Unlocking Digital Ag and Seed Technology

John Jansen, VP, Agronomic Services, The Climate Corporation
Integrated Solutions Drive Improved Ag Productivity, Profitability

**CROP PROTECTION**
Offerings that help to improve in-field protection against threats like weeds and pests through foliar and seed treatment products

**BIOTECHNOLOGY**
Weed, pest and other agronomic traits focus on protecting or improving the yield potential of seeds

**BREEDING**
Industry-leading genetics library and field-testing network drives seed improvements, crop yields

**DATA SCIENCE**
Precision Ag help to increase efficiency by leveraging data about weather, soil and other patterns to help growers use agriculture solutions at the right time, in the right place

**BIOLOGICALS**
- **BIOAG ALLIANCE**
  BioAg Alliance, in partnership with Novozymes, researches and develops new technologies to help improve options for soil health, yield, pests
- **BIODIRECT™**
  This technology combines knowledge of genomes, natural processes to develop new ways to control on-farm pests while preserving biodiversity

**COMMON GOAL:**
Improve Productivity and Net Return Per Acre For Farmers
Climate’s Mission:
To help all the world’s farmers sustainably increase productivity with digital tools.
Digital Ag Opportunity: Two-thirds of Variability in Farmers’ Fields Comes from Controllable Factors

University of Illinois Crop Physiology: The Seven Wonders of the Corn Yield World¹

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor</th>
<th>Yield (bu/acre)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weather</td>
<td>70</td>
<td>27%</td>
</tr>
<tr>
<td>2</td>
<td>Nitrogen</td>
<td>70</td>
<td>26%</td>
</tr>
<tr>
<td>3</td>
<td>Hybrid</td>
<td>50</td>
<td>19%</td>
</tr>
<tr>
<td>4</td>
<td>Previous Crop</td>
<td>25</td>
<td>10%</td>
</tr>
<tr>
<td>5</td>
<td>Plant Population</td>
<td>20</td>
<td>8%</td>
</tr>
<tr>
<td>6</td>
<td>Tillage</td>
<td>15</td>
<td>6%</td>
</tr>
<tr>
<td>7</td>
<td>Growth Regulators</td>
<td>10</td>
<td>4%</td>
</tr>
</tbody>
</table>

Total = 260 bu 100%

Outside of the variability of weather and climate, more than 2/3 of the biggest influencers of yield in the field are from controllable factors.

¹ Source: cropphysiology.cropsci.illinois.edu/research/seven_wonders.html
Digital Ag Opportunity: Narrow the Yield Gap from Variability

- **Seed Genetics**
- **Diseases**
- **Agronomic Practices**
- **Weather**
- **Pests**
- **Field Variables**

2015 NCGA Corn Yield Contest winner

**532 bu/acre**

vs. 168 bu/acre national average

364 bu/acre opportunity

2015 Monsanto Soy Yield Contest winner

**134 bu/acre**

vs. 48 bu/acre national average

86 bu/acre opportunity
Climate FieldView Provides…

**ALL MY DATA IN ONE PLACE**
Centralized field data management

**SIMPLIFIED FIELD INSIGHTS**
Visualization & reporting that create actionable insights

**OPTIMIZED SEEDING & FERTILITY**
Data-driven seed & fertility subfield insights
Climate FieldView Adoption is Growing

**FY2015**
- 75M Platform acres
- 5M Paid acres

**FY2016**
- 92M Platform acres
- 14M Paid acres
Climate FieldView Demo
Monsanto Breeding Update
Today’s Plant Breeding is Powered by our Knowledge of Genetics

Our breeding teams working across 120+ locations in 25+ countries combine genes from distant locations to create valuable new seed products. These seeds are developed to provide crop qualities that include:

- Increased Yields
- Disease Resistance
- Stress Tolerance
- Grain Quality/Added Value
High-Density Corn System

Leveraging germplasm which can perform at higher plant population and drive yield

- By increasing plant population, this project could help farmers sustainably grow more crops on each acre
- High-Density Corn (Phase 3): Leveraging current products & pipeline; part of Precise Product Placement
- Ultra High-Density Corn (Phase 2): Breeding & testing for high density and increasing narrow row system adoption
- **Benefits:** Producing more on the same footprint of land, soil preservation and reduced emissions
Corn Disease Protection Pipeline

*Delivering disease protection through plant breeding methods for better overall plant health*

- Corn with comprehensive resistance to the most common, yield-robbing corn diseases.
- The severity of crop diseases depend on three main factors:
  1. Favorable Environment
  2. Disease Pathogen
  3. Susceptible Plant
- **Benefits**: Yield protection and enhanced overall plant health

**Protection against some of the most common corn diseases:**

- Anthracnose Stalk Rot
- Gray Leaf Spot
- Goss' Wilt
- Northern Corn Leaf Blight
- Fusarium Stalk Rot

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1: [https://mirc.itap.purdue.edu/dept.asp?tmp_dept=Botany and Plant Pathology](https://mirc.itap.purdue.edu/dept.asp?tmp_dept=Botany and Plant Pathology)
Second-Generation Soybean Cyst Nematode Resistance

*Developed to protect soybeans from multiple nematode races for better overall plant health*

