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UWEX Cooperating Counties – Walworth, Monroe, and Fond du Lac
2006 Wisconsin Corn Conferences

Joe Lauer
University of Wisconsin

Elkhorn, Centerville, Ripon
January 10-12, 2006
Overview

- Recap 2005
- Keys to high yields and profitability in 2006
- Planting Systems for Northern Corn Belt Soils
- Single, Paired, Triple and Quad Stacks - Making some Sense out of the Options!
- Long-term tillage effects on soil structure and properties - What does it mean for corn yield?
Corn Production during 2005

- **Record grain yields in western Wisconsin**

- **Growing season**
  - Cool, dry spring ---> Early planting
  - Drought stress, variable rains
  - Corn growth and development on target with normal GDU accumulation
  - Beautiful September and October harvest season

- **Hybrid Trials: New Grain Production Records**
  - Zone (n=9): High Cycle 7560Bt = 261 bu/A (SC)
    - Previous record: Pioneer 33A14 = 259 bu/A (S-1998)
    - Six hybrids from S and SC zone placed in Top 10 performances
  - Location (n=3): Dairyland Stealth 5204 = 288 bu/A (Hancock)
    - Previous record: Jung 2668 = 284 bu/A (Arlington-1998)
    - Six hybrids from Hancock placed in Top 10 performances
University of Wisconsin - Corn Agronomy Program
Production Zones = S, SC, NC, and N
## 2005 Wisconsin Corn Performance Trials

### Grain Summary

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
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<tr>
<td>Arlington</td>
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<td>198</td>
<td>167</td>
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<td>167</td>
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<td>1837</td>
<td>189</td>
<td>166</td>
<td>238</td>
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<tr>
<td>Fond du Lac</td>
<td>1637</td>
<td>171</td>
<td>149</td>
<td>207</td>
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<td>Galesville</td>
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<td>149</td>
<td>238</td>
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<td>197</td>
<td>149</td>
<td>255</td>
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<td>Chippewa Falls</td>
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<td>Seymour</td>
<td>1204</td>
<td>161</td>
<td>142</td>
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<td>Valders</td>
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<td>153</td>
<td>142</td>
<td>184</td>
<td>20</td>
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<td>Spooner</td>
<td>1661</td>
<td>142</td>
<td>94</td>
<td>132</td>
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<tr>
<td>White Lake/Rhinelander</td>
<td>511</td>
<td>106</td>
<td>47</td>
<td>187</td>
<td>76</td>
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Frequency of Transgenic Hybrids Yielding Above the Trial Average in the 2005 UW Corn Trials

<table>
<thead>
<tr>
<th>Hybrid Type</th>
<th>Frequency (%)</th>
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<tbody>
<tr>
<td>Normal hybrids (n=354)</td>
<td>-66 34</td>
</tr>
<tr>
<td>Mon810 &quot;YieldGard&quot; (n=535)</td>
<td>-36 64</td>
</tr>
<tr>
<td>NK603 &quot;RR2&quot; (n=156)</td>
<td>-58 42</td>
</tr>
<tr>
<td>T25 &quot;Liberty Link&quot; (n=19)</td>
<td>-33 21</td>
</tr>
<tr>
<td>IT &quot;Clearfield&quot; (n=9)</td>
<td>-33 67</td>
</tr>
<tr>
<td>Bt11+T25 &quot;YieldGard + LL&quot; (n=112)</td>
<td>-62 38</td>
</tr>
<tr>
<td>Bt11+IT+T25 (n=3)</td>
<td>-67 33</td>
</tr>
<tr>
<td>Mon810+Mon863 &quot;YieldGard Plus&quot; (n=25)</td>
<td>24</td>
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<tr>
<td>Mon810+MonGA21 (n=8)</td>
<td>-50 50</td>
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<tr>
<td>Mon810+NK603 (n=322)</td>
<td>-47 53</td>
</tr>
<tr>
<td>Mon810+T25 (n=9)</td>
<td>-33 67</td>
</tr>
<tr>
<td>Mon863+NK603 (n=18)</td>
<td>-61 39</td>
</tr>
<tr>
<td>TC1507+T25 &quot;Herculex I&quot; (n=60)</td>
<td>-45 55</td>
</tr>
<tr>
<td>Mon810+Mon863+NK603 (n=16)</td>
<td>-28 62</td>
</tr>
</tbody>
</table>
Recent University Trials Evaluating Twin-Row Corn (JD = John Deere, GPPS= Great Plains Precision System)

