Saskatchewan Watershed Authority

Management of Downy Brome *(Bromus tectorum)* in Native Grasslands

Patrick Porter

Downy Brome

INVASIVE species

Introduction

Bromus tectorum, commonly referred to as downy brome, cheatgrass, or 100-day grass, is an erect spring or winter annual that is a problem in many southern areas of western Canada. Introduced into North America in the 1860's, it has spread throughout southwestern Canada and is especially abundant in interior British Columbia as well as the Great and Columbia Basins of the western United States. Downy brome is most commonly found in rangelands, winter wheat fields, pasture lands, waste areas, eroded areas, and abandoned fields. Its long awns, which create a sharp seed, are easily caught in the fur of animals and clothing of people, making it easily transported to other areas. If not controlled, this quick spreading grass has the potential to work its way into our native grasslands, choking out native species and becoming a large threat to native grassland biodiversity.

The Problem

Native prairie is a part of our natural heritage and provides an important resource for grazing, wildlife habitat, and soil and water conservation. Threats like the invasion of exotic species can degrade our prairie ecosystem by excluding native species, and thus reducing biodiversity, carrying capacity, habitat, and the aesthetics of our prairie ecosystem.

A Well Established Grass

Downy brome grows on a wide variety of soils but thrives on medium to coarse textured soils especially those high in potassium. It is well adapted to low to medium precipitation zones and prefers low temperatures for germination and growth (3.5-15 degrees Celsius is the optimum growth temperature).

The establishment of perennial grasses, forbs, and shrubs is greatly limited when downy brome has infested an area. Downy brome has many competitive advantages which enables it to become easily established and out compete other native species:

- **It has a dense, fibrous root system that continues to develop over the winter allowing it to take full advantage of spring moisture. Downy brome makes more efficient use of water than perennial grasses, allowing it to produce greater biomass with less water.**
- **Its seeds are not limited to one germination season as with many other annual plants. Because germination can take place continuously throughout the year, establishment of the population is ensured.**

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- **Seeds are shed shortly after maturity and if conditions are right, most will germinate immediately. If conditions are not favourable, seeds can develop a secondary dormancy which requires an extended period of moist conditions in order to break dormancy. This is very advantageous to downy brome as it allows seeds to occupy all available sites able to support germination, survive periods of limited moisture, and provides the ability to renew its population in case of environmental disaster.**
- **Downy brome is a cool season grass that completes its life cycle early in the season before soil moisture diminishes. This means that it has the opportunity to deplete moisture and nutrients from the soil before native species begin to grow. This is one of its greatest competitive advantages.**
- **Seed production is extensive and occurs much earlier than other species. Seeds are spread by wind and in animal fur. The sheer volume and number of seeds allows downy brome to fill any available niche in the forage cover and ensure that some germination will take place.**

Why is Downy Brome Becoming a Problem?

The ability of downy brome to begin growth and establishment so early in the season poses a large threat to our native prairie ecosystems. Native grasses start growing much later than downy brome, usually in early summer. By the time that native species start to grow, downy brome has already become established, effectively competing with other species for available soil nutrients and moisture. A downy brome community displaces native grasses and decreases the diversity of native grasslands.

Downy brome can spread quickly due to its large seedmass and germination abilities. This makes it difficult to get rid of once it has become established. Perennial grasses and shrubs are hard to re-establish in areas infested with downy brome resulting in further dominance of this introduced species.

Downy Brome and Grazing

In areas where downy brome has become a large part of the grassland ecosystem, it is considered to be a good source of forage for livestock early in its life-cycle and is often relied upon by many cattle producers. It provides an abundant supply of forage earlier in the spring than most species during years of adequate moisture. However, there are many drawbacks associated with using this grass as a source of feed. Although plentiful in the spring during wet years, growth is very limited in dry years. In a dry year, less than one seed may be produced per established plant. This makes it challenging to rely on it as a primary source of feed. Also, downy brome matures very quickly and is usually dried out by mid-July therefore resulting in reduced quality forage late in the season and a shorter grazing season. In addition, when mature, the seeds contain long, stiff awns which have been know to puncture mouth and throat tissue of livestock causing injuries and infections such as lumpy-jaw.