- Soybean Cyst Nematode (SCN) is one of the most devastating pests of soybeans in the United States
- Second-generation resistance (Phase 3) has the potential to offer additional protection from multiple races of soybean cyst nematodes
- This additional protection is being developed through plant breeding techniques for improved plant health
- **Benefits**: Yield protection, enhanced overall plant health

Chlorotic Plants are Visual Symptom of High SCN Pressure

<table>
<thead>
<tr>
<th>Predominant source of resistance for today</th>
<th>Alternative source of resistance for future deployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race 3 prevalence</td>
<td>Race 1 or 2 prevalence</td>
</tr>
</tbody>
</table>
Innovation Sets Up Next Waves of Upgrades in the Industry’s Largest Weed Control Platform

**SOYBEAN TRAITS**

**ROUNDUP READY XTEND SOYBEANS**

- Tolerance to glyphosate & dicamba

**ROUNDUP READY XTEND CROP SYSTEM + RR PLUS² SYSTEM**

- 3rd GENERATION

- Tolerance to glyphosate, dicamba & glufosinate

**FUTURE GENERATIONS**

- Tolerance to glyphosate, dicamba, glufosinate, HPPD, PPO and an additional mode of action

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**FOUNDATIONAL HERBICIDES (PENDING REGULATORY APPROVALS)**

**WARRANT HERBICIDE + DICAMBA PREMIX**

**PHASE 3**

- Convenient premix will deliver multiple modes of action for trait & chemistry durability
- Efficient, broad acre – can be applied pre- & post-emergence
- Up to 4 weeks of strong residual control of small seeded broadleaf weeds and grasses

**DICAMBA FORMULATION II**

**PHASE 3**

- Higher concentration will offer significant grower convenience, reduced transportation footprint and packaging waste
- Improved compatibility with other agricultural products

1. USDA deregulation received. Awaiting EPA approval for in-crop use of dicamba.
2. RR PLUS = Roundup Ready PLUS® Platform.
Monsanto’s Technology Portfolio for Wheat is Poised to Deliver Half-Dozen New Technologies in the Next 5 Years

### Wheat Technology Portfolio: Development Horizons and Priorities

<table>
<thead>
<tr>
<th>PLATFORM</th>
<th>DISCOVERY</th>
<th>EARLY DEVELOPMENT</th>
<th>COMMERCIAL DEPLOYMENT</th>
<th>TARGET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Germplasm Upgrades</td>
<td></td>
<td></td>
<td></td>
<td>Annual</td>
</tr>
<tr>
<td>Wheat Insight System</td>
<td></td>
<td></td>
<td></td>
<td>FY16</td>
</tr>
<tr>
<td>BioAg Microbials (QuickRoots)</td>
<td></td>
<td></td>
<td></td>
<td>FY16</td>
</tr>
<tr>
<td>Acceleron Seed Treatment</td>
<td></td>
<td></td>
<td></td>
<td>FY17</td>
</tr>
<tr>
<td>NemaStrike Technology</td>
<td></td>
<td></td>
<td></td>
<td>FY21+</td>
</tr>
<tr>
<td>Climate FieldView Analytics Tools</td>
<td></td>
<td></td>
<td></td>
<td>FY18+</td>
</tr>
<tr>
<td>Herbicide Tolerant Wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insect Control Platforms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disease Control Platforms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Today, Monsanto is investing more in wheat technology than at any point since its WestBred acquisition – with its broadest set of technology platforms… including a half dozen new technologies poised to innovate the Wheat Industry before the end of the decade.

In the near-term, we will be prioritizing our opportunities for wheat in Seed and Seed Treatments, Precision Ag, and Microbial platforms. Biotechnology remains a longer-term opportunity.
Thank You

For more information, visit Climate.com

/climatecorp   @climatecorp   /climatecorp
   @fieldview
Backup Demo Slides
## Yield Field Report

<table>
<thead>
<tr>
<th>HYBRID</th>
<th>YIELD (BU/AC)</th>
<th>MOISTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKC62-77RIB</td>
<td>194</td>
<td>15.8%</td>
</tr>
<tr>
<td>DKC62-08RIB</td>
<td>205</td>
<td>19.1%</td>
</tr>
</tbody>
</table>

**TOTALS**

<table>
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<tr>
<th></th>
<th>199</th>
<th>17.4%</th>
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**TOTALS**  
199  
17.4%
Draw a region of the field with your finger to generate the report.
## Field View

**ACRES**

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Acres</th>
<th>Average Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKC62-77RIB</td>
<td>2.2</td>
<td>257</td>
</tr>
<tr>
<td>DKC62-08RIB</td>
<td>4.9</td>
<td>224</td>
</tr>
</tbody>
</table>

**YIELD (BU/AC)**

<table>
<thead>
<tr>
<th>BY HYBRID</th>
<th>ACREs</th>
<th>AVG YIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selma loam, 0 to 2 percent slopes</td>
<td>6.2</td>
<td>233</td>
</tr>
</tbody>
</table>

**MOISTURE**

<table>
<thead>
<tr>
<th>BY POPULATION</th>
<th>ACREs</th>
<th>AVG YIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.6 - 37.8 k</td>
<td>4.2</td>
<td>243</td>
</tr>
<tr>
<td>33.3 - 35.6 k</td>
<td>2.9</td>
<td>221</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BY ELEVATION</th>
<th>ACREs</th>
<th>AVG YIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 475 ft</td>
<td>7.1</td>
<td>234</td>
</tr>
</tbody>
</table>