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1996 Results and Future Outlook

Jack T. Bernens
Northup King Company

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1996 Results
And Future Outlook

Jack T. Bernens
Director Product Management
and Product Development
Northrup King Company

Introduction

The objective of this presentation is to share the results of our wide scale farmer strip trials conducted in 1995 and 1996 seasons. In 1995 Northrup King had over 400 farmer strip trial locations and each location was ranked by independent third party crop scouts for level of European Corn Borer infestation (None, Low, Moderate, Severe).

In 1996 we expect to harvest over 700 locations and will rank these locations using the same scale. At the time of this writing, we still have many of these locations to harvest and the compilation of ranking etc. still needs to be accomplished. The preliminary data for 1996 is showing very similar trends as we saw in 1995.

1995 Bt Hybrid Data

In 1995 across most of the country corn borer pressure was much heavier than normal. We believe that the data that is to be presented is a fair representation of the advantage Bt hybrids can offer when corn borer are present and feeding. However, we do believe that late infestations of second and some third generation corn borer in 1995 may have happen after we had finished rating our plots for infestation level. Therefore, even though we know that most yield lose occurs prior to pollen shed the ratings may be slightly understated.

Economics of the Bt hybrid investment

Based on the 1995 yield data the overall advantage for Bt corn exceeded 10 bu/ac over all infestation levels. In the data presented we will demonstrate the various values of purchasing Bt hybrids at each level of infestation and at different input cost levels depending on seeding rate. This return on investment approach allows each individual farmer to determine their predicted R.O.I. for planting Northrup King Bt corn hybrids.

1996 Bt Hybrid Data

At the time of this writing the were still many farmer strip trials to be harvested, the preliminary results are showing very similar results to our 1995 data. We hope by the time of this presentation we will be able to provide a good summary of 1996 results.
## 1995 NATIONAL DATA
COMPARATIVE PERFORMANCE SUMMARY
BT EXPERIMENTAL HYBRIDS VERSUS NON-BT CHECKS

**INFESTATION LEVEL**

<table>
<thead>
<tr>
<th>Bt Hybrid</th>
<th>None</th>
<th>Low</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>N4242BT:</td>
<td>-0.8</td>
<td>+13.7</td>
<td>+13.9</td>
<td>+20.2</td>
</tr>
<tr>
<td></td>
<td>(17)</td>
<td>(134)</td>
<td>(198)</td>
<td>(34)</td>
</tr>
<tr>
<td>N4640BT:</td>
<td>+2.0</td>
<td>+15.3</td>
<td>+15.6</td>
<td>+16.9</td>
</tr>
<tr>
<td></td>
<td>(21)</td>
<td>(139)</td>
<td>(246)</td>
<td>(48)</td>
</tr>
<tr>
<td>N6800BT:</td>
<td>-2.7</td>
<td>+5.0</td>
<td>+9.2</td>
<td>+22.2</td>
</tr>
<tr>
<td></td>
<td>(9)</td>
<td>(174)</td>
<td>(131)</td>
<td>(19)</td>
</tr>
<tr>
<td>N7639BT:</td>
<td>-0.6</td>
<td>+6.2</td>
<td>+12.4</td>
<td>+23.5</td>
</tr>
<tr>
<td></td>
<td>(13)</td>
<td>(227)</td>
<td>(164)</td>
<td>(31)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Tunnel length in Inches/Plant</th>
<th><strong>Approximate</strong> No. of Borer/Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.0 - 0.2</td>
<td>0.00 - 0.10</td>
</tr>
<tr>
<td>Low</td>
<td>0.21 - 1.50</td>
<td>0.11 - 1.00</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.51 - 5.50</td>
<td>1.01 - 3.00</td>
</tr>
<tr>
<td>Severe</td>
<td>5.51 and up</td>
<td>More than 3.00</td>
</tr>
</tbody>
</table>

1. Non-Bt Checks = NK Brand N4242; Pioneer Brand 3769, 3751, 3861, 3733; DEKALB DK442, DK471, DK512
2. Non-Bt Checks = NK Brand N4640; Pioneer Brand 3769, 3751, 3563, 3525; DEKALB DK512, DK580, DK591
3. Non-Bt Checks = Northrup King Experimental X6514; Pioneer Brand 3489, 3394, 3375, 3357; DEKALB DK580, DK591, DK623, DK626
4. Non-Bt Checks = Northrup King Experimental X7514; NK Brand N7590; Pioneer Brand 3489, 3394, 3375, 3357, 3225, 3162, 3245; DEKALB DK623, DK626

