

**2011**

**PROGRESS REPORT SUMMARY**

**TEXAS AGRILIFE EXTENSION SALTCEDAR  
BIOLOGICAL CONTROL IMPLEMENTATION  
PROGRAM**

**Allen Knutson and Mark Muegge**

**Texas Agrilife Extension Service,  
Texas A&M University System**



**Saltcedar Trees defoliated by Tunisian Leaf Beetles at Leon Lake, near Fort Stockton, TX.  
September 2011. C. Hart photo.**

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### **Summary.**

Beginning in 2006, the Saltcedar Biological Control Implementation Program has released saltcedar leaf beetles for the biological control of saltcedar at 23 sites in 15 counties in west Texas. In 2010, leaf beetle populations were established at 12 of these sites and defoliated as estimated 500 acres of saltcedar. These sites were in the Colorado River Basin (Martin, Mitchell, Borden, Coke, Coleman and Tom Green Counties), the Red River Basin (King County), the Brazos River Basin (Crosby, Motley, Garza and Kent Counties), and in the Pecos/Rio Grande River Basin (Pecos, Reeves, Crockett and Brewster Counties). In 2010, this project field collected 354,000 Crete beetles and 47,000 Tunisian beetles for re-distribution at new sites, bringing the 2009-2010 total collection to over 700,000 beetles.

In 2011, populations of the Crete species were very low or absent at 75 % of the sites where the Crete beetles had been well established in 2010. This loss is believed due to 2-3 consecutive days of below freezing weather which swept into west Texas in early February, 2012. Some of the Crete populations may have emerged from overwintering and experienced high mortality as the sudden cold front followed several warm days. It is possible that some of the Crete populations were below detectable levels in 2011 and may recover in 2012. The Tunisian beetles on the Pecos and Rio Grande increased and defoliated large areas as in 2010 and were apparently not negatively impacted by the early February freeze.

In the fall, 2011, leaf beetles were established and defoliating saltcedar trees at seven sites. Three of the established populations were Tunisian beetles on the Pecos River at Iraan and Leon Springs, and along the Rio Grande River in Big Bend National Park. The remaining four Crete populations were established on the Colorado and Rio Grande Rivers and at White River Lake in Crosby County. As all of the Crete populations were present in low numbers in 2011, no Crete beetles were collected and re-located in 2011. However, 84,000 Tunisian beetles were collected from sites on the Rio Grande River and Pecos River and relocated to new sites on the Pecos River and on Lake Spence and Lake Ivie.

### **Introduction.**

In 2008, the Saltcedar Biological Control Implementation Program SBCIP was organized by the Texas AgriLife Extension Service to provide technical assistance and educational programs to land owners, land and water resource managers, and others

relative to biological control of saltcedar. The objectives of this project are to 1) implement biological control of saltcedar using leaf-feeding beetles for the long-term suppression of saltcedar and 2) educate land owners, land managers and others about biological control and riparian habitats in this watershed. The Implementation Program is focused on establishing saltcedar beetle populations along saltcedar-infested areas of streams and rivers in each of the major river basins of west Texas: Red River, Brazos River, Colorado River and Rio Grande River Basin. Once established, saltcedar beetles are expected to naturally disperse along saltcedar infested tributaries and draws and into upland sites throughout each watershed.

**Collection and Release Efforts.**

During 2009, this project field collected and released more than 300,000 saltcedar beetles. In 2010, this project collected 354,000 Crete beetles, primarily from the Big Spring/Colorado City area but also from the Pecos River site, for release at new sites. In addition, 47,000 Tunisian beetles were collected from near Presidio and released on the Pecos River. To date, the SBCIP program has collected over 700,000 beetles.

In 2011, populations of Crete beetles were so low that none could be collected for re-distribution. The Tunisian species was abundant on the Rio Grande and this species was collected and redistributed. About 71,000 Tunisian beetles were collected from the Presidio area and near Iraan and released at five sites on the Pecos River. Also, 13,000 Tunisian beetles were released at Lake Spence and Lake Ivie in 2011 to see how far north this species might survive.

<b>Year</b>	<b>Sites</b>	<b>Counties</b>	<b>Crete Beetles Released</b>	<b>Crete: Established Populations</b>	<b>Tunisian Beetles Released</b>	<b>Tunisian: Established Populations</b>
<b>2006</b>	16	9	20,300	0	0	0
<b>2007</b>	13	11	6,200	2	0	0
<b>2008</b>	23	9	5,700	2	0	0
<b>2009</b>	15	15	300,000	3	14,300	0
<b>2010</b>	23	19	354,000	10	47,000	1
<b>2011</b>	8	6	0	4	84,000	3

The record breaking cold weather that swept through west Texas during early February, 2011 apparently took a heavy toll on overwintering saltcedar beetles. Low temperatures were in the single digits as far south as Fort Stockton and high temperatures were below freezing for 2-4 consecutive days in many areas. Two days before the flash freeze hit, high temperatures were in the 60-70s in Midland and Fort Stockton. In response, some beetles may have started to move from their overwintering shelters and then were suddenly exposed to the Arctic blast.

