

Perennial Pepperweed (*Lepidium latifolium*)

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Perennial pepperweed infests moist areas and the land along streams, rivers and sub-irrigated pasture. Perennial pepperweed is not presently widespread in Montana, so knowledge and awareness are even more crucial in order to prevent this aggressive plant from invading Montana rangelands.



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PERENNIAL PEPPERWEED, OFTEN USED BY

florists in fresh and dried flower arrangements, is not just another pretty white flower growing along the roadside. This weed is quickly spreading across the West and infesting moist areas and the land along streams, rivers and sub-irrigated pasture. As perennial pepperweed becomes established in wet areas, it also encroaches onto pastures. Perennial pepperweed is not presently widespread in Montana. Therefore, knowledge and awareness are even more crucial in order to prevent this aggressive plant from invading Montana rangelands.

Identification

Perennial pepperweed belongs to the mustard or Brassicaceae family. It is an erect, branching perennial weed that grows one to three feet high, but may reach heights of eight feet in wet areas. The base of the stems is semi-woody. The roots enlarge at the soil surface to form a woody crown (Figure 1A). Toothed leaves are lance-shaped and bright green to gray-green and may have a leathery texture. Basal leaves are larger than upper leaves and typically taper to an elongated stem (Figure 1B). Upper leaves are sessile, which means the leaves have no stalk and are directly attached to the stem. Dense white flower clusters of six to eight tiny blossoms occur near the ends of stems around mid-June (Figures 2A and B, page 2). Perennial pepperweed is a prolific seed producer, capable of producing more than six billion seeds per acre of infestation. Nearly microscopic, reddish-brown seeds occur in an elongated pod and are rounded, flattened and slightly hairy. The seed pods are less than one eighth inch in diameter and flattened, with a few scattered hairs (Figure 2C, page 2).

In addition to seeds, perennial pepperweed spreads by creeping underground roots (rhizomes) which may grow to a length of ten feet. New plants shoot up from

the underground root and enable perennial pepperweed to form dense monocultures that block sunlight from reaching the soil, thus suppressing the growth of other plants.

Perennial pepperweed, or tall whitetop, should not be confused with whitetop ("hoary cress"). Although whitetop (*Cardaria pubescens*) is a member of the mustard family, it belongs to a different genus. Whitetop is a noxious weed that is usually much shorter than perennial

FIGURE 1. A). Enlarged root forms woody crown. B). Basal leaves are larger than upper leaves.

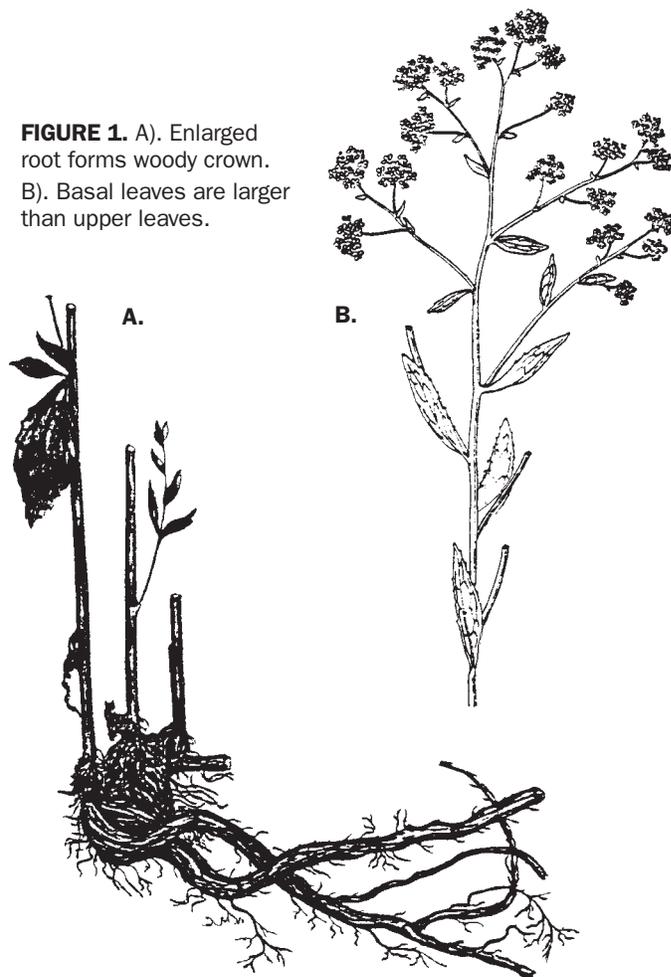




FIGURE 3. A). Flower is small and white. B). Dense white flower clusters of six to eight tiny blossoms occur near the ends of stems. C). Small seed pod with scattered hairs.

pepperweed and blooms in mid-May. See the MSU Extension bulletin, *Biology, Ecology and Management of Whitetop* (EB0138), for more information.

History and distribution

Perennial pepperweed is a native of southern Europe and western Asia. It is believed to have been introduced into the United States around 1900 as a contaminant of sugar beet seeds. In the last two decades, the weed has been spreading rapidly throughout the West. The plant is found in most western states (except Arizona), and is spreading rapidly along river systems. The Montana Weed Management Plan reports approximately 5,000 acres of perennial pepperweed as of 2008. According to herbarium records at Montana State University, several Montana counties have reported perennial pepperweed, including Big Horn, Blaine, Broadwater, Chouteau, Fergus, Gallatin, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, McCone, Park, Powell, Silver Bow, Teton, Toole, and Valley. Perennial pepperweed is especially prevalent in Nevada, Oregon, Utah and California. Nineteen counties in Wyoming and twenty-eight counties in Idaho report perennial pepperweed infestations.

