<td>3</td>
<td>2</td>
<td>0</td>
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<td>283</td>
<td>30.6</td>
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<tr>
<td>252-258</td>
<td>255</td>
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<td>2</td>
<td>0</td>
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<td>2</td>
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<td>0.84</td>
<td>312</td>
<td>30.6</td>
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<tr>
<td>267-302</td>
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<td>220</td>
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<td>2</td>
<td>0</td>
<td>0.81</td>
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<td>2</td>
<td>0</td>
<td>0.88</td>
<td>285</td>
<td>153.0</td>
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</table>

**Management Factors By Yield Range**

<table>
<thead>
<tr>
<th>Dry Yield Range</th>
<th>Avg Yield</th>
<th>Avg Population</th>
<th>Avg Plant Speed</th>
<th>Avg Plant Date</th>
<th>Acres</th>
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</thead>
<tbody>
<tr>
<td>181-233</td>
<td>225</td>
<td>32334</td>
<td>4.87</td>
<td>04/23/2008</td>
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<td>4.94</td>
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<td>32219</td>
<td>5.00</td>
<td>04/23/2008</td>
<td>30.6</td>
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<tr>
<td>252-258</td>
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<td>32256</td>
<td>5.02</td>
<td>04/23/2008</td>
<td>30.6</td>
</tr>
<tr>
<td>258-267</td>
<td>262</td>
<td>32154</td>
<td>5.02</td>
<td>04/23/2008</td>
<td>30.6</td>
</tr>
<tr>
<td>267-302</td>
<td>273</td>
<td>32076</td>
<td>4.96</td>
<td>04/23/2008</td>
<td>15.5</td>
</tr>
<tr>
<td>Entire Field</td>
<td>251</td>
<td>32213</td>
<td>4.98</td>
<td>04/23/2008</td>
<td>153.0</td>
</tr>
</tbody>
</table>
Real world agronomy is integrated and complex
Premier Crop Systems

Field production information, costs, etc.

Soil samples

Yield

Variable rate fertilizer

(234 total attributes)
Crop type
Herbicides applied/timing/rates
Fungicides applied/timing/rates
Insecticides applied/timing/rates
Manure applied
Management name
Net effective stand
Nutrient application method
Irrigation type
Irrigation amount
Costs
Hail damage
Herbicide injury
Percent cover
Emergence rating
Plant spacing rating
Replant prevented plant
Hybrid/variety info (Disease & pest resistance, RM, special traits)
Management zones
ETC...

(8 total attributes)
Moisture
Harvest date
Harvest speed
Dry yield
Elevation

(24 total attributes)
Phosphorus
Potassium
Magnesium
pH
pH Buffer
Zinc
OM
CEC
Calcium
NO₃
Sulfur
Manganese
Boron
Base Saturations

(28 total attributes)
Applied K Rates/Timings
Applied P Rates/Timings
Applied N Rates/Timings
Sulfur Rates/Timings
Boron Rates/Timings
Manure
Starter
Additives
ETC...

Hybrid/Variety
Plant speed
Plant date
Target population
Downforce
Singulation
Spacing
Seed Treatment
Insecticide

(15 total attributes)
Hybrid/variety
Plant speed
Plant date
Target population
Downforce
Singulation
Spacing
Seed Treatment
Insecticide

Weekly Rainfall

52 weeks of:
GDU's
Weekly Rainfall

(234 total attributes)
Crop type
Herbicides applied/timing/rates
Fungicides applied/timing/rates
Insecticides applied/timing/rates
Manure applied
Management name
Net effective stand
Nutrient application method
Irrigation type
Irrigation amount
Costs
Hail damage
Herbicide injury
Percent cover
Emergence rating
Plant spacing rating
Replant prevented plant
Hybrid/variety info (Disease & pest resistance, RM, special traits)
Management zones
ETC...

(8 total attributes)
Moisture
Harvest date
Harvest speed
Dry yield
Elevation

(24 total attributes)
Phosphorus
Potassium
Magnesium
pH
pH Buffer
Zinc
OM
CEC
Calcium
NO₃
Sulfur
Manganese
Boron
Base Saturations

(28 total attributes)
Applied K Rates/Timings
Applied P Rates/Timings
Applied N Rates/Timings
Sulfur Rates/Timings
Boron Rates/Timings
Manure
Starter
Additives
ETC...

