

STATUS OF BOLL WEEVIL ERADICATION IN TEXAS
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Abstract

The Texas Boll Weevil Eradication program completed a successful year in 2002 with more than 5.7 million acres in 12 active zones. Support from growers, grower organizations, Texas and federal legislators, USDA research and implementation agencies and Texas agricultural research and education agencies, and the Texas Department of Agriculture has grown stronger with continued program success. Retention referenda conducted in four zones 2001 and 2002 have reaffirmed growers desire to continue the program. Four more zones will hold retention referenda in 2003.

Introduction

During the twentieth century, boll weevil has been responsible for more dollars in control costs and crop losses than any other cotton pest in Texas and the US. The National Cotton Council estimates the boll weevil has cost US cotton producers more than \$13 billion (NCC 1994) since it entered the US about 1892 (Hunter and Hinds 1905). Following successful experiences with a cooperative boll weevil eradication experiment in Mississippi, Louisiana and Alabama in 1971 and a successful three-year boll weevil eradication trial in North Carolina and Virginia from 1977-80, growers requested program expansion in other regions of the US beginning in 1983 (El-Lissy 1998).

Texas cotton growers began participating in boll weevil eradication in 1994 on approximately 220,000 acres in the Southern Rolling Plains (SRP) zone. In 1996 eradication activities began on approximately 500,000 acres of cotton in the South Texas/Winter Garden (ST/WG) zone and about 500,000 acres in the Rolling Plains Central (RPC) zone. In 1997 the program was challenged and halted by the Texas Supreme Court, and a new law was passed that allowed the program to be restarted (El-Lissy, 1998).

Eradication programs were conducted on 1,130,263 acres in three zones, SRP, RPC and ST/WG, in 1998.

In 1999 boll weevil eradication was initiated in five new zones, adding an additional 2.3 million acres to the program. Added were 745,692 acres in the Western High Plains (WHP) zone by a positive vote by 79 percent of qualified voters in Dec. 1998, 445,289 acres in the Northwest Plains (NWP) zone through a positive vote by 75 percent of the voters there, 73,467 acres in the El Paso/Trans Pecos (EP/TP) zone with a positive vote by 80 percent of the growers and land owners, 716,548 acres in the Permian Basin (PB) zone with a positive vote by 73 percent of qualified voters, and 295,682 acres in the Northern Rolling Plains (NRP) zone with a positive vote by 71 percent of the growers and landowners in that zone (El-Lissy 2000, Stavinoha and Woodward 2001). By the fall of 1999, eight zones were involved in active eradication. Full season programs were continuing on 1,299,343 acres in the SRP, ST/WG and RPC zones. Diapause control programs had begun in the WHP, NWP, EP/TP, PB and NRP zones, representing 2,276,678 acres. Boll weevil was being eradicated on 3,576,021 acres of Texas cotton.

The SRP zone was declared functionally eradicated by Texas Department of Agriculture Commissioner Susan Combs on Sept. 20, 2000. Full-season programs were conducted on 4,288,399 cotton acres in 8 active zones in 2000. Referenda held during 2000 added 3 new zones. Growers in the Southern Blacklands (SBL) zone, the Northern High Plains (NHP) zone, and the Southern High Plains/Caprock (SHPC) zone held referenda to assess grower support for the program. Referenda were passed in the NHP by a 75.5 percent positive votes among qualified voters in October 2000 and in the SHPC by 80.4 percent of the voters in November 2000. A referendum supporting starting a program had been previously passed in the SBL in 1999 through a positive vote of 52 percent of the acreage in the zone, but the assessment proposal had failed (Stavinoha and Woodward, 2001). An assessment referendum held in April 2000 passed by 70.8 percent.

In the late summer and fall of 2001, the diapause control phase of the program began in the three new zones. The program was conducted in the NHP on 558,993 acres, in the SBL on 91,770 acres and in the SHPC on 1,230,590 acres, for a total of 1,881,353 acres in the diapause phase of the program. A total of 4,249,402 acres were in full-season programs in the eight older zones. All together, eleven zones with a total of 6,130,755 cotton acres were involved in eradication programs in the fall of 2001.

