

Medusahead: Economic Impact and Control in Nevada

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Medusahead (*Taeniatherum caput-medusae*), is an aggressive, winter annual weed that is changing the ecology of western rangelands. It was first discovered growing in Oregon in 1887 by Thomas Howell (1903). Since then, medusahead has invaded millions of acres in the Pacific Northwest, California, Utah and Nevada. Native habitat has been lost and many native species displaced. Medusahead is extremely competitive, especially on heavier soils, and has crowded out cheatgrass (*Bromus tectorum*) in areas of Idaho (Miller et al., 1999). Medusahead reduces the forage productivity of rangelands, while enhancing the ignition and spread of wildland fires (Young 1992). Rangeland fire not only kills desirable vegetation, but it produces disturbed land that is easily infested with more medusahead. Such unnatural fire decreases species diversity of plant and animal communities.

In Nevada, medusahead infestations occur in Carson City, Douglas, Elko, Humboldt, Pershing and Washoe counties. Prevention, control of small infestations, and containment of larger ones is imperative, otherwise the future environmental and economic impacts will be devastating.

Medusahead germinates mostly in the fall, although winter and spring germination occurs with favorable environmental conditions. Medusahead roots grow during the winter and early spring. Because they develop early and deeply, medusahead outcompetes native plants for soil moisture. It flowers in early spring and seeds mature in late June or early July (Fig. 1). The seeds are covered with spiny barbs. They are dispersed by becoming attached to animals, humans or vehicles as they pass by. As medusahead grows it accumulates silica which makes the plant unpalatable to



Photo courtesy—State of Utah.

Figure 1. “[Medusahead]...is probably the greatest threat to the biodiversity of the natural vegetation that has yet been accidentally introduced into the Great Basin.” (Jim Young, ARS 1992)

livestock, except when the plant is very young. Medusahead creates a dense layer of litter that decomposes slower than other plants because of its high content of silica. After several years of accumulation, it creates an enormous load of fuel. It also suppresses native plant growth while promoting the germination of its own seed.

The density of medusahead stands varies from several hundred plants per square foot to 2,000 plants per square foot. This depends largely on annual precipitation, soil type, and adjacent vegetation. Young

(1992) reports that medusahead is highly adaptable and can produce more seeds at one plant per square foot than at 1,000 plants per square foot. Due to its late maturation, medusahead is bright green when all other annuals are brown, which makes it easy to identify. As the weed matures, it turns purple and eventually tan. Medusahead ranges in height from six to 24 inches. The seedhead produces persistent awns with spiny bristles (Fig. 2) (View with a 10X hand lens or feel the bristles by running the awns between your thumb and finger). The seed is grain-like and may remain viable for many years.

Economic analysis of invasive weed management allows the land manager to evaluate potential costs and benefits of weed control schemes. Good economic analyses must illustrate both direct and indirect costs that are associated with invasive weed infestations in order for the land manager to make correct decisions. Direct costs are labor, chemicals and equipment. Indirect costs can include, the cost of reduced grazing acreage, decreased recreational activity/revenue, increased fire hazard and/or lost wildlife diversity. Cattle ranchers lose productive grazing acres that cannot be substituted easily; some invasive weeds can be injurious or poisonous to livestock and wildlife. Farmers risk contaminating their crops, which lowers the market price for those crops, if they can even be sold. Nevada's agricultural reputation and future agricultural sales are also at risk if contaminated hay is not discovered before it is sold. Government agencies may lose revenues on contaminated rangelands that lack wildlife diversity caused by invasive weeds.

Photo courtesy—University of California, Davis.



Figure 2. Medusahead seedhead with its persistent awns.

These situations are occurring because of invasive weeds, including medusahead. In order to stop medusahead, control strategies must be an economically sound and include cooperative effort among federal, state, and county agencies and private citizens. Invasive weeds lay waste to natural resources and consume valuable time and financial resources. Learn to prevent invasive weeds from entering an area and report any sightings to the land manager or your local Cooperative Extension Educator.

Several control methods reduce medusahead infestations and used in combination can eradicate it. The following methods are used by weed scientists and land managers for medusahead control. Not every method will be a perfect solution for your medusahead infestation. Adjustments must be made for climatic factors (annual precipitation, average temperature, etc.), soil type and native plants present or desired. Land management objectives must also be considered (grazing, harvesting, wildlife conservation, etc.).

