

# Analyzing Nematode Management Practices in Cotton

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## Abstract

Southern Root-Knot nematodes (*Meloidogyne incognita*) are detrimental to cotton production in Effingham and Screven Counties. Cotton producers in Georgia have virtually zero profit margin according to the May 2023 UGA Crop Comparison Tool. With a low profit margin, it is imperative growers maximize yield potential to prevent a negative return on investment. Effingham County ANR Agent and the Southeast Agronomy Agent collaborated with a local producer and implemented a cotton variety trial to compare varieties and production practices when facing nematode pressure. Twelve treatments were selected, each replicated four times across the field. Varieties were selected based on local growers' interests, cotton agronomists' recommendations, and the 2021 UGA State Cotton Variety Trial results.

## Introduction

The presence of just one Southern Root-Knot nematode, can cause a cotton grower's crop to be negatively affected. Root-knot nematodes can hide underground in fields while showing symptoms above ground, which could be confused with fertility issues, poor soils, or disease issues. This situation can lead to the wrong approach for management of the problem and cost producers opportunity for revenue. The UGA Irrigated Cotton Crop Budgeting tool for 2023 shows a cotton farmer that locked into a contract in February of 2023 at 0.75/lbs. would have to yield a minimum of 1,000 lbs./acre to just break even. With a low profit margin, it is imperative growers maximize yield potential to prevent a negative return on investment.

## Methodology

Using communication networks with local grower, such as email Listservs, production meetings, and visiting at the famous breakfast spot majority of growers eat at, issues were identified that ultimately drove the research objectives for this study. Local issues included growers experiencing yield reductions, being overwhelmed with varietal selections, and struggling to decide whether the added costs of nematicides produce enough return on investment to use. Twelve treatments were selected, each replicated four times across an 18-acre field. The field chosen had peanuts planted in '21 and a multi-species cover crop blend planted during the winter. This allowed for more accurate and realistic nematode populations and pressures being faced. Out of the twelve treatments, six were nematode resistant varieties, three were nematode susceptible varieties with a nematicide (AgLogic at 5lbs/acre), and those same three nematode susceptible varieties without the nematicide.

Table 1. Root-Knot Nematodes/100ccs of soil

Variety	Root-Knot	
	Untreated	Ag Logic
DG 3615 B3XF	234	606
DG 3644 B3XF	55	-
DP 2038 B3XF	315	89
DP 2141 B3XF	27	-
PHY 411 W3FE	7	-
PHY 545 W3FE	53	-
PX 1140A383 W3FE	79	-
ST 5091 B3XF	470	115
ST 5600 B2XF	109	-

Table 2. Average Gall Ratings

All Pairwise Differences Connecting Letters			Least Squares Mean
Column 1			
DP 2038 w/outLogic	A		18.783333
DG 3615 W/out Logic	A B		14.533333
St 5091 W/ Logic	A B C		11.133333
St. 5091 w/out Logic	B C		10.066667
DP 2038 w/ Logic	B C		8.600000
PHY 411	B C		6.333333
PHY 383	B C		6.333333
ST 5600	C		5.800000
DG 3615 w/ Logic	C		5.666667
DP 2141	C		5.600000
DGc 3644	C		4.350000
PHY 545	C		3.666667

Levels not connected by same letter are significantly different.

