

Enhancement Activity WQL02 – Biological Suppression and Other Non-Chemical Techniques to Manage Herbaceous Weeds (pasture)

Biological weed suppression is the use of a living organism to lower the population or the competitive ability of a weed species so that it is no longer an economic problem. Living organisms used as biological agents include insects, birds, livestock, parasites and plant pathogens. Biological weed suppression techniques are different from other weed control methods in that the weed may not be killed but instead the weed's competitiveness or reproductive ability are reduced. Biological suppression is usually slow acting. The technique chosen targets a single weed species. Grazing livestock, biologically active and healthy soils, and conservation of weed seed predators can enhance the overall herbaceous weed management in pastures.

Identify the weed species to be controlled

Understanding the biology of the target weed species is essential for selection of the biological suppression technique and the management needed to apply the technique. Herbaceous pasture weeds can be annuals, biennial, or perennial species. Weeds that move and invade new habitats are among the most dangerous and destructive of the herbaceous pasture weeds. Other herbaceous weeds produce huge numbers of seeds per plant and have excellent dispersal systems that facilitate seeds finding bare ground for establishment. Correct weed identification is essential to choosing a suppression technique. Confirm the weed species' toxicity to protect livestock from consuming toxic weed species.

Document the weed species to be controlled and describe the pretreatment plant cover or density and identify the post-treatment cover or density desired.

Maintain high quality pastures

One of the key factors to weed infestation is the pasture condition of the infested site. The first step in pasture weed control is to maintain a healthy and vigorous forage plant base through appropriate and timely amendments to the soil as indicated by a soil nutrient analysis. Healthy soils support healthy, vigorous plants.

Apply grazing management

Livestock and poultry can be used as weed consumers. Good grazing and/or haying management can enhance weed control and prevent the build up of perennial pasture weeds. Livestock can either reduce or aggravate weed problems in pastures, depending on how they are managed.

Correct stocking rates and suitable recovery periods generally improves pasture quality and minimizes weed growth. Evaluate the pasture for weed distribution, then adapt the grazing management to target the priority areas. Plan livestock grazing to occur before the weed set seed for the most effective control*.

Grazing in the early spring will remove new growth, requiring the plant to utilize root and crown reserves while significantly reducing photosynthesis and subsequent food production. If continued for long enough, the plant is weakened and may die. Grazing later in the spring can prevent flowering and seed formation, reducing the opportunity for seed production. Grazing the target weed during the growing season can stress the weed while allowing desirable plants to grow with reduced competition. Fall grazing can disrupt the flow of plant nutrients to the roots and crowns of the plant and, as a result, reduce carbohydrate reserves necessary for subsequent spring growth.

Grazing plans will describe the implementation of one of these grazing strategies:

- Priority area rotational grazing- the key area infested by the target weed is identified in each pasture or paddock. Livestock graze in the priority area long enough to achieve 50% defoliation of the desirable forage plants. It may be necessary to confine livestock with temporary fencing, forcing them to consume the weeds. Grazing weed control works best on weeds that are high quality forage such as johnsongrass, quackgrass, crabgrass, lambsquarters and pigweed. Move livestock to different paddocks allowing the priority area desirable vegetation to recover. Repeat the process in the priority area during the grazing season.
- High density short duration grazing- Stock paddocks infested by the target weeds with high to extremely high livestock numbers. The stock density is planned to remove greater than 50% defoliation of weeds in a short period of time, followed by a long rest period. Grazed stubble height of desirable forage plants should not be allowed to reach below 2 inches. The number of paddocks, grazing capacity and stocking density will determine the number of times a treated area will be grazed.
- Multi-species grazing (Table 1.)- Cattle, horses, and bison are true grazers preferring grasses, clovers and palatable legumes. Goats are true browsers, eating a high percentage of shrubs and forbs. Sheep are intermediate grazers, eating grasses and legumes along with palatable forbs and shrubs. Swine not only graze, but will dig into the soil to root out and consume fleshy roots of some perennial weeds. Weeder Geese are certain African and Chinese varieties of geese used for removal of young grasses and other weeds. Weeder geese are introduced to pastures at six to eight weeks of age, and usually utilized for weed control for one year only. Combining species can reduce the weeds rejected by the livestock. Multi-species grazing management should follow the priority area rotational grazing model.

* To reduce the risk of weed seeds being transported to new paddocks, livestock that are being used to graze noxious weeds when the plants are flowering must be quarantined for a period of time and fed weed-free forage before moving them to any location that is weed free. The amount of time mentioned in the literature ranges from a minimum of 5 to upwards of 14 days.

Encourage weed and weed-seed consumers

Herbivorous or seed-eating insects, specific microbial pathogens of weeds, and soil micro-organisms have the potential to suppress weed germination, emergence or growth. Insects can control weeds by feeding on seeds, flowers, leaves, stems, roots, or combinations of these, or by transmitting plant pathogens, which will infect plants. Classic biological control of weeds with insects requires the release of known insects that feed on a specific weed species at several points within the weed's range. When releases are successful, the insects multiply and spread over a number of years, gradually bringing the weed under control. Consult with MSU Extension Educators for information on weed specific insects and release procedures.

Farm-scaping to provide habitat for weed and weed-seed consumers will conserve the biological controls already present in the pasture. The more diverse the ecosystem, and the more ground cover maintained, the more likely ground beetles and other consumers of the seeds or seedlings of major weeds will be present. Maintaining season-long diverse habitat, including leaving un-grazed field borders and adding forbs, legumes, and wildflowers as well as avoiding the use of broad spectrum insecticides around pastures and on hayfields can conserve and encourage weed seed consumers.

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Document the release date, kind, and number of biological agents in a record keeping system.

Table 1. Animal species for multi-species grazing by weed.

Herbaceous Weed Common name	Animal Type			
	Sheep	Goats	Cattle	Horses
Canada thistle	X	X	X	NR
Musk thistle	X	X	X	NR
Spotted knapweed, young	X	X	X	X
Leafy Spurge	X	X	X	Toxic
Field Pepperweed	X	X	NR	NR
Quackgrass	X	X	X	X
Hoary Allysum	X	X	X	Toxic
Smartweed	X	X	X	NR
Crabgrass	X	X	X	X
Pigweed	X	X	X	NR
Lambsquarter	X	X	X	NR
Foxtails	X	X	X	X
Common ragweed	X	X	X	X
Chickweed	X	X	X	X
Henbit	X	X	X	X
Shepherds Purse	X	X	X	X

NR= not recommended

Reference:

Davison, J, E. Smith and L. Wilson. Livestock grazing guidelines for controlling noxious weeds in the western United States. University of Nevada, Reno Publication EB06-05. Available online <http://www.unce.unr.edu/publications/files/ag/2006/eb0605.pdf> accessed 7/28/2009.

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