

Project Report for 2007
Wheat and Feed Grain Committee

Project Title: Reproduction of the cotton root knot nematode (*Meloidogyne incognita* race 3) and the peanut root knot nematode (*Meloidogyne arenaria* race 2) on corn.

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Objectives: Assess the rate of reproduction of the cotton root knot nematode (*Meloidogyne incognita* race 3) and the peanut root knot nematode (*Meloidogyne arenaria* race 2) on selected commercial, sweet, and ornamental corn varieties in field plantings at three locations in Alabama.

Production Methods

Brewton Agricultural Research Unit [BARU]: A sizable population of the cotton root knot nematode (*Meloidogyne incognita* race 3) was established at the study site. After being turned with a moldboard plow, 600 pounds of 5-10-15 analysis fertilizer was incorporated on March 12 with a disk harrow and then the study area was bedded with a ripper-bedder. On April 10, the beds were knocked down and the corn was sown with a cone planter. The experimental design was a randomized complete block with four replications. Individual plots consisted of two rows on 36 inch centers that were 25 feet in length. The study site was not irrigated. Weed control was provided by an at-plant broadcast application of Dual Magnum II at 1.3 pints per acre + Roundup Weathermax at 1 quart per acre on April 10. A post-plant application of Atrazine at 4 quarts per acre was made on May 17. Broadcast applications of 176 lb per acre of ammonium nitrate (34-0-0) were made on April 30 and May 17. Plots were picked with a plot combine on September 7. Soil samples for a nematode assay were collected from each plot on September 10.

Weather Patterns for BARU: While rainfall totals for April, July, and August were above the 30-year historical average, totals for May and June were well below normal for the study location. In addition, temperatures in the two dry months of May and June were above the 30-year historical average.

Wiregrass Research and Extension Center [WGREC]: The study site, which was maintained recently in a corn-peanut rotation, had a sizable established population of the peanut root knot nematode (*Meloidogyne arenaria* race 2). A blended liquid fertilizer was broadcast on March 7 at a rate of 30, 60, and 60 pounds per acre of actual nitrogen, phosphorus, and potassium, respectively. On March 19, rows were laid off with a strip tillage unit and the corn was then sown with a cone planter. Weed control was provided by a broadcast application of Atrazine at 2 quarts per acre on March 27. An application of 120 pounds per acre of actual nitrogen plus 20 pounds per acre of sulfur on April 13 was followed by another application of 80 pounds per acre plus 20 pounds per acre of sulfur on May 2. Plots, which were irrigated 14 times, received a total of 13.5 acre inches of water between May 3 and August 9. Soil samples for a nematode assay were collected on September 9.

Weather Patterns at WGREC: Rainfall totals for May, June, July, and August were below to well below the historical average for this location, afternoon temperatures in July and August were higher than normal.

Plant Breeding Unit [PBU]: In 2007, the site, which was planted to cotton in 2006, was disked and chiseled on February 19 and then leveled with a field cultivator on February 28. On March 27, a 16-8-8 fertilizer supplemented with Zn and S at a rate of 250 pounds per acre was broadcast

and lightly incorporated with a disk harrow. Corn also planted on a 30-inch row spacing on March 27. Pre-emergent weed control was provided by a broadcast application of a tank mixture of Dual II Magnum at 12 fluid ounces per acre + Atrazine at 1.75 quart per acre. Post-plant applications of ammonium nitrate at 88 and 288 pounds per acre were made on March 28 and May 3, respectively. A hose tow system was used to apply 1.1, 0.7, 1.0, 1.1, and 0.8 acre inches of water on May 9, May 23, June 5, June 20, and June 27, respectively. The experimental design was a randomized complete block with six replications. Individual plots consisted of two 30-foot rows spaced 0.8 feet (30 inches) apart. Plots were harvested using a plot combine on August 8. Soil samples were collected for a nematode assay on April 20 and on August 23. Samples were processed using the sugar flotation method and the nematode populations are expressed as the number of larvae (J2) of the cotton root knot nematode per 100 cc of soil.

Weather Patterns at PBU: While rainfall totals for much of the summer months were often below to well below the 30-yr average, afternoon temperatures were unusually high, particularly in June and July.

