MULTISAR

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Controlling Japanese Brome (*Bromus japonicus)* and Downy Brome (*Bromus tectorum*) in Native Grassland Using Simplicity Herbicide

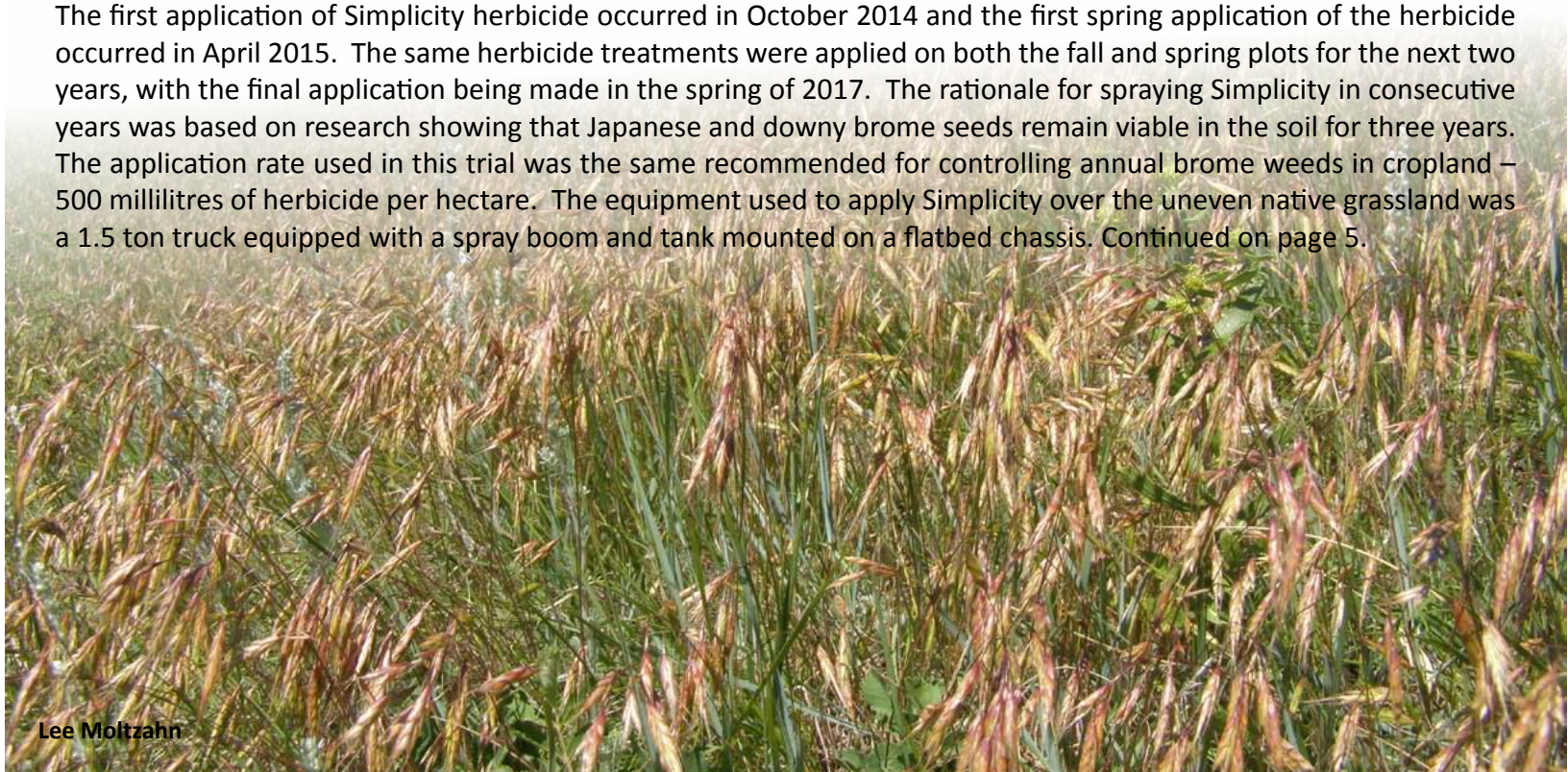
The spread of two grassy, noxious weeds, Japanese and downy brome, in native rangelands within the Milk River drainage basin has been alarming to landowners, leaseholders, land managers, and MULTISAR resource managers. Whereas downy brome appears in patches usually on disturbed sites, Japanese brome is becoming more widespread, invading healthy, native rangeland. Chemical control of Japanese and downy brome has its own challenges, the largest of which is finding an herbicide registered in Canada for its control in native rangeland pastures.

