

## The Curse of Medusahead

Medusahead has been called the devil plant. Its high silica content makes medusahead extremely low in digestibility and palatability. It effectively competes with more valuable forages and can replace sagebrush, forbs, and perennial grasses. It also increases the fire cycle. In order to survive and thrive, medusahead can even change how an ecosystem functions. So what makes this plant so devastating on arid rangelands?

**Terrible Thatch.** Its high silica content slows the breakdown of mature medusahead plants creating a thick layer of ashen-gray thatch. The thatch reduces the amount of light that reaches the soil surface, inhibiting germination of other plant species. Medusahead thatch may prevent seeds of other large-seeded plant species from reaching the ground. Smaller seeds may not have enough light, moisture or nutrients to grow through the thatch. It also delays soil warming in spring and ties up nutrients. While medusahead can germinate and establish through its own thatch, it physically suppresses germination, establishment, and survival of other rangeland plant species.

Medusahead thatch aids in germination of medusahead seeds and establishment of new medusahead seedling by controlling the relative humidity within the litter. The primary root produced by medusahead is more resistant to drying than primary roots of other plant species. In addition, should the primary root dry and die, the seed can produce multiple new roots if it gets wet again. This gives medusahead a big advantage, because it has multiple opportunities to root even under in dry conditions that kill most competing seedlings. In one study, establishment of medusahead seedlings was 47 times greater under litter than on bare ground.

**Poor Forage.** As forage medusahead is high in silica and low in nutrients making the grass low in palatability for domestic livestock and wildlife. The plant is primarily stem with little leaf material. It produces nasty awns discouraging its consumption. Once the plant sets seed the already poor nutritional value of medusahead plummets further.

Medusahead is encased in silica reducing the rate and extent of its digestibility. Thus, sheep are unable to eat medusahead because it takes so long for the forage to digest reducing the feedback the animal receives and the rate of passage as the forage travel down the digestive track (Montes 2016).

**Birds and Small Mammals.** Invasive annual grasses such as medusahead are a major threat to the sagebrush steppe ecosystem and to sage-grouse. They feed on the leaves of sagebrush and forbs. They find shelter under sagebrush and other shrubs. Medusahead degrades sage-grouse habitat by displacing sagebrush, forbs, and perennial bunchgrasses. Seed-eating birds rarely use medusahead seeds. Seed-eating rodents also prefer seeds of other species, tending to avoid medusahead-infested.

**Increases Fire Cycle.** Like cheatgrass, medusahead promotes fire in the more arid areas of the Great Basin. It also fills in the gaps between sagebrush plants, creating continuous fuel across the landscape that increases the fire cycle. Areas in the Great Basin dominated by cheatgrass have an average fire return interval of 50 to 80 years, compared to fire return intervals of about 200 years on native sagebrush steppe. The persistent thatch produced by medusahead poses a risk of fire in any season.

Many species of sagebrush don't regenerate as the frequency of fires increases. Fire can rapidly degrade the ecosystem from a native shrub community to an invasive annual grassland. In addition, increased fuel accumulation from annual grass infestations can kill desirable perennial grasses. This can contribute to the decline of sagebrush-dependent wildlife species such as sage grouse.

**Great Competitor.** Medusahead is an effective competitor for water and nutrients especially when perennial grasses are establishing from seed. In the Great Basin, medusahead can even displace cheatgrass provided there is still enough moisture in the soil after cheatgrass matures. Medusahead is better able to survive on infrequent precipitation events than cheatgrass or *Ventenata*, two other invasive annual grasses found in the Great Basin.

The buildup of persistent thatch ties up soil nutrients, making them unavailable to other plant species. In addition, thatch may leach chemicals that suppress germination of other plant species.

When soils from medusahead-infested sites were compared with soils from uninfested sites, soil from the medusahead sites had reduced nitrogen mineralization and total nitrogen. It did not affect soil microbes but did increase soil pH.

**Soils.** In more arid areas, medusahead tends to require well-developed clay soils, which helps to retain soil moisture until later in the season. On high-nutrient soils, medusahead is more likely to inhibit native vegetation than on nutrient poor soils, because its seedlings acquire water and soil nutrients more efficiently than native grass seedlings. Disturbing the soil also increases the likelihood that medusahead will invade any site regardless of the type of soil.

**Hearty Seeds and Seedlings.** Medusahead is almost entirely self-pollinated. Seedheads take about a month to go from green to senescent. Once the seeds are filled, it appears that most seeds are viable even in the green stage.

An average medusahead plant produces three to five seedheads, with a mean of 5.6 seeds/head in dry areas and 8.7 seeds/head in wetter sites. On nutrient-rich soils, or areas with limited competition, medusahead may produce many more heads and/or seeds per head. Medusahead produces many seeds per year, ranging from 130 to 5,574 seeds/ft<sup>2</sup> or 5.7 to 243 million seed/ac.

Most medusahead seeds germinate the first fall after dropping from the parent plant. Some seeds only germinate after exposure to cold temperatures 90 to 120 days after medusahead matures. The good news is that most medusahead seeds persist in soil for less than two years, with very few seeds surviving for three years or more.

The optimum germination temperatures for medusahead seeds in thatch are 50 to 59 F. Medusahead often begins to germinate after fall rains and rapidly develops its root system during winter. Growth can continue, even under a layer of snow. In cold temperatures medusahead roots grow faster than do roots of perennial grasses. In spring after winter snows melt, there is a second large flush of medusahead germination.

Heavy infestations of medusahead can produce dense stands of seedlings with 130 to 1,860 plants/ft<sup>2</sup>. However, when plants are sparse (1 plant/ft<sup>2</sup>), they produce more seeds than plants growing at higher densities. When control efforts reduce the density of medusahead, surviving plants grow larger and may reach similar values for total cover and seedhead production as denser stands. In addition, sparse populations of medusahead may remain green and productive longer into the growing season because there are more resources available to individual plants, particularly moisture.

Fact sheet adapted from: Kyser GB, JM DiTomaso, KW Davies, JS Davy, and BS Smith. 2014. Medusahead Management Guide for the Western States. University of California, Weed Research and Information Center, Davis. 68 p.  
Available at: [http://wric.ucdavis.edu/publications/MedusaheadManagementGuide\\_pub\\_2014.pdf](http://wric.ucdavis.edu/publications/MedusaheadManagementGuide_pub_2014.pdf)

Also cited: Montes, J.J. 2016. Modulation of the Nutritional context and Early Experience as New Tools to Increase the Use of Medusahead (*Taeniatherum caput-medusae* ssp. *asperum*) by Grazing Sheep. Dissertation, Utah State University, Logan, UT.