GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Tamarix ramosissima***

Tamarix ramosissima 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Violales	Tamaricaceae

Common name salt cedar (English), Sommertamariske (German), tamarisk (English), tamarix (English)

Synonym *Tamarix pallasii* , var. *brachystachys* Bunge
Tamarix pentandra

Similar species *Tamarix aphylla, Tamarix canariensis, Tamarix chinensis, Tamarix gallica, Tamarix parviflora*

Summary *Tamarix ramosissima* is a rampantly invasive shrub that has dominated riparian zones of arid climates. A massive invasion of *T. ramosissmia* in the western United States has dominated over a million acres. Typically found in conjunction with other *Tamarix* species and resultant hybrids, *T. ramosissima* displaces native plants, drastically alters habitat and food webs for animals, depletes water sources, increases erosion, flood damage, soil salinity, and fire potential.

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Species Description
Tamarix ramosissima is a semi-deciduous, loosely branched shrub or small to medium-sized tree. The branchlets are slender with minute, appressed scaly leaves. The leaves are rhombic to ovate, sharply pointed to gradually tapering, and 0.5 - 3.0mm long. The margins of the leaves are thin, dry and membranaceous. Flowers are whitish or pinkish and borne on slender racemes 2-5cm long on the current year's branches and are grouped together in terminal panicles. The pedicels are short. The flowers are most abundant between April and August, but may be found any time of the year. Petals are usually retained on the fruit. The seeds are borne in a lance-ovoid capsule 3-4mm long; the seeds are about 0.45mm long and 0.17mm wide and have unicellular hairs about 2mm long at the apical end. The seeds have no endosperm and weigh about 0.00001 gram. (Carpenter, 2003; Dudley, pers. comm.).
T. ramosissima, *Tamarix aralensis*, and *T. chinensis* can be distinguished from other members of *Tamarix* by their sessile leaves, pentamerous flowers, and hololophic androecial discs. *T. chinensis* and *T. ramosissima* can be distinguished from *T. aralensis* by its caducous petals at the time of seed maturation.*T. ramosissima* and *T. chinensis* may be distinguished by a few microscopic floral characters especially where the filament is inserted into the nectary disk and edaphic affinities. *T. ramosissima* has an eroded denticulate, obovate petals, and is halophilous, while *T. chinensis* has entire sepals, elliptic-ovate petals, and prefers non-halophilous soils (Gaskin & Scheel, 2003)

Notes
There are few plants that are true genetic species of *Tamarix ramosissima* in infested areas, at least in North America. Most of what is called *T. ramosissima* represents a variety of hybrids, including haplotypes of *T. ramosissima*, *T. chinensis*, *T. gallica* and others (Gaskin and Schaal 2002); it even hybridizes with athel (T. aphylla), an evergreen species, in some southwest U.S. locations (Gaskin and Shafroth, in press). The most common genotype in the U.S. is a morphologically cryptic hybrid of *T. ramosissima* and *T. chinensis* not detected in Eurasia (Gaskin & Schaal, 2002).

Lifecycle Stages
Tamarix ramosissima will produce roots from buried or submerged stems or stem fragments. This allows the species to produce new plants vegetatively following floods from stems torn from the parent plants and buried by sediment. Ideal conditions for first-year survival are saturated soil during the first few weeks of life, a high water table, and open sunny ground with little competition from other plants. The seedlings of this species grow more slowly than many native riparian plant species and it is highly susceptible to shading (Carpenter, 2003).

Uses
Often planted as an ornamental and to prevent erosion in arid areas. *Tamarix ramosissima* provides a nectar source for honeybees in some areas, and is widely used in the old world for furniture making and for firewood, for tannin extraction, and for cover for livestock (Dudley, pers. comm.). *T. ramossisima* may also be useful for bioremediation, for instance it takes up perchlorate from groundwater, perchlorate being a pollutant derived from jet fuel (Urbansky *et al.* 2000).
Many species of native birds, including the endangered and federally protected south-western willow flycatcher (*Empidonax traillii extimus*), are able to exploit *T. ramosissima* for shelter and nesting, especially when some native trees remain (Fleishman *et al.* 2003). However, it is mostly foliage gleaners and fairly opportunistic species that use it to a substantial extent - cavity nesters like owls and wrens, drillers like woodpeckers and sapsuckers, frugivores, granivores and other specialists rarely occupy tamarisk (Ellis 1995, Shafroth *et al.* 2005, Hunter 1984, Hunter *et al.* 1985, Cohan *et al.* 1979, Lovich and DeGouvenain 1998, Dudley and DeLoach 2005) and usage by insectivores declines greatly as vegetation dominance by tamarisk increases (Yard *et al.* 2004).

