

**COST OF INSECT CONTROL IN  
TENNESSEE COTTON PRODUCTION:  
RESULTS OF A 1997 SURVEY OF FARMERS**  
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**Abstract**

Survey results indicate that damage caused by insects to cotton yield is greater in Southwest Tennessee than in the Northwest. Nearly 1/2 of the damage expressed in net returns foregone was caused by the boll weevil. While potential yields are estimated to be nearly the same in southwest and northwest regions of the state, expenditures to control insects and reductions in yield are higher in the southwest region of the state.

**Introduction**

In 1995, 650 thousand of the 660 thousand acres planted in cotton were infested with insects that damage cotton production. The bollworm/tobacco budworm and thrips reduced potential yield by 10 percent on 600,000 acres and the boll weevil reduced potential yields by 3.3 percent (Williams, 1996). These damages occurred even though the cotton acreage received 2.5 applications averaging \$5.50 per acre. Some application costs were as high as \$14 per acre.

Although 1996-1997, Tennessee cotton producers in the south western portion of the state considered the boll weevil eradication program referendum, many producers in the state have not yet considered this program. These producers, boll weevil eradication program officials, and other decision makers would benefit from information about costs of controlling insects, insect damage, and attitudes and perceptions concerning the boll weevil eradication program.

This paper addresses the insect control costs and yield damages caused by insects that occurred during the 1994 through 1996 growing seasons. Particular attention is paid to the boll weevils and their damages. Much more information is available in Edens, Larson, Roberts, English, and Collins (1997).

**Materials and Methods**

A mail survey of Tennessee cotton producers was conducted in late February and March, 1997. Procedures used followed Dillman's methodology to conduct a general mail survey.

The mailing list of producers was constructed from information provided by the Cotton Board located in Memphis, Tennessee and the Milan Experiment Station in Milan, Tennessee. Based on the addresses, most of the producers were located in northwest and southwest Tennessee. Only 68 lived in Middle and East Tennessee.

The survey sought to query the principal operator about their cotton production practices in the past three years -- 1994, 1995, and 1996. The initial question of the survey asked if they grew cotton during the past three years. If they did not grow cotton in these years, then the survey was returned after answering the initial question. Following the initial question, questions regarding cotton acres planted, total crop acres planted, cotton and total crop acres rented, lint yields harvested, lint prices received, ranking of insects that caused yield damage, listing of insecticide used to control those insects and number of applications, two estimates of yield losses as a result of insect damage due to boll weevils and all insects, expenditures for materials and applications to control the boll weevil and all yield damaging insects, and activities and costs related to scouting for common insects.

The cotton producers were also questioned about their attitudes toward the boll weevil eradication program. Information from producers that voted in the most recent boll weevil eradication program referendum was tabulated. Data were also collected on the sources of information used in making the decision on how to vote. They were also asked about cotton production during and after an eradication program. Finally, the cotton producers that voted in the referendum were asked how much they would be willing to pay for a boll weevil eradication program.

Finally, producer demographic information was collected. Data on the producers' age, education, experience growing cotton, and farm finances were tabulated.

**Results and Discussion**

There were 800 responses to the mail survey. The respondents were divided into three regions, northwest Tennessee (NWTN), southwest Tennessee (SWTN), and middle Tennessee. Farmers in west Tennessee not having an opportunity to vote in the boll weevil eradication program were in the northwest region of the state. Producers located in SWTN lived in the portion of the state that voted in the most recent boll weevil eradication program referendum (Figure 1) -- Shelby, Fayette, Hardeman, McNairy, Hardin, Tipton counties along with a portion of Haywood county. Northwest Tennessee has the most acres planted in cotton within the state and also the majority of survey responses came from northwest Tennessee (NWTN) (78 percent). Crockett county had the largest number of responses.

