

BOLL WEEVIL ERADICATION IN TEXAS AND EASTERN NEW MEXICO: A STATUS REPORT**Charles T. Allen, Larry E. Smith, Lindy W. Patton and Richard O. Newman****Texas Boll Weevil Eradication Foundation****Abilene, TX****Abstract**

The Texas Boll Weevil Eradication Foundation (TBWEF) completed a successful year in 2005 with 6,773,675 cotton acres in the program. Program expansion in 2005 brought the Lower Rio Grande Valley (LRGV) zone and the Northern Blacklands (NBL) zone into eradication programs. These were the last two zones in the United States to enter eradication programs. In 2005 the Texas Foundation operated boll weevil eradication programs in 16 zones in Texas and four zones in Eastern New Mexico. Support from growers, grower organizations, Texas and federal legislators, USDA and Texas Cooperative Extension, Texas Agricultural Experiment Station and the Texas Department of Agriculture has grown stronger with continued program success. Referenda were passed by strong margins in 2005. The last program initiation referendum in the US was passed by over 84 percent by NBL producers in January. Program retention referenda were passed in the Southern Blacklands (SBL) zone by over 97 percent in March and in the South Texas/Winter Garden (ST/WG) zone by over 86 percent in November. In 2004 the Texas Agricultural Statistics Service (TASS) reported that the Texas cotton crop set a new record for the state with 7.7 million bales harvested and an average yield per acre of 694 pounds. For 2005 TASS reported that the Texas yield record was broken for the second year in a row with a crop of 8.1 million bales and an average per acre yield of 707 pounds.

The change in cotton acreage, weevil capture and acreage treated from 2004 to 2005 by region provides useful overview statistics. The four zones in eastern New Mexico experienced a 26 percent acreage decrease, a decrease in weevil captures of more than 95 percent and a decrease of 39 percent in acreage treated for boll weevil. The ten zones in west Texas (excluding the STL zone in its first full year of operations) had a 3 percent increase in acreage, a 36 percent decrease in boll weevil captures and a 24 percent decrease in acres treated. In the Blacklands (excluding the NBL in its diapause year in 2005) cotton acreage increased 21 percent, weevil captures decreased 43 percent, and weevil treatments decreased 23 percent. In south Texas (excluding the LRGV in its diapause year in 2005) cotton acreage increased about 1 percent, weevil captures decreased by 74 percent and treatments for boll weevil decreased by 29 percent.

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. In the US, The National Cotton Council estimates that since the boll weevil entered the US about 1892 it has cost cotton producers more than \$13 billion (NCC 1994) (Hunter and Hinds 1905). Following successful experiences with cooperative boll weevil eradication experiments in Mississippi, Louisiana and Alabama in 1971 and a successful three-year boll weevil eradication trial in North Carolina and Virginia 1977-80, growers requested program expansion in other regions of the US beginning in 1983 (El-Lissy 1998) and active programs were established in the Southeastern and Southwestern US. The eradication programs in these regions were soon successful in eradicating boll weevils and active boll weevil eradication programs moved to the center of the US cotton belt.

Growers in the LRGV passed a program referendum in April 1994 October 1994 with 73 percent of the growers in favor. In response to the wishes of the growers the program in the LRGV zone was set to begin in the spring, not with the normal late season diapause phase. Secondary pest outbreaks and other concerns lead to a grower recall election which ended the program in the LRGV in January of 1996. In December 1994 cotton growers in the Southern Rolling Plains (SRP) passed a program referendum by 85 percent in March 1994. The SRP began the diapause phase of their program in September 1994 on approximately 220,000 acres. In December of 1994 growers in the Rolling Plains Central (RPC) voted to begin assessments in 1995 and begin the diapause phase of the program in 1996. The referendum to have an eradication program in the RPC passed by 85 percent of the vote. The South Texas/Winter Garden (ST/WG) zone held a referendum to join the program in February 1995. Seventy-four percent of the growers in the ST/WG voted in favor of having a boll weevil eradication program in their zone. (Stavinoha

and Woodward, 2001).

