

This WEED REPORT does not constitute a formal recommendation. When using herbicides always read the label, and when in doubt consult your farm advisor or county agent.

This WEED REPORT is an excerpt from the book *Weed Control in Natural Areas in the Western United States* and is available wholesale through the UC Weed Research & Information Center (wric.ucdavis.edu) or retail through the Western Society of Weed Science (wsweedsociety.org) or the California Invasive Species Council (cal-ipc.org).

Lepidium latifolium L.

Perennial pepperweed (tall whitetop)



Family: Brassicaceae

Range: All western states, except North and South Dakota.

Habitat: Many different areas and habitats, including wetlands, riparian areas, meadows, vernal pools, salt marshes, flood plains, sand dunes, roadsides, irrigation ditches, ornamental plantings, and agronomic crops, including alfalfa, orchards, vineyards, and irrigated pastures. Most typically found on moist or seasonally wet sites in the west, and most problematic in riparian or wetland areas. Tolerates saline and alkaline conditions.

Origin: Native to Eurasia.

Impacts: Perennial pepperweed can rapidly form large, dense stands that displace desirable vegetation and wildlife. Populations easily spread along waterways and can infest entire stream corridors, riparian areas, or irrigation structures. Roots do not hold soil together well, allowing erosion of river, stream, or ditch banks. Flooded streams often wash away roots growing along the streambank, and new infestations develop downstream. Once established, perennial pepperweed is persistent and difficult to control in crops, natural areas, and ornamental plantings. Perennial pepperweed reduces forage quality in hay and pasture. Perennial pepperweed plants extract salts from deep soil and deposit them on the soil surface, inhibiting the germination and growth of other species that are sensitive to salinity.

Western states listed as Noxious Weed: California, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, Utah, Washington, Wyoming

California Invasive Plant Council (Cal-IPC) Inventory: High Invasiveness

Perennial pepperweed is an erect perennial to 6 ft tall. The crown and lower stems are weakly woody. The foliage lacks hairs and is green to gray-green, often dusted with powdery white caused by a rust fungus. The basal leaves are larger and wider than stem leaves, to 1 ft long and 4 inches wide, with serrate margins. The aboveground parts typically die in late fall and winter, leaving dead stems and thatch which can persist for several years. The roots are long, thick, minimally branched, and vigorously creeping. Most grow in the top 2 ft of soil, but some can penetrate to a depth of 10 ft or more.

The inflorescences are rounded to pyramidal and consist of numerous small white flowers. The flowers have four petals, producing small pods (about 2 mm long) with tiny reddish-brown seeds (about 1 mm long). Perennial pepperweed is a prolific seed producer. Laboratory tests suggest seeds germinate readily with fluctuating temperatures and adequate moisture; however, seeds do not appear to remain viable in the soil for extended periods. As a result, perennial pepperweed reproduces primarily vegetatively from roots and root fragments. Large root fragments can survive desiccation on the soil surface for extended periods, and fragments as small as 0.5 to 1 inch long and 2 to 8 mm in diameter can develop into new plants. Root fragments and seeds disperse with flooding, soil movement, and human and animal activities.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Seedlings are easily controlled by hand-pulling or tillage, but these techniques do not control established plants because shoots quickly resprout from vast root reserves. In addition, seedlings are not often encountered. Root segments as small as 1 inch are capable of producing new shoots. Cultivation and tillage typically increase infestations by dispersing root fragments. Clean equipment after tillage to prevent spreading root fragments. Mowing stimulates perennial pepperweed plants to resprout and produce new growth, but mowing is
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	helpful for removing accumulated thatch. Mowing breaks old stems into small fragments and helps prevent shading of favorable species. Combining mowing with herbicides has been shown to be an effective control strategy. For best results, mow plants at the bolting or flower bud stage and apply herbicides to resprouting shoots once they have reached the flower bud stage.
Cultural	<p>Cattle, sheep, and goats will graze perennial pepperweed, especially rosettes in early spring. When stands are dense it becomes difficult for most animals to graze. Goats appear to tolerate heavy consumption of fresh plants. Sheep and goats permanently maintained in a pasture suppress growth of perennial pepperweed. However, once livestock are removed, plants quickly resprout.</p> <p>Burning is not effective at reducing perennial pepperweed stands, but it is helpful at removing accumulated thatch. Perennial pepperweed thatch burns best in winter or spring under dry conditions before initiation of spring growth.</p> <p>Seasonal flooding for an extended period during the growing season can significantly reduce populations. It is not known how long perennial roots can survive flooded conditions, but anecdotal information indicates that 6 months of submergence are required.</p> <p>Establishing desirable vegetation in disturbed areas can suppress perennial pepperweed and slow reinvasion after control. Because perennial pepperweed is very competitive, seed or transplant desirable vegetation after dense perennial pepperweed stands are controlled. Choose vigorous, fast-growing plant species that are adapted to the site. Perennial grasses are a good choice for natural areas and pastures. Grasses are tolerant of broadleaf-selective herbicides, and over time grasses form a thick sod that prevents future weed establishment. In pastures, promote grass expansion and vigor with fertilization and grazing management.</p>
Biological	Biological control agents are being evaluated for use on perennial pepperweed in the United States, but currently no organisms are available.

