FREE PRESS 10/19/99

SOUTHERN NEVADA

PERENNIAL PEPPERWEED

THE UNIVERSITY OF NEVADA, RENO

Cooperative Extension

Bringing the University to You

PERENNIAL PEPPERWEED (Lepidium latifolium)

SOUTHERN NEVADA

Maria Ryan, Natural Resources Specialist, (702)257-5550
Susan Donaldson, Water Quality Education Specialist, (775)784-4848
Wayne Johnson, State Horticulture and Integrated Pest Management Specialist, (775)784-1334

For more information, access the University of Nevada Cooperative Extension’s web site at:

www.unce.unr.edu/tallwhitetop/

The University of Nevada, Reno is an equal opportunity affirmative action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, sexual orientation, in any program or activity operated by the University. The University of Nevada employs only United States citizens and aliens lawfully authorized to work in the United States.

Where did it come from?
A native to southeastern Europe and southwestern Asia, it may have come into the United States as a contaminant in sugar beet seed in about 1900. Now it is spreading rapidly across the western United States.

How does it grow?
Perennial pepperweed (or tall whitetop), is a member of the mustard or brassicaceae family, commonly growing to 2 to 4 feet in height, but may reach heights of 7 or 8 feet in wet areas. It forms dense colonies that dominate fields and wetlands. Its distinctive light tan white flower clusters, (six to eight) flower from April to June and again from September to December in southern Nevada.

Perennial pepperweed has a look-alike cousin that it is also a noxious weed. Do not confuse Perennial pepperweed with the noxious weed “hoary cress” or “whitetop” (Cardenia draba L.) that is usually much shorter in height and blooms in April in southern Nevada. Hoary cress is found in the Meadow Valley, the Las Vegas Wash and its tributaries, and waste places in southern Nevada. It is important to keep in mind that there are species of Lepidium that are native plants. Proper identification to distinguish between species is essential, especially when considering control of Perennial pepperweed.

Cooperative Extension’s web site at:

www.unce.unr.edu/tallwhitetop/

In 1999, the Nevada State Legislature asked Cooperative Extension to mount a statewide attack on Perennial pepperweed (tall whitetop). The Initiative was a public education and action campaign to control and eradicate this weed, launched by a multidisciplinary team of Cooperative Extension specialists in concert with other agencies and local volunteers. Eleven Nevada “hot spots” were targeted for education, control, and/or demonstration projects.

A taskforce was formed in 1992 to study best management for controlling this weed. Individuals from conservation districts, Natural Resources Conservation Service, University of Nevada Cooperative Extension, Pyramid Lake Paiute Tribe, Agricultural Research Service and many local, state and national governmental agencies are participating in this effort. Please support the work of the initial taskforce and the taskforces, and participate in activities sponsored by these groups.

There are several coordinating agencies and individuals working on several control projects in southern Nevada. Volunteers are needed to assist in identifying, mapping, and controlling this pest. If you can participate in opportunities to assist in eradicating this weed get involved! YOU are the first line of defense in the war against Perennial pepperweed. For more information contact your local Cooperative Extension office.

To successfully manage Perennial pepperweed, desirable, competitive vegetation must be established immediately after its control. Species which are highly competitive and spread by creeping perennial roots, may be successful.

How can our community participate?

Large amounts of semi-woody growth produced by Perennial pepperweed may persist for several years. Its distinctive light tan white flower clusters, (six to eight) flower from April to June and again from September to December in southern Nevada.
Perennial pepperweed lowers the quality of feed from pastures and hay fields it infests. Both protein content and digestibility are reduced, devaluing the hay nutritionally and economically. While livestock do not like Perennial pepperweed, they will eat it if it is the only food available. The accumulation of feed in meadows and pastures makes it difficult for small animals to move through it. The overall effect of establishment of Perennial pepperweed is a decrease in the native biological diversity of all species of flora and fauna.