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Downy Brome and Fire

Early maturation, complete summer drying, and an ability to accumulate litter makes downy brome an extremely flammable species. Areas infested with downy brome pose as a serious fire risk. Areas largely infested with downy brome are 10-500 times more likely to burn than uninfested areas. Fire is an important ecological tool for managing grasslands, but fires that burn more often than the natural fire interval are detrimental. Frequent fires reduce the cover of important perennial species which may not be adapted to such high frequencies, as well, these numerous, hot fires may leave the land vulnerable to erosion. In fact, downy brome can actually benefit from the occurrence of a fire. In downy brome ecology, fires are most likely to occur once downy brome is mature. Dry downy brome seed is very tolerant to heat allowing it to survive the quick burn that often happens during a prairie fire.

Fire reduces forage cover opening up a germination environment better suited for downy brome. While the stand of downy brome thins often with fire, it is able to compensate by producing a greater number of stems and seeds per plant. This may result in a larger infestation of downy brome than before the fire occurred.

Control of Downy Brome in Native Grasslands

The downfall of downy brome is the inability of its seed to survive in the soil for longer than two to five years. Since seed survival in the soil is short and downy brome relies exclusively on seed production to perpetuate, the management goal should be focused on eliminating seed production and exhausting the seed bank.

1. Timing

Timing is a crucial part of keeping downy brome under control. Control options must be implemented early in the season before the seed sets. Otherwise seeds can be deposited into the soil seedbank where they can remain and germinate for up to five years.

2. Accuracy

All areas infested with downy brome must be targeted. This includes the hard to reach, smaller areas as well. Only a few established plants are needed for re-establishment to occur.

3. A Continuous Effort

Treating an infested area once will not be effective. The presence of downy brome indicates that it will be producing seed; therefore multiple treatments are required to keep it at a reasonable level. Downy brome has a large seedbank, this allows it to re-invade an area even after a few years of control.

4. Monitoring

Areas that have a potential for downy brome infestation should be monitored every spring with special attention to areas where downy brome is commonly found. If an infestation is found, the location should be recorded and then further monitored to measure the rate in which the infestation is spreading. GPS (Global Positioning System) technology is an effective means of monitoring weed stands.

Management Techniques

Hand Picking

Hand picking of downy brome is an effective management technique for small infestations. As this method is very labour intensive, it is not recommended for larger outbreaks, but may be an effective way to manage once stands are reduced.

Mowing

Mowing can be used as long as it occurs at the bloom stage or within one week after flowering. To clip plants at the dough stage (when the seeds are well developed) will cause death but seeds may already be viable. Disadvantages associated with mowing are that often the shorter plants are missed enabling them to still produce seeds. It is important to use repeated mowing to be effective.