On February 19, 2002, Commissioner Susan Combs declared the RPC zone functionally eradicated. A referendum in the Upper Coastal Bend (UCB) zone was held in January 2002. It passed with greater than 55.2 percent of the acreage voting in favor of

the program. The program began diapause treatments on the zone's 187,813 acres in early July 2002. The eleven older zones, comprising 5,546,253 cotton acres, were conducting full season eradication programs. In total, boll weevil eradication was conducted on 5,734,066 acres in 2002.

Retention referenda were passed in the ST/WG by 87.8% in October 2001, in the SRP by 88.2% in February 2002, in the RPC by 89.7% in March 2002, and in the WHP by 86.0% in December 2002.

Methods

El-Lissy et al. (1997) provided a detailed description of the boll weevil eradication methods used in the Texas program. Minor modifications have been made in data management systems and in the management of secondary pests since that time.

Discussion

The boll weevil eradication program in Texas has made strong progress toward the goal of complete elimination of this damaging pest during recent years. Evidence of this success can be seen in every active boll weevil eradication zone. The SRP zone (Ballinger/San Angelo area) had 213,999 acres of cotton in 2002. In 2001 no boll weevils were caught in 395,736 traps inspected, but a total of 16 weevils were caught in 324,837 trap inspections in 2002 (Table 1). All 16 were caught near roads. The first weevil was caught northeast of San Angelo near the edge of the city limits at the junction of Highway 277 and the Old Ballinger Road in Tom Greene County. A total of nine weevils were caught at this location over the next 40 days. Two more weevils were caught on cotton fields near a roadside park just north of Water Valley in Coke County. Another two weevils were caught at fields near Fife at the intersection of Highway 283 and 765 in McCulloch County. Single weevils were caught from fields near the junction of Highway 277 and Orient Road northeast of San Angelo and near the Goodyear Test Track in Tom Greene County; and ½ mile west of Santa Anna near the junction of Highway 84 and 67 in Coleman County (due north of the Fife weevils). These 15 boll weevils are believed to have been moved into the zone by equipment or traffic moving on these major highways. One other boll weevil was captured west of San Angelo off Highway 853 (Arden Rd.) near the community of Midway in Tom Greene County. This weevil is believed to have moved into the zone from cotton in Glasscock County, not in an eradication program, to the west. Boll weevil trap captures are very low in the SRP zone and despite aggressive treatment of fields near the catches only 18,722 acres were treated in 2002 (Table 2). Increased efforts are underway to improve quarantine protection of cotton in the SRP zone to prevent weevils from being brought into the zone from other areas.

In the 571,246 acre RPC zone (Snyder/Munday/Abilene area) program results looked very strong through the third week of August with only 2 to 27 boll weevils being captured per week from over 63,000 in the zone traps. The last week of August 602 boll weevils were caught in the zone, and all but 15 were caught on the west side of the zone in the Snyder and Colorado City districts. Catches were exclusively from fields on the west side of these districts, nearest to cotton fields in the Permian Basin zone. Weevil catches remained high through September, decreased somewhat in October, and did not again fall below 100 weevils trapped in the zone until the third week of November. While boll weevil numbers were still low in the RPC zone (Table 1) and most of the zone remains weevil free, the western area of the zone was invaded by migrating weevils and 518,687 acres required treatment, an average of just under 1 application per acre in the zone (Table 2). Upon detailed inspection of the infested fields, no boll weevil reproduction was detected in the zone.

In the 436,916 acre ST/WG zone (Uvalde/Corpus Christi/Victoria area), strong progress was seen in the central part of the zone. But, higher numbers of boll weevils were caught in the northeast part of the zone near the border with the UCB zone, where diapause control treatments began in the fall 2002, and in the southern part of the zone, near the border with the Lower Rio Grande Valley (LRGV) zone, not in an eradication program. Trapping data from late April and May showed the highest boll weevil catches in the northeast part of the zone near the UCB zone. By the third week of June, higher boll weevil trap catches were beginning to be seen from the Kingsville district in the far southern part of the zone. Boll weevil populations reached levels much higher than expected in a few of these southernmost fields, peaking the first week of September at 5.4 weevils per trap in the Kingsville district that week. They remained high during September in the Kingsville district, not dropping below 1 weevil per trap per week until the last week of September. Data from 3 trap lines that extend southward from the ST/WG zone to cotton fields in the LRGV showed that one of the reasons for the higher than expected boll weevil populations in the southern end of the ST/WG zone was strong migration northward from cotton fields in the LRGV during the late summer 2002. Another contributor to the higher than expected weevil numbers in the southern end of the ST/WG was three isolated "problem fields" from which very high trap catches were seen. No weevils were trapped from these fields during May and the first half of June, which coincidentally was the period honeybees had been moved onto nearby watermelon fields for pollination of the watermelons. By July and August these fields were heavily infested and contributed nearly 20,000 weevils per week to the Kingsville district by early September. Trap dumping is suspected as the reason the infestations later found in these fields was not detected early enough to be contained before large