Responding to concerns of our landowner partners, MULTISAR rangeland staff commenced field trials in 2014 to test the effectiveness of the herbicide, Simplicity, in suppressing or eradicating Japanese brome on two native rangeland sites. The two main objectives of this field study were to measure the effectiveness of Simplicity in controlling Japanese and downy brome in native rangeland and to determine if the herbicide would have any negative effects on native grass and forb species.

The larger field trial was situated in the southeast corner of the Last Sands Ranch approximately 1.5 miles south of where Secondary Road #500 crosses the Milk River. Each of the three test plots at this site measured approximately five acres in size and was situated on a loamy range site. The field trial site on the Ross Ranch was located approximately one mile south of the ranch headquarters along one of the many tributaries flowing into the Milk River. The narrow overflow site between the creek and the coulee hills restricted the size of each of the test plots on the Ross Ranch to approximately 1.50 acres. These two field trial sites were selected because both had wide-spread infestation of the target species, Japanese brome, and were fairly close to developed roads or trails.

To guarantee the highest possible success at reducing the present population and future spread of Japanese brome in the native grassland, Simplicity was applied in the early stages of growth. For Japanese brome, this can occur in the fall or early spring depending on soil moisture conditions. Two field trial plots were set up at each location, one to be sprayed with Simplicity in the fall (mid-October) and the other to be sprayed in early spring (mid-April). A third plot received no treatment and acted as a control to measure natural variations in the native vegetation.

The first application of Simplicity herbicide occurred in October 2014 and the first spring application of the herbicide occurred in April 2015. The same herbicide treatments were applied on both the fall and spring plots for the next two years, with the final application being made in the spring of 2017. The rationale for spraying Simplicity in consecutive years was based on research showing that Japanese and downy brome seeds remain viable in the soil for three years. The application rate used in this trial was the same recommended for controlling annual brome weeds in cropland – 500 millilitres of herbicide per hectare. The equipment used to apply Simplicity over the uneven native grassland was a 1.5 ton truck equipped with a spray boom and tank mounted on a flatbed chassis. Continued on page 5.



Lee Moltzahn

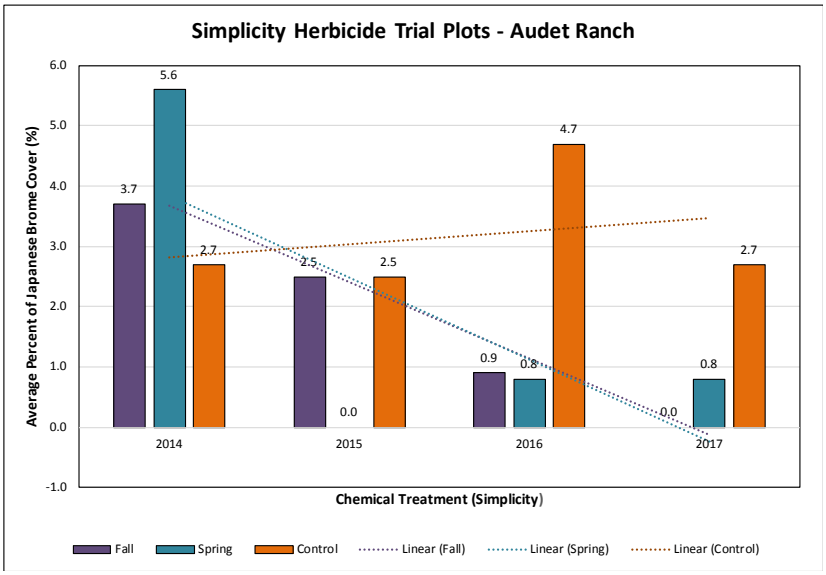
Continued from front cover:

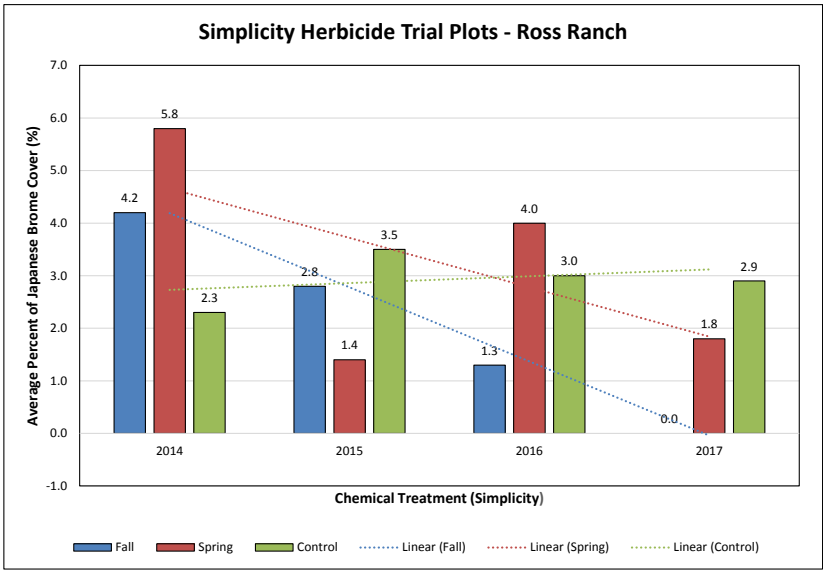
The relative abundance of each grass and forb species in the native grassland was tracked over four growing seasons to measure the effect Simplicity would have on both the Japanese brome and the desirable native plant species. The initial detailed vegetation inventory was conducted in June 2014 to establish a baseline for all plant species before the first application of herbicide in October 2014. Detailed vegetation inventories were then conducted in the middle of June the following three years.

The results are summarized in the tables outlining the percent cover of Japanese brome in each of the treatments at both the Last Sands and Ross Ranch sites. When compared with the untreated plots or control plots, a clear and consistent decline in the presence of Japanese brome was evident in the fall sprayed plots on both sites. At the end of the third year of spraying no Japanese brome plants were detected. The effectiveness of Simplicity when applied in the spring in controlling Japanese brome was not as strong. The spring-sprayed plot at the Last Sands site showed a dramatic drop in the noxious weed population in the first year with a small resurgence in the following two years. The plant cover estimates at the Ross Ranch site were much less definitive in regards to eliminating Japanese brome from the plant community. Years 1 and 3 showed significant declines of Japanese brome in the spring-sprayed plot, whereas in year 2, it rose back up to close to pre-treatment levels.

The detailed vegetation inventories at both sites demonstrated that Simplicity presents minimal risk to non-targeted native grass and forb species. This selective herbicide performed well in controlling Japanese brome in native grassland when applied in the fall but achieved less than desired results when applied in the spring.

We want to acknowledge our partners who facilitated this study; Roy and Christy Audet, the John Ross Family, and Alberta Environment and Parks. Their support and cooperation was greatly appreciated.





Japanese and Downy Brome Life Cycle

Japanese and downy brome are cool season, annual grasses, native to Eurasia. They were introduced to North America in contaminated packing materials and crop seeds and possibly ship ballast. They are now found throughout Canada, the USA, and parts of Mexico. Both species are primarily winter annuals, when fall moisture levels and temperatures allow. This means seeds can germinate in the fall and seedlings will overwinter in a rosette stage and resume growth in early spring resulting in a competitive edge when compared to native plants. They thrive in semi-arid environments taking hold in sandy, clay, and loamy soils. Japanese brome is less drought tolerant and prefers moister sites. While both species appear most often on disturbed sites, Japanese brome is known to invade healthy, native grassland. Japanese and downy brome are known to be prolific seed producers, each plant can produce 25-5,000 seeds. This translates to up to 500 pounds of seed per acre.

Japanese and downy brome are relatively easy to identify. As seedlings, they are hairy and found in dense clumps. At maturity, both species have large, open, drooping panicles with awns approximately one-half inch in length. Downy brome matures to a reddish, purple colouration, whereas Japanese brome remains a tan color. Downy brome plants will range in height from 10 to 70 cm; Japanese brome can be taller, reaching 90 cm.

Due to their invasive nature and the difficulties in controlling infestations, both brome species are listed as 'Noxious' and are subject to the regulations in the Alberta Weed Control Act.

