IMPACT OF BOLL WEEVIL ERADICATION IN THE SOUTHERN ROLLING PLAINS OF TEXAS AT THE FIELD LEVEL

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Abstract

The Texas Boll Weevil Eradication Foundation (TBWEF) has operated a boll weevil eradication program in the Southern Rolling Plains (SRP) of Texas since the fall of 1994. Despite secondary pest outbreaks, poor weather conditions and legal problems the eradication program has been successful in making the boll weevil a non-economic pest in the SRP. Although a number of ways exist to evaluate the program, this paper will focus on the impact of the program at the field level in fields that have been in a scouting program since 1994.

Adult boll weevils, *Anthonomus grandis* Boheman, and boll weevil damaged squares declined every year except 1997. Insecticide costs as well as insecticide applications for other pests increased rapidly in 1995 and then declined except for a slight increase in 1997.

Program alterations in 1996, weather and legal problems can explain the results in 1997. We discuss the impact of these program changes and the effect on producers fields and the eradication program.

Introduction

The SRP plants an average of 200,000 acres of cotton annually. Approximately 170,000 acres are dryland and 30,000 consist of supplemental or full irrigation. Yields can range from 100 to 1200 lbs of lint per acre with an average of 300 lbs lint per acre. The boll weevil is a key pest in the area and annually caused the highest losses among the different insect pests (Fuchs and England 1989).

The TBWEF initiated a boll weevil eradication program in the SRP of Texas with diapause applications in the fall of 1994. Since that time, the TBWEF has operated a full season program. As with eradication programs in other areas, the SRP effort has had its share of controversy and problems.

Although the 1995 season was successful in reducing boll weevil populations, producers experienced a crop disaster due to secondary pest problems, primarily the beet armyworm, *Spodoptera exigua* (Hubner). The TBWEF implemented changes in the program in 1996 in response to producer concerns. These changes included the use of alternative insecticides, primarily endosulfan (Phaser® and Thiodan®) and oxamyl (Vydate®), and increased trap thresholds from July 4 through August 15 to limit the chance of having secondary pest problems.

Boll weevil numbers increased in 1997 due to a number of factors. The program changes in 1996 probably saved the program from being voted out by the growers but did not help in the boll weevil eradication effort. Also, diapause applications in 1996 were disrupted by wet weather throughout the fall. In addition, the 1997 program experienced a delay in start-up due to legal concerns. Producers realized that the program changes in 1996 would extend the eradication program so trap thresholds, which trigger insecticide applications, were reduced to original levels. Despite the late start in 1997, the TBWEF did an excellent job in re-establishing the program and the weather cooperated in the fall. The program continued to operate at a high level in 1998 and the decline in boll weevil numbers reflected its effectiveness.

The eradication effort can be measured in a number of ways. This paper looks at eradication results through scouting reports and insecticide inputs.

Materials and Methods

The fields in this study represent various conditions in Concho, Tom Green and Runnels counties. The fields represent both irrigated and dryland production as well as areas with high and low boll weevil populations. Data on boll weevil numbers and damage were collected from field scouting records in fields scouted by the Texas Pest Management Association (TPMA). Field scouts check 40 plants by making whole plant inspections and recording pest and natural enemy numbers within each field. Field scouts recorded insect damage by sampling 100 fruiting forms and inspecting the fruit for damage. The insecticide costs and number of applications were derived from the cotton insect loss assessments compiled by the National Cotton Council.

Results

The eradication program started in the fall of 1994 with diapause applications on a cumulative 856,300 acres (Table 1) (El-Lissy et al. 1998) Cumulative acreage sprayed increased in 1995 due to the implementation of a full season regime. Program changes implemented after 1995 resulted in fewer acres treated in 1996. However, these changes and poor weather conditions in the fall of 1996 did not advance eradication of the boll weevil and as a result, more cumulative acres were treated in 1997, primarily in the fall. Cumulative treated acres in 1998 were the lowest since the program started and 80% of the fields were not treated prior to the fall diapause portion of the program.

Figures 1 and 2 show the impact of the eradication program on boll weevil populations in the field. Average percent

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boll weevil damaged squares reached economically damaging levels of at least 20 percent damaged squares in all fields in 1994 prior to the initiation of eradication (Fig. 1). The first full season of eradication in 1995 resulted in no fields in this study having economically damaging levels of boll weevils. However, secondary pests devastated the crop and producers requested that the TBWEF make changes for the 1996 season. These changes included the use of alternative insecticides and higher trap thresholds. The average percent damaged squares remained below economically damaging levels in 1996 but the impact of the changes can be seen in 1997 when average percent damaged squares increased compared to the previous season (Fig. 1). None of the fields in the study had boll weevil damaged squares in 1998 after the program reverted back to the use of ULV malathion and lower trap thresholds. The number of adult boll weevils found in the field follow similar trends (Fig. 2).

Insecticide costs for other pests mirror the cumulative acres treated by the eradication program (Table 2) (Williams 1998). The high costs in 1995 reflect insecticide treatments for beet armyworms, aphids, bollworms *Helicoverpa zea* (Boddie) and tobacco budworms *Heliothis virescens* (Fabricius). The increased costs in 1997 compared to 1996 are due to cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter), bollworm and tobacco budworm. The number of insecticide applications reflects the pest pressure in the scouting program and the impact of weather (Table 2).