CHEMICAL CONTROL

The following specific use information is based on 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	<p>Rate: 2 qt product/acre (1.9 lb a.e./acre)</p> <p>Timing: Postemergence at rosette to flowering stages. Most effective at flower bud or flowering stage.</p> <p>Remarks: 2,4-D often requires annual application for multiple years. It is broadleaf-selective and safe on most grasses. 2,4-D has minimal soil activity. Do not apply ester formulations when outside temperatures exceed 80°F. Amine forms are as effective as ester forms, and amine forms reduce the chance of off-target movement.</p>
AROMATIC AMINO ACID INHIBITORS	
Glyphosate <i>Roundup, Accord XRT II, and others</i>	<p>Rate: 2 to 4 qt product (<i>Roundup ProMax</i>)/acre (2.25 to 4.5 lb a.e./acre). Spot treatment: 2 % product v/v</p> <p>Timing: Postemergence from seedling to bloom stage. Most effective at flower bud or flowering stage.</p> <p>Remarks: Glyphosate will not kill seeds or inhibit germination the following season. Glyphosate is nonselective and has no soil activity. It can create bare ground conditions that are susceptible to weed recruitment. In areas with desirable vegetation, use spot treatment. Glyphosate is a good control option if reseeding is planned shortly after application, as it will not injure seedlings emerging after application. Add a surfactant when using a formulation where it is not already included (e.g., <i>Rodeo, Aquamaster</i>).</p>
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Chlorsulfuron <i>Telar</i>	<p>Rate: 1 to 2.6 oz product/acre (0.75 to 1.95 oz a.i./acre)</p> <p>Timing: Postemergence from seedling to flowering stage. Most effective at flower bud or flowering stage.</p> <p>Remarks: Chlorsulfuron has long soil residual activity. It has mixed selectivity, but is generally safe on grasses. Always use a surfactant. 2,4-D at 1 to 2 pt/acre can be tank-mixed with chlorsulfuron for</p>

	quicker burndown. <i>Telar</i> can be used near water, but cannot be applied to water. Chlorsulfuron is included with aminocyclopyrachlor in <i>Perspective</i> . This combination (i.e., formulation) is expected to provide good control, but has not been reported.
Imazapic <i>Plateau</i>	Rate: 8 to 12 oz product/acre (2 to 3 oz a.e./acre) Timing: Postemergence from seedling to flowering stage. Most effective from the bud to the late flowering stage. Remarks: Imazapic gives effective control with some soil residual activity. It can be used in combination with glyphosate (premix trade name of <i>Journey</i>). Selective to most native grasses. Higher rates may suppress seedlings of some cool-season grasses. Add a methylated seed oil. Imazapic is not registered for use in California.
Imazapyr <i>Habitat</i>	Rate: 1 to 2 qt product/acre (0.5 to 1 lb a.e./acre) Timing: Postemergence from seedling to flowering stage. Most effective from the bud to the late flowering stage. Remarks: <i>Habitat</i> is registered for aquatic use. Also effective following early season mowing and/or disking. It is nonselective, has long soil residual activity, and leaves more bare ground than other treatments, even a year after application. Add a spray adjuvant.
Metsulfuron <i>Escort</i>	Rate: 1 to 2 oz product/acre (0.6 to 1.2 oz a.i./acre) Timing: Postemergence from seedling to flowering stage. Most effective at flower bud and flowering stage. Remarks: Metsulfuron has similar activity compared to chlorsulfuron. Metsulfuron has some soil residual activity. Always use a surfactant. Metsulfuron can be tank-mixed with 2,4-D for quicker burndown. Other premix formulations of metsulfuron can be used at similar application timing. These include <i>Cimarron Max</i> (metsulfuron + dicamba + 2,4-D) and <i>Cimarron X-tra</i> (metsulfuron + chlorsulfuron). Metsulfuron is not registered for use in California.
Propoxycarbazone-sodium <i>Canter R+P</i>	Rate: 0.9 to 1.2 oz product/acre (0.63 to 0.84 oz a.i./acre) Timing: Postemergence to young, rapidly growing plants. Remarks: Propoxycarbazone is a broad-spectrum herbicide that will control many species. It will provide only partial control of perennial pepperweed. Perennial grass species vary in tolerance. A non-ionic surfactant should be added at 0.25 to 0.5% v/v solution.

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.