Control

Saltcedar is difficult to control. Single treatment approaches to control saltcedar have not proven feasible because no method completely eliminates saltcedar or its regeneration. An integrated approach and development of a restoration/revegetation plan are essential for success in restoring an area to long-term productivity. Incomplete control efforts can stimulate regrowth that increases the density of a saltcedar stand. The rate of success in saltcedar control will increase with a combination of mechanical, chemical or biological control treatments. An integrated approach that maximizes the use of local resources and takes advantage of environmental conditions will achieve the highest level of long-term control.

Chemical

Triclopyr and imazapyr are effective herbicides against saltcedar. Triclopyr is most effective in cut stump and basal bark treatments. Trees should be cut so that the stumps are two inches above the soil surface and the herbicide should be applied within a few minutes to the sides of the stump and the cambium layer. Basal bark applications can be applied any time of the year when the bark isn't wet or frozen. Herbicide should be applied from the ground up to 12-18″ on all sides of the stem. Imazapyr treatments are most effective as foliar applications and provide the highest rate of saltcedar mortality at levels of 90 percent or greater. Fall applications in August or September produce the highest mortality rates.

Cut stump application

Mechanical

Attempts at mechanical control include mowing, cutting, and root plowing. These methods rarely kill the plant and often stimulate shrubby regrowth. Mechanical treatments should be followed with a chemical treatment to reduce the vigorous resprouts. Debris from mowing or plowing should be gathered into piles and burned to prevent sprouting from adventitious buds.

Biological

The extensive invasion of saltcedar has justified the search for a suitable biological control agent. The saltcedar leaf beetle, *Diorhabda elongata*, has been tested for 20 years by APHIS and has been released at test locations in the western United States At these test sites, it was demonstrated

D. elongata feeding damage

that the saltcedar leaf beetle: 1) can be imported safely into the U.S., 2) will feed only on saltcedar, and 3) can potentially kill saltcedar and reduce its spread. The saltcedar leaf beetle was tested in containers with native plants and shown not to eat these plants. Agronomic crops of economic importance and riparian species associated with saltcedar invasions, such as willow and cottonwood, were exposed to the saltcedar leaf beetle with no negative impact. The saltcedar leaf beetle does not feed or develop on any plant other than members of the genus *Tamarix*.

At a test site located on the lower Sevier River about 25 miles southwest of Delta, Utah, caged testing lasted for two years from 1999 to 2001. In 2001 approval was received to release and monitor the saltcedar leaf beetle. Four years after the initial releases, the beetle populations had grown dramatically and had defoliated an estimated 1000 - 1500 acres of saltcedar.

The saltcedar leaf beetles are yellow-brown and about ¼ inch long. Larvae feed on saltcedar foliage for about 3 weeks before crawling or dropping to the ground where

D. elongata pupae and adult

they pupate in the leaf litter or loose soil at the base of the plant. About one week later adult beetles emerge and feed on the saltcedar foliage. The saltcedar leaf beetle over-winters as an adult and emerges the following spring to lay eggs.

Conclusion

Saltcedar is well established throughout the west and will require a long-term commitment of time and resources to manage. Prevention should be a major focus in saltcedar management to protect areas not yet infested.

For more information and references on saltcedar and its management see the following Web sites:

http://extension.usu.edu/cooperative/publications

http://www.utahweed.org

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Saltcedar

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Introduction

Saltcedar, also known as tamarisk, was introduced into the United States in the 1820s for its ornamental characteristics and was later used for wind breaks and stream bank stabilization. Saltcedar has since become a concern to recreationists because it forms dense stands that limit access to river and stream banks. Land managers are concerned because of the loss of native vegetation that affects

plant and animal diversity, especially in riparian areas. Water management groups are also concerned with saltcedar infestations along waterways because of its ability to change hydrological patterns and the high rate of water loss associated with saltcedar evapotranspiration. In the western United States, saltcedar is on the noxious weed lists of Arizona, California, Colorado, Montana, Nevada, New Mexico, Oregon, Washington, and Wyoming.