Figure 1. Examples of Galling and Root Sampling

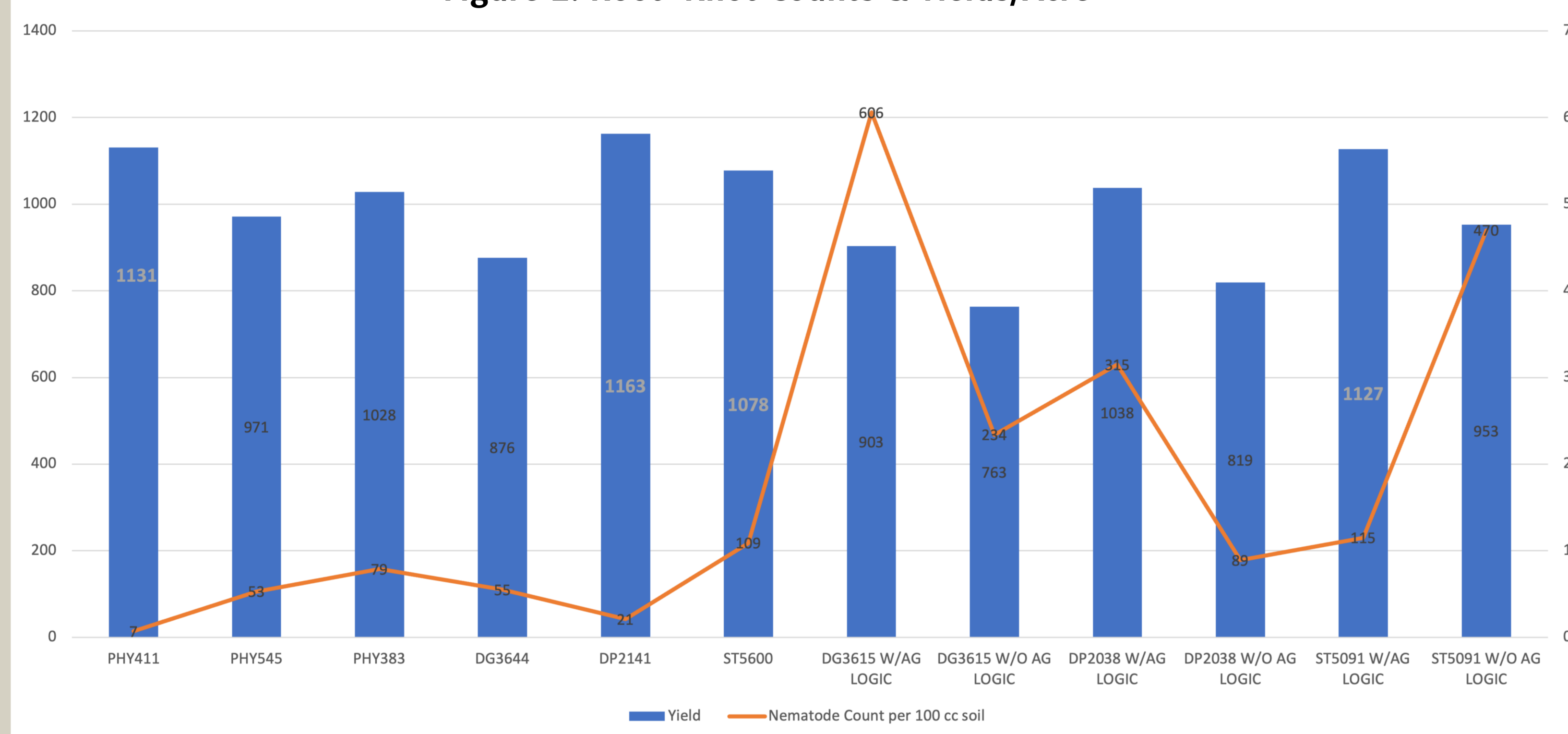


Table 3. Average Yield Results

All Pairwise Differences Connecting Letters			Least Squares Mean
Column 1			
DP2141	A		1162.8946
PHY411	A B		1131.0219
ST5091 W/AG LOGIC	A B		1126.8003
ST5600	A B C		1077.9115
DP2038 W/AG LOGIC	B C D		1037.5908
PHY383	B C D		1027.6417
PHY545	C D E		970.4804
ST5091 W/O AG LOGIC	D E		953.3230
DG3615 W/AG LOGIC	E F		902.6796
DG3644	E F G		875.9139
DP2038 W/O AG LOGIC	F G		819.0222
DG3615 W/O AG LOGIC	G		762.5519

Levels not connected by same letter are significantly different.

Figure 2. Root-Knot Counts & Yields/Acre



## Findings

Seeing the results from the previous years' trials, investigating deeper into what nematode pressures looked like across the replications and treatments was essential in understanding what decisions are best from a management standpoint. Instead of a blanket sample for nematodes across each replication, the treatments were sampled and the average counts can be seen in [Table 1](#).

Throughout the growing season, galling became more evident in susceptible varieties, and by September even the susceptible varieties with nematicide showed galls ([Figure 1](#)). Root samples were taken and gall ratings were conducted after harvest. Root gall ratings ([Table 2](#)) showed the RK nematode resistant variety Phytogen 545 had the lowest root gall rating with only 3.7.

[Table 3](#) shows the yield results for each treatment. Varieties such as DP2141, PHY 411, ST5091 (with nematicide), and ST5600 out yielded the next statistically different variety by a range of 42-130lbs. The same number of nematode resistant varieties and susceptible varieties yielded above 1,000 lbs./acre, which meant 50% of the treatments in this trial yielded enough to either keep the grower out of the negative, or even make the farm profitable for the growing season.

[Figure 2](#) represents the impact nematode resistant varieties have on nematode populations, as well as yields. Seeing the higher populations in the susceptible varieties even with Ag Logic, further supports the benefits of nematode resistant cotton varieties.

## Impact

Upon completion of this trial, the data and results were shared through the same communication channels. Over 120 growers received the information with 15% actually implementing a new variety in their rotation,

Nematicides are useful management tools in cotton production, but are not always the answer to addressing the issue of nematodes.

Nematode resistant varieties can and will reduce nematode populations in a field. Meaning a grower may not have to use a resistant variety every year, but could use it in rotation to help reduce nematode pressure.

This research has inspired the direction for the 2023 growing season where further analyzing the impact specific nematode ranges have on varietal performance will be the focus.

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