<table>
<thead>
<tr>
<th>State</th>
<th>Years</th>
<th>Tests</th>
<th>Planter comparison</th>
<th>Yield advantage for Twin-rows (bu/A)</th>
<th>Authors</th>
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<tbody>
<tr>
<td>IA</td>
<td>2002-2004</td>
<td>3</td>
<td>JD 7000</td>
<td>2.1</td>
<td>McGrath et al.</td>
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<tr>
<td>PA</td>
<td>2002</td>
<td>1</td>
<td>GPPS v JD1780</td>
<td>1.4</td>
<td>Roth et al.</td>
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<tr>
<td>ON</td>
<td>1995-1999</td>
<td>15</td>
<td>Unknown</td>
<td>5.0</td>
<td>Stewart</td>
</tr>
<tr>
<td>MO</td>
<td>2001</td>
<td>7</td>
<td>GPPS v JD7000</td>
<td>-9.7</td>
<td>Nelson &amp; Smoot</td>
</tr>
<tr>
<td>DE, MA</td>
<td>2003-2004</td>
<td>4</td>
<td>GPPS v JD</td>
<td>-5.0</td>
<td>Kratochvil &amp; Taylor</td>
</tr>
<tr>
<td>OH</td>
<td>2004</td>
<td>6</td>
<td>GPPS v JD</td>
<td>-9.0</td>
<td>Watters &amp; Foster</td>
</tr>
<tr>
<td>OH</td>
<td>2005</td>
<td>1</td>
<td>GPPS v JD7000</td>
<td>-1.5</td>
<td>Wert</td>
</tr>
</tbody>
</table>

Average: **-2.4**
Calculating Grower Return

Partial Budget Analysis

- Grower return = (Yield x Price) - Input costs
  - Handling ($0.02 per bushel)
  - Hauling ($0.04 per bushel)
  - Trucking (system rate)
  - Drying (system rate per bushel-point > 15.5)
  - Storage (system rate per 30 day)

  ✔ Marketing plan: 50% sold at harvest, 25% at 4 months, and 25% at 8 months.

- Corn Production Systems
  ✔ Livestock: drying=$0.00, trucking=$0.00, storage=$0.01
  ✔ On-farm: drying=$0.02, trucking=$0.11, storage=$0.02
  ✔ Commercial: drying=$0.04, trucking=$0.11, storage=$0.03

- Corn Price per bushel
  ✔ Price matrix: $2.00, $2.50, $3.00 = gr250
  ✔ grPEPS: Weighted Price per bushel =
    50% November Average Cash price
    + 25% March CBOT Futures ($0.15 basis)
    + 25% July CBOT Futures ($0.10 basis)

  ✔ November Average Cash price derived from WI Ag Statistics;
  CBOT Futures prices derived from closing price on first
  business day in December.
Research Questions

- What is the optimum planting date and planting window?
  - What does the relationship between grain yield and planting date look like?
  - Are optimum planting dates earlier now than a generation ago?

- When should hybrid maturity be switched?

- What is the risk associated with planting dates?
Materials and Methods

- Total dataset = 16,772 plots from 34 locations
- Data criteria
  - Each location required at least 2 years of testing
  - Each trial required at least 3 planting date treatments
  - Focus on trials with planting dates before and after 20 May (switch date)
  - Wisconsin (1974-2002): E = 56, G = 90, GxE = 196, Total = 2,644
  - Pioneer (1987-2002): E = 68, G = 139, GxE = 626, Total = 10,809
  - Final dataset = 13,453 plots from 19 locations
- Location full-season maturity belt determined by the annual most frequent RM of the maximum measure (i.e. **grain yield**, grower return)
- Full-season hybrid >= location maturity belt - 5 days
  Mid-season hybrid = location maturity belt - 5 to 15 days
  Short-season hybrid < location maturity belt - 15 days or more
Corn Planting Date

What is Full-Season Relative Maturity at a Location?

