AgriLIFE EXTENSION
Texas A&M System

BEETLE - MANIA

BIOLOGICAL CONTROL OF SALTCEDAR IN TEXAS

VOL. 3 NO. 2 SUMMER 2011

The saltcedar leaf beetle feeds only on saltcedar and athel. Athel is a closely related species that grows along the Rio Grande River in Texas.

If saltcedar or athel trees are not present, the larvae starve to death.

Saltcedar beetles were first established in Texas in 2004 at Big Spring, TX. Since then, there have been no reports of beetles or larvae feeding on any other plant. except saltcedar and its close relative athel (Tamarix aphylla).

Beetle Populations Decline in 2011 Following Extreme Winter Cold

Cold Winter. 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.

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. Sixty percent of those populations were lost due to the cold winter, including those on the Wichita River, at Lake Thomas, and at two sites each on the Colorado and Pecos River. 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 at Colorado City, although numbers did not increase until late in the summer. Also, a small remnant populations of Crete beetles was finally found in the fall south of Big Spring. 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.

While the Crete beetle suffered in west Texas, the Tunisian species survived the winter cold along the Rio Grande River and thrived in 2011. See inside for more….

A new publication "Biological Control of Saltcedar" is now available from Texas AgriLife Extension. Log onto:

https://agrilifebookstore.org/ and enter "saltcedar" in the search box to download this and other publications on saltcedar.

Tunisian Species Again Defoliates Saltcedar Along Rio Grande in West Texas

Larvae of the saltcedar leaf beetle feed on saltcedar leaves and tender bark. Larvae feed for about 12-14 days during the summer. Full grown larvae are about 1/3 inch long. Several generations are completed per year. The adult stage overwinters on the ground under leaf litter and in clump grasses.

A second species of saltcedar beetle, *D. sublineata,* or 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 and provided the map showing the distribution of beetles in this region.

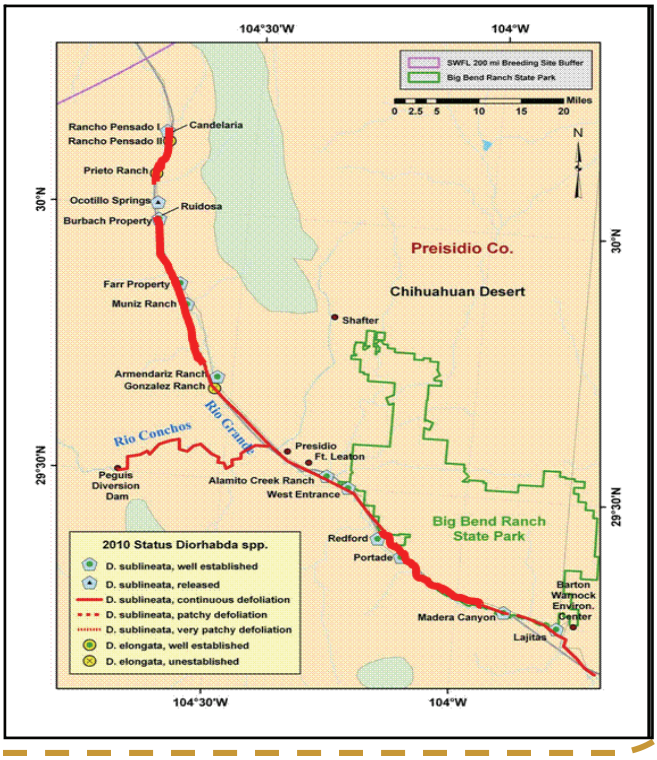
Also in 2009, a second population was established in Big Bend National Park by Texas AgriLife Extension and NPS personnel. These beetles also rapidly increased and defoliated saltcedar along the Rio Grande throughout much of the western portion of park in 2010 and 2011.

While the Tunisian beetles survived the 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.

Tunisian beetles are now established at three sites on the Pecos River. These populations 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 2011, about 75,000 Tunisian beetles were collected from the Presidio area and near Iraan and released at five sites on the Pecos River. Also, 34,000 Tunisian beetles were released at Lake Spence and Lake Ivie in 2011 to see how far north this species might survive.

The Tunisian beetle was originally collected from Tunisia in north Africa. They were sent to the USDA-ARS lab in California where the beetles were held in quarantine and heat treated to kill internal parasites, allowing only disease free beetles to be released into the US.



Biocontrol of Saltcedar in Nevada, Utah, and Colorado

Relative to Texas, biological control of saltcedar got a head start in Nevada, Utah and Colorado. The first open field releases of saltcedar beetles were made there in 2001 and beetles quickly established, increased and dispersed from release sites in Nevada and Utah. The beetle species effective in these northern states is *D. carinulata* and was collected from Fukang, China and Chilik, Kazakhstan at 43-44°Latitude, which is equivalent to northern Wyoming in the US. For this reason, the Fukang/Chilik species is very well adapted to cold winters and survives will in Nevada, Utah and western Colorado.