Mechanical control of medusahead involves the use of prescribed fire and/or spring plowing or disking (Fig. 3). Prescribed fire is effective in controlling medusahead if the seeds are not mature and have not disseminated. The burn should occur when the seed is in the soft dough stage (when the seeds exude a milky substance if squeezed) in late spring (McKell et al. 1962). Burning also stops the accumulation of a litter layer, which increases available space and light promoting the growth of desirable species. Removing the litter layer also improves the effectiveness of mechanical and chemical control (Harris and Goebel 1976). Use caution when burning to prevent wildfire. Always obtain permission from local firefighting and quality management agencies.

Plowing and disking effectively control medusahead infestations. Plowing reduces infestations by 65% to 95% the next growing season (Harwood 1960). Followed by chemical spot treatment and revegetation, prescribed fire or plowing (disking) can control, even eradicate, medusahead. Eradication using mechanical control by itself is nearly impossible.

Biological control uses natural enemies to control medusahead's growth and seed pro-



Figure 3. Prescribed fire being used to reduce the competition medusahead and favor the growth of desirable species in southern Cache county Utah.

duction. Grazing, with sheep or cattle, has been moderately effective in the control of medusahead, and is best utilized as part of an integrated control program. Livestock will graze the plant early in the spring when it is green. Overgrazing must be avoided, otherwise medusahead will reinfest the area (Fig 4). A crown rot fungus is moderately effective in controlling medusahead, and research is being carried out on possible root pathogens in the Great Basin (Sheley 1995). No insects are used in medusahead management.

Chemical control is effective when used in combination with other control methods. Glyphosate applied at .375 lbs/acre in early spring before seed production gives good results. This also limits the damage incurred by desirable species that develop later (Sheley 1995). Research suggests that burning the area before herbicide application is more effective than only applying the chemical.

Read the label to ensure that the chemical used will not harm desirable plants growing in the infested area. Initial monitoring should include a description of all species including other weed species. Exercise caution when working with any chemical herbicide, mechanical equipment and fire. Always read and follow safety guidelines.

Revegetation should be part of any medusahead management plan. Seeding a medusahead infested area with a desirable plant will be unsuccessful without first controlling the medusahead.

This requires controlling both the existing medusahead, especially not allowing it to produce seed, and reducing the seed bank in the soil, which usually takes two or three years, depending upon soil moisture and growing conditions. After this, seedlings of desirable plants will become established. Combining a tillage treatment followed by herbicide treatment is most effective in controlling the weed and promoting desirable plant growth (Torell and Erickson 1976). When using herbicides before seeding with desirable species, the herbicide residue in the soil must be at a level where it will not damage the seeded species. Check the herbicide label for its soil persistence. Squirreltail, bluebunch wheatgrass, crested wheatgrass, intermediate wheatgrass, orchardgrass, Thurber needlegrass, needle-and-thread grass, Indian ricegrass, Sandberg bluegrass and sheep fescue, are all competitive grasses that work well when renovating previously infested medusahead stands in the western United States.

Integrated control methods work best for managing medusahead infestations on rangelands. Livestock grazing is a highly efficient tool to use as part of an integrated program when the timing and duration are managed correctly. For example, grazing in conjunction with revegetation must occur after the desirable species has become established, otherwise revegetation will not work. Winter and early spring grazing works well where desirable species have completed their life cycle. Medusahead may also be grazed by animals during that time because it is a winter annual. Late spring, summer and fall grazing is not recommend as it gives medusahead a competitive advantage. Livestock used to graze mature medusahead must be moved to a



Figure 4. Close-up of a medusahead infestation in a perennial grass stand.

holding area for 10 to 14 days and fed weed-free feed before they can be moved to weed-free areas.

Recognize that not every control option will work on all infested sites. Monitoring the progress of a management strategy and making the necessary adjustments year to year is the only way to successfully eradicate medusahead. For further assistance, or to report an infestation, contact Dr. Wayne S Johnson at (775) 784-1931. Contact your local extension educators; they can also help you with invasive weed management (sidebar).

Medusahead must be reported, mapped, controlled and monitored in order to protect Nevada's wilderness and rangelands.

Internet Invasive Weed Resources

University of Montana: <http://invader.dbs.umt.edu/>
Western Society of Weed Science: www.wsweedscience.org/
California Weed Science Society: www.cwss.org/
Colorado State University: www.arapcsuext.org/agri/noxious2.htm
Bureau of Land Management: <http://www.blm.gov/weeds/>

Precaution: Pesticides have both benefits and risks. Maximize the benefits and minimize the risks by following the label. Labeled information contains both instructions and limitations. Pesticide labels are legal documents and it is a violation of both federal and state laws to use a pesticide in a manner inconsistent with its labeling. The pesticide applicator is legally responsible for the proper use of a pesticide. Always read and follow the label! The use or nonuse of chemical names does not constitute an endorsement nor criticism of a product containing the chemical.

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