



## 2013 DEMONSTRATION REPORT Monsanto Learning Center at Monmouth, IL

# Corn Rootworm Management Under High Pressure

## Background

Best management practices to help control corn rootworm (CRW) include<sup>1</sup>:

- Crop rotation to soybeans or other non-host crops.
- Planting a corn product with multiple modes of action for CRW.
- Planting a corn product with a single mode of action (MOA) for CRW in conjunction with soil-applied insecticide (SAI) at planting.
- Scouting for adult beetles and applying a foliar insecticide if they reach threshold to help minimize egg lay and subsequent pressure the following year.

Selection of a *B.t.* trait technology is the main platform on which all other management strategies should be built.

A trial was conducted at the Monsanto Learning Center at Monmouth, IL to assess the efficacy of trait packages offering single and dual modes of action in conjunction with SAI in the management of CRW under high pressure.

## Study Guidelines

The trial was planted in a continuous corn rotation on May 13, 2013. The soil was prepared under conventional tillage with a chisel plow in the fall followed by a soil finisher to establish the seed bed in the spring. A pre-emergent herbicide application of Harness<sup>®</sup> Xtra 5.6L at 2.75 qt/acre was applied on May 14, 2013. A post-emergent herbicide application of Roundup PowerMAX<sup>®</sup> at 22 fl oz/a + AMS at 17 lb/100 gal was applied on June 21, 2013.

Corn technology used included:

- Dual MOA Genuity<sup>®</sup> SmartStax<sup>®</sup> RIB Complete<sup>®</sup> corn blend (112 RM)
- Single MOA Genuity<sup>®</sup> VT Triple PRO<sup>®</sup> RIB Complete<sup>®</sup> corn blend (112 RM)
- Roundup Ready<sup>®</sup> Corn 2 (111 RM)
- Single MOA competitor product (112 RM)

Treatments included:

- An application of Force<sup>®</sup> 3G, a SAI (applied at planting)
- Not treated with soil-applied insecticide

Plots measured 10' x 100' (0.023 acres)/treatment. The trial was planted at 36,000 seeds/acre in 30" single rows with 4 rows per treatment. Yield data was adjusted to 15% moisture content.

## Results

CRW larvae feed on corn roots, which can decrease yield potential and increase the risk of root lodging. Figure 1 shows the amount of root damage from CRW larvae as influenced by SAI and the different technologies used in this study.

Without SAI, Roundup Ready<sup>®</sup> Corn 2 had the highest node-injury scale (NIS) of 2.9, followed by the single MOA competitor product, and Genuity<sup>®</sup> VT Triple PRO<sup>®</sup> RIB Complete<sup>®</sup> corn blend. Genuity<sup>®</sup> SmartStax<sup>®</sup> RIB Complete<sup>®</sup> corn blend had the lowest NIS of 0.02 (Figure 2). Application of SAI substantially reduced root damage by as much as 87% in the Roundup Ready<sup>®</sup> Corn 2, 95% in the single MOA competitor product, and 92% in Genuity<sup>®</sup> VT Triple PRO<sup>®</sup> RIB Complete<sup>®</sup> corn blend. SAI did not provide any additional value to the dual MOA Genuity<sup>®</sup> SmartStax<sup>®</sup> RIB Complete<sup>®</sup> corn blend product in terms of larval feeding. Economic damage is more likely to occur with NIS ratings of 0.75 or greater<sup>2</sup>; therefore, without SAI, the single MOA competitor product will be more likely to suffer economic damages with its 1.1 NIS score than the Genuity<sup>®</sup> VT Triple PRO<sup>®</sup> RIB Complete<sup>®</sup> corn blend with its 0.64 NIS score.

The two single MOA products had nearly the same average yield of approximately 144 bu/acre. Even though this is 33% higher than Roundup Ready<sup>®</sup> Corn 2, which yielded an average of 95.8 bu/acre, the dual MOA Genuity<sup>®</sup> SmartStax<sup>®</sup> RIB Complete<sup>®</sup> corn blend had the highest average yield of 204 bu/acre (Figure 3), 53% and 30% yield increases over Roundup Ready<sup>®</sup> Corn 2 and the two single MOA products, respectively.

The addition of SAI increased yield across all products, with 41, 18, 12 and 7% yield increases in Roundup Ready<sup>®</sup> Corn 2, the single MOA competitor product, Genuity<sup>®</sup> VT Triple PRO<sup>®</sup> RIB Complete<sup>®</sup> corn blend, and Genuity<sup>®</sup> SmartStax<sup>®</sup> RIB Complete<sup>®</sup> corn blend respectively. SAI may also be controlling secondary insects that the trait technologies do not protect against. SAI alone can be inconsistent from year-to-year because of environment, planting dates, and other factors. As a result, it may not always provide adequate protection when used alone.

## Key Messages

The study indicates that *B.t.* technology provides an effective management strategy for CRW.