Hybrid/Variety
Plant speed
Plant date
Target population
Downforce
Singulation
Spacing
Seed Treatment
Insecticide

(15 total attributes)
Hybrid/variety
Plant speed
Plant date
Target population
Downforce
Singulation
Spacing
Seed Treatment
Insecticide
Premier Crop

• Organizes data into a database structure that allows you to see the relationship between all the layers of data that you can collect.
• Provides tools that show previously hidden relationships.
• Provides analysis at the field and grower level and across thousands of confidentially pooled acres.
Understanding data uses & limitations

• Correlation does not always equal cause and effect.

• With Premier Crop - using “observational or evidence-based data” vs. “traditional replicated treatments”.
Correlation - not always cause and effect

- Hair Loss
- Years of working with farmers
Understanding data uses & limitations

• Examples of disciplines that rely on observational or evidence-based data
  
  – Economics, epidemiology, insect and human behavioral sciences
  
  – Human medicine (both)
  
  – Genomics (both) – SCA (single gene mutation) vs. aging
Since 2005 - our fastest growing trend – Variable Rate Planting – but only 13% of industry

• Visual – growers love using their historic yield data
• Simple message – A, B, C’s
• Checking our work – Learning Blocks™
• Synergy – with nutrients
“ABC’s” of Management Zones

• A Zone: **Highest Productivity.** The best of the best. Growers should be aggressive with inputs on these areas – better chance of high return on investment.

• B Zone: **Average Productivity.** Consistent and stable production. Growers should maintain their “average” management practices in these zones.

• C Zone: **Below-Average Productivity.** Yield-limiting factors are preventing top production. Growers should be conservative with inputs – low return on investment.
Can easily see or use other layers
Final Management Zone Map

Corn Management Zone

A Zone

B zone

C zone

Premier 1020

- 79.86 to 94.83 (43.7 acres)
- 81.28 to 87.44 (1.0 acres)
- 79.59 to 93.81 (66.6 acres)
- 92.99 to 97.22 (6.2 acres)
- 84.55 to 98.32 (120.3 acres)
- 93.01 to 96.32 (6.2 acres)
# Field Variable Rate Population Report

Report calculated on: Monday, February 20, 2012 10:51 PM

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**Yield by Mgmt Zone**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Target Pop.</th>
<th>Avg Yield</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>A zone</td>
<td>35996</td>
<td>212</td>
<td>132.7</td>
</tr>
<tr>
<td>B zone</td>
<td>33982</td>
<td>208</td>
<td>66.6</td>
</tr>
<tr>
<td>C zone</td>
<td>31188</td>
<td>200</td>
<td>44.6</td>
</tr>
<tr>
<td>Entire Field</td>
<td>34501</td>
<td>209</td>
<td>243.9</td>
</tr>
</tbody>
</table>

**Target Population**

- A zone: 35,995 acres (120.3 acres)
- A zone High Ck: 39,000 acres (6.2 acres)
- A zone Low Ck: 33,000 acres (6.2 acres)
- B zone: 33,982 acres (66.6 acres)
- C zone: 31,010 acres (43.6 acres)
- C zone High Ck: 40,000 acres (1 acre)

**Yield by Target Population**

<table>
<thead>
<tr>
<th>Acre %</th>
<th>Target Pop. Range</th>
<th>Target Pop Avg</th>
<th>Avg Yield</th>
<th>Acres</th>
</tr>
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<tbody>
<tr>
<td>10%</td>
<td>31000 - 31000</td>
<td>31000</td>
<td>200</td>
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<tr>
<td>20%</td>
<td>31000 - 34000</td>
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<tr>
<td>20%</td>
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<td>36000</td>
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<tr>
<td>20%</td>
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<tr>
<td>20%</td>
<td>36000 - 40000</td>
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<tr>
<td>10%</td>
<td>36000 - 40000</td>
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<td>209</td>
<td>243.9</td>
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</table>
### Yield by Mgmt Zone

<table>
<thead>
<tr>
<th>Zone</th>
<th>Target Population</th>
<th>Avg Yield</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>A zone</td>
<td>36296</td>
<td>193</td>
<td>13.6</td>
</tr>
<tr>
<td>B zone</td>
<td>34000</td>
<td>185</td>
<td>16.2</td>
</tr>
<tr>
<td>C zone</td>
<td>29910</td>
<td>172</td>
<td>13</td>
</tr>
<tr>
<td>Entire Field</td>
<td>33289</td>
<td>183</td>
<td>42.9</td>
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</table>

### Yield by Target Population

<table>
<thead>
<tr>
<th>Acre %</th>
<th>Target Population Range</th>
<th>Target Population Avg</th>
<th>Avg Yield</th>
<th>Acres</th>
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<tbody>
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<tr>
<td>20%</td>
<td>30000 - 30000</td>
<td>34000</td>
<td>185</td>
<td>16.2</td>
</tr>
<tr>
<td>20%</td>
<td>34000 - 36000</td>
<td>36000</td>
<td>192</td>
<td>11.6</td>
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<tr>
<td>20%</td>
<td>36000 - 36000</td>
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<td>198</td>
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<tr>
<td>Entire Field</td>
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<td>183</td>
<td>42.9</td>
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</table>

Learning Blocks Results are numbered on the map above and to the right.

