Elaeagnus angustifolia L.

Russian-olive

Family: Elaeagnaceae
Range: Throughout the western U.S. and in most other states, with the exception of the southeastern U.S.
Habitat: Riparian areas, floodplains, grasslands, roadsides, fencerows, seasonally moist pastures, ditches, and other disturbed sites. Often inhabits seasonally moist areas and sites near farmlands. Grows under a wide range of environmental conditions, including clay, sandy, and fairly alkaline or saline soils. Grows best in inland areas with warm summers and cold winters. Tolerates drought, high water tables, and both freezing and hot temperatures.
Origin: Native to the temperate regions of Asia. Continues to be cultivated as a hardy landscape ornamental and windbreak tree, but has escaped cultivation in many areas of the United States.
Impacts: Russian-olive is especially invasive in seasonally wet riparian areas and may eventually replace stands of native willows (*Salix* spp.) and cottonwoods (*Populus* spp.) at some locations. Although Russian-olive fruits provide food for wildlife, trees are used to a lesser degree than the native vegetation.
Western states listed as Noxious Weed: Colorado, New Mexico
California Invasive Plant Council (Cal-IPC) Inventory: Moderate Invasiveness

Russian-olive is a fast-growing, deciduous tree to 25 ft tall, with silvery foliage. Its twigs and branches are sometimes thorny. Leaves are alternate, simple, narrowly lanceolate or elliptic, mostly 2 to 4 inches long, with smooth margins. The upper surface of the leaf is gray-green and moderately covered with silvery star-shaped hairs and scales. The twigs, leaf stalks, and lower leaf surfaces are silvery gray, and densely covered with silvery shield-shaped (peltate) scales. Cut trees typically resprout from the crown and roots. Depending on the location, roots sometimes associate with nitrogen-fixing bacteria (*Frankia*).

Russian-olive flowers are in umbel-like clusters. The flowers are highly fragrant, mostly 5 to 10 mm long and wide, consisting of a narrow, bell-shaped calyx (sepals as a unit) with four acute petal-like lobes. The fruits are drupe-like (with a fleshy outer layer covering 1 seed), ovoid, about 0.5 to 1 inch long and covered with silvery scales. Plants primarily reproduce by seed. Most fruits remain on trees until distributed by animals, especially birds. The seeds survive ingestion by animals. Seeds are dormant at maturity and require a cool moist stratification period of about 2 to 3 months. Some seeds are hard-coated and may require scarification as well as stratification. Stored seeds survive up to 3 years, but longevity in the field is undocumented.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Manually removing seedlings and saplings with roots before they mature is a more effective than removing mature trees. Pulling or digging out larger plants is both extremely labor-intensive and not recommended, since it can leave behind root fragments that can resprout. Ring-barking has also been used to kill older trees. Russian-olive plants with small diameters of 3.5 inches or less can be pulled out with a weed wrench when soils are moist. In certain situations larger trees can be removed using a bulldozer or a tractor with an attached chain. Any remaining exposed roots should be cut off below ground level and buried. Girdling and cutting can suppress Russian-olive but are not effective control options when used alone. Trees vigorously resprout from the roots and crown, or below the girdled or cut area, or along root lines, often resulting in even denser growth. These techniques also require frequent retreatment and cause significant soil disturbance. Cutting trees in mid-summer and then mowing the resprouts once in late

	summer the following year gave effective control, but was labor intensive and costly. Cutting trees before fruits mature can be combined with either burning the stumps or applying an herbicide in a cut stump treatment to give effective control. Choosing other landscape ornamentals for sites where seedlings may invade nearby natural areas can help prevent the spread of Russian-olive.
Cultural	Small seedlings of Russian-olive may be susceptible to fire, but burning alone does not adequately control larger individual plants as they vigorously resprout following fire. Stump burning of Russian-olive has been shown to be successful, but it is time-consuming compared to other control techniques. Prescribed burning, however, can be used as a pretreatment for another control method, particularly a subsequent herbicide treatment to the resprouts or a basal bark treatment to the stems of resprouts.
Biological	There are no efforts to develop a biological control program for Russian-olive.

CHEMICAL CONTROL

The following specific use information is based on published papers and reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