- The trait package to be used should be selected by the prevailing insect pressure.
  - Under low-moderate pressure, a single MOA product could be used with (or without, in some cases) SAI for effective management.





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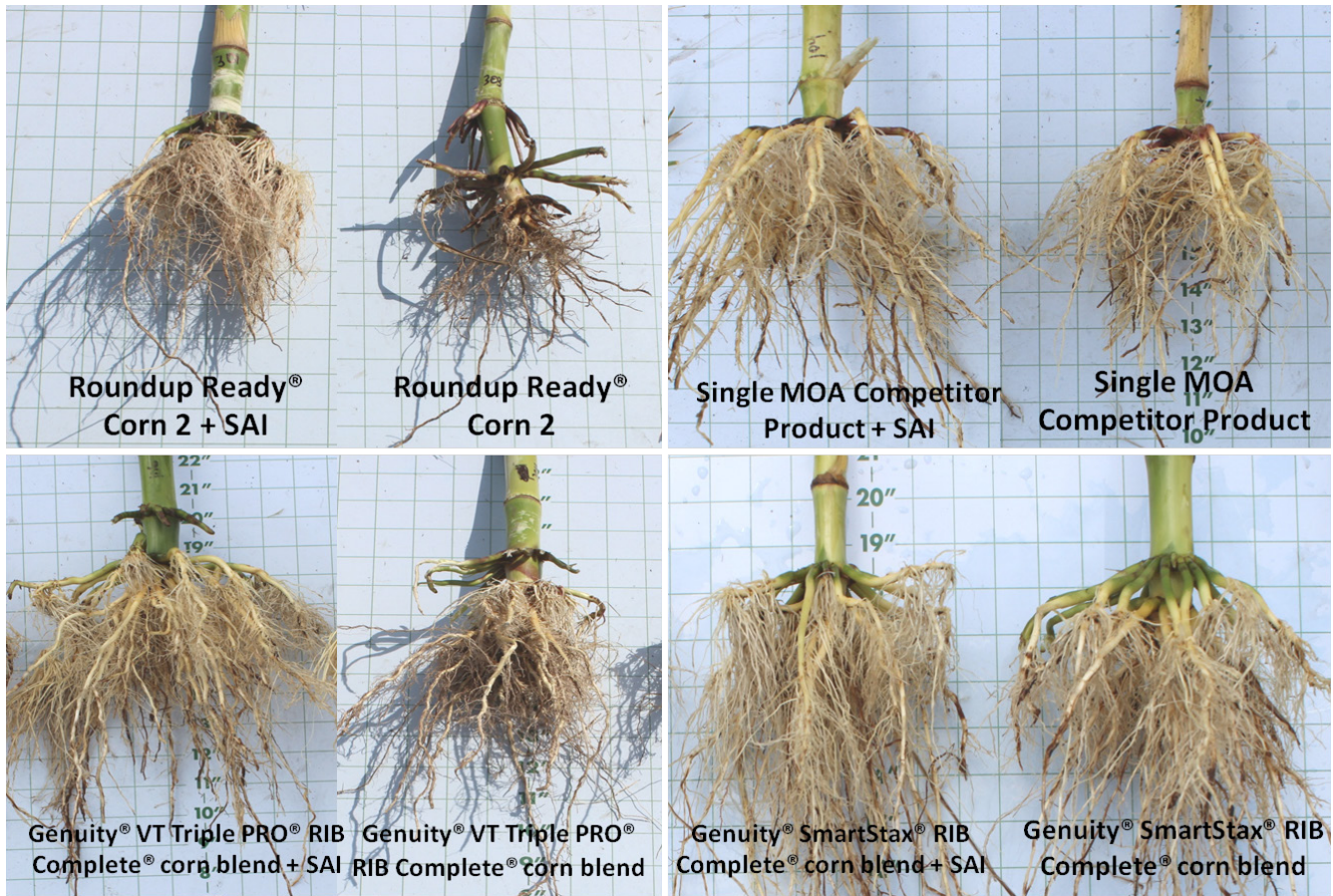


Figure 1. Examples of corn rootworm larval damage as influenced by SAI and corn *B.t.* technology.

- Under all corn rootworm pressure environments, a dual MOA product provides the best control.
- The use of the appropriate *B.t.* technology for a field is highly recommended.
  - Protects the sustainability of the grower’s production as well as the durability of *B.t.* technology.
- Growers are encouraged to scout fields to determine pest pressure and employ various management tactics during the existing crop season (such as foliar insecticide applications), which can reduce egg laying and subsequent CRW population the following year.
  - Knowing current season’s beetle density provides a valuable decision tool for next year’s management, including crop rotation and the trait package to use.

- For continued success and profitability in CRW management, growers should look to an integrated pest management strategy and employ best management practices as part of their whole farm solution to pest management.