In 1996 eradication activities began on approximately 500,000 acres of cotton in the ST/WG zone and about 650,000 acres in the 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 the SRP, RPC and ST/WG zones 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; 445,289 acres in the Northwest Plains (NWP) zone through a positive vote by 75 percent of the voters; 73,467 acres in the El Paso/Trans Pecos (EP/TP) zone with a positive vote by 80 percent of the qualified voters; 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, Stavinocha 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. The diapause control phase of the program was conducted in the WHP, NWP, EP/TP, PB and NRP zones, representing 2,276,678 acres. During the 1999 season 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 (TDA) 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 76 percent positive vote among qualified voters in October 2000 and in the SHPC by 80 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 (Stavinocha and Woodward, 2001). An assessment referendum held in April 2000 passed by 71 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. The ST/WG passed its retention referendum with 88 percent of the voters choosing to continue the program in October 2001.

After two years of participation with the Texas program through contracting acres with Texas zones, cotton producers from the Lea County Boll Weevil Control District (LCNM), the Central Lea County Boll Weevil Control District (CLCNM) and the Curry/Roosevelt Counties Boll Weevil Control District (C/RNM) formally associated with the Texas Boll Weevil Eradication Foundation for operations in August, 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 percent of the acreage voting in favor of the program. The program began diapause treatments on the UCB 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.

In 2002, retention referenda were passed in four zones. Growers voted in favor of continuing the program in the SRP by 88 percent in February, in the RPC by 90 percent in March, and in the WHP by 86 percent in December. A start-up referendum to conduct boll weevil eradication in the Northern Blacklands (NBL) zone failed with 58 percent of the vote and 34.7 percent of the acres voting for a program in December.

TBWEF operations were conducted on 5,735,257 Texas cotton acres in 12 active zones in 2003. In addition,

program operations were conducted on 31,006 acres in four active zones in New Mexico.

After three years of program work in the Pecos Valley, the Pecos Valley Boll Weevil Control District (PVNM) began collaborating with the Texas Foundation to conduct program operations in 2003. Retention referenda were passed during 2003 as follows: in the NWP zone by 83 percent in March, in the EP/TP zone by 89 percent in March, in the PB zone by 86 percent in April, and in the NRP by 91 percent in April. A referendum to attach a portion of northern Glasscock County to the PB zone failed in August 2003 with 64 percent of the growers voting in favor of starting a program, just short of the 66.6 percent positive vote needed for passage. In December NBL growers voted a second time on whether to initiate a boll weevil eradication program in their zone. The referendum failed with 65 percent of growers and crop-share land owners and 46 percent of the cotton acres in favor of starting a program.

In 2004, TBWEF conducted boll weevil eradication in 14 active Texas zones involving 6,327,102 cotton acres and 4 active New Mexico zones with 44,080 cotton acres.

In March of 2004, Commissioner Combs declared the NWP, NHP, NRP, SHP/C, WHP, PB and EP/TP zones suppressed. These seven zones joined the SRP and RPC zones with boll weevil populations low enough to qualify for quarantine protection. Taken together, nine west Texas zones with 5,284,663 acres of cotton were declared suppressed or functionally eradicated by the start of the 2004 growing season. By the end of the year the suppressed and functionally eradicated Texas cotton acreage was joined by 44,081 New Mexico acres operated by TBWEF which were also declared suppressed. In the fall two New Mexico zones received suppressed declarations; 12,128 cotton acres in the Lea County zone and the 22,761 cotton acres in the Curry/Roosevelt County zone. The Quay County zone, which was not operated by TBWEF, also received suppressed status declaration in the fall of 2004. In December the 9,191 acre Lea County Central Zone was declared suppressed as well.

Operations began in two new Texas zones during 2004, the St. Lawrence (STL) zone and the Panhandle (PH) zone. In early April, a referendum in the 37,611 acre PH zone passed with 93 percent of the growers and 74 of the acreage in favor of program initiation. Trapping activities in the PH zone were conducted from pinhead square to hard freeze. No weevils were captured and no treatments were made. Later in April, the 156,093 acre STL zone passed its start-up referendum with 83 percent of the growers and 66 percent of the acres in favor of starting a program. Weekly diapause sprays began in the STL zone in late September and continued through the November.

