# COTTON INSECT LOSSES - 1979 - 1996

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## Abstract

Since 1979, cotton entomologists from across the Cotton Belt have annually estimated losses and cost of insect related production. Bollworm/budworms were the number one pest 13 of the 18 years reported. Boll weevil was the "top" pest 4 times and cotton aphid has held the distinction once. 21 arthropods or arthropod groups are assessed for damage.

## Introduction

Recording the assessment of cotton insect losses began with the 33rd Annual Conference in 1980, and featured losses for the previous year, 1979. Assessments of losses have always been a part of the conference report but were anecdotal to a great extent with indications of pest abundance and "what worked" and frustration when "failures" occurred. Following the lead of the other pest management groups, the insect conference selected a committee consisting of an entomologist from each of the cotton states and asked them to assess losses for their respective area. In most cases the extension entomologist from each state serves on that committee. An evaluation questionnaire was developed and in November of each year it is sent to the committee with the request for assessments. Committee members gather the information by conducting surveys within their states and return it to the committee chair, who compiles it and publication in the proceedings. This process has been successful in developing useful data from across the belt. Each year and each area has its own distinct characteristics and differences, but there are also similarities and trends which must be noted.

Initially, the assessments encompassed boll Weevil, bollworm/budworm, cotton fleahopper, plant bug (*Lygus*), cotton leaf perforator, pink bollworm, spider mite, thrips and "others" which included most of the secondary or occasional pests of cotton. The "others list" became more and more important and in 1986 was changed to include armyworms, new pests and minor pests. In 1988, western flower thrips were added to the list and in 1989, aphids were added and beet and fall armyworms were separated and added. In 1992, European corn borer, stink bug, grasshopper, saltmarsh caterpillar, banded wing and sweetpotato whiteflies, and soybean and cabbage loopers were included in the list of pests. A final insect, cutworm, was added in 1993. This brings a total of 21 pests which are included in the list of cotton insects which cause loss. We also have another 2 or 3 which may need to be added in the future. These include garden webworm, leafminers, and at least 2 species of other armyworms.

## General observations

In the 18 years included in this report bollworm/budworm, boll weevil and plant bugs have predominated the list of the most injurious pests of cotton. 1979, 1980, 1982, 1989 and 1995 are the five high insect loss years (Figure 1). Of those years, the bollworm/budworms were top pests in 1979 (3%), 1980 (3.07%), 1982 (2.59), and 1995 (3.97). In fact, bollworm/budworm have been the number 1 cotton insect pest 13 of the last 18 cropping seasons. Boll weevils were the number one pest in 1983, 1987, 1989 and 1993. Aphids hold the distinction of being the top pest in 1991 (2.01%)(see Table 1).

## 1979 - 1982

Bollworm/budworms topped the list at 3.0% loss and weevils, *Lygus* and cotton fleahopper trailed at 1.4%. Almost a third of Georgia's crop was lost to insects. They reported a 16% loss to boll weevils accompanied by a 10% loss to bollworm/ budworms(Hamer, 1980).

Worms were again at the top of the list in 1980, but spider mites and *Lygus* were 2nd and 3rd, respectively. Georgia again reported the high percent loss to insects (29%). Cost of control estimates were added to the questionnaire and Florida reported spending $100 per acre while Texas had the low of $8.05 (Hamer, 1981).

In 1981 North Carolina had the heaviest losses at 19.1% and Florida spent $135 per acre on insect control. The Tennessee cost of control averaged $3.50. (Head, 1982) 1982 was a year in which both weevils and worms were potent pests. Worms caused damage in every cotton producing state and weevils were not pests in California, Missouri, New Mexico and Virginia. South Carolina reported the heaviest percent loss at 19.4%, Missouri had the least (3.2%) (Head, 1983)

## 1983-1992

Boll weevils were the top pest of 1983 maintaining about the same damage level as in 1982 (2.5)%. Bollworm/budworm damage went down to 1.7%. Other insect pests were relatively light across the belt. *Lygus* and spider mites were both problems in some areas.

1984 has been called the year of the plant bug by many. *Lygus* at 1.3% loss and bollworm/budworm at 3.2% combined to give most of the 1984 damage (Head, 1985). More than 20" of rainfall in October kept much of the midsouth crop from being harvested. US average yields

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were 514 pounds of lint per acre in 1984.

Losses to worms were once more the norm in 1985. The 2.4% damage was more than double that of any other pest. Aphids, stink bugs, beet and fall armyworms were beginning to arise as more than just incidental pests. 9 states reported more than 1% loss in the `other' category. North Carolina had 6.7% loss due to stink bugs and European corn borers (Head, 1986).