Maturity belts based on grain yield

- 80 - 89 days
- 90 – 99 days
- 100 – 109 days
- 110 – 120 days

Did not meet criteria
What Does the Relationship Between Grain Yield And Planting Date Look Like?
Total forms = 9; GxE N = 822 cases

- Linear
  - L = 1%
  - +L = 1%
  - -L+Q = 2%

- Quadratic
  - Q = 1%
  - +Q = 1%

None
  - None = 21%

Grain yield vs. Planting date

Optimum

95% of optimum

40%
<table>
<thead>
<tr>
<th>RM Belt</th>
<th>Location</th>
<th>Optimum Date</th>
<th>95% of Optimum Date</th>
<th>Window (Days)</th>
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<tbody>
<tr>
<td>80-89</td>
<td>Ashland</td>
<td>May 3</td>
<td>May 1</td>
<td>9</td>
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<tr>
<td></td>
<td>Spooner</td>
<td>May 3</td>
<td>April 28</td>
<td>13</td>
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<tr>
<td>90-99</td>
<td>Marshfield</td>
<td>May 3</td>
<td>April 27</td>
<td>17</td>
</tr>
<tr>
<td>100-109</td>
<td>Hancock</td>
<td>April 28</td>
<td>April 23</td>
<td>22</td>
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<tr>
<td></td>
<td>Arlington</td>
<td>May 2</td>
<td>April 30</td>
<td>16</td>
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<td></td>
<td>Lancaster</td>
<td>April 30</td>
<td>April 25</td>
<td>14</td>
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<td>RM Season</td>
<td>Grain yield (bu/ A)</td>
<td>Optimum</td>
<td>Window Begin</td>
<td>Window End</td>
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<tr>
<td>-----------</td>
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<tr>
<td>85 day RM belt</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-89 Full-</td>
<td>137</td>
<td>May 3</td>
<td>April 30</td>
<td>May 11</td>
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<tr>
<td>70-79 Mid-</td>
<td>128</td>
<td>May 8</td>
<td>May 3</td>
<td>May 17</td>
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<tr>
<td>95 day RM belt</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>90-99 Full-</td>
<td>152</td>
<td>May 9</td>
<td>May 6</td>
<td>May 21</td>
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<tr>
<td>80-89 Mid-</td>
<td>142</td>
<td>May 12</td>
<td>May 8</td>
<td>May 25</td>
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<tr>
<td>70-79 Short-</td>
<td>122</td>
<td>May 11</td>
<td>May 8</td>
<td>May 24</td>
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<tr>
<td>105 day RM belt</td>
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<td></td>
<td></td>
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<tr>
<td>100-109 Full-</td>
<td>172</td>
<td>May 2</td>
<td>April 29</td>
<td>May 18</td>
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<tr>
<td>90-99 Mid-</td>
<td>169</td>
<td>May 2</td>
<td>April 29</td>
<td>May 23</td>
</tr>
<tr>
<td>&lt; 90 Short-</td>
<td>156</td>
<td>May 5</td>
<td>April 29</td>
<td>May 28</td>
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<tr>
<td>115 day RM belt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110-119 Full-</td>
<td>182</td>
<td>April 25</td>
<td>April 21</td>
<td>May 11</td>
</tr>
<tr>
<td>100-109 Mid-</td>
<td>167</td>
<td>April 27</td>
<td>April 22</td>
<td>May 16</td>
</tr>
<tr>
<td>&lt; 100 Short-</td>
<td>146</td>
<td>April 29</td>
<td>April 24</td>
<td>May 19</td>
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</tbody>
</table>
Switching From Full-season To Mid-season Corn Hybrids
N = 124 cases

Switch date

71%
Quadratic and Quadratic

21%
None and None

LL = 3%
LN = 2%
NL = 2%
Switch Dates For Corn Hybrid Maturity Groups - Wisconsin data

