

BT/RR CORN HYBRID EVALUATION

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ABSTRACT: This study was conducted to evaluate yield response of BT [toxic to Southwestern corn borers (*Diatraea grandiosella*)] and Roundup Ready (RR) corn hybrids compared to conventional hybrids. Growing conditions, especially during the grain fill period were excellent and resulted in good yields. Destructive stalk samples (splitting stalks longitudinal) were taken from selected hybrids which included both the BT (DK 69-70, DK C68-70, and Pioneer 31B13) and near isogenic parent line (DK 697, DK 687, and P3223). Samples were taken on two different dates corresponding to second and third corn borer generations (7/16 and 8/22). No corn lodging was observed at the time of harvest. Corn yields ranged from 159.9 to 187.3 bu/ac. There was no yield difference among BT (DK 69-70, Pioneer 31B13, DK C68-70, and TX P267-D) and non-BT hybrids (Pioneer 3223, TV 2140, DK C64-10, and DK 697) which had yields of 181.3 to 187.3 bu/ac. The sampled non-BT lines had 6, 19, and 31% second generation corn borers infestations in DK 697, DK 687, and Pioneer 3223, respectively, on July 16. No larvae or damage was observed for the sampled BT lines (Pioneer 31B13, DK C68-70, and DK 69-70) on either sampling date. Non-BT hybrids sampled for corn borers on August 22 showed 33 to 73% corn borer infestation. DK 687 was the only non-BT hybrid sampled for corn borer infestation which yielded less than the BT-hybrids. The Roundup isogenic and parent lines showed inconsistent yield responses. The conventional hybrid TV 2140 produced higher yield than its isogenic Roundup line (TV 2140RR), while the DK 687 and its Roundup isogenic line DK 687RR showed no yield differences.

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KEYWORDS: BT-corn, corn borers, Roundup Ready corn

MATERIALS AND METHODS: A field study was conducted on a Leeper silty clay loam soil, Verona, Mississippi, during the 2002 growing season to evaluate BT, Roundup Ready (RR), and conventional corn hybrids for southwestern corn borer infestation and yield. The study was conducted as a randomized complete block with 4 replications. Plot size was 8 rows (30-inch) by 50 ft. Soil test results indicated high levels of P with medium K level. Therefore, 250 lb/ac of potash (0-0-60) was applied broadcast on the soil surface on 9/25/01.

Land preparation consisted of a disking (9/26/01), chiseling (9/26/01), disking (10/02/01), do-alling (10/04/01), bedding (10/06/01), paratilling (10/08/01), bedding (10/09/01), and rebedding (3/08/01). The corn was planted (4/18/02) with Lorsban 15G (chlorpyrifos) at 1.3 lb ai/ac applied in-furrow. Gramoxone Max (paraquat) + Guardsman Max (dimethenamid-P + atrazine) at 0.38 + 1.25 lb ai/ac was applied 4/19/02. Sidedress liquid nitrogen (32% N) at 175 lb N/ac

was applied 6 inches from row and 2 inches deep on 5/17/02. Corn plants were destructively sampled (4 stalks/plot) on 7/16/02 and 8/22/02 to determine Southwestern corn borer infestation and tunnel length. Corn hybrids sampled included both the transformed BT line and its near isogenic non-BT parent line.

The center 2-rows of each 8-row plot were harvested for grain yield with a plot combine on 9/12/02. The grain was weighed after harvest and grain moisture and test weight were determined with a Dickey John[®] GAC 2000 grain analysis computer. All yields were adjusted to 15% seed moisture. Corn yield data was subjected to analysis of variance analysis and treatment means were separated using Fisher's Protected LSD at the 5% significance level.

RESULTS AND DISCUSSION: Rainfall during the growing season was above normal for May and July which resulted in good corn grain yield. The Southwestern corn borer stalk infestation threshold level is 25%. Mid-season stalk sampling (7/16/02), indicated Southwestern corn borer infestations of 6, 19, and 31% infestations for the non BT hybrids DK 697, DK 687, and Pioneer 3223, respectively, (data not shown). Mid (7/16/02) and late season (8/22/02) stalk sampling results indicated no Southwestern corn borer infestation in the sampled BT hybrids, DK 69-70, Pioneer 31B13, and DK C68-70 (Table 1). This compares to 33, 66, and 73% late season infestations for non-BT hybrids, DK 697, Pioneer 3223, and DK 687, respectively. The percent larvae present ranged from 13 to 40% and tunnel length ranged from 2 to 5 inches.

All hybrids showed no stalk lodging at harvest, possibly due to the early harvest at 16 to 22% grain moisture. The yields of the hybrids sampled for Southwestern corn borer, excluding DK 687, were not different. DK 687 (170.6 bu/ac) was the only non-BT hybrid sampled for corn borers that had a lower yield than its BT parent line DK C68-70. Pioneer 3223 (non-BT) corn borer infestation was similar to DeKalb 687 (non-BT) but showed yield equal to its near isogenic BT parent line Pioneer 31B13. The similar yield between non BT Pioneer 3223 and its near isogenic BT parent line Pioneer 31B13 may be related to differences in agronomic traits. Pioneer 3223 is a 116 day maturity while Pioneer 31B13 is a 118 day maturity and is not from the same isogenic line. The DeKalb DK 687 and DK C68-70 are of the same isogenic line with a 118 day maturity. DK 687 showed lower yield than its BT isogenic line DK C68-70. DK 697 corn borer infestation level of 6% (second generation) was below the 25% threshold. However, DK 697 showed late corn borer infestation (33%) which was above threshold but the yield was equal to its BT parent isogenic line DK 69-70.

The conventional hybrid and its isogenic Roundup Ready lines showed inconsistent yield responses. The conventional hybrid TV 2140 produced 183 bu/ac which was greater than its Roundup Ready parent isogenic line TV 2140RR. DK 687RR (Roundup Ready) isogenic line, however, produced yield equal to the parent conventional line DK 687RR.

COOPERATORS: None

PUBLICATIONS: None

Table 1. BT/RR-corn hybrid yield response and southwestern corn borer infestation on a Leeper silty clay loam soil in 2002, Verona, MS.

Hybrid	Brand	Trait ²	-S.western corn borers ¹ --			BTW lb/bu	Yield bu/ac
			% infested	% larvae	tunnel lngth (in)		
DK 69-70	DeKalb	BT	0	0	0	52.2	187.3
31B13	Pioneer	BT	0	0	0	53.2	187.3
DK C68-70	DeKalb	BT	0	0	0	52.6	186.0
DK 697	DeKalb	----	33	13	2	54.8	185.2
3223	Pioneer	----	66	40	6	56.2	184.3
TV 2140	Terral	----	---	---	---	52.6	183.0
DK C64-10	DeKalb	RR	---	---	---	55.8	182.9
TX P267-D	DeKalb	RR/BT	---	---	---	55.3	181.3
DK 687RR	DeKalb	RR	---	---	---	54.3	172.1
8222IT	Garst	----	---	---	---	54.6	172.0
34B23	Pioneer	----	---	---	---	56.8	171.1
TV 2140RR	Terral	RR	---	---	---	53.0	170.7
DK 687	DeKalb	----	73	33	5	53.7	170.6
5516RR	Dynagrow	RR	---	---	---	55.2	159.9
Mean							
LSD (.05)						2.2	11.7
% CV						2.9	4.6

¹ Sample data 8/22/04 from 4 plants/plot and 4 replications.

² BT trait-hybrid is resistant to southwestern corn borer. RR trait-hybrid is resistant to Roundup (glyphosate).