Discussion

Field scouting data are useful for evaluating a boll weevil eradication program. Information from the field shows the impact of boll weevil eradication and can be used to help verify the effectiveness of the program.

The program in the SRP of Texas implemented changes in 1996 in response to producer concerns about secondary pests. The full impact of these changes were not seen until late 1996 and the 1997 season. Average percent boll weevil damaged squares increased late in the 1996 season. Although the program tried to maintain timely diapause applications, wet weather delayed or washed off applications. The program was also facing budget limitations due to the use of more expensive alternatives in 1996 and a lawsuit that eventually stopped the program for a brief period in 1996 and 1997. The 1997 season showed the full impact of the changes in 1996 with increased boll weevil damage and adults present throughout the 1997 season.

Most individuals associated with the program realized that the changes in 1996 were necessary to retain the program but did not enhance eradication. The program made changes in 1997 again in response to producer concerns about the progress of eradication. The changes involved the exclusive use of ULV malathion by the program and a reduction in trap thresholds to original levels. Producers still had the option to use an alternative insecticide for overwintered boll weevil applications at their expense. The result of these changes can be seen in the 1998 data when no fields in this study had detectable boll weevil infestations.

The significance of the eradication program in the SRP is that this was the first program conducted in a minimum input area. The number of insecticide applications rarely averaged more than four prior to eradication. For eradication to be beneficial to SRP producers, insecticide inputs must be minimized. After a peak of five applications in 1995, the number of applications for other insect pests have not averaged above three and have averaged less than one application in 1996 and 1998. Insecticide costs have also declined. Although, insecticide costs have varied during the five years of the program, the overall trend is for costs to decrease. Producers in the area would have a significant economic advantage if insecticide costs could be minimized as they were in 1996 and 1998.

The full impact of eradication has not been experienced in the SRP of Texas but data from the field after the first five years indicate that the boll weevil has been reduced to a non-economic pest.

References

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Table 1. Cumulative acres treated by the TBWEF in the SRP of Texas. 1994-1998.

Year	Cumulative Acres Treated
1994	856,300
1995	2,095,060
1996	785,500
1997	1,302,800
1998	234,100

Table 2. Average number of insecticide applications and average insecticide costs for pests other than boll weevils in the SRP of Texas. 1994-1998.

Year	Average Number of Applications	Average Cost/Acre
1994	1.40	$8.60
1995	5.20	61.80
1996	0.80	7.99
1997	2.50	20.07
1998	0.30	3.37

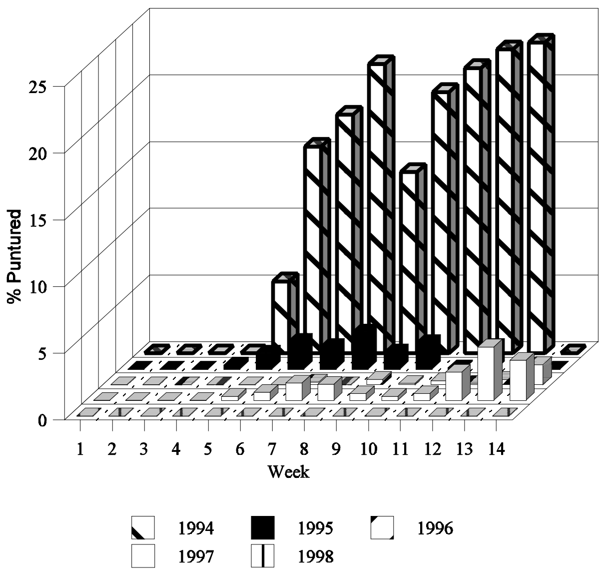

Figure 1. Average number of percent boll weevil damaged squares for selected fields in the SRP of Texas. 1994-1998.

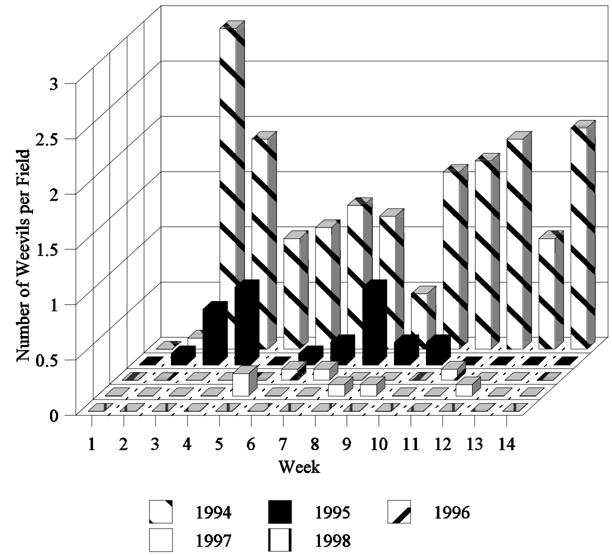

Figure 2. Average number of adult weevils per 40 plants in selected fields in the SRP of Texas. 1994-1998.