<table>
<thead>
<tr>
<th>RM belt</th>
<th>Location</th>
<th>Full- to Mid-</th>
<th>Full- to Short-</th>
<th>Mid- to Short-</th>
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</thead>
<tbody>
<tr>
<td>80-89</td>
<td>Ashland</td>
<td>May 21</td>
<td>----</td>
<td>----</td>
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<tr>
<td></td>
<td>Spooner</td>
<td>June 3</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>90-99</td>
<td>Marshfield</td>
<td>May 10</td>
<td>May 30</td>
<td>----</td>
</tr>
<tr>
<td>100-109</td>
<td>Hancock</td>
<td>May 20</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>Arlington</td>
<td>May 23</td>
<td>May 26</td>
<td>May 30</td>
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<tr>
<td></td>
<td>Lancaster</td>
<td>May 30</td>
<td>----</td>
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</table>
## Switch Dates for Full-, Mid- and Short-Season Hybrids

<table>
<thead>
<tr>
<th>Grain yield</th>
<th>Full- to Mid-</th>
<th>Full- to Short-</th>
<th>Mid- to Short-</th>
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</thead>
<tbody>
<tr>
<td>85 day RM belt</td>
<td>May 28</td>
<td>----</td>
<td>----</td>
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<tr>
<td>95 day RM belt</td>
<td>May 24</td>
<td>June 4</td>
<td>----</td>
</tr>
<tr>
<td>105 day RM belt</td>
<td>May 22</td>
<td>May 27</td>
<td>May 28</td>
</tr>
<tr>
<td>115 day RM belt</td>
<td>May 23</td>
<td>June 14</td>
<td>June 10</td>
</tr>
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</table>

**Corn price = $3.00 / bu**

**Drying cost = $0.04/bu*pt**

<table>
<thead>
<tr>
<th></th>
<th>Full- to Mid-</th>
<th>Full- to Short-</th>
<th>Mid- to Short-</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 day RM belt</td>
<td>June 2</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>95 day RM belt</td>
<td>May 22</td>
<td>May 24</td>
<td>June 7</td>
</tr>
<tr>
<td>105 day RM belt</td>
<td>May 22</td>
<td>May 25</td>
<td>May 28</td>
</tr>
<tr>
<td>115 day RM belt</td>
<td>May 11</td>
<td>June 6</td>
<td>June 10</td>
</tr>
</tbody>
</table>
Risk Distributions

Low Standard Deviation
- Low risk

Positive Skew
- High “upside” risk

Positive Kurtosis
- Infrequent extremes

High Standard Deviation
- High risk

Negative Skew
- High “downside” risk

Negative Kurtosis
- Frequent extremes

Normal
Grain Yield Response of Full-Season Corn Hybrids to Planting Date at Arlington (1976-2002)

Graph showing the grain yield (bu/A) response to planting date. The x-axis represents different dates from April 24 to June 19, and the y-axis represents grain yield in bu/A. The graph includes a line graph and scatter plot, indicating the yield variation with planting date.
## Risk Patterns for Full-Season Hybrids

<table>
<thead>
<tr>
<th>Grain yield</th>
<th>Full-</th>
<th>April 20</th>
<th>April 30</th>
<th>May 10</th>
<th>+ or - bu/A</th>
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</thead>
<tbody>
<tr>
<td>85 day RM belt</td>
<td>NS</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td></td>
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<tr>
<td>95 day RM belt</td>
<td>-L +Q</td>
<td>28</td>
<td>21</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>105 day RM belt</td>
<td>-L +Q</td>
<td>26</td>
<td>21</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>115 day RM belt</td>
<td>-L +Q</td>
<td>22</td>
<td>21</td>
<td>20</td>
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**Corn price = $3.00 / bu**

<table>
<thead>
<tr>
<th>Drying Cost = $0.04/ bu*point</th>
<th>Full-</th>
<th>April 20</th>
<th>April 30</th>
<th>May 10</th>
<th>+ or - $/A</th>
</tr>
</thead>
<tbody>
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<td>NS</td>
<td>58</td>
<td>58</td>
<td>58</td>
<td></td>
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<tr>
<td>95 day RM belt</td>
<td>-L +Q</td>
<td>72</td>
<td>53</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>105 day RM belt</td>
<td>-L +Q</td>
<td>66</td>
<td>54</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>115 day RM belt</td>
<td>-L +Q</td>
<td>59</td>
<td>56</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>
Yes, current optimum planting dates are 5 days earlier than 1974.