The estimates began to take on some changes in 1986 with expansion into multiple tables showing individual states as well as a US summary. Worms and weevils continued to be the number 1 and 2 pests in the country. Cost of insect control averaged $24.70 for the belt (Head, 1987).

Weevils were again the number one pest in US cotton in 1987, even though it was not listed as a pest in 5 states. Yields were up to 700 lbs nationwide. Costs were also up somewhat. Foliar insect control costs were $31.89. Total costs plus losses were $56.76 per acre ($562,700,000) (Head, 1988).
The combined US losses for 1988 were 6.87% amounting to $283,500,000. When combined with insecticide costs this totals *ca*.$55.26 per acre. Costs of boll weevil eradication in the southeast and southwest were $28,300,000. Bollworms, alone, cost farmers $74,539,741 in control costs and another $71,476,416 in yield loss (Head, 1989).

1989 saw a new set of pests arrive on the scene. Soybean loopers moved into cotton in high numbers in Georgia, Florida and Alabama, as well as Texas. North and South Carolina and Florida reported damage and loss from European corn borers, and stink bugs continued to damage cotton mostly along the East coast states. Boll weevil (2.75%) and Lygus (2.05%) were the number 1 and 2 pests across the belt. Bollworm/budworm (1.87%) and spider mites(l.ll%) also caused a significant amount of damage to the 1989 crop. The 9.22% loss was the second highest in the 18 years recorded and amounted to $686,007,210 in cost plus loss ($70.87 per acre)(Head, 1990).

The 5 most damaging pests of 1990 were bollworm/budworm (1.73%), spider mites (1.24%), Lygus (0.91%), aphids (0.64%) and boll weevils (0.60%). Yield losses plus costs of control amounted to $52.61 per acre. This figure included $30.67 per acre foliar insecticide cost. Stink bugs, yellow striped armyworms, European corn borers, saltmarsh caterpillars, whiteflies and soybean loopers were also listed as secondary pests which caused losses (Head 1991).

1991 was the year of the aphid. Cotton aphids were rated at 2.01% loss for the US, the majority of the losses were concentrated as 5.94% loss to Texas' 5.4 million acres of cotton. Bollworm/ budworms reduced yields by 1.68% nation wide. There were increases in the secondary pests again in 1991 with the sweet potato whitefly (*Bemesia)* taking center stage in the western states and also making cameo appearances in many of the southern states. The corn root aphid was reported as a pest of cotton in New Mexico for the second year in a row. The 5.63% loss was the lowest recorded and amounted to $290,000,000 in yield lost ($22.34 per acre). Cost of control was $33.39. Total cost plus loss was estimated at $55.72 per acre (Head, / 1992). US yield averages exceeded 650 pounds of lint per acre in 1991, reflecting record yields for many states.

Bollworm/budworm(2.21%) and boll weevil (2.12%) regained their position as number 1 and 2 pests in the cotton belt in 1992. Secondary pests continued to be of significant concern. Sweetpotato whiteflies spread to over 800,000 acres of US cotton and beet and fall armyworms infested more than 2,000,000 acres, each. Cost of control increased to $46.81 per acre and yield loss (6.96) was $28.84 per acre for a total cost plus loss of $75.65 per acre (Head, 1993).

**1993-1996**

Boll weevils (1.88%) were again the number one pest in US cotton in 1993. Bollworm/budworms (1.56%) were a close 2nd, but most of the other pests remained below the 1% range. The total cost plus loss of the 1993 crop exceeded $918,000,000, or $70.74 per acre. This was the second year in which cost plus loss exceeded $70.00 per acre (Williams, 1994).

In 1994 several new features were added to the estimates. Tables with acreage and cost by state showing 'at-planting insecticide applications' and the boll weevil eradication areas were added. These costs were also included in the per acre cost summation for the crop. The overall US loss to insects was 6.03% ($25.80/acre). Worms, weevils, and *Lygus*, respectively, were the top 3 pests. Cost of foliar insecticide was $42.74 per acre. Weevil eradication costs were assessed on more than 2.8 million acres and averaged $6.01 per assessed acre. At planting insecticides were used on 7.2 million acres and averaged $9.13 per acre. The average cost plus loss for the US exceeded $994,000,000 ($74.83 per acre)(Williams, 1995).