Results

BARU: Significant differences in yield were noted between the commercial corn varieties (Table 1). Yield for the heirloom field corn varieties Hickory King and Big Daddy Yellow were so low that they were not included in the table. Growth and yield of the earlier maturing popcorn, sweet, and ornamental corn varieties was greatly reduced by the combination of low soil moisture levels and high temperatures at silking. Highest yield was recorded for DKC 69-72. Other corn varieties with statistically similar yields included Pioneer 31N26, Pioneer 31G66, Pioneer 33V15, Pioneer 31G97, Croplan 827, Southern States 804, and Southern States 783. In addition, yield for Croplan 7505, Croplan 5822, DKC 67-60, and Pioneer 33M53 was significantly lower compared with DKC 69-72. Nematode count data will be available at a later date.

PBU: Significant differences in yield were noted between corn varieties (Table 1). Highest yield was recorded for Pioneer 31G66. Yield for DKC 69-72 was similar to that of Pioneer 31G66 as well as Pioneer 33V15, Pioneer 31G97, and Southern States 783. With the exception of DKC 67-60, the heirloom corn varieties had the lowest yields.

WGREC: Despite less than ideal growing conditions, yields for the majority of corn varieties were relatively high. Significant differences in yield were noted between the corn varieties (Table 1). The heirloom field corn varieties Golden Truckers Favorite, Hickory King, and Big Daddy Yellow had the lowest yields. In contrast, highest yields were reported for Pioneer 31G97, DKC 69-72, Pioneer 31G66, Croplan 827, and Southern States 783. Yields for the remaining commercial field corn varieties were intermediate between those noted for the highest yielding commercial and low yielding heirloom varieties.

Table 1. Yields for selected corn varieties on sites infested with either the cotton root knot or peanut root knot nematodes at three sites in Alabama.

| Corn Variety | Corn Yield (bu/A)* | | |
|-----------------------------|--------------------|----------|----------|
| | WGREC | PBU | BARU |
| Pioneer 31N26 | 131.9 bcde** | 69.2 g | 100.9 ab |
| Pioneer 31G66 | 161.0 ab | 127.2 a | 123.8 ab |
| Pioneer 33V15 | 125.7 cde | 97.8 bcd | 111.3 ab |
| Pioneer 33M53 | 117.2 de | 87.7 def | 60.0 c |
| Pioneer 31G97 | 172.6 a | 97.9 bcd | 118.8 ab |
| DKC 69-72 | 169.0 a | 112.6 ab | 135.7 a |
| DKC 67-60 | 104.1 e | 34.1 h | 91.7 bc |
| Golden Truckers Favorite*** | 73.1 f | 20.4 hi | --- |
| Croplan 7505 | 121.7 de | 89.1 cde | 93.4 bc |
| Croplan 827 | 153.2 abc | 79.0 efg | 119.3 ab |
| Croplan 5822 | 134.1 bcde | 63.8 g | 96.9 b |
| Golden Queen Sweet Corn | --- | --- | --- |
| Southern States 804 | 134.1 bcde | 72.3 fg | 101.0 ab |
| Southern States 783 | 146.5 abcd | 104.8 bc | 106.2 ab |
| Merrit Yellow Sweet Corn | -- | --- | --- |
| Hickory King*** | 52.6 f | 12.0 i | --- |
| Big Daddy Yellow*** | 54.9 f | 16.1 i | --- |
| Rainbow**** | -- | --- | --- |
| Strawberry Popcorn | -- | --- | --- |
| Blue Hopi**** | -- | --- | --- |
| Earth Tones**** | -- | --- | --- |

*Yields reported at 15.5% moisture.

**Means in the same column that are followed by the same letter are not significant different according to Fisher's least significant difference (LSD) test (P=0.05).

***Heirloom field corn cultivars.

****Ornamental corn varieties.

Summary: At this time, no information from any of the 2007 corn variety evaluations concerning the reproduction of the cotton or peanut root knot nematodes is available. Results from previous years have shown that corn is an excellent host for the cotton but not for the peanut root knot nematode. While considerable differences in variety yield were noted at the three locations, DKC 69-72, Pioneer 31G66, and to a slightly lesser extent Pioneer 31G97 were consistently among the highest yielding corn varieties.