Criteria: 10 or more years of data at a location

- Arlington, WI = 5 days
- Johnston, IA = 4 days
Conclusions

- Optimum and 95% of optimum planting dates are similar among Full-, Mid-, and Short-season hybrids.
  - Planting windows are 1 to 10 days longer with Short- v. Full-season hybrids.
- Switch dates for Full- to Mid-season hybrids range from May 22 to May 28.
  - Earlier switch date with higher corn price and/or drying cost.
- Planting date risk for full-season hybrids is curvilinear between April 20 and June 15.
  - Equal risk among all planting dates in 80-89 day maturity belts.
  - Equal risk for full-season hybrids among all planting dates when low corn price and high drying cost.

http://corn.agronomy.wisc.edu
Parting Thoughts

• The biggest risk to early planting is non-uniform stands.
  ✓ But remember: “The yield potential of an early planted field with a poor stand is usually better than a later planted field with uniform spacing and emergence. It just doesn’t look as pretty in June and July.”
  ✓ Late-planted fields have higher grain moisture, thus more drying costs.

• Replanting is an “insurance” option, especially when seed costs are low.
  ✓ Crop insurance may not help with replanting costs if the field was planted before April 6. Check with your insurance agent.

• Planting depth and early planting: Temptation is to plant shallower. Recommend planting seed 1.5 to 2.0 inches deep.
  ✓ Seedbed can settle, but seed doesn’t move from where it was placed.
  ✓ If enough settling occurs, the crown of the plant may be too close to the surface resulting in reduced and poor secondary root growth.
  ✓ Adequate depth reduces effects of soil drying, bird and rodent feeding.
How much field testing of transgenics is going on? (Permits and Notifications \( n = 12052 \))

Source: Information Systems for Biotechnology (& Jan 06)
http://www.isb.vt.edu/
Where is field testing of transgenics occurring?

Number of Field Test Sites by State in the U.S.

Source: Information Systems for Biotechnology (1 Jan 87 to 7 Jan 06)
http://www.isb.vt.edu/

http://corn.agronomy.wisc.edu
How many field tests are occurring by crop? (Permits and Notifications \( n = 12\,052 \))

Regulated Organism - Corn

Number of APPROVED Releases Under Permits And Notifications

Corn (5180)

Regulated Organisms With At Least 10 Releases

Number of APPROVED Releases Under Permits And Notifications

Soybean (911)
Potato (759)
Cotton (740)
Tomato (566)
Wheat (373)
Alfalfa (329)
Tobacco (250)
Rapeseed (218)
Rice (202)
Creeping bentgrass (174)
Beet (169)
Melon (132)
Poplar (106)
Lettuce (79)
Squash (60)
Barley (53)
Sugarcane (46)

Source: Information Systems for Biotechnology (7 Jan 06)
http://www.isb.vt.edu/
What transgenic phenotypes are being tested?

Source: Information Systems for Biotechnology (7 Jan 06) http://www.isb.vt.edu/
APPROVED Releases By Phenotype Category

Total Number Of APPROVED Releases Under Permits And Notifications

- Herbicide Tolerance (3730)
- Insect Resistance (3218)
- Product Quality (2552)
- Virus Resistance (1248)
- Agronomic Properties (1211)
- Fungal Resistance (686)
- Other (658)
- Marker Gene (601)
- Bacterial Resistance (111)
- Nematode Resistance (26)

Source: Information Systems for Biotechnology (7 Jan 06)
http://www.isb.vt.edu/
Frequency of ‘Normal’ Corn Hybrids Yielding Above and Below the Trial Average in the UW Corn Trials

In 2005, yield of normal hybrids averaged 5.6 bu/ A less than the trial average.
Frequency (%) of Transgenic Hybrids Yielding Above (+) and Below (-) the Trial Average (UW Corn Trials, 1997 to 2005)