By the fall of 2010, the Fukang/Chilik beetle had defoliated saltcedar along 340 miles of streams and rivers in Nevada, or nearly all of the saltcedar in that state. In Utah, beetles defoliated saltcedar along about 1,500 miles of the Colorado, Green and San Juan Rivers. From Utah, beetles followed saltcedar along the Delores and Colorado Rivers into western Colorado. In this region, beetles defoliate the saltcedar twice a year and observers report willows are recovering as saltcedar growth is suppressed.

Saltcedar beetles use the declining daylength in the fall as a cue to prepare for winter. Beetles stop laying eggs, store up fat reserves and then enter the leaf litter on the soil in preparation for winter cold. For the Fukang/Chilik beetle, days less than 14.65 hours of sunlight signal that winter is coming. This system works when this species is in northern China, but not in Texas where daylight never exceeds 14.65 hours.

When released in Texas, this species stopped feeding in late July and went into overwintering sites, expecting the weather to soon turn cold as it would in northern China. However, the beetles used up their overwintering fat during the warm Texas days in August-November and soon starved to death before saltcedar leaves were available to eat the following spring. Thus, efforts to establish this cold-hardy species in Texas failed. For this reason, beetle species were collected from southern regions (Tunisia, Crete) where daylenths are similar to Texas. These species have established in Texas, but as the winter of 2011 proved, they are not well adapted to survive the "blue-northerners" that can blow into Texas in late winter.

Enemies of Saltcedar Leaf Beetles

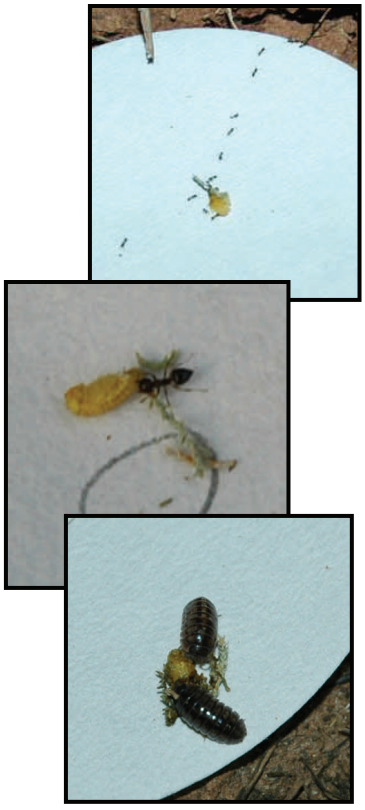
Saltcedar leaf beetles can only be successful when large numbers survive and populations increase sufficiently to defoliated saltcedar trees several times during the growing season. Other creatures which feed on leaf beetles can limit this population growth, especially when beetle numbers are very low following the initial releases at a new site.

Because predation can hinder establishment of new beetle populations, we conducted several studies to determine how important predators were, what life stages they attacked, and what specific predators were important.

Beetles are sometimes found entangled in spider webs or serving as a meal to a slender assassin bug. But studies in other systems show that many predators, especially ants, are more active at night when the temperatures cool after a hot, summer day. Ants are common at many sites in west Texas. Also, the leaf beetle pupa occurs on the ground where ants and other predators are active, and since the pupa can not move, it can not defend itself against attack. Thus, our studies focused on ants feeding on the pupa stage. We reduced ant numbers using a granular ant bait spread around the study area and then compared the survival of beetle pupa in areas where ant activity was suppressed relative to untreated areas.

We found that suppressing ant activity did not increase survival of leaf beetle eggs or larvae on the tree, but did increase the survival of pupae. As more pupae survived, a greater number of adults were reared in field cages protected from ant predation.

To further confirm these results, leaf beetle pupae were placed on white paper disks beneath saltcedar trees and observed every 15 minutes from sunset until midnight in west Texas. The observations showed that ants were the most common predator feeding on beetle pupae. Surprisingly, pill bugs (or roly-poly) were also commonly seen feeding on pupae. Pill bugs feed primarily on dead plants, but they also apparently enjoy a helpless leaf beetle pupae when they find one.



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BEETLE-MANIA is a newsletter on biological control of saltcedar in Texas, and is written and produced by Allen Knutson, Texas AgriLife Extension. To be included on the mailing list, please contact Allen Knutson.

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For more information on biological control of saltcedar and other invasive weeds in Texas, go on-line at: **bc4weeds.tamu.edu**.