populations had developed. Overall, weevil populations were reduced from 2001 levels in 2002 and are 98.8 percent lower in 2002 than when the program began in 1996 (Table 1). Also treatments were reduced 64 percent from their peak of more than 8 applications per acre in 2000 to fewer than 3 applications per acre in 2002 (Table 2).

In the 41,652 acre EP/TP zone (El Paso/Pecos area), boll weevil numbers were relatively low at the inception of the program in 1999. Numbers of weevils trapped have been reduced substantially through the years of the program. In 2002, 58 weevils were captured in the zone from a total of 110,611 traps inspected (Table 1). These weevils were caught from late August through October in northern Reeves and Pecos counties. Field inspections revealed no boll weevil infestations of fields in the EP/TP zone. Migration of weevils from Eddy County New Mexico is suspected. In spite of boll weevil migrations, populations have decreased by 99.7 percent since the program began in 1999. Program treatments have declined from 3.42 applications per acre in 1999 to 0.11 treatments per acre in 2002 (Table 2). This is a reduction 96.8 percent.

In the 367,515 acre NRP zone (Vernon/Childress area) boll weevil populations have been reduced from 18.54 per trap inspection when the program began in 1999 to 0.0019 weevils per trap inspection in 2002, a 99.99 percent reduction (Table 1). During the last calendar year weevil populations have been reduced by 96.6 percent. Zone reorganization, staff changes and aggressive treatment of low-level localized infestations have improved results in the NRP zone in 2002. Even though infested areas were aggressively treated, treatments have been reduced from more than 9 per year in 1999 and 2000 to 0.53 in 2002 (Table 2). This is a 94.2 percent reduction in treatments since the program began in 1999.

The 525,316 acre NWP zone (Littlefield/Muleshoe/Hereford area) included 17,177 acres in Curry and Roosevelt counties in New Mexico in 2002. Initiation of eradication programs in 2001 in New Mexico to the west, SHPC to the south and NHP to the east contributed substantially to progress in the NWP by curtailing weevil migration into the zone. These factors, along with a well run program in the NWP zone, led to impressive boll weevil population reductions in the zone. Yearlong average weevil trap catches were lowered to .00091 weevils per trap inspection in 2002 from a high of 7.23 weevils per trap inspection in 1999, the year the program began in the NWP zone. This represents a reduction of 99.98 percent from 1999 and a 93.9 percent reduction during the last calendar year (Table 1). Treatments in the NWP are shown in Table 2. In 2002, an average of 0.30 treatments were applied per acre of cotton in the zone. This is a reduction of 94.9 percent from the number of treatments made in the first year of the program (Table 2).

Program progress in the 752,014 acre PB zone (Midland/Big Spring/Lamesa area) had been remarkable until 2002. Cotton fields in the southern end of the zone are in close proximity to cotton fields in the St. Lawrence zone which are not under an areawide boll weevil suppression or eradication program. This area was a source of boll weevils moving into the Permian Basin zone in 2002. Failed cotton fields complicated the situation further. Dry weather in the spring of 2002 caused cottonseed planted on some 200,000 acres in the southern end of the zone to fail to germinate. On these failed fields trap density was lowered to one trap per field in accordance with established program protocol. Later, other crops such as milo, hay grazer and black-eyed peas were planted on these fields. July rains brought up the alternate crops along with cotton plants from the seed still present in these fields. In many of these fields, trap densities were not increased to one trap per 1/10th mile of perimeter as they should have been when hostable cotton plants developed in them. Insufficient numbers of traps were present to assure adequate detection of migrating boll weevils before reproduction had occurred. Numbers of trapped boll weevils remained low until the middle of August but began increasing in the southeastern area of the zone during the last half of the month. By the end of the first week of September all failed fields that contained hostable cotton were again completely and properly trapped. Boll weevil trap catches peaked at 8,522 weevils from 18,444 traps inspected in the Big Spring district (0.46 weevils per trap inspection) and 2,192 weevils from 13,689 traps inspected in the Stanton district (0.16 weevils per trap inspection) during the week of September 16. Weevils from the infested area northeast of Big Spring moved into cotton in the RPC near Snyder and Colorado City. Fields in the southern part of the PB zone received repeated applications of malathion to bring the weevil populations down. In spite of the localized weevil increase in the southern end of the PB zone in 2002, boll weevil populations have been reduced in the zone by 99.7 percent since the inception of the program in 1999 (Table 1). Similarly, treatments have been reduced by 81 percent, from more than 7 per acre during 1999 to 1.34 per acre this year (Table 2).