- Normal hybrids n=9578
  - Below: -55%
  - Above: 45%
- Bt176 "NatureGuard" n=113
  - Below: -41%
  - Above: 59%
- Mon810 "YieldGard ECB" n=3014
  - Below: -38%
  - Above: 62%
- MonGA21 "RR" n=130
  - Below: -57%
  - Above: 43%
- NK603 "RR2" n=156
  - Below: -57%
  - Above: 43%
- T25 "Liberty Link" n=84
  - Below: -56%
  - Above: 44%
- Mon863 "YieldGard CRW" n=34
  - Below: 21%
  - Above: 79%
- IT "Clearfield" n=172
  - Below: -53%
  - Above: 47%
- Bt11+T25 n=454
  - Below: -44%
  - Above: 56%
- Bt11+IT+T25 n=6
  - Below: 17%
  - Above: 83%
- Mon810+Mon863 "YieldGard Plus" n=25
  - Below: 24%
  - Above: 76%
- Mon810+MonGA21 n=94
  - Below: -36%
  - Above: 64%
- Mon810+NK603 n=684
  - Below: -46%
  - Above: 53%
- Mon810+T25 n=30
  - Below: -37%
  - Above: 63%
- Mon863+NK603 n=31
  - Below: 29%
  - Above: 71%
- TC1507+T25 "Herculex I" n=120
  - Below: -37%
  - Above: 63%
- Mon810+Mon863+NK603 n=16
  - Below: -28%
  - Above: 72%
How much does it cost for corn seed technologies?
Where is the breakeven point?

Cost ($/A) matrix of corn seed sold at a premium (i.e. technology fee)

<table>
<thead>
<tr>
<th>Yield Increase (bu/A)</th>
<th>$20 Bag difference</th>
<th>$40 Bag difference</th>
<th>$60 Bag difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corn Price</td>
<td>Corn Price</td>
<td>Corn Price</td>
</tr>
<tr>
<td></td>
<td>$2.00  $2.50  $3.00</td>
<td>$2.00  $2.50  $3.00</td>
<td>$2.00  $2.50  $3.00</td>
</tr>
<tr>
<td>0</td>
<td>$-8  $-8  $-8</td>
<td>$-17  $-17  $-17</td>
<td>$-25  $-25  $-25</td>
</tr>
<tr>
<td>2</td>
<td>$-4  $-3  $-2</td>
<td>$-13  $-12  $-11</td>
<td>$-21  $-20  $-19</td>
</tr>
<tr>
<td>4</td>
<td>$-0  $2  $4</td>
<td>$-9  $-7  $-5</td>
<td>$-17  $-15  $-13</td>
</tr>
<tr>
<td>6</td>
<td>$4  $7  $10</td>
<td>$-5  $-2  $1</td>
<td>$-13  $-10  $-7</td>
</tr>
<tr>
<td>8</td>
<td>$8  $12  $16</td>
<td>$-1  $3  $7</td>
<td>$-9  $-5  $-1</td>
</tr>
<tr>
<td>10</td>
<td>$12  $17  $22</td>
<td>$3  $8  $13</td>
<td>$-5  $0  $5</td>
</tr>
<tr>
<td>12</td>
<td>$16  $22  $28</td>
<td>$7  $13  $19</td>
<td>$-1  $5  $11</td>
</tr>
</tbody>
</table>

Assume: 80,000 seeds/bag planted at 33,000 seeds/A for final population of 30,000 plants/A
Hybrids with “YieldGard ECB” (Mon810) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

- Favors Normal
- Favors Transgene

Grain yield (bu/ A) advantage

- Mon810 n=3014
- Mon810+Mon836 n=25
- Mon810+MonGA21 n=94
- Mon810+Nk603 n=684
- Mon810+T25 n=30
- Mon810+Mon836+Nk603 n=16

Grain yield (bu/ A) advantage

http://corn.agronomy.wisc.edu

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Hybrids with “YieldGard ECB” (Bt11) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

- **Favors Normal**
  - 1998 n=21
  - 1999 n=29
  - 2000 n=41
  - 2001 n=53
  - 2002 n=48
  - 2003 n=158
  - 2004 n=83
  - 2005 n=115
  - Average n=463

