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Biological Control of Saltcedar



**A sustainable approach
using insect natural enemies
to suppress saltcedar infestations**

Saltcedar is an exotic shrub or small tree that has spread throughout the rivers, streams and lakes of west and southwest Texas and other areas of the western United States. In these regions, saltcedar causes serious problems, including:

- * Depleting groundwater
- * Reducing stream flow
- * Drying up lakes and reservoirs
- * Increasing the salinity of the soil surface
- * Competing with forage grasses and native plants
- * Degrading wildlife habitat

Although saltcedar can be controlled by herbicides and mechanical means, these methods are expensive when used over a large area. If applied improperly, these techniques can also kill desirable native plants.

Another control tactic is to use living organisms to suppress saltcedar. This method is called biological control. To help control saltcedar, insects that feed only on the plant are being introduced into Texas and the western United States.

Invader of rivers, lakes and wetlands

Saltcedar, also called tamarisk, is the common name for several species in the genus *Tamarix*. These trees were introduced into the United States from central Asia in the 1830s and planted here as ornamentals and wind-breaks and to stabilize river banks.

Three of those saltcedar species have invaded rivers, lakes and other such riparian habitats in 17 western states. In Texas, large expanses of saltcedar grow along all of the western river systems, including the Canadian, Brazos, Colorado, Pecos and Rio Grande.

Saltcedar has several characteristics that help it grow across extensive areas and crowd out native plants such as willows and cottonwoods. The tree tolerates drought, heat, cold, salinity, fire and flooding. Its roots extend deeper into the soil than those of willow or many other native riparian plants, and thus it can spread further from streambanks and extend across more of a flood plain. The leaves of saltcedar concentrate and secrete salt, which increases soil salinity beneath saltcedar trees.

Saltcedar has no economic value in the United States and very little value to wildlife.

(The athel tree, *Tamarix aphylla*, is planted as a landscape ornamental in the southwestern United States and Mexico. This species of tamarisk is noninvasive and un-common in natural areas. It is not a target of biological control.)

Natural enemies

In its native range in Central Asia and the Mediterranean, more than 350 species of insects feed on saltcedar. But when saltcedar



Saltcedar leaf beetle eggs and larva.

was introduced into the United States, almost all of these natural enemies were left behind.

Three of its natural enemies — one species of leafhopper and two species of scale insects — were accidentally introduced with the saltcedar plants. Although these insects feed specifically on saltcedar, they cause little damage. As a result, saltcedar grows and reproduces in the United States without the many insect enemies that suppress its growth in its native habitat.

Researchers are identifying the natural enemies of the plant so that the insects can be imported and established in the United States. The USDA-Agricultural Research Service has conducted research to identify insects that:

- * Can be imported safely into the United States
- * Feed only on saltcedar
- * Can kill saltcedar and reduce its spread

This and all U.S. biological control programs are regulated under the National Environmental Policy Act and the USDA-Animal and Plant Health Inspection Service (APHIS). Exotic insects can be released only if they have been approved by APHIS and the participating state.

Insects proposed for introduction into the United States are studied rigorously overseas and in quarantine facilities in the United States to ensure that they feed only on the target weed and that they do not threaten native plants, nontarget species or economically important plants.

Saltcedar is a good target for biological control as it has no close relatives in the United States. Thus, there is very little risk that insects that feed specifically on saltcedar will attack any other plant.

Saltcedar leaf beetle

The first insect approved for release in the United States for biological control of saltcedar is the saltcedar leaf beetle, *Diorhabda elongata*. This insect was introduced from northern China, Uzbekistan, Crete and Tunisia.

Saltcedar beetles are yellow to yellow-brown, about 1/4 inch (6 mm) long and shaped like a cucumber beetle. Eggs are deposited in masses of up to 20 eggs each, which are glued to saltcedar foliage. The eggs hatch in about 5 days.

When small, the larvae are black. Larger larvae are black with a yellow strip along each side. Full-grown larvae are about 1/3 inch (9 mm) long.

The larvae feed on saltcedar foliage for about 3 weeks and then crawl or drop to the ground, where they pupate in the leaf litter

on the soil surface. About a week later, adult beetles emerge from the pupae. Two or more generations are completed each year. Over the winter, adults live beneath the leaf litter and grasses on the soil surface.

For future release, researchers are studying other insect species, including a small weevil, a mealybug and gall insects.

Gradual death by defoliation

Saltcedar beetle larvae and adults feed on the small, scalelike leaves of saltcedar. Larger larvae and adults may also feed on the bark of small twigs, causing the ends of the twigs to dry up and die.

When a saltcedar leaf beetle feeds on saltcedar leaves, they turn brown and die. Large numbers of larvae can quickly defoliate saltcedar trees. Although the trees can grow new leaves, they are not expected to be able to withstand repeated feeding by several generations of beetle larvae.

Biological control of saltcedar will likely be a gradual process. Before the trees begin to die, they will need to be defoliated by saltcedar beetles for one or more seasons. Also, the beetles need time to reproduce so that populations can grow large enough to cause widespread damage to the trees. The rate at which beetles fly to new sites is not known.

Although biological control will not eradicate saltcedar, it is expected to check the tree's growth and spread, allowing native plants to be more competitive.

Biological control is a sustainable approach that can suppress saltcedar in the long term. Control may be slow initially, but once beetles are established in an area, they should continue to reduce the regrowth of estab-

lished trees as well as the growth of seedling saltcedar plants.

Target dates for implementation

The saltcedar leaf beetle has been reared in cages and studied at three research sites in Texas for several years. In July 2003, researchers were granted federal and state approval to release the beetle at six more sites in Texas.

Once populations of beetles are established — expected in 2005 — beetles will be collected from these sites and distributed to landowners, ranchers and public and private agencies. The initial programs for distribution will be limited by the availability of beetles.

Much of the saltcedar infesting the Pecos River has been treated recently with aerially applied herbicides. Plans are to expand this program to the Colorado River and other areas. Biological control can complement these herbicide programs, as the beetles can help suppress the regrowth of surviving trees.

Biological methods are especially useful in areas where herbicides cannot be applied because of the potential harm to desirable native vegetation, in environmentally sensitive areas and in areas where there are too few saltcedar trees to justify the cost of aerial sprays.

Cooperating agencies

The Saltcedar Biological Control Program in Texas is a cooperative effort among many federal, state, public and private agencies and groups. The USDA-Agricultural Research Service is the lead agency responsible for identifying and testing insects approved for biological control of saltcedar.

Other participating agencies include Texas A&M University, Texas Cooperative Extension,

Texas Agricultural Experiment Station, Texas Department of Agriculture, USDA-APHIS and the Colorado River Municipal Water District.

The national effort to biologically control saltcedar is coordinated by the Saltcedar Biological Control Consortium, an organization of federal, state and private interests devoted to improving natural and agricultural ecosystems through the control of invading saltcedar.

For more information

For current information on the Saltcedar Biological Control Program, contact the authors or log onto:

<http://bc4weeds.tamu.edu/saltcedar.html>.

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