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Influence of Date of Planting on Corn Hybrids with/without Bt Corn Rootworm Protection

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Influence of Date of Planting on Corn Hybrids with/without Bt Corn Rootworm Protection

Abstract

Genetically-modified hybrids with corn rootworm (CRW) protection have been commercially available for six years. Hybrids with the Bt CRW traits are more expensive and initially were available in limited supply. Corn rootworm feeding pressure typically decreases on late planted/replanted corn. Producers were asking if the additional seed costs were justified and, if they could only get a limited supply of the Bt CRW hybrids, when should they be planted for maximum response. Marlin Rice, ISU Extension entomologist, conducted an initial 3-year study (2003–2005) in Central Iowa. The objective of this demonstration was to compare the corn root feeding damage, yield, and economic response of a Bt CRW hybrid with its non-Bt CRW isoline at three planting dates in a continuous corn rotation in Northern Iowa.

Disciplines

Agricultural Science | Agriculture

Influence of Date of Planting on Corn Hybrids with/without Bt Corn Rootworm Protection

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David Rueber, farm superintendent

Introduction

Genetically-modified hybrids with corn rootworm (CRW) protection have been commercially available for six years. Hybrids with the Bt CRW traits are more expensive and initially were available in limited supply. Corn rootworm feeding pressure typically decreases on late planted/replanted corn. Producers were asking if the additional seed costs were justified and, if they could only get a limited supply of the Bt CRW hybrids, when should they be planted for maximum response. Marlin Rice, ISU Extension entomologist, conducted an initial 3-year study (2003–2005) in Central Iowa. The objective of this demonstration was to compare the corn root feeding damage, yield, and economic response of a Bt CRW hybrid with its non-Bt CRW isolate at three planting dates in a continuous corn rotation in Northern Iowa.

Materials and Methods

Another study was conducted for three years (2006–2008). Related corn hybrids with (W)/without (WO) the Bt CRW trait were planted early (April 22–May 1), mid (May 7–13), and late (May 18–22) as weather and soil conditions permitted in a site planted to corn the previous year. The hybrids used and the related seed costs are listed in Table 1. All hybrids in the study carry the traits for European corn borer resistance and glyphosate tolerance and received Poncho 250 seed treatment. Each treatment was 3 rows wide

× 75 ft long, randomized and replicated three times. Root ratings were determined in late July using the ISU nodal injury rating system. Program specialist Jim Oleson did the root ratings in 2006 and 2007. George Cummins, ISU extension field agronomist, did the root ratings in 2008. Each replication was weighed at harvest and adjusted to market moisture.

Results and Discussion

Annual project results are listed in Tables 2–4 and the 3-yr averages in Table 5. There was good CRW pressure in all treatments every year. Nodal injury was consistently higher in the hybrid WO the Bt CRW trait. Nodal injury in the hybrid WO the Bt CRW decreased with the later planting dates. With two exceptions (the early planting dates in 2006 and 2008) the Bt CRW hybrid outyielded its non-Bt CRW isolate at all planting dates. While there are exceptions in the annual data, average yields of both hybrids decreased with later planting dates. Although commodity corn prices at harvest varied over the years of the study from \$2.25/bushel to \$4/bushel, in most cases the increased yield and income from the Bt CRW hybrid more than offset the increased seed cost.

Acknowledgements

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Table 1. Hybrids used and seed costs per acre in a Bt/non-Bt corn trial.

| Year | Hybrid | Trait | \$/Unit | Seed cost/acre @ 32K |
|------|----------|-------|----------|----------------------|
| 2006 | DKC50-20 | WO | \$164.90 | \$ 65.96 |
| 2006 | DKC51-39 | W | \$208.90 | \$ 83.56 |
| 2007 | DKC52-47 | WO | \$160.65 | \$ 64.26 |
| 2007 | DKC52-40 | W | \$181.17 | \$ 72.47 |
| 2008 | DKC50-20 | WO | \$204.90 | \$ 81.96 |
| 2008 | DKC50-19 | W | \$233.90 | \$ 93.56 |

Table 2. 2006 root ratings (RR), harvest moistures (%), and yields (bu/acre) × 3 planting dates in a Bt/non-Bt corn trial.

| Planting date | Early | | | Mid | | | Late | | |
|---------------|-------|-------|-------|------|-------|-------|------|-------|-------|
| | Trait | % | bu/ac | RR* | % | bu/ac | RR* | % | bu/ac |
| WO | 16.8 | 187.7 | 1.69 | 17.4 | 161.5 | 1.42 | 17.9 | 150.9 | 1.29 |
| W | 16.5 | 179.7 | 0.01 | 16.9 | 184.3 | 0.02 | 18.0 | 158.6 | 0.01 |

*RR = root rating on a 0–3 scale.

Table 3. 2007 root ratings (RR), harvest moistures (%), and yields (bu/acre) × 3 planting dates in a Bt/non-Bt corn trial.

| Planting date | Early | | | Mid | | | Late | | |
|---------------|-------|-------|-------|------|-------|-------|------|-------|-------|
| | Trait | % | bu/ac | RR* | % | bu/ac | RR* | % | bu/ac |
| WO | 15.4 | 149.5 | 1.47 | 15.4 | 158.3 | 1.17 | 15.8 | 126.9 | 0.95 |
| W | 15.4 | 189.6 | 0.02 | 15.4 | 174.1 | 0.13 | 15.9 | 165.3 | 0.01 |

*RR = root rating on a 0–3 scale.

Table 4. 2008 root ratings (RR), harvest moistures (%), and yields (bu/acre) × 3 planting dates in a Bt/non-Bt corn trial.

| Planting date | Early | | | Mid | | | Late | | |
|---------------|-------|-------|-------|------|-------|-------|------|-------|-------|
| | Trait | % | bu/ac | RR* | % | bu/ac | RR* | % | bu/ac |
| WO | 17.9 | 157.1 | 1.2 | 18.2 | 140.2 | 1.3 | 18.7 | 151.9 | 0.6 |
| W | 18.5 | 150.1 | 0.04 | 18.4 | 157.3 | 0.05 | 18.8 | 176.4 | 0.08 |

*RR = root rating on a 0–3 scale.

Table 5. 3-year average root ratings (RR), harvest moistures (%), and yields (bu/acre) × 3 planting dates in a Bt/non-Bt corn trial.

| Planting date | Early | | | Mid | | | Late | | |
|---------------|-------|-------|-------|------|-------|-------|------|-------|-------|
| | Trait | % | bu/ac | RR* | % | bu/ac | RR* | % | bu/ac |
| WO | 16.7 | 164.8 | 1.45 | 17.0 | 153.4 | 1.3 | 17.5 | 143.2 | 0.95 |
| W | 16.8 | 173.1 | 0.02 | 16.9 | 171.9 | 0.07 | 17.6 | 166.8 | 0.03 |

*RR = root rating on a 0–3 scale.