- **Favors Transgene**
  - 1998 n=10
  - 1999 n=9
  - 2000 n=11
  - 2001 n=15
  - 2002 n=5
  - 2003 n=2
  - 2004 n=6
  - 2005 n=7
  - Average n=454

**Grain yield (bu/ A) advantage**

- Bt11+T25 n=454
- Bt11+IT n=3
- Bt11+IT+T25 n=6

**Favors Normal**
- Bt11+T25 n=454
  - 7
- Bt11+IT n=3
  - 8
- Bt11+IT+T25 n=6
  - -9

**Favors Transgene**
- Bt11+T25 n=454
  - -9
- Bt11+IT n=3
  - -8
- Bt11+IT+T25 n=6
  - -7

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Hybrids with “Herculex I” (TC1507) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

Grain yield (bu/ A) advantage

Favors Transgene

<table>
<thead>
<tr>
<th>Year</th>
<th>TC1507 n=6</th>
<th>TC1507+T25 n=120</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>126</td>
<td></td>
</tr>
</tbody>
</table>

TC1507 n=6

TC1507+T25 n=120

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http://corn.agronomy.wisc.edu
Hybrids with “YieldGard CRW” (Mon863) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

- **Mon863 n=34**: -12
- **Mon863+Nk603 n=31**: -7
- **Mon810+Mon863 n=25**: -2
- **Mon810+Mon863+Nk603 n=16**: 15

Grain yield (bu/A) advantage

- 2003 n=11
- 2004 n=36
- 2005 n=59
- Average n=106

http://corn.agronomy.wisc.edu

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Hybrids with “Liberty Link” (T25) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

- **Favors Normal**:
  - 1997 n=18
  - 1998 n=54
  - 1999 n=61
  - 2000 n=82
  - 2001 n=81
  - 2002 n=62
  - 2003 n=101
  - 2004 n=121
  - 2005 n=203
  - Average n=783

- **Favors Transgene**: 13

- **Grain yield (bu/A) advantage**:
  - T25 n=84
  - Bt11+T25 n=454
  - Bt11+IT+T25 n=6
  - Mon810+T25 n=30
  - TC1507+T25 n=120

- **Grain yield (bu/A) advantage**:
  - -1
  - 7
  - -9
  - 8
  - 10

Source: Lauer © 1994-2005 University of Wisconsin - Agronomy

http://corn.agronomy.wisc.edu
Hybrids with “Roundup Ready 1” (MonGA21) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

- **Favors Normal**
- **Favors Transgene**

Grain yield (bu/ A) advantage

1998 n=20
1999 n=12
2000 n=16
2001 n=35
2002 n=67
2003 n=41
2004 n=23
2005 n=8
Average n=224

MonGA21 n=130
Mon810+MonGA213 n=94

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http://corn.agronomy.wisc.edu
Hybrids with “Roundup Ready 2” (Nk603) Compared to the Average of Normal Corn Hybrids (UW Trials, 1997 to 2005)

- Nk603 n=365
- Mon810+Nk603 n=684
- Mon863+Nk603 n=31
- Mon810+Mon836+Nk603 n=16

Grain yield (bu/ A) advantage

Favors Normal
Favors Transgene

http://corn.agronomy.wisc.edu

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Hybrids with “Clearfield” (IT) Compared to the Average of Normal Corn Hybrids (UW Trials, 1993 to 2005)

- Bt11+IT n=3
- Mon810+IT n=9
- Bt11+IT+T25 n=6

Grain yield (bu/ A) advantage

Favors Normal

- IT n=219
- Bt11+IT n=3
- Mon810+IT n=9
- Bt11+IT+T25 n=6

Favors Transgene

-1 8

-11 8

-11 -9

1993 n=6
1994 n=19
1995 n=13
1996 n=9
1997 n=3
1998 n=33
1999 n=79
2000 n=41
2001 n=12
2002 n=10
2003 n=8
2004 n=12
2005 n=12
Average n=257
## Relative Performance of Transgenic Hybrids Compared to Normal Corn (1997 to 2005)

