RUSSIAN THISTLE

Integrated Pest Management in the Landscape

Russian thistle, also known as tumbleweed, is in the goosefoot family (Chenopodiaceae). Its scientific name is *Salsola tragus,* but it also has been known as *Salsola iberica, Salsola kali,* and *Salsola australis.* It is a summer annual native to southeastern Russia and western Siberia and was first introduced into the United States in 1873 by Russian immigrants as a contaminant in flax seed in South Dakota. After its introduction, it spread by contaminated seed, threshing crews, railroad cars (especially livestock cars), and by its windblown pattern of seed dissemination. In 1895 Russian thistle moved to the Pacific Coast in contaminated railroad cars that transported cattle to Lancaster in California's Antelope Valley. Today it is common throughout the western United States—having invaded about 100 million acres. It is particularly well adapted to California's climate of winter rainfall and summer drought.

Russian thistle is primarily a weed in sites where the soil has been disturbed, such as along highways and fencelines. It is also prevalent in vacant lots and other noncrop areas, in field and vegetable crops, and in poorly tended landscapes. It is rarely a problem in well-managed gardens or turfgrass.

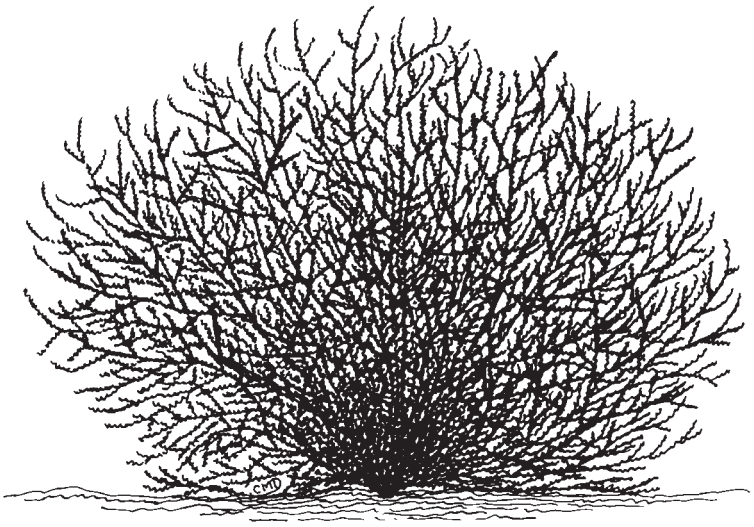

Figure 1. Russian thistle.

IDENTIFICATION

Russian thistle is a bushy summer annual with numerous slender ascending stems that become quite woody at maturity (Fig. 1). Stems vary from 8 to 36 inches in length and usually have reddish to purplish stripes. Seedlings have very finely dissected leaves that almost look like pine needles. Leaves of young plants are fleshy, dark green, narrow, and about 1 inch in length. Young plants are suitable for livestock forage and are sometimes grazed. As the plant matures in July through October, the older leaves become short and stiff with a sharp-pointed tip. The single, inconspicuous flowers lack petals and are borne above a pair of small spine-tipped bracts (a small modified leaf at the base of the flower) in most leaf axils (where the narrow leaves meet the stem). The bracts and spiny leaves prevent predation by herbivores as the plant nears maturity. The overall shape of the plant becomes oval to round and at maturity can attain a diameter of 18 inches to 6 feet or more under favorable soil moisture and fertility conditions. After the plant dries, the base of the stem becomes brittle and breaks off at soil level in fall and early winter. These round, spiny plants are capable of dispersing seed for miles as they tumble along in the wind. This dispersal characteristic has led to the more commonly used name of tumbleweed.

There has been a good deal of taxonomic confusion with species in the genus *Salsola* in California. Recent work has demonstrated that what was once referred to as *Salsola tragus* is likely three or more morphologically similar species that differ in their flower size and shape.

LIFE CYCLE

The Russian thistle seed is a naked, coiled embryo or plantlet within the seed, that begins to uncoil when it is

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Figure 2. Leaves on a young plant.

exposed to the proper temperature (52° to 90°F) and moisture conditions. As it uncoils, the young taproot extends into the soil within about 12 hours, making the germination period quite rapid and giving Russian thistle a decided advantage over many other plants under limited moisture conditions. A minimum amount of moisture, lasting only a few hours, will allow germination and root growth to deeper, subsurface moisture.