As in past years, program progress continued to be strong in the WHP zone (Brownfield/Seminole/Plains area) in 2002. With the addition of 11,911 acres from two Lea County, New Mexico, zones, the Lea County zone and the Central Lea County zone, the total acreage in the WHP zone was 816,058 acres in 2002. Boll weevil populations were reduced 99.98 percent from levels present when the program began in the zone in 1999, and 87.6 percent during the last calendar year (Table 1). Only 5,371 weevils, 0.0026 weevils per trap inspection, were counted from more than 2 million traps inspected in the zone in 2002. The average number of treatments for boll weevil eradication per acre in the WHP zone have decreased from more than 9 applications per acre in 1999, the initial year of the program, to 0.38 in 2002 (Table 2). This is a 95.9 percent reduction in cotton acres treated by the eradication program in the WHP zone.

The 562,055 acre NHP zone (Plainview/Floydada/Tulia area) began boll weevil eradication in 2001. Populations of boll weevils averaged 0.89 weevils per trap per week in the diapause year but only 0.0045 weevils per trap per week in 2002 (Table 1). This indicates a boll weevil population reduction of 99.5 percent in one year. The outstanding reduction in boll weevil population in the NHP zone has resulted in fewer acres being treated in 2002. In a single year of operations treatments per acre have dropped from 9.59 in 2001 to 0.71 in 2002, a reduction of 92.6 percent in acres treated by the program (Table 2).

Growers in the 61,978 acre SBL zone (Taylor/Bryan/Temple area) also started their program 2001. Weevil populations were high in the SBL zone in 2001 averaging 13.68 weevils per trap inspection (Table 1). Populations were reduced in 2002 to an average of 1.36 weevils per trap inspection, a reduction of 90 percent in one year. Treatments went from 7.86 applications per acre in 2001 to 18.58 applications per acre in 2002 (Table 2).

The 1,197,507 acre SHPC zone, the largest in the state, began eradication in 2001. Trapping in 2001 demonstrated the presence of boll weevils in the zone at a level of 1.16 weevils per trap inspection during the initial diapause year of the program (Table 1). In 2002 the average number of weevils per trap inspection was 0.0047, 99.6 percent below the average number trapped the previous year. Treatments went from 6.83 per acre in the diapause year to 1.08 per acre in 2002, an 84.2 percent reduction in treated acres in one year (Table 2).

The program in the 187,813 acre UCB zone began in 2002. Trapping indicated high boll weevil populations in the zone, as an average of nearly 20 weevils were caught per trap inspection (Table 1). Applications in the diapause control phase of the program began the week of July 8. By the end of the year 9.71 applications per acre of cotton in the zone had been made (Table 2).

Overall, excellent progress has been made in recent years in the boll weevil eradication program in Texas. As in past years, program success was extremely strong. There were, however, migration-related population increases in a few isolated areas of the state in 2002. These localized population increases have stimulated changes that will improve the program in future years. Program management has made changes in several areas. Changes have been made in program protocol with regard to removal of traps from failed cotton acres. Cooperative work with USDA-FSA, USDA-ARS and Texas A&M have begun to improve early (pre-squaring) detection of cotton fields using remote sensing. Changes are underway to strengthen the quality assurance program to improve program performance. We continue to make every effort to communicate with and support growers in those areas of the state not in eradication programs as they entertain ideas about their needs. And we continue to work with Texas Department of Agriculture to protect the progress that has been made in eradication through communicating the need to clean equipment before moving it into or through zones that are free or nearly free of boll weevils.