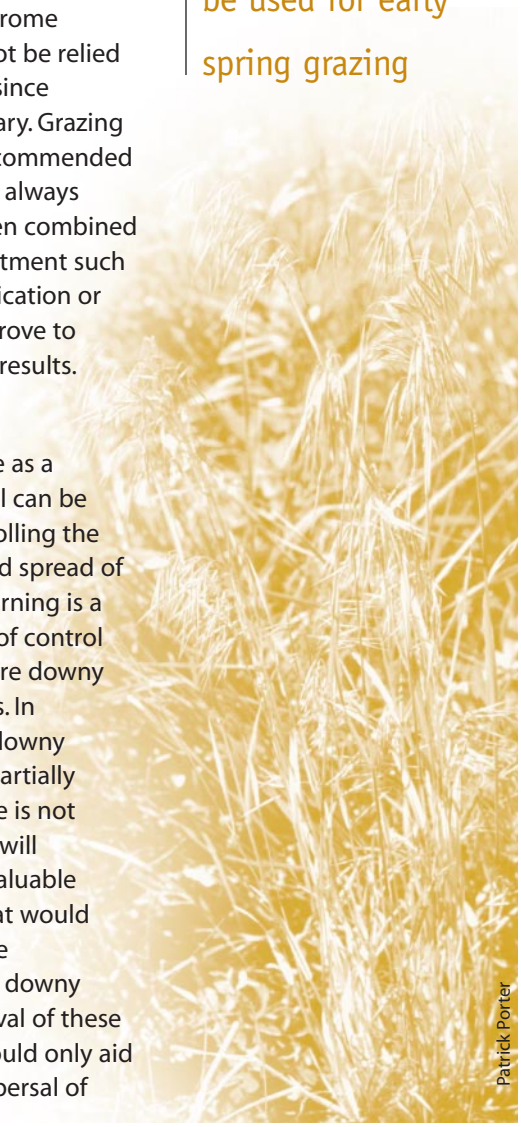
Grazing

On a repeated basis early in the spring, grazing can have some impact on the abundance of downy brome in a stand. High intensity grazing can almost eliminate downy brome infestations but a reduction in intensity will allow it to invade again. If an area is highly infested and dominated by downy brome, an option could be to use it in a grazing rotation. Downy brome is an early season grass and therefore could be used for early spring grazing. Livestock should be removed from downy brome pastures before seed sets to prevent seeds from being transported to native pastures by animals. But it should be noted that an infested downy brome pasture should not be relied upon every year since production will vary. Grazing is not a highly recommended option as it is not always effective, but when combined with another treatment such as herbicide application or burning it does prove to have satisfactory results.

Downy brome is an early season grass and therefore could be used for early spring grazing

Burning

In some cases, fire as a management tool can be effective in controlling the establishment and spread of downy brome. Burning is a suitable method of control only in areas where downy brome dominates. In locations where downy brome has only partially infested, using fire is not effective. The fire will eliminate other valuable native species that would otherwise provide competition with downy brome. The removal of these native species would only aid in the further dispersal of



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downy brome as well as other troublesome weeds. Caution should also be taken when using fire as a management tool as downy brome is well adapted to fires and can come back fairly quickly after a fire has burned through an area.

If burning is to be used as a method of management in tame pastures or cropland, it is suggested that the area burned be reseeded to perennial grass. This prevents downy brome and other weedy species from re-establishing. Seeding to perennial grasses allows for more effective competition with downy brome for available soil nutrients and water. Downy brome uses water at shallow depths. Once perennial grasses have established, their roots can penetrate to a depth which is almost free from downy brome competition.

A concern that should be addressed regarding fire as a management option is that all of the downy brome must be eliminated, including the litter. The amount of litter or ash left on a site is a good indication of how many downy brome seedlings are left surviving. All of the litter must be removed, otherwise it can protect the seeds from the fire adding them to the soil seedbank resulting in downy brome re-establishment. Usually burning is best followed by another method of control such as grazing.

Chemical Control

A number of different chemicals have been used in controlling downy brome. For small infestations, it is recommended that a spot sprayer be used for selective control. Larger areas that are infested may require larger equipment.

In most cases, application of chemicals should be conducted in the early spring. This is when non-target species are dormant, allowing for selective control. Glyphosate is recommended for non-selective control of downy brome. Glyphosate should be applied before the downy brome plants reach a height of six inches, and before any perennial forages have emerged. Refer to the Guide to Crop Protection produced annually by Saskatchewan Agriculture, Food, and Rural Revitalization, for registered application rates and procedures.

Fall applications have also been used to control downy brome but this is usually in cropland situations. If chemicals are to be applied in the fall, applications should be conducted after downy brome seeds have germinated and are beginning to grow.

Biological Control

As of yet, there are no successful biological control agents available.

Summary

Downy brome is a competitive species that has started to invade and threaten many of our native grasslands. Its increase in abundance indicates that it is a problem which needs to be addressed. Management of this species should involve an integrated approach including monitoring. This is an extremely difficult weed to get rid of and it will take time and patience for the objectives to be accomplished.

FACT sheet

For Further Information

A bibliography of the resources used to prepare this factsheet is available from the Saskatchewan Watershed Authority. Factsheets on other species and topics are also available.

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Agricultural Enviromental Stewardship Initiative is a Canadian Adaptation and Rural Development in Saskatchewan Program funded by Agriculture and Agri-Food Canada.