Retention referenda were held in the NHP and SHP/C zones in 2004. The NHP zone passed its retention vote with 81 percent of growers voting to continue the program in late October. In December, the SHP/C zone also passed its retention vote with 81 percent of growers voting to continue the program. In Mexico, the state of Tamaulipas began boll weevil eradication in 2004. The Lower Rio Grande Valley (LRGV) held a program referendum in November 2004. It passed with 74 percent of the growers and landowners voting in favor of the program and 59 percent of the cotton acreage registering a positive vote. There is little doubt that the presence of a program in adjacent cotton in Mexico was a positive factor in the LRGV vote.

In 2005 TBWEF conducted boll weevil eradication activities on 6,773,675 cotton acres in 16 Texas and 4 New Mexico zones. For the first time, boll weevil eradication programs were in place on all US cotton acres.

A referendum to establish a program in the NBL zone passed in January 2005 with 84 percent of the producers and 66 percent of the acreage voting in favor of an eradication program. Retention referenda were passed in the SBL zone in March and in the ST/WG zone in November by 97 and 86 percent positive votes, respectively. In the EP/TP zone a referendum was held to continue boll weevil eradication and move from pink bollworm suppression to pink bollworm eradication. The votes were tabulated in June with over 95 percent voting for the program.

Methods

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

Discussion

The 2005 growing season was dry in the south and east Texas zones, but had adequate rainfall through August in the west Texas zones. The dry weather in south and east Texas resulted in good trapping and treatment conditions in the NBL, SBL, UCB, ST/WG and LRGV zones; but caused crop stress and lower cotton yields. Hurricanes caused short term disruption of operations in these zones and may have contributed to weevil migration to the north. Treatment activities were disrupted in the NBL and SBL zones during the month of August as no-fly zones were established around Crawford, TX while President Bush was vacationing there. In the west Texas zones, conditions were more suitable for the production of high cotton yields. Sporadically wet conditions caused short term trapping and treatment disruptions, but weather related trapping disruptions generally did not persist for more than a few days. Where reproducing populations of boll weevils remained, the weather conditions were excellent for their survival.

Boll weevil migration caused problems in 2005 in zones adjacent to and within 150 miles of other zones in which reproducing weevil populations were present. Over-all, weevil populations were lower in 2005 than in previous years, but migration related captures late in the year caused the year end 2005 weevil captures to rise above 2004 capture levels in some of the high plains zones which had negligible detectable boll weevil reproduction. Program progress in the STL zone is expected to curtail most of this migration in the future. In the south Texas zones dry weather, the best stalk destruction program in many years and aggressive program activities brought fall weevil populations down earlier than usual in the southern zones. Lower spring captures in 2006 are expected as a result of these factors. Dry weather and aggressive fall diapause treatments are expected to strongly impact spring weevil captures in the NBL zone, but stalk destruction was not as thorough in this zone. This resulted in higher than necessary boll weevil populations and control costs in the fall of 2005. Some of the weevils that fed on re-growth cotton post-harvest in the NBL zone are expected to survive to infest the 2006 crop.

Texas High Plains Zones

Cotton acreage increased strongly in the PH zone (Dumas, Spearman, Amarillo, Pampa area) which began the program in 2004. In 2004 maximum mapped cotton acres in the zone was 37,611 acres. For 2005, maximum mapped cotton acres reached 95,535 acres. TBWEF has conducted trapping activities in the zone for three years and no boll weevils have been caught in the zone. Seventy seven thousand seven hundred and seventy-five traps were inspected in 2005. All hostable fields were trapped in 2005 from early June to mid-November with low level sentinel trapping conducted from mid-March through late May.

In the NWP zone (Friona, Dimmitt, Muleshoe Littlefield area) one weevil was caught in 2005. It was caught in the Dimmitt district in mid-October. No weevils had been caught in the zone in 2004. Three hundred nineteen thousand nine hundred and forty-three traps were inspected for the year on 522,755 maximum mapped cotton acres. One thousand three hundred and fifty-four acres were treated.