**NOTE:** Data from 1995 Northrup King Strip Plots. Significance improves as the number of locations increases above 20 to 30.
Yield loss varies depending on the stage of plant growth when corn borer damage occurs. And each generation of corn borers attacking a plant adds to the damage. Even one corn borer per plant can cause significant yield loss.
EUROPEAN CORN BORER YIELD LOSS

% Yield Loss

- Mid-Whorl: 5.9%
- Green Tassel: 5%
- Pollen-Shedding: 4%
- Blister: 3.1%
- Dough: 2.4%

SOURCE: W.M. Bode, D.D. Calvin and C.E. Mason
What is the Yield Potential of NK Bt Hybrids?

Yield Potential in Bushels

Hundreds of field trials conclusively prove that Bt hybrids with YieldGard protection offer superior yield and profit potential in the face of low, moderate or severe ECB pressure through the combination of high-yielding elite hybrids and the yield loss protection of the Bt gene. Bt protects the bred-in yield potential of the hybrid under corn borer pressure, although it doesn't improve the yield potential of the hybrid.
What is the Value of the Bt Yield Potential?

Earning Potential Per Acre

As corn borer pressure increases, the value of protecting your yield with Bt is increased. And, as the market value of corn increases, the payback from the additional yield protection increases. It's like an insurance policy for the yield potential of the hybrid—the more the corn borer attacks, the greater the value of the protection.
What is the Additional Investment for Bt Yield Protection?

Investment for Bt Hybrids
- Based on $25.00 premium per bag over conventional hybrids.

![Bt Corn Investment $ Per Acre Graph]

While the price per unit of Bt corn hybrids is greater than non-Bt hybrids, it calculates out to be a small additional investment per acre. And, additional savings such as Early Pay and Volume Purchase Savings can reduce the investment per acre even further. You also can forget about insecticide and spraying costs for your Bt acres. Plus there's the value of better standing corn for longer in-field drying.
What is the Return on Investment for Bt Yield Protection?

Return on Investment Per Acre Potential

Based on $3.00 Corn Price

Level of Infestation
- Low
- Moderate
- Severe

Calculate the “Return On Investment” (ROI) for Bt hybrids by using the following formula: the dollar value per acre of the additional yield advantage of Bt hybrids divided by the per acre price of the Bt investment equals your ROI. Even under a low level of corn borer infestation and a high planting rate, the ROI is still an amazing 200%. Few other investments match that! Use the Bt Investment/Value Calculation worksheet to determine the ROI on your own acres.
What is the Risk of European Corn Borer Infestation?

Frequency of Infestation
Average percent of years with European Corn Borer

<table>
<thead>
<tr>
<th>Level of Infestation</th>
<th>% of Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0%</td>
</tr>
<tr>
<td>Low</td>
<td>14%</td>
</tr>
<tr>
<td>Moderate</td>
<td>32%</td>
</tr>
<tr>
<td>Severe</td>
<td>44%</td>
</tr>
</tbody>
</table>

Observations from Minnesota and Illinois from 1963-1994

Definition of Level of Infestation

<table>
<thead>
<tr>
<th>Infestation Level</th>
<th>Tunnel Length per Plant</th>
<th>Number of European Corn Borer per Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.0-0.2 inches</td>
<td>0.00-0.10</td>
</tr>
<tr>
<td>Low</td>
<td>0.21-1.5 inches</td>
<td>0.11-1.00</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.51-5.5 inches</td>
<td>1.01-3.00</td>
</tr>
<tr>
<td>Severe</td>
<td>More than 5.5 inches</td>
<td>More than 3.00</td>
</tr>
</tbody>
</table>

Over thirty years of observation show that virtually every year brings a significant risk of corn borer infestation. Also the increased acres of minimum tillage leave corn plant debris where corn borer overwinter.

Evaluating hundreds of trials, researchers used these criteria to rank the levels of corn borer damage for the information used in the charts which follow.