Perennial pepperweed is adapted to a wide range of ecological sites which allows it to have a large geographical distribution. In the Intermountain West, the plant's

distribution corresponds to river systems and riparian zones which are the primary areas of invasion in most states. However, perennial pepperweed is not limited to riparian zones and is found in waste areas, ditches, roadsides, pastures and residential areas as well. The plant can tolerate high salt concentration in soils, but is not limited to these sites.

Perennial pepperweed spreads in many ways. The plant commonly travels in rivers and irrigation systems as seeds and rhizomes from eroded banks. Flood irrigation carries plant propagules into hay meadows, pastures and other irrigated lands. Perennial pepperweed is also carried in contaminated topsoil used as fill in construction and landscaping sites. Seeds are transported when they attach themselves to machinery and vehicle tires. Livestock, waterfowl and dried flower arrangements disperse seeds long distances.

Perennial pepperweed threat

Perennial pepperweed is a very competitive species that crowds out desirable vegetation and results in dense monocultures and a decrease in biodiversity. When established along rivers and streams, the plant interferes with the regeneration of willows and cottonwoods, reducing cover and food availability for birds. The accumulation of semi-woody stems negatively impacts nesting habitat for wildlife.

Perennial pepperweed poses a large threat to hay meadows. It is introduced through irrigation ditches and, once established, can decrease protein content and digestibility of hay. In areas that are not mowed annually, semi-woody stems can accumulate and hinder grazing. Although there is no scientific evidence, it is believed that pepperweed is toxic and could pose a threat to livestock.

Control

The best method of managing perennial pepperweed is to prevent the weed from becoming well established. Minimizing soil disturbances from vehicles, machinery and overgrazing will reduce areas where the weed might become established. Healthy, vigorous grass stands that are properly managed can limit the establishment and growth of weed populations by using resources needed by weeds. Early detection is vital to prevent invasion. Survey your land three times a year and remove any individual plants before they become established. If you discover an infestation, containment is critical. The most effective method of containment is to spray borders of the infested areas with a herbicide. Lastly, limit perennial pepperweed seed dispersal.

Once perennial pepperweed is established, control is difficult because the plant is so competitive and spreads rapidly by its creeping roots.

The weed is usually found on sites difficult to access and along waterways where control presents special challenges. Eradication of perennial pepperweed is impossible in most cases. Instead, efforts and resources should be focused on preventing its spread and using an integrated weed management program.

Integrated weed management typically uses a combination of cultural, mechanical, biological and chemical weed control techniques. Cultural control of perennial pepperweed begins with maintaining healthy, robust stands of desirable plants with proper species selection, fertilization and irrigation. Perennial pepperweed will have a difficult time encroaching upon a healthy, functioning ecosystem in which few niches are left unoccupied.

Mechanical control of perennial pepperweed is not recommended. Digging, mowing and tilling will only encourage new plants to sprout from the root crown and creeping roots. Grazing can be complicated by perennial pepperweed's persistent semi-woody stems. Before grazing, removing old stems by mowing or burning will allow livestock to reach new growth. Questions remain regarding the possible toxicity of the plant and until they are answered, grazing infested areas should be avoided.

No biological control agent is approved for perennial pepperweed. Many valuable crop species like canola, mustard and cabbage belong to the same family as perennial pepperweed. In addition, eleven native *Lepidium* species, one of which is endangered, grow throughout the western U.S. Little effort has been taken to develop a biocontrol agent for perennial pepperweed because the risk is too great of releasing an insect that would attack a valued crop or endangered or native plant. The impact of a prospective biological control organism on agricultural crops and other closely related species must be clearly established before its use will be allowed.

Chemical control of perennial pepperweed is best achieved by using chlorsulfuron (Telar®) or metsulfuron (Escort®). Both of these are sulfonamide compounds. Chlorsulfuron should be applied at one ounce per acre during bud to early bloom stage on non-cropland only. One ounce per acre of metsulfuron applied when plants are actively growing, but before bud and bloom stage, will control perennial pepperweed. Both products should be applied with a nonionic surfactant (see Telar® and Escort® labels). Unfortunately, neither chemical is registered for use in wet areas. Both chemicals kill most broadleaf plants, including native trees and shrubs, so care must be taken to avoid contact with desirable vegetation.

Imazapyr (Arsenal®) is also effective against perennial pepperweed when applied to actively growing foliage. However, this chemical is non-selective and will kill all vegetation indiscriminately. Phenoxy herbicides, such as 2,4-D, will kill the shoots of perennial pepperweed, but root crowns will quickly sprout new foliage. Repeated applications for up to five years are necessary to starve the root system. To successfully manage perennial pepperweed with chemicals, competitive vegetation must be established immediately after its control to prevent reinvasion.

Conclusion

The best management of perennial pepperweed is containing its current distribution and preventing its spread into non-infested areas. While Montana currently does not have any extensive infestations of perennial pepperweed, small, local patches of the weed have been reported. Neighboring states have major infestations. Because perennial pepperweed recognizes no state boundaries, early detection and treatment of perennial pepperweed is crucial for any land management program in the state of Montana. If you think you have perennial pepperweed on your land or believe you have seen it elsewhere in Montana, contact your county Extension agent or weed district officials.



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