The NHP zone (Tulia, Plainview, Floydada area) had 582,565 maximum mapped acres in 2005. Seventeen weevils were caught in the zone in 2005. No weevils were caught until mid-August when one weevil was caught. No subsequent weevils were caught until late September when seven were caught. Then eight were caught during October and one was caught in November. There was no detectable boll weevil reproduction in the zone and the majority of the weevils were caught in the area south of Floydada near the caprock. Six hundred eight thousand two hundred and forty traps were inspected during the year. Sixteen thousand three hundred and twenty-one acres were treated.

In the SHP/C zone (Morton, Levelland, Lubbock, Tahoka, Crosbyton area) maximum mapped cotton acres were 1,233,564 acres in 2005. Three hundred sixty nine weevils were caught in the zone, up from the 166 caught in 2004. A concerted effort was made to find evidence of reproduction in the zone. No oviposition punctures were found, but feeding punctures were found at the site where the only multiple captures in the zone were found. This was a field near a cotton mote processing plant which had transported motes from south Texas. One million two hundred eighty three thousand forty traps were inspected for the year in the SHP/C zone. Four hundred and twelve thousand five hundred and ninety six acres were treated.

The WHP zone (Brownfield, Plains, Seagraves, Seminole area) had 885,933 cotton acres in 2005 and 356 weevils were caught, up from the 282 caught in 2004. Most of the weevils captured were caught in two areas, the southeast part of the zone and in the eastern edge of the zone against the caprock. Reproduction was suspected in a few fields

near a watermelon packing shed, but no reproduction was found in the zone. A total of 884,770 traps were inspected. Treatments were made to a cumulative 446,491 acres.

The PB zone (Lamesa, Big Springs, Stanton, Midland area) had 769,742 cotton acres in the zone in 2005 and 28,578 weevils were caught in 1,632,566 traps inspected. Most of the weevils caught in the PB zone were caught south of Interstate 20. The area near Big Spring caught more weevils than did the area near Stanton and Midland. Low level reproduction was found in a few fields at the south edge of the zone

In 2005, 124,328 weevils were captured in 475,486 traps inspected the 173,642 acre STL zone (Garden City, Big Lake area). Weevil reproduction could be found in the northern and central areas of the zone. For the year, 784,761 acres were treated.

New Mexico and Far West Texas Zones

In 2005 growers in the Curry/Roosevelt (C/RNM) zone planted 14,651 acres of cotton. One weevil was caught from 16,745 trap inspections. Because the capture occurred the first week of November and no hostable cotton was present within a mile of the capture, no treatments were applied.

In 2005 the Lea County zone (LCNM) had 13,145 cotton acres. A total of 18,850 traps were inspected with four weevils captured. They were caught in late September and October. Three thousand one hundred and thirty-six acres were treated.

In 2004 growers in the Central Lea County (CLCNM) zone planted 4,832 acres of cotton. At the end of the year 8,647 traps had been inspected and three boll weevils had been caught. Weevil captures were in mid-October and early through mid November. Three thousand one hundred and ninety-six acres were treated.

Growers in the Pecos Valley New Mexico (PVNM) zone planted 9,689 acres of cotton in 2005. Trap inspections totaled 63,292 for the year and three weevils were caught. The captures occurred during the middle three weeks in June south of Carlsbad and there were no late season captures. Two thousand nine hundred and eighty-four acres were treated.

In the EP/TP zone (El Paso, Pecos, Presidio area) growers had 43,405 maximum mapped acres of cotton in 2005. From 108,161 traps inspected in the zone, 31 weevils were captured. Thirty of these were caught during the period late August to mid-November on an isolated 328 acres of cotton near a truck stop east of El Paso. Another weevil was caught the second week of November (after the fields in the area were harvested and non-hostable) near Ft. Hancock. A total of 2,746 acres were treated. Pink bollworm eradication efforts in the zone produced positive result in 2005.

Texas Rolling Plains Zones

The NRP zone (Clarendon, Childress, Paducah, Vernon area) had 422,747 acres of cotton in 2005. During the year 582,283 trap inspections were conducted and 89 weevils were caught, down from the 161 weevils caught in 2004. Seventy-seven of the weevils caught in 2005 were caught in the Jayton district and most of those were caught in the vicinity of Post. Seven weevils were caught in the Paducah district, two were caught in the Vernon district and one was caught in both the Turkey, Memphis and Childress districts. Three weevils were caught in June and no weevils were captured subsequently until mid-September. The period late September through mid-October had the highest captures with 64 weevils caught in four weeks at that time. Thirty seven thousand eight hundred and thirty-three acres were treated during the year.