GROWTH REGULATORS	
2,4-D Several names	**Rate:** 2 qt product/acre (1.9 lb a.e./acre) **Timing:** Postemergence when leaves are fully developed in early to mid-summer. **Remarks:** 2,4-D is a broadleaf herbicide with no soil activity. It will require two to three retreatments for effective control. 2,4-D can also be mixed with dicamba (4 lb product 2,4-D/acre + 2 lb product dicamba/acre).
Picloram *Tordon 22K*	**Rate:** Foliar spot treatment: 3% v/v solution provides good control of stems but vigorous suckers can develop. **Timing:** Postemergence at the end of summer to beginning of fall, but before leaf drop. **Remarks:** Picloram is broadleaf-selective and is used to control a variety of annual and perennial broadleaved herbs and woody species. High levels of picloram can give long-term soil activity for broadleaves. Picloram has long soil residual activity. Picloram is a restricted use herbicide. It is not registered for use in California. Picloram is often sold mixed with 2,4-D (*Tordon 101M*), and this formulation has also been used as a cut stump treatment to control Russian-olive or as a foliar treatment to control Russian-olive seedlings.
Triclopyr *Garlon 3A*, *Garlon 4 Ultra*, *Remedy Ultra*, *Pathfinder II*	**Rate:** Broadcast foliar treatment: 1 to 2 qt product/acre (1 to 2 lb a.e./acre); addition of 7 oz product/acre of *Milestone* can improve control of Russian-olive. Low volume foliar treatment: 5% v/v solution of triclopyr and water plus 0.5% surfactant v/v to thoroughly wet all leaves. Foliar treatment of resprouts: 25% *Garlon 4 Ultra* for the following two years. Basal cut stump treatment: 25 to 50% *Garlon 4 Ultra* in 50 to 75% oil carrier. Cut stump treatments: undiluted *Garlon 3A* or 50% *Garlon 3A* in water. Basal bark treatment: 25% *Garlon 4 Ultra* in 75% oil carrier, or *Pathfinder II* as a ready to use formulation. **Timing:** Cut stump, basal cut stump, and basal bark treatments can be applied as long as the ground is not frozen, but are best in late summer or early fall, before leaf drop. For foliar treatment, the best time to apply the herbicide is when plants are growing rapidly from May through September. **Remarks:** Triclopyr is a selective herbicide for broadleaf species and will not harm grasses growing nearby. For cut stump treatments, cut stems horizontally at or near ground level and apply herbicide solution immediately, covering the outer 20% of the cut face. Suckering from the roots typically occurs after cutting, but the treatment should control most resprouts. For basal bark treatment, spray the lower trunk, including the root collar, to a height of 12 to 15 inches from the ground; the spray should thoroughly wet the lower stem but not to the point of runoff. Trees should not be cut for 1 month to a year after basal bark treatment. *Remedy Ultra* can also be used for basal bark treatments. *Garlon 4 Ultra* at 3 qt product/acre can be tank mixed with aminopyralid (*Milestone*) at 7 oz product/acre when treating resprouts after cutting. The girdling method has also been shown to be effective for Russian-olive control. This involves making shallow, overlapping cuts into the bark around the trunk base using a hatchet or chainsaw, and then

	lightly spraying the entire cut surface with herbicide.
AROMATIC AMINO ACID INHIBITORS	
Glyphosate *Roundup*, *Accord XRT II*, and others	**Rate:** Foliar treatment: 1 to 1.5% v/v solution of *Roundup ProMax* (or other trade name with similar concentration of glyphosate) to thoroughly wet all leaves. Low volume spot treatment: 4 to 7% v/v solution of *Roundup* (or other trade name) to wet 50% of the leaves. Cut stump treatment: undiluted *Roundup* (or other trade name) or 50% v/v in water applied to the cambium. Frill treatment: undiluted glyphosate. **Timing:** Postemergence foliar treatments are best when leaves are fully expanded. Suckering from the roots might occur the following year. Cut stump and frill treatments are best applied in late summer, early fall or dormant season. Treatment should occur immediately after cutting. **Remarks:** Glyphosate is a nonselective systemic herbicide with no soil activity. It gives good control with some resprouts. Trees should not be cut for about 1 year after foliar treatment to ensure roots have been killed.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Imazapyr *Arsenal*, *Habitat*, *Stalker*, *Chopper*, *Polaris*	**Rate:** Broadcast foliar treatment: 1 to 2 qt product/acre (0.5 to 1 lb a.e./acre). Spot foliar treatment: 1 to 4% v/v solution **Timing:** Postemergence foliar treatments are best when leaves are fully expanded. **Remarks:** Imazapyr is a broad-spectrum herbicide with long soil residual activity. Add a surfactant at 0.25% v/v solution for broadcast application or 1% for spot treatment. Imazapyr has only been shown to give about 75% control of Russian-olive.
PHOTOSYNTHETIC INHIBITORS	
Tebuthiuron *Spike*	**Rate:** Individual spot treatments: 20 lb product (*Spike 20P*)/acre (4 lb a.i./acre), 7.5 lb product (*Spike 80DF*)/acre (6 lb a.i./acre); 0.5 oz product (*Spike 20P*)/1 inch of stem diameter **Timing:** Soil treatments can be applied anytime except when the soil is frozen or saturated with moisture. Applications should be made before the start of spring growth or before expected seasonal rainfall. **Remarks:** Tebuthiuron is a surface applied, soil-active product intended for total vegetation control in non-cropland. For best control, do not disturb plants for 2 years after application.

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.