Pasture Water Systems

It's every producers goal to provide safe, clean, reliable water for their livestock. There are different ways that producers can achieve this goal, and methods used often depend on what is currently occurring on the property, including where natural water is located, size of pastures, number of cattle, topography of the landscape, grazing management strategies, etc. MULTISAR has worked with many landowners to come up with water supply strategies specific to their needs, and in many cases, can provide some funding for water improvement projects. In this section, we have provided a few examples of water projects that we have worked on with landowners.

A few potential benefits of water systems:

- Clean water provided to cattle, which improves herd health and calf weight gain
- Better pasture utilization
- Protection of natural waterways, including wetlands and riparian areas
- Reduction of erosion along riparian edges and dugout slopes
- Improved wildlife habitat

Spring Development

Springs are places where groundwater emerges naturally onto the surface of the ground and are generally found in low areas and along hillsides. They flow all year, and can be a good source of fresh water for livestock if taken care of. Letting cattle water directly from a spring can result in more of a mud hole, with contamination from manure, significantly reducing the benefits of using the spring to water cattle.

In this example, a tire trough was located in a riparian area. The cattle would walk along the riparian area to get to the tire trough, muddying the riparian area and decreasing the water quality going into the trough. With the use of a backhoe, the tire trough was pulled out of the riparian area and moved downhill onto a piece of elevated ground nearby. Water is gravity fed into the trough from the spring using 2 inch black poly (100 psi). When the trough fills, overflow water is redirected back down to the spring through another pipe (situated lower than the intake pipe). Costs for these projects can be quite reasonable but ultimately depend on what type of spring development is being planned.

For more information about spring development visit: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex4595.

Removing the old trough from the spring.

New location of tire trough. The trampled spring in the foreground will now have a chance to recover.

Clean water for cattle to drink in the tire trough.

For more information on watering systems visit: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/agdex15866/$FILE/716_B01_module5.pdf

Pasture Pipeline

Water pipelines can be useful with rotational grazing systems because they allow producers to better utilize their water sources over greater areas and encourage cattle to graze areas more evenly. In this example, cattle distribution is an issue, with some upland areas receiving very little grazing in comparison to lower areas. It appeared that this was due to a lack of water in the uplands. In addition, the range health around the currently used water sources (two existing dugouts and wetlands in lower areas) was being severely impacted by cattle and scoring low.

After consultation with specialists, it was determined that a solar-powered remote watering system, using water from a tank installed near an existing dugout, would be the most reliable, cost-effective and enduring approach to getting water to the uplands and better distributing cattle throughout the pasture. The lift needed to pump water from the dugout to the three troughs (one near the dugout and two on the uplands) was 92 feet (28.04 meters), with a distance of 1.67 miles (2.69 km) to cover. The system was designed using a Dandkoff 3040 – 42 volt piston pump supplying 9.1 us/gem. By installing a 24 volt battery bank with an amp/hr capacity of 840, a fully charged system is able to water 180 cow/calf pairs and 130 yearlings for 5.5 days with zero sunlight before needing to recharge. The pipeline itself, a two-inch 160 psi high density poly pipe, could either be left above ground or buried shallowly. In this case, it was buried to prevent overheating of the water over such a long distance and to prevent cattle from damaging it through trampling.

Pipeline from dugout to trough using solar powered pump to trough #1

Costs for these types of projects are variable as it depends on multiple construction and planning factors. For more information on different types of pasture pipelines visit: http://www1.foragebeef.ca/$Foragebeef/frgebeef.nsf/all/frg95/$FILE/waterpipelines.pdf

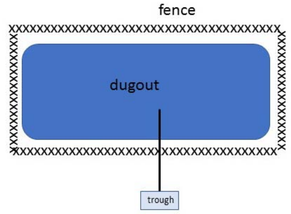
Pasture pipeline from dugout to 3 troughs.

Consider the following when planning a pipeline:

- Flow, pipe size and type
- Elevation changes along the route/will I use gravity to my advantage or do I need to pump water?
- When do you need water? And how often do you need water?
- What permits might I need? Who might I need to contact before digging?

