Comparison of a Rootworm Resistant Corn Hybrid and its Conventional Isoline

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Objectives

The objective of this trial was to evaluate a corn hybrid containing the BtCRW trait (Monsanto's YieldGard Corn Rootworm technology) with its hybrid isoline that did not have the BtCRW trait for differences in corn rootworm feeding, and determine yield differences related to feeding and/or yield lag associated with the BtCRW trait.

Background

Soil Type:	Hoytville Clay	Replant PRE:	12 oz/A Roundup
Drainage:	Non-systematic Tile	(May 21)	WeatherMax + 1.3 qt/A
Previous Crop:	Soybeans		Degree Xtra + 17 lb/ 100
Tillage:	fall disk/ripper; spring field		gallons AMS
	cultivate (2x), no additional	POST(June 17):	2 pt/A Basagran + 1 pt/A
	tillage performed for replant		Soyencap + 1% v/v
Soil Test (2005):	pH 6.6, P 21 ppm, K 128 ppm		Accuquest
Fertilizer:	260 lb/A 6-26-30 2X2	Insecticide:	Gaucho seed treatment
	banded at planting	Hybrid:	LG Seeds LG2540G and
	150 lb nitrogen/A sidedressed		LG2540RW
	as 28% UAN	Row Width:	30 inch
Herbicide:	2.5 qt/A Degree Xtra +	Planting Rate:	29,400 seeds/A
PRE (April 19):	3 oz/A Callisto + 1 qt/A	Planting Date:	April 19, 2005
	Princep 4L	Replant Date:	May 18, 2005
		Harvest Date:	October 19, 2005

Methods

This trial was set up with two treatments in a split planter design such that each treatment was replicated 10 times across the field in a six row alternating pattern. One treatment was LG2540G isoline hybrid, and the other treatment was the same LG Seeds hybrid genetically modified to contain the BtCRW trait within the seed. Both hybrids were from commercial seed lots and were graded as the same seed size. Both hybrids were treated with Gaucho insecticide seed treatment. Plots were planted using a John Deere 7000 Maxemerge six row planter with three row units on one side of the planter containing the isoline seed and the other three row units on the other side of the planter containing the BtCRW trait seed. Plot size was 15 feet wide (6 rows) by 600 feet long.

Corn rootworm feeding checks (July 28) were performed by randomly selecting five plants from each hybrid treatment and rating the roots for feeding damage using the new Node Injury Scale (0-3). Harvest populations (October 14) were estimated by counting the number of plants on

each side of a 17.5 foot section at three different locations in five randomly selected plots for each treatment. The average number of plants counted per 17.5 feet was converted to plants per acre. Two six row plots of the same hybrid were harvested as a round using a John Deere 6620 combine equipped with a calibrated AgLeader PF3000 yield monitor. This harvest pattern provided five replications of each hybrid treatment for statistical analysis. Grain weights were measured with a calibrated weigh wagon. Grain moistures were taken from the combine yield monitor. All yields are adjusted to a 15% moisture standard.

Results

Table 1. Corn harvest population, moisture, yield, and root rating means[1].

Treatment	Harvest Population	Moisture	Yield	Root Rating
	(plants/A)	(%)	(bu/A)	(0-3 scale)
LG2540RW (BtCRW)	29,800	16.0	193.8	0.01
LG 2540G (Isoline)	27,400	16.7	189.6	0.05
Expected t	2.776	2.776	2.776	-
Observed t	5.045	16.500	3.556	-

[1] Observed t values larger than Expected t values indicate a statistically significant difference between treatments. $P = 0.05$

Summary

Because there were only two treatments involved in this trial and they were not randomized within the replications, statistical analysis was performed using a paired t-test to look for differences. Results from this split planter trial indicate there were significant differences between the two different hybrids for harvest population, moisture, and yield.

Root ratings completed by OSU IPM specialist, Bruce Eisley, are an average score given to the five root samples of each hybrid inspected. The level of feeding observed in both the rootworm resistant seed and the isoline seed plots was well below the economic threshold level of 0.5 on the node injury scale. Thus we wouldn't expect to see yield differences based strictly on root feeding damage. Preharvest population counts were performed on October 14, at that time no root lodging was observed. This is further evidence that corn rootworm damage was limited.

This years test results support similar findings from our 2004 trial (reference the 2004 report on our Farm Focus website at www.farmfocusshow.com/research.htm). In both years, corn rootworm resistant seed provided a higher yield, and had a higher final stand population even though both seeds were planted through the same planter at the same time and set for the same planting rate. Concern over potential yield lag with the new genetically modified rootworm resistant seed doesn't appear to be an issue.

Farmers can expect to pay an additional $14-16/acre to have this rootworm resistant technology in their seed along with an insecticide seed coating to protect against other insect pests in corn. This cost is competitive with most other furrow insecticide treatments when applied at a rate that will control corn rootworm. The decision to use seed with this rootworm resistant technology should be based on the expected potential for insect damage to corn in a particular field.

Acknowledgement

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