Estimates of losses to insects in 1995 were 11.08%, the highest US losses recorded. 1995 was the year of the insect. Lepidopterous pests, bollworm/
budworm (mostly budworm), and beet armyworms combined to reduce yields of the crop by 5.65%. Weevils (1.66%), *Lygus* (1.02%), and aphids (1.09%) completed the loss story. Fields in some areas of the US were completely devastated by these pests leaving nothing for harvest. Different areas of the country sustained heavy losses from different pests. *Lygus* was the culprit in the far west, while a large acreage in Texas was lost to beet armyworms and the eastern midsouth contended with budworms. Costs and losses rose to a record $1.68 billion ($113.77 per acre). Foliar insecticide costs were $57.93 and losses were $46.58

per acre(Williams, 1996).

Losses in 1996 were estimated at 6.61% nationwide. Bollworm/budworm (mostly bollworms) were the number one pest at 2.37% loss. Total insect related cost and loss, was $89.68 per acre. This included $34.59 foliar insecticide costs, $5.81 at planting insecticide costs, $1.92 for Bt cotton license fee (averaged across all acreage) and $3.15 for boll weevil eradication. Total insect related cost of production was $1,188,911,465.

## Conclusion

Figure 2 shows the insect related costs of production for the cotton belt for each year from 1979 through 1996. These numbers indicate that we are 'doing less with more' and they cry out for change. As new products become available, pest complexes will ebb and flow. Hopefully, the boll weevil will be a pest of the past in a few years and perhaps we can eliminate some of the secondary pests which have arisen as a result of intensified boll weevil management. We must look at where we have been to keep from repeating the mistakes over again. Reviewing losses may help to prevent costly mistakes in the future.

## References


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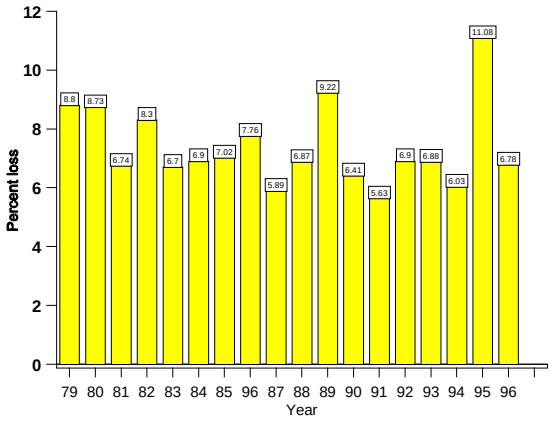


Figure 1. Cotton insect losses 1979-1996.

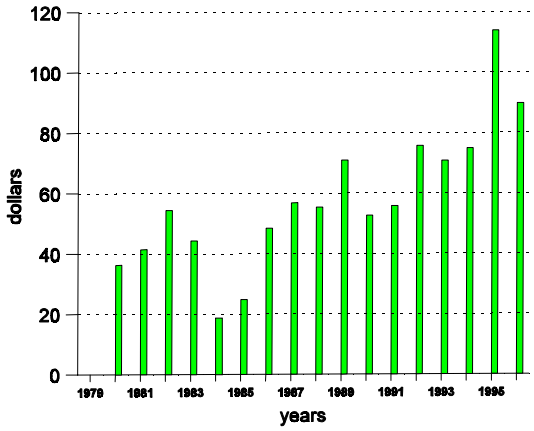


Figure 2. Cost and loss per acre: insect related. 1979-1986 gives cost only.

Table 1. Top three pest insects of cotton by year.

| Year | 1 | 2 | 3 |
|---|---|---|---|
| 1979 | boll/budworm | boll weevil | `bug complex' |
| 1980 | boll/budworm | spider mites | *Lygus* |
| 1981 | boll/budworm | boll weevil | spider mites |
| 1982 | boll/budworm | boll weevil | spider mites |
| 1983 | boll weevil | boll/budworm | Lygus |
| 1984 | boll/budworm | *Lygus* | spider mites |
| 1985 | boll/budworm | `other'* | boll weevils |
| 1986 | boll/budworm | boll weevil | minor pests** |
| 1987 | boll weevil | boll/budworm | fleahopper |
| 1988 | boll/budworm | boll weevil | *Lygus* |
| 1989 | boll weevil | *Lygus* | boll/budworm |
| 1990 | boll/budworm | spider mites | *Lygus* |
| 1991 | aphids | boll/budworm | boll weevil |
| 1992 | boll/budworm | boll weevil | *Lygus* |
| 1993 | boll weevil | boll/budworm | *Lygus* |
| 1994 | boll/budworm | Boll weevil | *Lygus* |
| 1995 | boll/budworm | beet armyworm | boll weevil |
| 1996 | boll/budworm | boll weevil | thrips |

*other (1985) combination of armyworm complex (fall, beet, Yellowstriped), stink bugs, aphids, whiteflies, European corn borers, W.F. thrips, and cutworms.

**minor pests (1986)combination of stink bugs, aphids, whiteflies, and others as in 1985.