The RPC zone (Snyder, Colorado City, Abilene, Stamford, Munday area) had 605,900 acres of cotton in 2005. Foundation employees inspected 1,209,359 traps in 2005 and captured 3,777 weevils, down from the 13,821 weevils caught in the zone in 2004. As in 2004 most of the weevils were caught in the Colorado City and Snyder districts on the west side of the zone. By district, the Colorado City district caught 3,061, the Snyder district caught 660, the Rotan district caught 32 the Haskell district caught 21 and the Stamford district caught 3. Limited reproduction was noted in a few fields the west side of the zone and on one field located adjacent to a roadside park southeast of Olney in Young County on the east side of the zone. Two hundred and sixty four thousand forty-three acres were treated in the zone in 2005.

The SRP zone (San Angelo, Ballinger, Eldorado area) had 254,534 acres in 2005. The SRP zone had 313,578 traps inspected. Only four weevils were caught in the zone through late August. The last week of August, 29 were captured and captures remained at about this level until late September when they increased to above 100 per week and fluctuated between 84 and 460 per week until mid-November. The captures occurred on the south and west end of the zone. In late September and October, reproduction was detected in several of the southern-most fields in the zone. Reproduction was associated with field edges in which deer had eaten the tops of the plants and regrowth with immature fruit was available late in the season. Two hundred thirty one thousand one hundred and thirty-two acres were treated.

Texas Blacklands Zones

The NBL zone (Hillsboro, Waco, Corsicana, Greenville, Paris area) had 66,369 acres of cotton in 2005. The zone was in its diapause year of the program in 2005 and treatments did not begin until first cracked boll. Traps were deployed at a density of one trap per field and by the end of the year 30,192 trap inspections had been conducted. This relatively low number of trap inspections produced a total of 346,439 weevils, however. From first cracked boll until fields were no longer hostable treatments were made to each field each week. A cumulative total of 630,090 acres were treated, with 127,239 acres treated after October 17th. Texas Cooperative Extension and Texas Department of Agriculture are working with growers to emphasize the importance of early, thorough stalk destruction during eradication.

The SBL zone (Taylor, Bryan, Temple area) had 116,511 acres of cotton in 2005. The zone had 915,404 traps inspected during 2005 with 172,469 weevils captured, down from 301,291 caught in 2004. Like 2004, the highest capture rate was the northern part of the zone, those fields nearest to cotton fields in the NBL zone. During the year 972,277 acres were treated.

South Texas Zones

In the UCB zone (Rosenberg, Wharton, Bay City, El Campo area) Foundation employees mapped 210,369 cotton acres. For the year 1,378,538 trap inspections were conducted and 414,609 weevils were captured, down from the 2,072,192 caught in 2004. Cumulatively, 2,333,740 acres were treated. The El Campo district had the highest weevil captures in the zone.

The ST/WG zone (Kingsville, Corpus Christi, Victoria, Uvalde area) had 528,135 acres mapped in 2005. Cumulative traps inspected were 2,170,105 for the zone with 456,600 weevils caught, down from the 1,287,408 weevils caught in 2004. Weevil captures for the year were highest in the Uvalde district, 1.14 weevils per trap inspection with lower captures in the Kingsville district, 0.43 weevils per trap. Captures were maintained at very low levels in the Victoria and Sinton districts, 0.0084 and 0.00085, respectively. Captures in the Robstown district averaged 0.019 weevils per trap for the year. Within zone captures and captures from trap lines indicated a large migration into southern areas of the ST/WG zone from the LRGV late in 2004. Program activities in 2005 focused on reducing the numbers of these weevils. Late season reproduction was seen in a number of the fields primarily in the southern end of the Uvalde district. Cumulatively, 2,123,843 acres were treated. The most heavily treated fields were in the Uvalde district.