Russian thistle normally will not germinate successfully in firm soil: the soil in the site must be loose. Likely sites for germination include vacant lots, abandoned gardens and agricultural fields, roadsides, fencelines—any open site with loosened soil. Germination normally occurs in late winter or early spring when the seed can take advantage of winter moisture. Seed viability is rapidly lost in soil. Over 90% of the seed either germinate or decay in the soil during the first year.

The Russian thistle plant is extremely drought tolerant. The taproot can extend several feet into the soil to reach subsurface moisture. Early leaves are linear and fleshy, much like pine needles, but as the plant matures, later leaves are short and spiny and much more capable of conserving moisture (Figs. 2 and 3). Russian thistle normally matures in late summer. The seed is

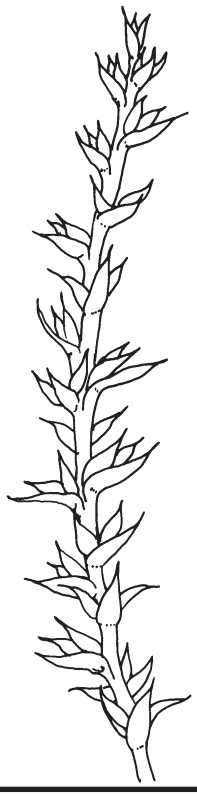

Figure 3. Leaves on a mature plant.

spread when mature plants detach at the base and are blown along by the wind (Fig. 4). A large Russian thistle plant may produce more than 200,000 seeds. In spring, months after their dissemination, it is possible to trace the paths of tumbleweeds across plowed fields by the green trails of germinating Russian thistle seedlings.

Russian thistle is especially well adapted to desert environments. It can tolerate alkaline soil conditions and it is very competitive when moisture is a limiting factor to the growth of other vegetation, when soils are disturbed, or when competing vegetation is suppressed by overgrazing or poor crop establishment. If moisture is not limiting, Russian thistle is less competitive with other species. Seedlings of Russian thistle are suppressed when other plants become established first and shade out the sunlight (Fig. 5).

IMPACT

In late fall and early winter, this troublesome pest becomes conspicuous as it breaks from the soil and is blown across highways and fields. Although Russian thistle, or tumbleweed, conjures up images of the old West, it can be a serious weed pest. In agricultural areas, Russian thistle can reduce yield and quality of numerous crops, particularly alfalfa and small grains. It depletes soil moisture, interferes with tillage operations, and serves as a shelter or food source to many insects, vertebrate pests, and crop diseases such as curly top, which affects many crops including potatoes and beans. Russian thistle can also threaten native plant ecosystems. Large plants can reduce highway safety by obstructing views along right-of-ways and causing drivers to swerve their cars in an attempt to avoid colliding with windblown plants. In many areas, plants accumulate along tree rows and fencelines, posing a serious fire hazard that necessitates hours of manual labor for cleanup and disposal. It has been reported that prairie wildfires can spread rapidly when ignited balls of burning Russian thistle blow through grasslands. Russian thistle is a major problem along the California aqueduct where it can interfere with water delivery and pumping systems. Many people are sensitive to Russian thistle and exhibit skin rashes and allergic reactions after exposure to the plant. A slight scratch or abrasion from the plant may result in itching or reddened patches of skin. The windblown pollen of Russian thistle can cause an allergic reaction in people during summer.

MANAGEMENT

Biological control. Control of Russian thistle is difficult. There have been numerous attempts through the years to import biological control agents, such as insects, but none have been successful. The biological control agents have become established but do not provide sufficient control. However, there is hope on the horizon. There is recent interest in the introduction of a blister mite, *Aceria salsolae*, for Russian thistle control. A native to the Mediterranean Basin, this mite is known to attack only Russian thistle and stunts it by killing the growing tips. Several other potential biological control agents, such as a

seed-feeding and stem-boring caterpillar and two different weevils are also under investigation.

Management in the Home Landscape

Cultural control practices such as mowing or destroying young plants by other means can prevent seed production. Avoid discing or loosening the soil in abandoned areas because loose soil is necessary for Russian thistle germination and is therefore likely to aggravate the situation. Burning is sometimes used to destroy accumulated Russian thistle plants. While this may eliminate the accumulated organic debris and some seed, much of the seed will already have been disseminated. Planting competitive, more desirable species can be an effective method of preventing Russian thistle establishment in most noncrop environments. Russian thistle competes poorly in situations with firm, regularly irrigated soil, and it is rarely a problem in managed gardens, turfgrass, or landscapes. Herbicides are rarely necessary in home gardens and landscapes for Russian thistle control.