### Sources and Legals

<sup>1</sup> Genuity. 2013. Best management practices for heavy corn rootworm pressure. Monsanto Technology Development & Agronomy. <sup>2</sup> Genuity. 2012. Corn rootworm management guide 2012. Monsanto Technology Development & Agronomy.

The information discussed in this report is from a single site, non-replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

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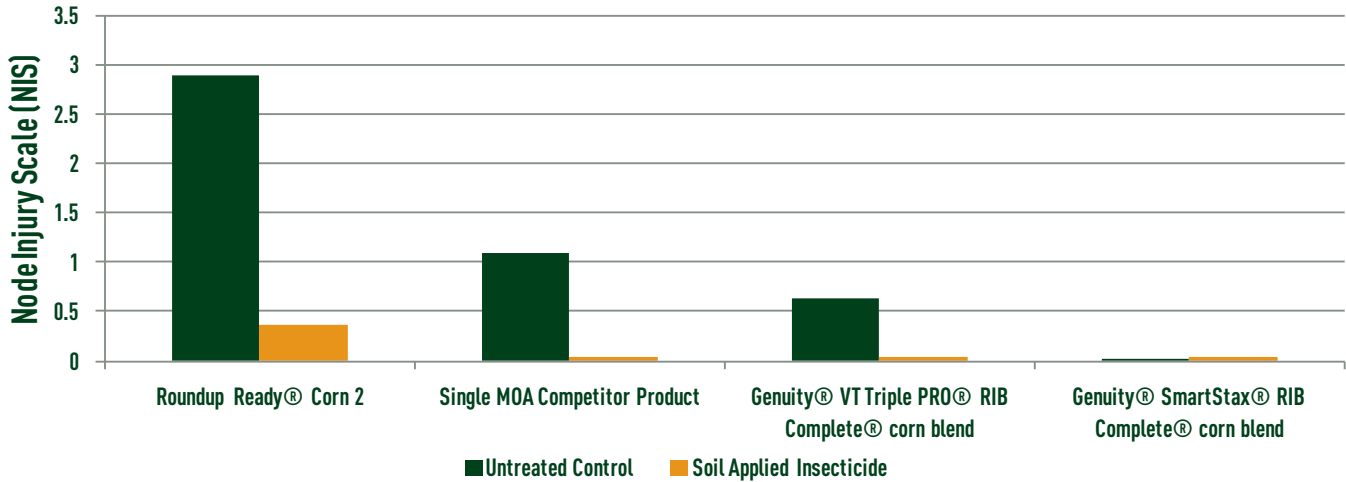


Figure 2. Effects of SAI on CRW root damage of corn products on a high pressure field at Monmouth, IL as measured by the Iowa State University Node-Injury Scale (NIS).

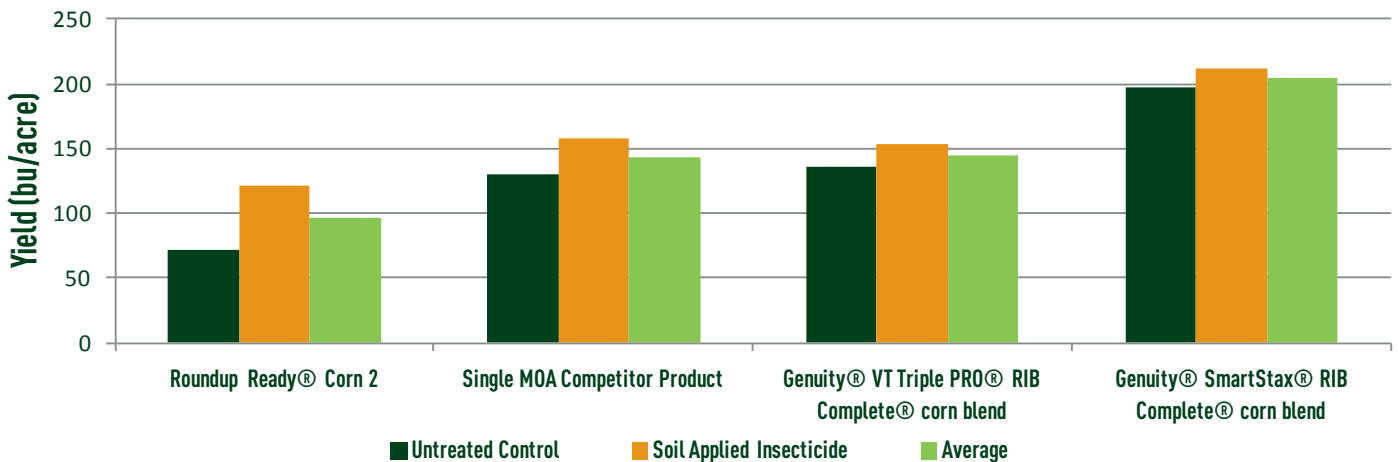


Figure 3. Yield performances of *B.t.* traited corn products as affected by SAI on a high CRW pressure field at Monmouth, IL. Average = average yield of untreated control and SAI.

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