

FIELD EVALUATIONS OF VIP 3A PROTECTED COTTON CULTIVARS: SEED PRODUCER PRIORITIES

**Jay S. Mahaffey, Tom Kerby, Kevin Howard, William Smith, Alan Coskrey and Jeff Miller
Delta and Pine Land Company
Scott, MS**

Abstract

Trials were planted across the Cotton Belt for evaluation of the efficacy characteristics of three VipCot protected cotton lines. Lines identified as COT 102, COT 202, COT 203, and a Coker 312 conventional check were evaluated against both *Helicoverpa zea* (Boddie) and *Heliothis virescens* (F.). Coker 312 sustained significant damage from Heliothine pests in all infested locations while significant reductions in insect feeding and damage were observed in all lines containing VipCot. However, some differences in efficacy were observed within the group of lines containing VipCot, with both COT 202 and COT 203 having significantly less damage than did COT 102 and COT 102 having significantly less damage Coker 312 in most locations.

Introduction

Beginning in the mid-1990's, transgenic, insect-protected cotton lines began being introduced into the US Cotton Belt. These technologies have resulted in great savings in insecticides (Layton 2000) resulting in environmental savings, reductions to the grower in the costs associated with control of certain insect species, and other benefits to the cotton production system. In recent years, several new technologies targeted toward controlling Heliothine pests have entered the cotton insect control scene (Jackson 2003, Langston 2004, Mascarenhas 2003). These technologies will likely further improve the general state of insect control in commercial cotton production.

On August 28, 2004 Delta and Pine Land Company entered into an agreement with Syngenta Crop Protection to license and develop to commercial status, novel technology primarily related to VipCot. This technology has numerous unique properties (Estruch 1996), which make it desirable for development and use in cotton insect control. The objective of the 2004 trials was to evaluate the efficacy/spectrum of the VipCot candidates for future development and integration into elite upland cotton backgrounds from Delta and Pine Land Company.

Materials and Methods

Four cotton lines were evaluated in the 2004 VipCot efficacy testing program. Those lines included three lines containing VipCot (those lines being COT 102, COT 202, and COT 203) and one conventional Coker 312 check variety. All tested varieties were similar in genetic background to Coker 312. Trials were planted across the Cotton Belt from NC to TX using production practices which were standard for the local area with modifications to production practices and insect control which would help to maximize both insect numbers and damage in a given trial. These somewhat subtle modifications include factors such as late planting, beneficial insect elimination, use of Heliothine selective chemistry for non-target pest control, etc...

Trials were planted in a treated/untreated configuration with the primary intent being relative comparisons of the efficacy of the VipCot containing lines with a secondary goal of measuring the relative efficacy of the tested VipCot technology against conventional insecticides. For the purposes of this presentation and simplicity's sake, only the untreated plot data is included here.

Insect sampling was accomplished via several sampling techniques. Given the fact that several cooperators were involved, a variety of techniques were used to measure the relative performance of the VipCot lines in the various testing environments. Some attempt has been made in the summary of data to standardize the data across locations into the form of cumulative damaged fruiting forms across the sampling period(s). Data has been analyzed via ANOVA (SAS Institute 2000) and means separated using LSD (Gomez and Gomez 1984) where necessary. Since little or no differential response between square and boll damage was observed, data from both square and boll damage estimates were pooled for estimation of cumulative damaged fruit during the season. An important note here is that comparisons are relative and only valid within a location. The relative trends across locations are

roughly comparable, but differences in sampling techniques/numbers of structures sampled and timings make direct comparisons across locations difficult.

Results and Discussion

The 2004 testing program was exposed to relatively high pressures from Heliothine pests. Across the testing locations, insect damage in the Coker 312 conventional line ranged from an average of 132.5 cumulative damaged fruit across six sampling events in Jamesville, NC to 10 cumulative damaged fruit in 1 sampling event from Haskell, TX (Table 1). The lines containing VipCot in all locations showed levels of damage significantly lower than the Coker 312 conventional line. However, significant differences did exist in the performance of the VipCot lines. In three of seven locations COT 102 showed significantly greater damage from Heliothine pests than did either COT 202 or COT 203 while the other locations demonstrated a similar trend (Table 1). In all locations, the efficacy of both COT 202 and COT 203 were not measured to be significantly different as measured by cumulative damaged fruit across the sampling periods for a given location.

Conclusions

During the 2004 testing series, insect populations in most locations were sufficient for the evaluation of the efficacy characteristics of the VipCot containing cotton lines. In all testing locations the VipCot containing lines demonstrated significant levels of resistance to Heliothine pests, with a few notable differences between lines. The lines containing either COT 202 or COT 203 demonstrated significantly higher levels of resistance to both Heliothine species than did either COT 102 or Coker 312 as measured in insect damage estimations. This indicates that, while all the VipCot lines were highly efficacious against the target pests, both COT 202 and COT 203 have and will likely continue to demonstrate greater efficacy than COT 102 toward both *H. virescens* and *H. zea*.

Many challenges exist in the process of developing new technologies. Among those are the initial screenings for efficacy, agronomic evaluations, introgression into elite varieties, and the associated seed increase and production issues. The 2004 VipCot trials will prove to be a very important step toward the development and introduction of elite, high yielding, superior quality cotton lines containing VipCot technology in advanced Delta and Pine Land Company backgrounds.

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Table 1. Cumulative fruit damage from Delta and Pine Land Company VipCot efficacy evaluation trials. Data are presented as cumulative damaged fruit and may include both boll and square damage estimations summarized across sampling dates within a location.

Cumulative Fruit Damage – Squares and/or Bolls							
Location							
Line	Hartsville, SC	Haskell, TX	Jamesville, NC	Blackville, SC	Headland, AL	Winnsboro, LA	Prattville, AL
Coker 312	57.75 a	10.0 a	132.5 a	11a	52.0 a	28.3 a	10.25 a
COT 102	2.5 b	1.0 b	44.25 b	2.75 b	25.25 b	8.0 b	0.75 b
COT 202	0.0 b	0.0 b	5.25 c	1.75 b	3.25 c	3.0 c	0.0 b
COT 203	1.5 b	0.0 b	3.5 c	1.25 b	3.75 c	2.0 c	0.0 b
# Data Events	5	1	6	3	12	11	4
P	<0.0001	0.0005	<0.0001	<0.0001	<0.0001	<0.0001	0.0011
LSD	3.3	2.0	16	2.6	9	4.7	5.4