The LRGV zone began its eradication program in 2005. In its diapause year, 186,628 acres were mapped and trapped at one trap per field. Cumulatively 2,035,202 weevils were caught in 126,265 trap inspections for the season, 16.1 weevils per trap inspection. The peak trap capture occurred the first week of September when traps averaged 87.9 weevils per trap. Treatments began when 10% of the bolls were cracked and ended when the crop was harvested and non-hostable. Cumulatively, 815,622 acres were treated.

Summary

Texas cotton producers experienced with back-to-back record breaking cotton yields in 2004 and 2005. Good soil moisture, adequate rainfall and the elimination of boll weevil as an economic pest contributed to this success. But the positive weather conditions and strong cotton crops provided excellent conditions for boll weevil population development in areas where reproducing populations are present. Late season boll weevil migrations into some of the plains zones, most of which had very low to undetectable overwintering weevil populations in the spring of 2005, increased eradication costs and slowed progress. Boll weevil populations were reduced in the south and east Texas zones. In these zones the program will benefit due to a crop which finished early and to growers who completed the earliest and most thorough stalk destruction in many years. For the first time all cotton grown in the US and northern

Mexico was in an eradication program and boll weevil populations were being eliminated throughout the region.

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

Zone	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
TX											
SRP	7.87	2.03	1.52	0.04	0.0023	0.00009	0	0.00005	0.00064	0.0013	0.0074
RPC		16.99	11.52	0.69	0.14	0.028	0.00053	0.0089	0.0044	0.012	0.0031
ST/WG		12.82	16.09	2.13	1.53	1.12	0.16	0.144	0.16	0.67	0.21
EP/TP					0.21	0.0093	0.00032	0.00052	0.012	0.00009	0.00029
NRP					18.54	2.34	0.056	0.0019	0.00005	0.00025	0.00015
NWP					7.23	1.30	0.015	0.0009	0.00001	0	0.000003
PB					9.99	0.42	0.0097	0.028	0.014	0.026	0.017
WHP					18.20	0.68	0.021	0.0026	0.00017	0.00034	0.0004
NHP							0.89	0.0045	0.00002	0.00002	0.000028
SBL							13.68	1.36	0.356	0.52	0.19
SHP/C							1.16	0.0047	0.00004	0.00013	0.00029
UCB								18.22	3.34	1.59	0.30
PH										0	0
STL										3.23	0.26
NBL											11.47
LRGV											16.12
NM											
C/RNM							1.1	0.0037	0.00004	0	0.00006
CLCNM						1.83*	0.11*	0.029	0.00009	0	0.00035
LCNM						1.83*	0.11*	0.046	0.00019	0.0001	0.00021
PVNM							2.49	0.96	0.05	0.0026	0.00005

* Data not separated between zones

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

Zone	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
TX											
SRP	8.90	4.55	7.60	1.42	0.64	0.01	0	0.08	0.23	0.79	0.91
RPC		5.42	6.89	1.62	3.12	1.52	0.15	0.91	0.89	1.37	0.44
ST/WG		4.93	4.62	5.57	6.24	8.05	4.80	2.92	4.15	5.39	4.02
EP/TP					3.42	0.96	0.14	0.11	0.09	0.02	0.06
NRP					9.21	9.11	2.22	0.53	0.10	0.23	0.09
NWP					5.85	7.36	1.57	0.30	0.01	0	0.002
PB					7.08	3.63	0.52	1.34	3.09	2.37	1.66
WHP					9.23	6.19	1.41	0.38	0.17	0.35	0.50
NHP							9.59	0.71	0.03	0.06	0.03
SBL							7.86	18.5	11.6	11.0	8.39
SHP/C							6.83	1.08	0.08	0.24	0.33
UCB								9.71	16.3	16.7	11.09
PH										0	0
STL										7.02	4.52
NBL											9.40
LRGV											4.37
NM											
C/RNM							3.00	1.01	0.01	0	0
CLCNM						9.3*	6.03	2.63	0.01	0	0.59
LCNM						9.3*	6.03	5.16	0.22	0.01	0.24
PVNM							8.64	8.17	7.83	1.46	0.31

* Data not separated between zones

Figure 1. Boll weevil eradication zones operated by TBWEF.