<table>
<thead>
<tr>
<th>Brand</th>
<th>Transgene</th>
<th>N</th>
<th>Grain yield</th>
<th>Grain moisture</th>
<th>Lodging</th>
<th>GR $2.50</th>
<th>GR PEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bu/A</td>
<td>%</td>
<td>%</td>
<td>$/A</td>
<td>$/A</td>
</tr>
<tr>
<td><strong>Insect Resistant Hybrids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature Guard</td>
<td>Bt176</td>
<td>113</td>
<td>5</td>
<td>1</td>
<td>-1</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>YieldGard ECB</td>
<td>Mon810</td>
<td>3014</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>YieldGard CRW</td>
<td>Mon863</td>
<td>34</td>
<td>-12</td>
<td>-1</td>
<td>0</td>
<td>-23</td>
<td>-19</td>
</tr>
<tr>
<td><strong>Herbicide Tolerant Hybrids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberty Link</td>
<td>T25</td>
<td>84</td>
<td>-1</td>
<td>1</td>
<td>0</td>
<td>-6</td>
<td>-5</td>
</tr>
<tr>
<td>Roundup Ready</td>
<td>MonGA21</td>
<td>130</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>RR2</td>
<td>Nk603</td>
<td>365</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Clearfield</td>
<td>IT</td>
<td>172</td>
<td>-1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Double-Stack Hybrids</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mon810+MonGA21</td>
<td></td>
<td>94</td>
<td>11</td>
<td>0</td>
<td>-1</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Mon810+Nk603</td>
<td></td>
<td>684</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>YieldGard ECB</td>
<td>Bt11+T25</td>
<td>454</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Mon810+T25</td>
<td></td>
<td>30</td>
<td>8</td>
<td>0</td>
<td>-1</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Herculex I</td>
<td>TC1507+T25</td>
<td>120</td>
<td>10</td>
<td>1</td>
<td>-1</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>YieldGard Plus</td>
<td>Mon810+Mon863</td>
<td>25</td>
<td>-2</td>
<td>0</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
</tr>
<tr>
<td>Mon863+Nk603</td>
<td></td>
<td>31</td>
<td>-7</td>
<td>-1</td>
<td>-1</td>
<td>-11</td>
<td>-8</td>
</tr>
<tr>
<td><strong>Triple-Stack Hybrids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mon810+Mon863+Nk603</td>
<td></td>
<td>16</td>
<td>15</td>
<td>0</td>
<td>2</td>
<td>30</td>
<td>21</td>
</tr>
</tbody>
</table>
Summary

- Care must be taken in selecting normal hybrids.
- Grain yield and grower return of Bt11, Mon810 and TC1507 corn hybrids is better than the trial average and normal hybrid average.
  - Bt11, Mon810 and TC1507 stacked with T25, MonGA21 or Nk603 perform well.
- At this time the single transgenes T25, MonGA21, and Nk603 (as well as IMI) do not add to yield or grower return.
  - Recommended for problem fields or difficult management situations.
  - Bt(CRW) = Yield lag or drag
- Pick hybrids based upon individual performance. DO NOT assume that performance is equivalent across a hybrid family or a hybrid’s ‘base’ genetics.
- “Variation for grain yield exists among commercial transgenic hybrids sold in Wisconsin.”
Long-term tillage effects on soil structure and properties - What does it mean for corn yield?

- Soil properties affected by tillage
  - Crop residue cover
  - Soil test measurements
  - Nutrient availability
  - Structure and aggregate stability
  - Water relationships
  - Temperature
  - Strength

- Recent Trends
  - Conversion from CT to NT
  - Corn residue removal
Yield advantage of chisel plow tillage over no-till 1986-2004 ("Long" Rotation trial, n= 7448 plots)
Long-Term Effects of Tillage and Corn Residue Removal
(Hooker et al., 2005 in *Soil Science Society of America Journal* 69:188)

- 28 yr experiment conducted in Connecticut
- Origin: adjacent forest soil
- Tillage treatments
  - Conventional tillage (CT)
  - No till (NT)
- Residue treatments
  - Removed (-): Silage
  - Returned (+): Grain
- Conclusions:
  - SOC decreased in CT with residue removed.
  - SOC not decreased in NT with residue removal
Thanks for your attention!

Questions?

January 26-27, 2006
Kalahari Resort, Wisconsin Dells, WI