### Yields and Yield Damage

The average yield reported by Tennessee farmers was 661 pounds per acre in 1996. Yields were higher in NWTN (664 pounds per acre) than in the SWTN region. Average yields in 1994 were larger in all regions of the state than 1995 and 1996. Excessive rainfall, flood damage, and heavy insect infestation decreased yields in 1995. Based on survey results, average yields over the 3 year reporting period was 651 pounds per acre in Tennessee with 653 pounds per acre in the NWTN region and 646 pounds per acre in SWTN (Figure 2).

Tennessee cotton producers reported that they lost 16% of their potential yield to cotton insects with 9% of their potential yield lost due to the boll weevil. In the SWTN region, the losses were higher than in NWTN which may partially explain why yields are reported to be lower in the SWTN region. In the SWTN region, 19% and 10% of the potential yield was lost due to all cotton insects and the boll weevil, respectively (Figure 3).

Yield losses were much higher in 1995 when compared to 1994 and 1996. In SWTN, farmers reported an average of 27% yield loss in 1995. This is compared to 19% for NWTN. Boll weevil losses were 5 to 6% higher in 1995 than in the other two years. In 1996, the boll weevil was rated as the most damaging insect. This remained constant over the 1994 and 1995 seasons.

### Insect Control Costs

There are two basic types of control costs -- insecticide application costs and scouting costs. The average insecticide application cost ranged from \$24.60 to \$38.84 per acre depending on the year. The cost of scouting ranged from \$0 to \$8 per acre in 1994 and 1996. In 1995 scouting costs increased slightly.

Insect control costs were highest in 1995 due to a mild 1994 winter which allowed overwintering and excessive wet weather which hampered insect control. The amount spent was greater for farmers in SWTN than for those located in NWTN. Control costs in the SWTN region ranged from \$34.65 in 1994 to \$64.80 per acre in 1995. Costs in NWTN were lower ranging from \$22.10 per acre in 1994 to \$31.62 per acre in 1995. Boll weevil costs followed this pattern and averaged \$14.09 per acre for Tennessee, \$21.05 per acre in the SWTN region, and \$12.91 per acre in the NWTN region.

Scouting was conducted an average of nine times a year over the three year period. In 1995 this increased to 11 times in the SWTN region. Costs ranged from \$3.08 per acre in 1994 to \$3.79 per acre in 1995. Forty-six percent of the producers used a crop or IPM consultant to conduct the scouting activities.

Average insecticide and scouting costs during the 1994-1996 period of analysis was \$31 per acre for all cotton

insects. In NWTN the average cost was \$28 per acre and in SWTN the average reported costs of insect control was \$37 per acre. Approximately fifty percent of the costs were incurred to control the boll weevil (Figure 4).

### Impact of Insects on Net Returns

By multiplying the yield losses times the price received for the lint and adding the insect control costs, total costs of insect damage can be determined. Total costs of insect damage is estimated to be \$125 per acre for Tennessee cotton producers with fifty percent of these costs attributed to boll weevil (Figure 5). In the SWTN region, costs per acre were \$17/acre more than in NWTN. Boll weevil costs were \$9 per acre higher.

Taking the highest twenty-five percent of the producers, an annual cost of \$151 per acre was incurred for insect and boll weevil control, respectively. The highest cost control producers in the SWTN region indicated they incurred a cost of \$165 and \$83 per acre for all insects and the boll weevil, respectively (Tables 1 and 2).