Management in Commercial and Roadside Areas

Cultural practices such as those recommended for home landscapes can help control this plant along roadsides or in commercial crops. In addition, there are many herbicides that will control Russian thistle in agricultural crops and noncrop areas. Aim treatments at controlling the immature plants to prevent them from producing seed. The selection of an appropriate herbicide depends on the site or the crop.

Preemergent Herbicides. Preemergent hebicides are applied to the soil before the weed seed germinates and usually incorporated into the soil with irrigation or rainfall. The most effective preemergent herbicides are atrazine (Aatrex), bromacil (Hyvar), chlorsulfuron (Telar), hexazinone (Velpar), imazapyr (Arsenal), napropamide (Devrinol), simazine (Princep), and sulfometuron (Oust). Other preemergent herbicides that are registered but only moderately effective in controlling Russian thistle are alachlor (Lasso), norflurazon (Predict), oryzalin (Surflan), pendimethalin (Prowl), prodiamine (Endurance), pronamide (Kerb), and trifluralin (Treflan). See the online UC IPM Pest Management Guidelines for specific materials registered for agricultural crops, http://www.ipm.ucdavis.edu.

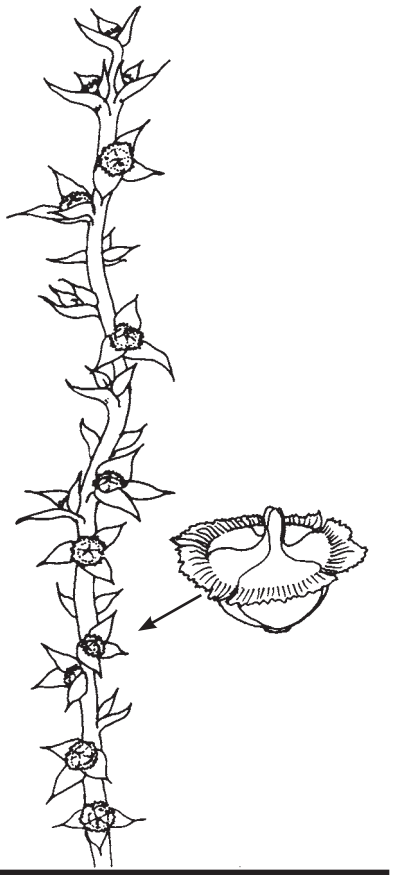

Figure 4. Mature plant in seed; close-up of seed.

Herbicide-resistant biotypes of Russian thistle have evolved in only a couple of years following treatment with chlorsulfuron (Telar) or sulfometuron (Oust). Avoid repeated use of a single herbicide or of herbicides that have the same mode of action to prevent the evolution of herbicide-resistant populations.

Postemergent Herbicides. Postemergent herbicides are applied to plants, but timing is critical. For best results, these herbicides must be applied while the weed is in its early growth stages, preferably the early seedling stage, before it becomes hardened and starts producing its spiny branches. Do not use postemergent herbicides to try to control the mature seed (either on the plant or on the ground) as they are not effective for this purpose. Also, the later spiny stage of Russian thistle is not readily controlled by any postemergent herbicide. If rain or irrigation occurs after a postemergent application, additional seedlings may emerge and require future treatments. Postemergent herbicides that are effective when properly applied include dicamba (2,4-D, Banvel, or Vanquish), glufosinate (Finale, Liberty, or Rely), glyphosate (Roundup), and paraquat (Gramoxone).

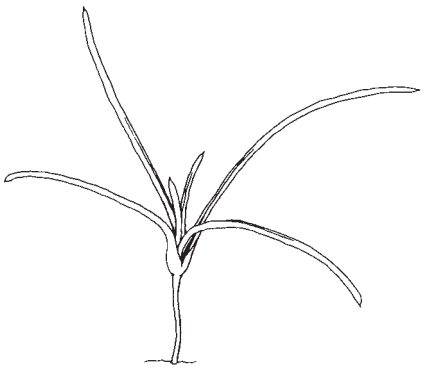

Figure 5. Russian thistle seedling.

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