Reproduction
Tamarix ramosissima is highly fecund. It produces massive quantities of minute seeds that are readily dispersed by wind (Carpenter 2003) but are usually only viable for a few days (Dudley pers. comm.). *T. ramosissima* seeds have no dormancy or after-ripening requirements. Germination can occur almost immediately upon reaching a moist site, and germination conditions are broad, good germination being found from 10 to 35°C, but mid-summer seed collections indicated poorer germination rates than those collected in late spring (Young *et al.* 2004). *T. ramosissima* flowered in two flushes, one in April-May and another in late July in northern Arizona, presumably reflecting availability of spring snowmelt and summer monsoon moisture. This species flowered continuously under favourable environmental conditions but the flowers require insect pollination to set seed (Carpenter 2003).

Nutrition
Tamarix ramosissima is a facultative phreatophyte, meaning that its roots are able to reach deep water tables but it is capable of tolerating periods without access to water (Carpenter 2003).

General Impacts
Tamarix ramosissima has displaced or replaced native plant communities and may be a major contributor to the decline of many native plants and animals, including endangered species (Dudley & Deloach, 2004). Alteration of natural flooding regimes through dam construction has resulted in *T. ramossisima* replacing many native tree species, such as cottonwood (*Populus deltoides* subsp. *wislizenii*) and willows (*Salix* spp.), in riparian forests (Everitt 1980; Horton 1977; Robinson 1965; Graf 1978). The invasion of *Tamarix ramosissima* along streams is likely to have altered the food webs in these aquatic ecosystems (Kennedy & Hobbie 2004). The roots of *T. ramosissima* bind together gravel and cobble riverbeds, resulting in enlarged bars and narrowed channels increasing the likelihood of flood (Cooper *et. al* 2003).
The leaf litter and foliage produced by *T. ramosissima* is flammable and encourages the spread of wildfires (Busch 1995; Brotherson & Field 1987; Dudley *et al* 2000). Native vegetation and wildlife is destroyed in these fires, while *T. ramosissima* seedlings are able to increase their spread. This is due to their ability to re-sprout more successfully than native plants following fire (Huntert *et al* 1988; Busch 1995; Ellis 2001; Dudley *et al* 2000).
T. ramosissima is capable of utilizing saline groundwater by excreting excess salts through glands in the leaves causing an increase in surface soil salinity. This increase, combined with dense canopy of saltcedar plants and higher likelihood of fires within stands of saltcedar, results in the elimination of native riparian plants (APHIS, 2000).
T. ramosissima is also known to transpire large amounts of groundwater, which dessicates soils and reduces the water table. Its transpiration rate is similar to native plants on a per-leaf basis but it maintains a larger leaf area per ground area, and therefore uses more water in total (Sala *et al* 1996; Dahm *et al* 2002; Shafroth *et al* 2005; Cleverly *et al* 2002). Because *T. ramosissima* can take up water from non-saturated soils, it has an added advantage in outcompeting native vegetaion (Dudley, pers. comm.).
T. ramosissima posseses many physiological adaptations that allow it to replace the native tree species, especially along human-altered river stretches. These include: high seed production, rapid germination and seedling establishment, high growth rates, high ET rates, drought tolerance, extreme salt tolerance, flood tolerance, the ability to resprout after fire, and high leaf area index (LAI) allowing it to establish quickly and deplete water-tables at the expense of native species These advantages appear to be so overwhelming that, once it becomes established, eradication of it by human intervention is difficult but necessary to restore riparian corridors (Glen & Nagler, 2005).