Summary

The Texas Boll Weevil Eradication Program had a successful year in 2002. Weevil populations continued to be pushed lower in all but a few localized areas in which migrating weevils were present. Experiences in the problem areas have been used to improve and strengthen the program. Through the leadership of our Board of Directors and Zone Steering/Advisory Committees, solid technical guidance from the Technical Advisory Committee, and oversight from the Texas Department of Agriculture, we continue to make progress and move toward the day when the boll weevil will no longer damage Texas cotton.

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Table 1. Annual average weevils caught per trap inspection in active Texas boll weevil eradication zones.

Zone	1995	1996	1997	1998	1999	2000	2001	2002
SRP	7.87	2.03	1.52	0.04	0.0023	0.000091	0	0.000049
RPC		16.99	11.52	0.69	0.14	0.028	0.000534	0.0086
ST/WG		12.82	16.09	2.13	1.53	1.12	0.156	0.144
EP/TP					0.21	0.0093	0.000326	0.00052
NRP					18.54	2.34	0.056	0.0019
NWP					7.23	1.30	0.015	0.00091
PB					9.99	0.42	0.0097	0.028
WHP					18.20	0.68	0.021	0.0026
NHP							0.89	0.0045
SBL							13.68	1.36
SHPC							1.16	0.0047
UCB								19.96

Table 2. Annual average number of ULV malathion applications per acre.

Zone	1995	1996	1997	1998	1999	2000	2001	2002
SRP	8.90	4.55	7.60	1.42	0.64	0.01	0	0.087
RPC		5.42	6.89	1.62	3.12	1.52	0.15	0.91
ST/WG		4.93	4.62	5.57	6.24	8.05	4.80	2.92
EP/TP					3.42	0.96	0.14	0.11
NRP					9.21	9.11	2.22	0.53
NWP					5.85	7.36	1.57	0.30
PB					7.08	3.63	0.52	1.34
WHP					9.23	6.19	1.41	0.38
NHP							9.59	0.71
SBL							7.86	18.58
SHPC							6.83	1.08
UCB								9.71

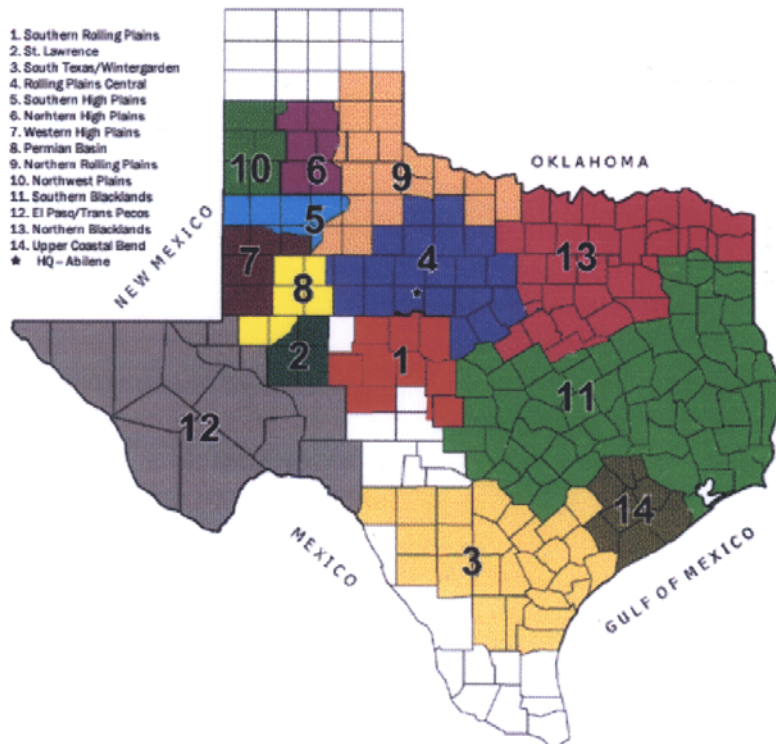


Figure 1. Boll Weevil eradication zones in Texas.