The first indication that something was wrong was in May when no beetles could be found at the Big Spring site. Surveys conducted in June and August again failed to find any beetles here in 2011. Low temperatures in the Big Spring area during Feb 2-4 were about 6-9°F and high temperatures did not exceed freezing for three consecutive days. The Crete species of beetle was first released at this site in 2004 and five years later

defoliated all of the saltcedar trees along about 35 miles of Beals Creek. This was the largest and most successful release of the Crete beetle, *Diorhabda elongata*, in Texas and its loss is considerable. In late September, a small remnant of this population was reported from Mustang Draw near Big Spring, giving hope that this population will recover.

The large population of Crete beetles on the upper Pecos River was also lost due to the extreme cold. This beetle population, released in 2006, had defoliated all of the saltcedar along more than 11 river miles by 2010. Several surveys here during the summer of 2011 failed to find any surviving beetles.

In 2010, the Crete beetle was well established at ten sites in Texas, not including the large population at Big Spring. In 2011, no beetles could be found at 7 of these 10 sites, including those on the Wichita River, at Lake Thomas, and at two sites each on the Colorado and Pecos River. The loss of the populations was attributed to the extreme cold in early February. Also, without the large field populations at Big Spring and Pecos, there was no source of Crete beetles to collect and redistribute to other sites during 2011.

Surprisingly, Crete beetles did survive at White River Lake and near Colorado City, although numbers did not increase until late in the summer. The Crete population at the I-20 bridge at Colorado City was not established in 2010 but beetles survived the winter and by late summer, 2011, defoliated about 15 trees at this site. As a result, this site was established in 2011. Also, a small remnant population of Crete beetles was reported on Lake Thomas late in the fall. This suggests that a few surviving beetles may have gone undetected at the other sites, giving hope that beetles may reappear in 2012 if the coming winter weather is less severe. The third established Crete population to survive was in Big Bend National Park.

While the Crete beetle suffered in west Texas, the Tunisian species survived the winter cold along the Rio Grande River and thrived in 2011. The Tunisian beetle, was first released in Texas by Dr. Jack DeLoach, USDA-ARS (retired) in 2009 on the Rio Grande River near Presidio, TX. This species rapidly increased and in 2010 defoliated almost all of the saltcedar along 20 river miles. Following the very cold winter, beetle numbers were low early in the spring of 2011 but soon increased and again defoliated saltcedar trees along the same area. Dr. Chris Ritzi and associates at Sul Ross University have been monitoring the Tunisian beetles in this region. Also in 2009, a second population was established in Big Bend National Park by Texas AgriLife Extension and NPS personnel. These beetles also rapidly increased and defoliated saltcedar along the Rio Grande throughout much of the western portion of park in 2010 and 2011.

While the Tunisian beetles survived the 2011 February freeze, many of the athel trees in the Presidio area were killed or greatly damaged by the cold weather. Tunisian beetles feed on athel trees and last season defoliated athel trees in the Presidio area but as expected, these trees grew new leaves 1-2 months later. Unfortunately, the extreme cold in early February, 2011 took a heavy toll on athel in this area.

The population of Crete beetles released in Reeves County on the Zeman Ranch in 2006 quickly established, expanded and by 2010 had defoliated all of the saltcedar along 11 miles of the Pecos River. A second population of Crete beetles was established at the Cooper Ranch in 2010. However, following the extreme cold experienced in early February, 2011, the Crete populations could not be detected in 2011 and were presumed extinct.

Based on climate-matching studies conducted by USDA-ARS *Diorhabda sublineata*, the Tunisian beetle was considered better adapted to the Pecos River watershed than the Crete beetle, *Diorhabda elongata*. The Tunisian beetles were initially released at two locations (Leon Springs and Imperial) in 2009 with additional releases in 2010 and 2011.

In 2011, a total of 84,000 Tunisian beetles were collected for redistribution from the Iraan site and along the Rio Grande near Presidio (ca. 27,000 beetles were collected from Iraan and 57,000 from the Rio Grande site).

<b>Location released</b>	<b>Number of Tunisian Beetles</b>
Pecos	29,000
Imperial	10,000
Grandfalls	10,000
Leon Springs	9,000
Toyah	10,000
Pecos North	3,000
Lake Spence and Lake Ivie	13,000
Total	84,000

Two populations of Tunisian beetles on the Pecos River (Iraan and Leon Lake) survived the extreme winter and in 2011 defoliated large areas of saltcedar along the Pecos. These results suggest the Tunisian species is more cold hardy than originally thought, and may better adapted to some areas of West Texas than the Crete species.