Integrated weed management uses many cultural, mechanical, biological and chemical weed control techniques in a systematic approach. Cultural control of Perennial pepperweed involves maintaining healthy stands of desirable plants with appropriate irrigation, fertilization and selection of species. Mechanical control, including digging, mowing or tilling, is generally ineffective, encouraging plants to sprout from their crowns and Perennial roots, and is not recommended. Shading or smothering with thick mulches is also ineffective. Hand Pulling

Hand pulling has been used in situations where only a few plants are present, (relatively new infestations) or in riparian areas where herbicides cannot be used. It is most effective in loose soils where a slow and steady pulling action will remove 6 to 8 inches of the root. This is a long-term control effort. Hand-pulled areas must be monitored frequently and new growth pulled as soon as it appears. This is a cost effective method that is only applicable in limited circumstances where herbicides are not an alternative.

Livestock Grazing

Antibacterial information suggest that livestock, especially sheep and goats, may play a role in control of tall whitetop in saltgrass meadows, where they eat the flower stalks, reducing seed production. Both sheep and goats have been seen to graze whitetop when it is present in pastures containing other desirable forage. Sheep and goats prefer the tender new growth rather than the mature, stemmy plant. Carefully managed intensive grazing by sheep or goats can suppress the weed, allowing desirable vegetation to thrive. If grazing is abandoned, however, the Perennial pepperweed will again begin to spread. The long-term implications of sheep and goat grazing on Perennial pepperweed control are largely unknown, although research is currently being conducted.

In irrigated pastures, cattle avoid Perennial pepperweed even during drought years when preferred forage species are depleted. Cattle eat the leaves in the early spring, if the coarse previous year’s stalks are removed, and will also eat the flowers. There is some concern that Perennial pepperweed is poisonous to livestock. This concern is underway at the USDA Poisonous Plant Research Laboratory in Logan, Utah to determine if the plant is harmful to livestock.

Biological Controls

Several chemicals have been tested for biological control alternatives for Perennial pepperweed. So far, no insects or diseases are available to kill or debilitate the plant. An Albugo rust has been identified on the leaves of perennial pepperweed plants, especially during wet years, but the effects of the rust do not appear to provide control. The influence of a potential biological control organism on closely related Lepidium species or other plants must be clearly established before its use will be allowed by the USDA. Extreme care is needed to avoid introduction of an insect or disease that could affect valuable crop species. Likewise, care must be taken to ensure the biological control will not have any of the 11 perennial Lepidium species in the mustard family that are native to the western United States. Two species within the genus Lepidium are listed as federal endangered species.

Chemical Controls

Current research focuses on the use of herbicides. Herbicides are most effective when applied at bud to early bloom stage as this timing has been shown to provide the best long-term control and prevents seed set. A second application to any regrowth in the fall appears to give the best control. In order to get good foliar coverage, it is important to remove as much as possible each year’s growth by mowing, burning or brush burning. Use caution and FOLLOW ALL LABEL DIRECTIONS WITH CARE. Do not spray during windy weather; when ambient air temperatures are extreme (> 90 degrees farenheit), and never apply chemicals to open water (ponds, ditches, streams or wetlands).

Herbicides can be used effectively in areas where this plant occurs in small patches by using a wiping or wiper applicator or spot spraying with a small (1 to 5 gallon) tank sprayer. These methods allow for minimum amount of herbicide to be used and exact placement of the herbicide in the right place and at the right stage. Follow label directions for wiping/wicking being sure to concentrate application in the critical period at the right stage.

When chemicals are used near wet areas, extreme care must be taken to avoid contaminating waterways. Rather than using a spray applicator and risking herbicide drift into the water, apply the chemicals in a container or device containing a source of herbicide, such as a reservoir of herbicide and a porous wicking applicator at one end. The chemical is carefully painted or wiped onto individual plants. The advantage of this application method is that drift does not occur thereby not affecting nearby desired vegetation.

Chlorosulfuron (Telar®) and metsulfuron-methyl (Escort®), two sulfonylurea compounds, give the best control of the herbicides studied to date. These two chemicals, which are broadleaf weed killers, do not harm most grass and grass-like species. They are not registered for use in wet areas, but show promise for use in rangeland and roadside applications. Metsulfuron-methyl is labeled for use on grazed pastures land, with no waiting period. Repeat use of these compounds may suppress germination of grass seeds, so they should be used with care. A surfactant should be added to aid in spreading and absorption.