Fencing Off Dugouts

Watering directly from a dugout can erode soil around the dugout and inject manure and other nutrients into the water, which in turn contributes to algae growth. Cattle also expend energy walking through mud to reach water at a dugout, and their risk of injury, disease (such as foot rot), and even death (if they get stuck in the mud), increases. Cattle will choose water that is clean and easier for them to access if available. Removing access to dugouts and providing watering systems outside of the dugout to troughs, storage tanks, etc. is not only beneficial to cattle for these reasons, but is also beneficial to many wildlife species that rely on clean water for a part of, or entirety of, their lifecycle.



Below are a few of different designs that MULTISAR participants are using to keep cattle out of dugouts. These types of designs are very cost effective and prolong the life of your dugout.

Fenced off dugout with various troughs using solar and wind energy to power pumps.

Water Licensing

In Alberta, water is owned by the Crown and its use is regulated by Alberta Environment and Parks under the Water Act (aep.alberta.ca/water/legislation-guidelines/water-act.aspx). Alberta's Water Act requires that approval and/or license be obtained before undertaking an activity in a water body or before diverting and using water from a water body. The general procedure to obtain the authorization under the Water Act is described in the Guidelines for Licensing Water Diversion Projects (aep.alberta.ca/water/education-guidelines/).

East side of fence line with cattle drinking from solar powered water trough that is pulling water from west side of fence.

West side of fence line with protected dugout.

Species Profile: Slender Mouse-ear Cress

Description: Slender Mouse-ear-cress is a native forb in the mustard family (*Brassicaea*) found in the mixed-grass regions in Alberta. It can be very variable in morphology ranging from a single stem to many branches, and grows 15-40 cm high. It flowers from late May to June, with flowers consisting of four white petals, measuring 4-8 mm across. The fruit pods are circular or slightly compressed, with the stalks coming out at a 45 degree angle from the stem. The plants are densely hairy, and covered with greyish, multi-branched hairs.[1] The species can be annual or biennial and the location and density of mature plants reflects patterns of seed dispersal from previous years. Seeds can remain dormant in the soil for many years until climatic conditions are favorable.

Environment Canada, Photo: J. Neudorf. https://www.registre-lep-sararegistry.gc.ca/default.asp?lang=En&n=407875B0-1

Status: The current status of Slender Mouse-ear-cress in Alberta is Endangered based on the small area of occupancy, small extent of occurrence and small population size, decline of habitat quality and isolation of populations.[2] The most recent 2015-2025 recovery plan is based on these factors.[3]

Habitat: Slender Mouse-ear-cress is found in the dry to moist mixed-grass regions in Alberta and Saskatchewan, and is abundant in the United States. It can inhabit a range of flat to gently undulating grassland terrain, in depressions or sand dune edges. It is thought to do best in areas with light grazing disturbances.[3]

Cliff Wallis

Threats: Like many species at risk, Slender Mouse-ear-cress is threatened by oil and gas development, urban expansion and agriculture, wind energy development, military activity on bases, non-native encroachment, unsustainable grazing practices (including the loss of grazing in the ecosystem), alteration to hydrological regimes, climate change and population fragmentation. It must also be noted however, that light disturbances in all forms can facilitate growth and population size.

Beneficial Management Practices:

1. Lightly graze areas of critical habitat.
2. Prevent competition by exotic invasive plants by implementing weed control, reseeding large disturbance areas with native species, and proper grazing programs.
3. Avoid cultivation or development on critical habitat.

[1] Looman, J. and K.F. Best. 1979. Budd's flora of the Canadian prairie provinces. Research Branch, Agriculture Canada, Publication 1662. Ottawa, ON. 872 pp.

[2] Alberta Sustainable Resource Development and Alberta Conservation. 2009. Status of the Slender Mouse-ear-cress (*Halimolobos virgata* or *Transberingia bursifolia* subsp. *Virgate* in Alberta: Update 2009. Alberta Sustainable Resource Development. Wildlife Staatus Report No. 55 (Update 2009). Edmonton, AB 22 pp.

[3] (Draft) Alberta Slender Mouse-ear-cress Recovery Team. 2015. Alberta Slender Mouse-ear-cress Recovery plan, 2015-2015. Alberta Environment and Parks, Fish and Wildlife Policy Branch. Alberta Species at Risk Recovery Plan No.37. Edmonton , AB. 25 pp.

[4] Environment Canada. 2012. Recovery Strategy for the Slender Mouse-ear-cress (*Halimolobos virgata*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. v + 45 pp.

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