### Learning Block #1

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<th>Learning Block Yield Comparison</th>
<th>Target Population</th>
<th>Avg Yield</th>
<th>Acres</th>
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</thead>
<tbody>
<tr>
<td>A zone High Ck</td>
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<td>Neighboring Cells</td>
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### Learning Block #2

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<th>Acres</th>
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<tbody>
<tr>
<td>C zone Low Ck</td>
<td>28000</td>
<td>184</td>
<td>0.7</td>
</tr>
<tr>
<td>Neighboring Cells</td>
<td>30000</td>
<td>180</td>
<td>1.2</td>
</tr>
</tbody>
</table>

4 bu+ @>2000 seeds - $6/ac+ push A zone more

4 bu + @<2000 seeds - $18/ac+ 2009 C zone same or less
Learning Blocks vs. Replicated Strip Trials

• Learning Blocks
  – Match real world field conditions
  – Doing research where it needs to be done

• Replicated Strip Trials
  – Designed to generate “average” results
  – Strip treatments cross ABC zones
Don’t We Already Know Better?

Premier Crop Systems®

Corn Management Zone

Premier 1020
- 79.86 to 94.83 (43.7 acres)
- 81.28 to 87.44 (1.0 acres)
- 79.59 to 93.81 (66.6 acres)
- 92.99 to 97.22 (6.2 acres)
- 84.55 to 98.32 (120.3 acres)
- 93.01 to 96.32 (6.2 acres)
Agronomic Synergy

• Synergy – The Marriage of Variable Rate Planting and Variable Rate Nutrients.
• Synergy – What’s Been “Missing” in the VR Population Recipe for Success
• Synergy - Integration of the Right Population, Right Nutrients, and Right Genetics at Specific Sites Within The Field.
• Agronomic Synergy – Premier Crop’s Goal/Direction for Current and Future Development
For immobile nutrients –
Uptake is driven by root length

Slide courtesy – Bob Schoper, Croplan Answer Plots – Truman, MN
Synergy with Nutrients

• “if you invite more people to dinner, you’ll need extra food”
• Nutrient Learning Blocks™ – just as popular
<table>
<thead>
<tr>
<th>Learning Block yield comparison</th>
<th>Target nutrient rate</th>
<th>Average yield</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>N High Ck</td>
<td>160</td>
<td>228</td>
<td>2</td>
</tr>
<tr>
<td>Neighboring cells</td>
<td>114</td>
<td>228</td>
<td>4.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Block yield comparison</th>
<th>Target nutrient rate</th>
<th>Average yield</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Low Ck</td>
<td>80</td>
<td>218</td>
<td>2</td>
</tr>
<tr>
<td>Neighboring cells</td>
<td>110</td>
<td>227</td>
<td>4.6</td>
</tr>
</tbody>
</table>
Refreshing to growers

• Checking your work—your recommendation with a Learning Block™ type concept keeps you grounded but it genuinely refreshing to growers.
Don’t exclude the grower

• Growers love to be part of the process – that takes time – slows you down – you need to charge them. How awful – you have to spend more time with your best customers!

• Most growers have insights that improve your “algorithm”
Growers’ values are different

• Value creation depends on perspective
  – A seed company values data analysis that shows an overall yield advantage vs. a competitor
  – A grower values data analysis that shows yield results from fields like mine

• Easy to create apples to oranges comparisons

• “the more local the better”
Ideal timeline for seed decisions

- August – September 2016 – if the advisor is selling seed – starts positioning hybrids-varieties by field for 2017 based on:
  - Crop rotation by field
  - Early vs. late planting by field
  - Early vs. late harvest by field
  - Soil fertility – based on spatial sample
  - Customer preferences by company
  - % old vs. new split portfolio split
  - Grower’s N practices
  - Grower’s Fungicide practices
Ideal timeline for seed decisions

