

2003 RESEARCH SUMMARY
ARKANSAS CORN AND GRAIN SORGHUM BOARD

Title: Use of Integrated Pest Management to Improve Arkansas Corn and Grain Sorghum Production

Investigators: P.J. McLeod (coordinator and insects); J. Ross (hybrids); and T.L Kirkpatrick (nematodes)

CROP: Field corn and grain sorghum

STATUS: Funded in 2003 for three years

Objectives:

- 1. To determine the impact of insects on conventional and Bt field corn**
- 2. To develop management systems for early season insects and nematodes, and determine the economic benefits of in-furrow insecticides/nematicides**
- 3. To establish the benefits of foliar insecticides applied for corn borer management during mid-season**
- 4. To establish information on the biology and management of overwintering corn borers in Arkansas field corn**
- 5. To develop management systems for insects attacking grain sorghum in Arkansas**
- 6. To establish information on the basic biology of the principal insect pests of grain sorghum in Arkansas**

Conventional and Bt lines were evaluated for corn borer damage at the Cotton Branch Station (CBS) and three additional locations. Damage from corn borers was heavy in non-Bt lines. Damage levels in Bt lines, were very low and in plants in Bt plots where damage was high, testing for the Bt protein was negative. The occasional lack of Bt producing plants is inherent with seed production. Thus, at this time, U of A and Monsanto personnel are in agreement that development of resistance in corn borer populations has not been detected in eastern Arkansas.

Three soil insecticide/seed tests were completed at the CBS. Early season insect populations were low and no significant differences in pest numbers were detected among the treatments. Plant growth was significantly improved with several of the treatments. Yields, however, did not differ among the treatments. Foliar insecticides were applied to seedling field corn at Coal Hill. Pyrethroids, esp. Capture and Fury, were highly effective against chinch bugs. Increase spray volume from 10 to 20 gpa significantly increased chinch bug mortality.

Small plots located at the Cotton Branch Station and four large fields were sprayed (Intrepid, Capture and others) during 2003 for corn borers. In general, the insecticides reduced the level of stalk boring and stalk lodging. Yields, however, were not significantly increased by using the foliar sprays. Currently studies are underway to determine the effect of the late-season foliar insecticide applications on overwintering corn borer populations.

The initial study of impact of cultivation on overwintering corn borers was completed this past spring. Although no significant differences in initial SWCB mortality were detected among the types of cultivation (mowing, discing, stale seed bed) it appears that each cultivation method increases the impact of the harmful effects of winter when compared to no stalk destruction. Also, white grub populations were much higher in plots with no stalk destruction.

Grain sorghum fields at Piggott, Des Arc, Marianna, Holly Grove and Morrilton were monitored for insect pests. Wireworms significantly reduced grain sorghum stand in commercial fields near Morrilton. Chinch bugs were detected in low numbers in several fields but impact on grain sorghum was minor. Sorghum midge significantly reduced yield at Des Arc.

Grain sorghum fields at Piggott, Des Arc, Marianna, Holly Grove and Morrilton were sampled on a weekly basis for insects. Data from these studies were used to produce the insect chapter of the Grain Sorghum Production Manual which should be available later this winter.

Supporting tables

Evaluation of foliar insecticides for corn borer management in field corn, Marianna, Arkansas, 2003

Treatment and rate lb ai/A	% of plants with corn borer damage	% of plants with more than 2 internodes damaged	% of internodes damaged	% shank damage	ear damage rating *
Intrepid 2 SC 0.031	97.5 a	72.5 a	30.8 b	63.9 ab	3.7 bcd
Intrepid 2 SC 0.063	82.5 abc	35.0 bc	18.2 cd	57.5 abc	3.3 d
Intrepid 2 SC 0.125	77.5 bc	17.5 cde	13.8 de	30.8 d	3.8 abc
Warrior T 0.03	75.0 bc	5.0 e	13.3 de	50.0 bcd	3.4 cd
Capture 2 EC 0.05	70.0 cd	40.0 b	18.3 cd	48.7 b	3.3 d
Mustang Max 0.018	87.5 ab	25.0 bcd	17.0 cd	38.5 cd	3.5 b
Untreated	97.5 a	85.0 a	38.2 a	75.7 a	4.2 a

* Damage ratings are 0 (none) to 5 (extensive).

Column means within a planting followed by the same letter are not significantly different (P=0.05, LSD).

Evaluation of field corn cultivars for resistance to insects, Marianna, Arkansas, 2003

Cultivar	% of plants with corn borer damage	% of plants with more than 2 internodes damaged	% of internodes damaged	% shank damage	ear damage rating *	yield bu/A
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Early planting (April)

1. Pioneer 3245	67.5 b	22.5 a	13.5 c	17.5 a	0.8-ns	159.6 bc
2. Pioneer 3223	75.0 ab	22.5 a	13.5 c	35.1 a	0.6	169.3 abc
3. Pioneer 31B13 Bt	5.0 c	0.0 b	0.3 d	0.0 b	0.5	181.6 ab
4. Pioneer 33J56	90.0 a	27.5 a	22.0 a	30.6 a	0.7	158.8 c
5. Pioneer 33J57 Bt	7.5 c	0.0 b	0.7 d	2.8 b	0.3	160.8 bc
6. Pioneer 34B97	80.0 ab	25.0 a	16.0 bc	20.5 a	1.0	149.8 c
7. Pioneer 34B98 Bt	10.0 c	0.0 b	0.7 d	5.0 b	0.5	154.4 c
8. Dekalb 697	85.0 a	27.5 a	18.2 ab	22.5 a	0.7	165.9 bc
9. DeKalb C6970 Bt	10.0 c	0.0 b	1.0 d	0.0 b	0.5	189.0 a

Middle planting (May)

1. Pioneer 3245	100.0 a	90.0 ab	43.2 b	73.7 b	3.8 a	66.3 d
2. Pioneer 3223	97.5 a	80.0 bc	42.3 b	78.8 ab	2.9 b	100.6 bc
3. Pioneer 31B13 Bt	5.0 c	0.0 e	0.5 d	2.6 c	1.2 d	153.7 a
4. Pioneer 33J56	100.0 a	100.0 a	50.8 a	93.9 a	4.4 a	76.3 cd
5. Pioneer 33J57 Bt	10.0 c	2.5 e	1.2 d	2.9 c	1.9 c	120.2 b
6. Pioneer 34B97	87.5 b	60.0 d	34.0 c	77.1b	3.1 b	98.2 bc
7. Pioneer 34B98 Bt	7.5 c	0.0 e	0.7 d	2.9 c	1.7 cd	103.5 b
8. Dekalb 697	97.5 a	77.5 c	37.3 bc	76.5 b	4.3 a	111.6 b
9. DeKalb C6970 Bt	2.5 c	0.0 e	0.2 d	2.9 c	2.8 b	153.8 a

* Damage ratings are 0 (none) to 5 (extensive).

Column means within a planting followed by the same letter are not significantly different (P=0.05, LSD).