### Acknowledgments

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### References

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### **1997 Survey**

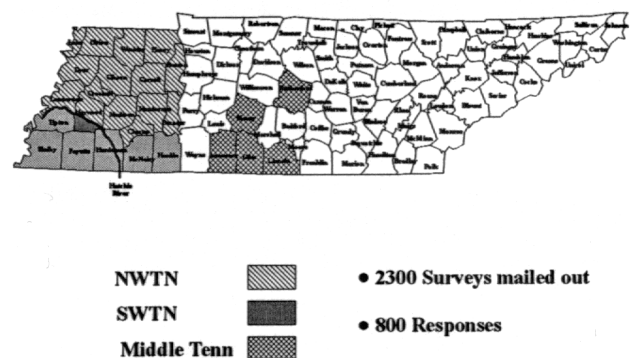


Figure 1. Tennessee regions used in the analysis

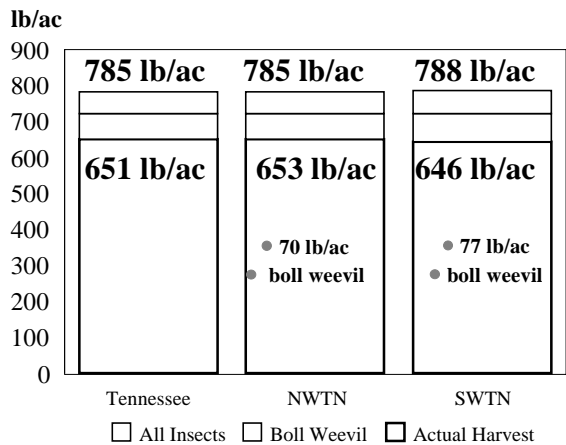


Figure 2. Impact on yield due to all insects, 1994-1996 average

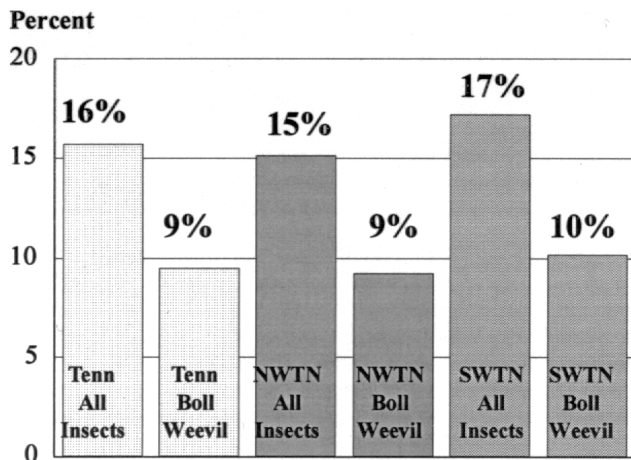


Figure 3. Percent yield damage, 1994-1996 average

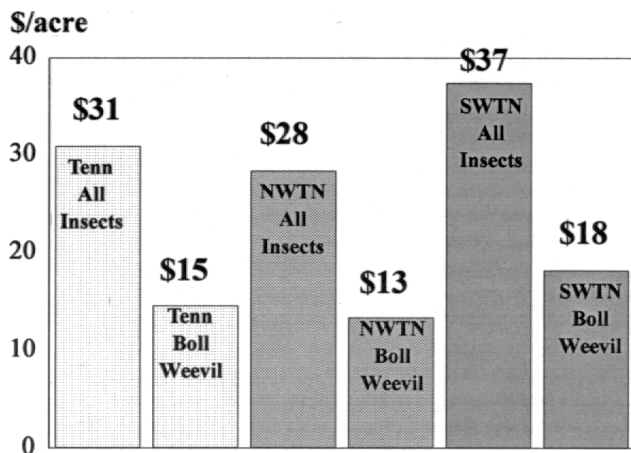


Figure 4. Insecticide and scouting costs, 1994-1996 Average

Table 1. Total cost for all insects including revenue losses, insecticide costs, and scouting costs, 1994-1996 Average

Percentage of ranked respondents used	Dollars per acre per year		
	Tennessee	NWTN	SWTN
25 %	151.21	144.04	164.81
50 %	104.07	98.74	118.10
75 %	63.71	56.66	74.55

Table 2. Total cost for boll weevils including revenue losses, insecticide costs, and scouting costs, 1994-1996 Average

Percentage of ranked respondents used	Dollars per acre per year		
	Tennessee	NWTN	SWTN
25 %	79.33	78.72	83.11
50 %	55.17	50.34	67.18
75 %	27.24	24.34	36.50