• Reality is seed companies know what their portfolio will be by August – specific # of units will change but they have already committed.
• Waiting for plot yield results can be an excuse.
• Premier Crop’s Advanced Seed Decision System allows our customers to scale placement recommendations – empowering seed sellers tying your company’s knowledge about placement with your company’s knowledge about each field and each grower’s practices.
Ideal timeline for seed decisions


```plaintext
IF([MgmtZone]=B, IF([POTASSIUM] > 190, [KRem2Yrs], ([KRem2Yrs] + ((190 – [POTASSIUM]) * (8 / 5)))), 0)
IF([MgmtZone]=C, IF([POTASSIUM] > 160, [KRem2Yrs], ([KRem2Yrs] + ((160 – [POTASSIUM]) * (8 / 5)))), 0)
```
Harvest 2016 – deliver and evaluate the grower’s own results. Cull and promote
Harvest 2016 – deliver and evaluate the grower’s own results. Cull and promote
Post Harvest – use group data to refine selection, placement and management decisions

...big data is good! But big LOCAL data is much better!!

...big shallow data is a start, but big LOCAL and DEEP data is the best!!!!

...the power of “by”..
The Power of “by”

• What if I could see yield “by” hybrid “by” soils “by” soil test P “by” soil test K “by” rainfall “by” relative maturity “by” population “by” applied nitrogen “by”....

• 700,000 plus acres reduced to 16,000 but it’s results from just the areas of fields that match each of my fields.
<table>
<thead>
<tr>
<th>Company</th>
<th>Variety</th>
<th>Pest Res</th>
<th>Chem Res</th>
<th>Sites</th>
<th>Std Dev Yield</th>
<th>Avg Yield</th>
<th>Haryv Mois</th>
<th>Area</th>
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</thead>
<tbody>
<tr>
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<td>SSTXRB</td>
<td>RR2/LL</td>
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<td>215.75</td>
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<td>121.34</td>
</tr>
</tbody>
</table>
Winter - Refine Mgmt Zones

- New data – new yield map
- Final seed placement
- Response to population by hybrid data
- Finalize 2017 VR planting Rx
Pre-spring

- Rx in the monitor
- Dress rehearsal with grower and crew
The future

• Science Friday – Ira Flatow

• Fruit Flies Aid Efforts to Develop Personalized Cancer Treatments By Christine Gorman | August 15, 2013
Can “precision ag” become agriculture’s fruit fly?

- The genes that are important for such developments in fruit flies are close enough on the molecular level to those found in people that studying the pathways in the insect will give you a lot of insight about what’s going in people.
- Indeed, biologists have gotten so good at producing fruit flies with specific genetic mutations that they can now order their own custom-designed insects from various supply houses via computer and have them delivered straight to the laboratory door.
Can “precision ag” become agriculture’s fruit fly?

• In other words, some of the mutated genes found in a tumor are acting as “drivers” of cancer growth and spread while others are “passengers” that pop up as the cells becomes more and more disorganized and mutations start to accumulate. The trouble comes when clinicians find that an individual patient’s tumor has 200 or more mutated genes—which ones should they be focusing their attention on and which can they safely ignore?
Can “precision ag” become agriculture’s fruit fly?

• On average, they find 180 matching genes in the flies. Then they go to a computer and order up 180 fruit fly lines—each one of which is specifically bred to have the same Ras and Src mutations plus one rare variant, based on the genetic profile of the human patient’s tumor.

• Eventually they whittle the number of genes down to about ten that seem to matter. Those ten genes (including the Ras and Src genes) produce a cancerous growth in the fly that most closely resembles the one in the human being. In other words, as Cagan says, “We’re building personalized flies.”
Can “precision ag” become agriculture’s fruit fly?

• The beauty of these highly detailed fruit fly experiments is that they allow researchers to start tackle the real-world complexity of malignant tumors rather than having to simplify everything, treating all breast cancers or all colon cancers alike and being disappointed when the results aren’t more predictable.”
Can “precision ag” become agriculture’s fruit fly?

• The answer is “yes” – that’s the promise of precision ag!

• Most fundamental change – precision ag’s history is applying existing knowledge spatially vs. using spatial data to create new complex agronomic knowledge that can be used in the most site specific applications possible.
The In-Cab Technology is Present
Premier Crop’s mission - To assist growers and their trusted agronomic advisors in creating real value from their geo-referenced agronomic data by converting data to knowledge supporting improved production decisions in an economic and sustainable manner.
Thank you

Dan Frieberg
Premier Crop Systems®