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Mowing to Manage Noxious Weeds

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Mowing can stress noxious weeds and favor growth of desired plants. In a Montana study, spotted knapweed density was decreased about 85 percent by one mowing during the flowering stage.

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FEW STUDIES HAVE BEEN CONDUCTED ON THE effects of mowing plant communities and noxious weeds, and virtually no long-term studies have been conducted on mowing rangeland. However, the ecological basis of mowing to manage noxious weeds and to favor desired plants is conclusive. Since leaves collect carbon dioxide and sunlight, defoliation alters competitive abilities. Mowing undesired plants decreases their competitive abilities and favors desired plants if proper timing, frequency and height of mowing are considered for each vegetative situation. This usually is based on the growth rates and growth stage of vegetation.

The purpose of this document is to provide principles to consider when developing a mowing program as part of an integrated weed management plan.

Timing

Properly timed mowing can suppress noxious weeds while favoring desired plants. Timing is based primarily on the growth stage of the plants to be mowed and secondarily on the growth stage of the desired plants. The most effective time to mow noxious weeds is when the desired plants are dormant and weeds have reached the flowering stage. Mowing during this time can prevent weed seed production and weaken the weeds after they have invested a large amount of energy for bolting (when the stem extends from the center of the rosette upwards two to four feet) and producing reproductive structures. Long-term repeated mowing during this growth stage can eventually delete root reserves. If regrowth bolts again and produces flowers, an additional mowing is necessary for a mowing strategy to be effective.

Some desired plants, like grasses, have equal amounts of growth above and below ground. When grasses are defoliated during the growing season, this stress reduces vigor and competitive ability. To maintain competitiveness and to allow grasses to produce seed for next year's stand, it is best to mow when these plants are dormant. If desired vegetation cover is inadequate (usually less than 20 percent), you may need to revegetate the area.

Effective mowing of large infestations is a long-term commitment. Some weeds, such as those that spread through rhizomes – a prostrate stem growing beneath the soil surface – have large energy storage capacities. During the first few years, mowing these weeds can stimulate shoot production from root buds and increase stem densities. However, over time, frequent mowing at each early flowering stage can affect underground reserves and eventually reduce stem densities.

Mowing frequency

Mowing frequency depends upon precipitation and the mowing tolerances of the vegetation – a function of relative growth rates, leaf replacement potential and the plant's ability to increase photosynthesis after mowing to compensate for leaf loss. Carbon allocation patterns in plants also help determine mowing tolerance. Particularly important are the number, location and source of growing points on plant stems. An effective mowing strategy minimizes the removal of growing points of desired plants and maximizes removal of growing points of weeds.

For annual, biennial and taprooted perennials, the frequency of mowing depends primarily on precipitation. A single midsummer mowing after flower production can reduce or eliminate seed production and shift the balance in favor of desired species in areas with little or no summer rain. In one study, 78 percent control of diffuse knapweed *(Centaurea diffusa)* was achieved after mowing to a two-inch height each month during the growing season. However, as summer rains increase, regrowth potential increases, and mowing may increase plant vigor and seed production similar to pruning. In this case, an additional mowing will be required.

Rhizomatous weeds usually require more frequent mowing. Repeated mowing is considered an effective

control of rhizomatous weeds in alfalfa and many pastures. In one study, mowing alfalfa two times per year reduced Canada thistle *(Cirsium arvense)* 86 percent after one year and 100 percent after four years. In other studies, mowing three or four times per year nearly eliminated Canada thistle in three years. However, other studies suggest that mowing Canada thistle kept stands in check but did not eliminate the weed.

Height

Most grasses can tolerate short mowings once dormant. If the dominant vegetation has not yet shifted to noxious weeds and still contains adequate grass cover, time the mowing so the weeds are at the flowering stage and the grasses are dormant.

When the dominant vegetation is a noxious weed, mow two inches high when the weed is at the flowering stage. However, in some cases, noxious weeds will reach the appropriate stage for mowing, but the grasses have not reached dormancy. If so, mow the weeds at a height above the desired plants. (Most noxious weeds will bolt above the height of desired grasses.) Mowing above the height of actively growing grasses allows seed production and unrestricted growth; this maintains vigor needed to minimize reinvasion by noxious weeds. Defoliating the weeds reduces seed production and vigor, increasing resources available for neighboring grasses.

Spotted knapweed: A case study

A study at Montana State University showed that mowing can greatly reduce or diminish seed production and adult spotted knapweed density. We studied the effects of mowing frequency and timing on spotted knapweed *(Centaurea maculosa)* and associated grasses over three years. The mower was set to cut at 10 inches – this height cut the bolted knapweed plants while passing over the grasses.

The study compared over 15 different strategies with varying frequencies and timing of mowing. We found that the most effective time to mow spotted knapweed was during the flowering stage. Mowing at this time decreased adult density by about 85 percent. Seedling density also was slightly reduced. Grasses were only decreased by the aggressive mowing treatments.

Integrating mowing with other management methods

The pervasiveness and complexity of noxious weeds, combined with their cost of control, makes an integrated weed management plan necessary. This type of plan uses the most economic, ecologic and environmentally effective combination of principles, practices, technologies and systems to meet noxious weed management goals and objectives. In many cases, mowing can be a valid component in an integrated plan.

Although little research has been conducted on incorporating mowing into an integrated plan, experience provides some practical hints. Some evidence suggests combining mowing with herbicides can enhance perennial weed control. For example, mowing two or three times a year consistently enhanced Canada thistle control following applications of picloram, picloram +2,4-D, clopyralid + 2,4-D and dicamba.

Mowing may also be combined with herbicides over several years. Most noxious weeds grow low to the ground after long-term repeated mowing. In these cases, periodic control through herbicides can remove plants that have acclimated to frequent mowing.

Summary

Mowing will not eradicate noxious weeds. However, it can stress weeds, providing desired plants a competitive edge. If can also prevent or greatly reduce seed production. Mowing strategies should be implemented with other methods as part of an integrated noxious weed management plan.

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