Unfortunately, both chlorosulfuron and metsulfuron are more expensive than many other common herbicides. They may kill most broadleaf plants, and may injure or kill native shrubs and trees if not applied with care. Both herbicides also have some preemergent activity that may inhibit competitive broadleaf plant germination following application. However, if perennial pepperweed is controlled with only one to two applications of chlorosulfuron or metsulfuron-methyl, the overall cost may be lower than other alternatives that require repeated applications over several years.

Another effective herbicide on Perennial pepperweed is imazapyr (Aranza®). It is a nioselcide herbicide that kills all varieties of Perennial pepperweed, providing bare ground control. Imazapyr is labeled for use on noncroplands, such as road and utility rights-of-way. It is most effective when applied to turfgrass or specialty crops.

The phenoxy herbicides (variants of 2,4-D) result in death of Perennial pepperweed shoots, but some roots and crown buds may rapidly sprout and grow. Repeated applications may be required for up to five years or more to stave out the root system. The only herbicide labeled for use in water that has been shown to be somewhat effective is Weedol-444, a 2,4-D-iron salt.

Glyphosate (Roundup®, or Rodeo® for use around water ways) is less effective than 2,4-D in controlling Perennial pepperweed, although pre-mixed formulations of 2,4-D and glyphosate show promise. These formulated products have been tested for Perennial pepperweed control in several western states. When applied at 54 ounces per acre, effective as a chiselsulfonyl, however, is more expensive than many other commonly used herbicides. When herbicides are applied, all vegetation to which it is applied will be killed or injured.

Researchers at the University of California, Davis have studied the effectiveness of mowing followed by herbicide application. If plants are mowed at the bud to early bloom stage and allowed to regrow to the same stage before treatment with herbicides, control was improved, especially with glyphosate application.
### Chemical Control of Perennial Pepperweed

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Application Rate (based on active ingredient)</th>
<th>Examples of Brand Names</th>
<th>Application Rate (based on formulated band)</th>
<th>Application Timing and Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRY SITES</strong> (includes rangelands, roadsides, native hay meadows when seasonally dry, dry upland areas)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, 4-D</td>
<td>Up to 2 pounds per acre. NOTE: a maximum of 2 pounds per year may be used per most label directions.</td>
<td>Weedone 638®</td>
<td>Calculate application rates based on active ingredient.</td>
<td>Apply at bud to early bloom stage. NOTE: Use the amine form of 2,4-D. It is cheaper and as effective as other forms. Multiple applications per year can be effective.</td>
</tr>
<tr>
<td>Chlorsulfuron¹</td>
<td>0.75 - 1.5 ounces per acre</td>
<td>Telar®</td>
<td>1 - 1.5 ounces per acre.</td>
<td>Apply at bud to early bloom stage. Product is very toxic to broadleaf plants, such as flowers and vegetables.</td>
</tr>
<tr>
<td>Metsulfuron¹</td>
<td>0.45 - 0.6 ounces per acre</td>
<td>Escort®</td>
<td>0.75 - 1 ounce per acre.</td>
<td>Apply at bud to early bloom stage. Product is very toxic to broadleaf plants, such as flowers and vegetables. May be used prior to grazing with no waiting period.</td>
</tr>
<tr>
<td>Imazapyr²</td>
<td>0.75 - 1.5 ounces per acre</td>
<td>Arsenal®</td>
<td>1.5 - 3 pints/acre</td>
<td>Apply at bud to early bloom stage. Provides bareground control suitable for roadsides.</td>
</tr>
<tr>
<td><strong>WET SITES</strong> (includes riparian areas, wetlands, ditchbanks, irrigated agriculture)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4-D (labeled for use next to water)</td>
<td>Up to 2 lbs. per acre</td>
<td>Weedar 64®</td>
<td>2 quarts per acre</td>
<td>Spray at bud to early bloom stage; when using a wipe applicator, apply when plants are knee height or shorter.</td>
</tr>
<tr>
<td>Glyphosate (labeled for use next to water)</td>
<td>3.0 lbs. per acre</td>
<td>Rodeo®</td>
<td>0.75 gallon per acre</td>
<td>Mow plants at bud to early bloom stage, allow plants to regrow to bud/early bloom stage; then apply glyphosate. This method has not been tested in Nevada.</td>
</tr>
<tr>
<td><strong>SPOT SPRAYING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4-D</td>
<td>Always follow label directions. 1 1/2 to 2 teaspoons per gallon of water.</td>
<td>Weedar 64®</td>
<td>Always follow label directions. 2 to 3 pints per acre</td>
<td>Apply at bud to early bloom stage. NOTE: Use the amine form of 2,4-D. It is cheaper and as effective as other forms. Multiple applications per year can be effective.</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>Always follow label directions. 1.5 to 2.5 ounces per gallon.</td>
<td>Rodeo®</td>
<td>Always follow label directions. 4.5 to 7.5 pints per acre.</td>
<td>Mow or cut plants at bud to early bloom stage, allow plants to regrow to bud/early bloom stage; then apply glyphosate. This method has not been tested in Nevada.</td>
</tr>
<tr>
<td>Metsulfuron¹</td>
<td>1.3 grams to 3 gallon water.</td>
<td>Escort®</td>
<td>Always follow label directions. 1 ounce per acre (can cover approximately 45' x 45').</td>
<td>Apply at bud flowering stage; Add 1 tsp (3 ml) household ammonia to 3 gallons. This mixture is stable for 3 days; only mix for area needed and do not store.</td>
</tr>
</tbody>
</table>