Management Info
Mechanical: Hand pulling can be used where plants are small, access is difficult, or herbicides cannot be used (Carpenter 2003). Uprooting methods are effective in the short-term because uprooted trees do not resprout. For sawing and mowing, chemical treatment may be necessary to prevent resprouting. Immature plants may often be physically removed by hand with care given to complete removal of the root structure and disposal of the plant by burning or deep burial. Bulldozing, followed by root-plowing is successful, consistent and effective when used on large thickets of established *Tamarix ramosissima*.
Managed flooding can effectively kill *T. ramosissima* on a long-term basis. Repeated flooding is necessary to kill saltcedar seedlings that are rapidly established from windborne seeds. Established saltcedar plants can tolerate flooding for up to 3 months. Conditions suitable for controlled flooding exist in relatively small areas such as highly managed wildlife refuges (APHIS, 2003).
Chemical: Aerial application of the herbicide imazapyr, alone or in combination with glyphosate, is effective and practical for controlling *T. ramosissima* over thousands of hectares, particularly in dense stands where little or no native vegetation is present. Several field trials have produced control rates of > 90% after one or two years (Carpenter 2003).
On smaller sites the cut stump method is successful when triclopyr herbicides are also used. Basal bark applications of Garlon4 were very effective on plants with a basal diameter of less than 4 inches. Burning, followed by herbicide application to the resprouts, also produced excellent results, although this method is not appropriate when *T. ramosissima* exists as a component of native plant communities (Carpenter 2003). The use of triclopyr (Garlon4 or Remedy) mixed with oil and applied as a basal bark or cut stump treatment has been used with great success on scattered infestations, with no resprouting occurring. The basal bark treatment involves applying the herbicide mixture to the lower 18 inches of the plant clear to the ground.
Herbicides used at aquatic sites include Arsenal and Habitat. These are very effective as foliar treatments, but are not selective and must be used with care. Around 30% of tamarisk may resprout after three years when using these herbicides (Baker, 2005. pers. comm.).
Biological: Cattle (and probably goats) will eat *T. ramosissima*.
A biocontrol agent, the saltcedar leaf beetle (*Diorhabda elongate*), has been released in nine states (California, Oregon, Nevada, Utah, Wyoming, Colorado, Montana, New Mexico and Texas), excluding those areas where the endangered southwestern willow flycatcher (*Empidonax traillii extimus* is nesting in tamarisk (Dudley *et al*. 2001, DeLoach *et al*. 2004).
The Athel Pine National Best Practice Management Manual brings together the best management practices available to date on control options for athel pine (*T. aphylla*), tamarisk (*T. ramosissima*) and smallflower tamarisk (*T. parviflora*). It also illustrates successful control programs with case studies that demonstrate how these weeds are managed effectively in Australia. Included are pointers to identify the Tamarix species you are dealing with as each of them are managed using different strategies. The manual includes a 'Decision Support Tree for Tamarix control' to develop a control program for athel pine, tamarisk or smallflower tamarisk based on the type of infestation you have to treat and the options available to you.

Pathway
Introduced as ornamentals and for windbreaks (Sobhian *et. al* 1998).

Principal source: Carpenter, 2003 Element Stewardship Abstract for *Tamarix ramosissima* Ledebour

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG)

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ALIEN RANGE

[1] ARGENTINA
[2] CANADA
[1] SOUTH AFRICA
[1] AUSTRALIA
[1] MEXICO
[30] UNITED STATES

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Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.
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Summary: English:
The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.
Invasive species - Plants is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas [Accessed 30 July 2008]
Spanish:
La lista de especies del Sistema de informaci&#65533;n sobre especies invasoras de m&#65533;xico cuenta actualmente con informaci&#65533;n aceca de nombre cient&#65533;fico, familia, grupo y nombre com&#65533;n, as&#65533; como h&#65533;bitat, estado de la invasi&#65533;n en M&#65533;xico, rutas de introducci&#65533;n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p&#65533;gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci&#65533;n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci&#65533;n novedades, para conocer los cambios.
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