In the fall, 2011, leaf beetles were established and defoliating saltcedar trees at seven sites (Table 1). Three of the established populations were Tunisian beetles and four populations were Crete beetles. Twelve populations (75%) of Crete beetles were either absent or present in very low numbers due to the late winter freeze.

### **Vegetation Recovery.**

Plots were established at Gillespie Ranch to monitor recovery of vegetation following defoliation. Similar plots in King Co. were abandoned as the Crete population there was extinct. Plans are to establish a second set of vegetation plots at Leon Lake where Tunisian beetles are present.

**Table 1. Status of Saltcedar Beetles at Project Implementation Sites, Fall, 2011.**

Site	County	Site	Species	Established in 2010	Absent in 2011	Established in 2011
<b>Colorado River Basin</b>						
1	Martin	Sulphur Springs	Crete	◆	??*	
2	Mitchell	Gillespie	Crete	◆		◆
5	Borden	Lake Thomas	Crete	◆	??	
6	Mitchell	Wright	Crete	◆	??	
7	Mitchell	I-20 Bridge	Crete			◆
8	Mitchell	Bradberry	Crete	◆	??	
9	Coke	Lake Spence	Crete		??	
10	Coleman	Lake Ivie	Crete		??	
<b>Red River Basin</b>						
11	King	Guthrie	Crete	◆	??	
<b>Brazos River Basin</b>						
14	Garza	Post	Crete		??	
15	Crosby	White River	Crete	◆		◆
<b>Pecos / Rio Grande River Basin</b>						
16	Reeves	Pecos	Crete	◆	??	
17	Pecos	Cooper	Crete Tunisian	◆	?? ??	
18	Pecos	Whyte, Hw18	Tunisian			
19	Pecos	Leon Springs	Crete Tunisian		??	◆
20	Crockett	Iraan	Crete/ Tunisian		??	◆
21	Reeves	Pecos North	Tunisian			
22	Brewster #1	Big Bend NP, Santa Elena	Crete	◆		◆
23	Brewster #1	Big Bend NP, Gravel Pit	Tunisian	◆		◆
24	Reeves	Toyah	Tunisian			
			<b>Total</b>	<b>11</b>	<b>12</b>	<b>7</b>

\*?? Indicates sites at which no beetles found or only a small remnant population found in late fall

## **Current Project/Focus Areas.**

### **Upper Colorado River/Colorado River Municipal Water District**

In 2006, the Colorado River Municipal Water District (CRMWD) completed the Colorado River Watershed Restoration and Management Plan designed to improve the environmental health of the Upper Colorado River Basin. A key aspect of this plan is the control and management of saltcedar. As part of the Implementation Program, most of the saltcedar adjacent to the Colorado River and parts of Beals Creek was killed by herbicide spraying beginning at Lake J.B. Thomas and extending down river to Lake Spence. However, not all of the saltcedar was sprayed. The Colorado Municipal Water District, with funding from Wal-Mart Inc., provided funding to SBCIP to establish beetle populations to suppress saltcedar growth and eliminate seed production from unsprayed sites, suppress regrowth of trees surviving the herbicide program and promote biological control of saltcedar throughout the upper Colorado River watershed.

### **Southern Plains, Rolling Plains/Natural Resource Conservation Service.**

The Saltcedar Biological Control Implementation Program has worked closely with NRCS since 2006 in releasing saltcedar leaf beetles in Borden and Fisher Counties. With funding from the Southern Agriculture Research and Education (SARE) Program, this program was expanded in 2010. Saltcedar leaf beetles were collected from Big Spring and shipped to NRCS offices for release in each of Kent, Motley, Garza, Terry and Lynn Counties. In 2010, each county received 6,000 beetles in June and 10,000 beetles in August, for a total of 16,000 each.

### **Pecos River , Pecos River Restoration Program.**

The goal of this program is to implement the Watershed Protection Plan developed for the Pecos River as a means to improve the quality of water in the Pecos River and to improve the health of the watershed. Part of this plan is the long term suppression of saltcedar using biological control. With funding from the program, the SBCIP released saltcedar leaf beetles at five new sites in on the Pecos River in 2010. At several of these sites, the Tunisian beetle was released nearby the Crete species to determine which species is best adapted to this southern region.

### **Rio Grande River, Big Bend National Park.**

Saltcedar is an exotic, invasive species which threatens the ecology and biodiversity of Big Bend National Park. In 2008, the Saltcedar Biological Control Implementation Program initiated a project to provide technical expertise, assistance and material support (cages and beetles) to establish leaf beetle populations in Big Bend National Park for the biological control of saltcedar. In 2010, a population of Crete beetles established at Santa Elena Canyon and a population of Tunisian beetles established at the Gravel Pit Campground. In September, 2010, this population had defoliated saltcedar along an estimated 17 river miles from Boquillas Canyon up river to Mariscal Canyon.

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