The Problem

Saltcedar initiates negative changes to the ecosystem. The deep roots combined with salt glands on the leaves account for the redistribution of salts from deep soil profiles to the soil surface. The excessive salt deposits on the surface inhibit the growth and germination of less salt tolerant native species leading to a reduction in plant and animal diversity. Although some wildlife species successfully survive in saltcedar-dominated areas, most species are negatively affected by displacement of native riparian plant species.

Well established infestations of saltcedar have the ability to increase the frequency and severity of flooding. The extensive root system increases sediment deposition, which narrows the water channel and increases water velocity. The area inundated by flooding is also extended along infested waterways because of the constricted channel. Dense stands of saltcedar choke the overflow and lateral channels that are used during a river's flood stage.

Saltcedar is adapted to fire and recovers more quickly than native riparian species after a burn because of its ability to vigorously resprout from the crown. Historic fire records from the lower Colorado River floodplain show that fire frequencies and size are greater in saltcedar infested sites compared to analogous non-infested sites. In saltcedar-dominated areas, 35 percent of the vegetation burned within a 10-year period (1981-1992) compared to the mesquite-dominated areas that burned 2 percent of the vegetation within the same time period. Dead and senesced woody materials, combined with an accumulation of leaf litter in saltcedar infested sites, creates a fuel load that can lead to an increase in the frequency of fires.

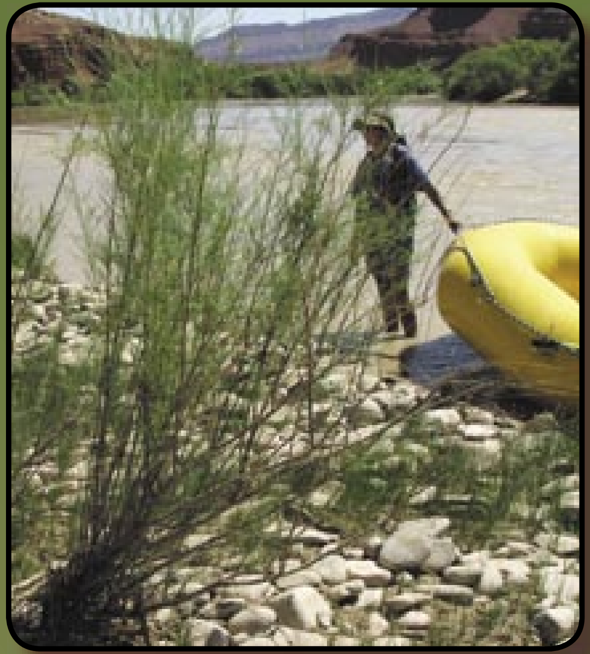
Biology

Saltcedar is a shrubby tree that can grow to be 20 feet tall. New growth has reddish-brown bark, which darkens with age. Saltcedar leaves are scale-like with salt secreting glands. The flowers are small, bright pink to white, and produce up to 500,000 seeds/plant throughout a growing season, usually from April to October.

Saltcedar competitiveness can largely be attributed to its intricate root system. The first root from a germinating seed grows directly to the water table, followed by profuse lateral root development. Saltcedar can tolerate higher levels of salt concentrations in soils than most native species. The deep roots in combination with the salt glands on the leaves make it possible for saltcedar to redistribute salts from lower soil profiles to the soil surface. Excessive salt deposits on the surface inhibit the germination of less salt tolerant native species. As the native species are crowded out, a monotypic stand of saltcedar is formed.

Water Usage

When analyzing plant transpiration rates it is important to consider all the contributing factors including: stand density and age, climatic conditions, water availability and the associated vegetation. Research supports the conclusion that in a plant-to-plant comparison, saltcedar uses comparable amounts of water as native riparian plants such as willow and



cottonwood. However, saltcedar tends to grow at higher densities than native riparian vegetation, and as a result it uses more water per unit area. The growth pattern of saltcedar infestations is determined by the depth of the water table and the disturbance history for an area. Saltcedar's ability to access the water table may provide it with more available water than associated vegetation with shallow root systems. These factors, stand density, water availability, and associated vegetation, affect measurements that determine water loss from saltcedar.