¹Persistence in the soil of Chlorsulfuron and Metsulfuron is dependent on soil pH, organic matter content, and soil type. In general, these products will persist longer in finer soils with higher pH and low organic matter that are typical in southern Nevada.

²Use of Imazapyr could result in persistence over many years in some environments.

Brand names are provided for example purposes only. Other brands may also be licensed for use in Nevada. Information herein is offered with no discrimination. Listing a commercial product does not imply an endorsement by the authors, University of Nevada Cooperative Extension or its personnel. Likewise, criticism of products or equipment not listed is neither implied nor intended. University of Nevada Cooperative Extension and its authorized agents do not assume liability for suggested use(s) of chemicals herein. Pesticides must be applied according to the label directions on the pesticide container to be lawfully and effectively applied.

See reverse for instructions on calculating application rates based on active ingredients.
Many herbicide users are familiar with herbicide application rates expressed as pints, quarts or fluid ounces per acre. This is especially true for 2,4-D. However, the proportion of active ingredients varies among the different manufacturers, and some formulations may contain twice as much active ingredient as others. For this reason, you must ALWAYS base your application rate on active ingredients instead of based on product. Information necessary to calculate this can be found on the herbicide label. Below is an example of how to accomplish this.

The amine form of 2,4-D is often sold in a formulation that contains 3.8 pounds of active ingredient per gallon. This information is found on the label under the section that lists "active ingredient." For example, the Weedar® 64 label states the product is 46.8% 2,4-D salt, followed by a "*" symbol. Reading the footnote, you will find that the 2,4-D acid equivalent is 38.9% by weight, or 3.8 pounds per gallon. Some herbicides (e.g., 2,4-D and Roundup) are only active when they are in the acid form, even though these herbicides were manufactured to contain a large amount of active ingredients. A portion of it is never found in acid form, therefore, it is not active. This information is provided on every herbicide label. While most labels list amounts in pounds per fluid volume, a few (such as Telar® and Escort®) provide information by weight only. These herbicides provide special measuring devices to ensure accurate amounts are used.

Dr. Jim Young's standard rate of application for 2,4-D for Perennial pepperweed control is 2 pounds of active ingredient per acre. With a label formulation of 3.8 pounds per gallon, the 2 pounds per acre rate can be calculated this way:

One gallon = 4 quarts = 8 pints
8 pints/3.8 pounds = 2.1 pints per pound of active ingredient
2.1 pints per pound x 2 pounds = 4.2 pints
At 16 ounces per pint, 4.2 pints x 16 ounces/pint = 67.2 ounces

It is critical to properly calibrated your sprayer to deliver the appropriate rate. This can be done by spraying a specific area at a set speed, or it can be calculated based on the gallons per minute produced by an individual nozzle, the speed of application, and the spacing of the nozzles. Gallons per minute from a given nozzle can be directly measured, or calculated from the sprayer pressure and the size of the nozzle opening. For more information, request a copy of "Calibration of your Field Sprayer", FS-96-06, from your Cooperative Extension office or website.