

CARA Shelterbelt Demonstration

CARA continues to maintain and monitor a Shelterbelt Demonstration site adjacent to the CARA Centre at Oyen. It was initially developed in the summers of 2003 with seedlings obtained from the PFRA Shelterbelt Enhancement Program. There were eight tree species planted in 2004, including Colorado Spruce, Green Ash, Mountain Maple, Chokecherry, Villosa Lilac, Hawthorn, Sea Buckthorn and Silver Buffalo berry.

Once the seedlings were planted, a drip tape irrigation system was laid out at the base of the trees and then covered with a black plastic mulch. The black plastic mulch, which comes in rolls four feet wide, was placed along the entire length of the row and secured to the ground using an applicator pulled by a small tractor. Two discs, one on each side of the unit, cut a small trench in the soil when the machine moves forward. As the mulch unrolls, discs near the back of the unit throw soil over each edge of the plastic, securing it to the ground. A small hole is then cut where each seedling has been planted and the tree is gently pulled upright. The drip irrigation system consists of a plastic tape which has outlets at regular intervals that allow a slow trickle of water to be delivered directly to the root systems of the seedlings. At the CARA Centre, the water source includes two 1250 gallon water tanks on either side of the equipment storage shop.

Adequate precipitation during the past few years has limited the need for direct watering or by the drip tape. The progress of all species included in the demonstration has been maintained and monitored. Few losses have occurred and most species are showing good growth for our prairie climate. The plastic mulch has become weathered in places, particularly where it was not held firmly to the soil. Deer hooves have broken the plastic in several places. Damage from wildlife has also caused leaks in the drip tape so it has not been used in the past 2 years. The trees were watered by hand a few times during 2018.

Relocation of the White Spruce trees process was started in 2017 when ATCO had advised CARA that they will have to be relocated due to potential interference with the overhead power lines in the future. These trees were planted in partnership with the Big Country Ag Society, so some were moved to an area near the Crossroads Center at Oyen. Four of the White Spruce were relocated to the south of the CARA Centre so we will be monitoring re-establishment of the root system of these 3-5 foot trees during the next couple of years.



Shelterbelt Mulch Demonstration

Applying mulch suppresses weeds, keeps soil warm in the winter and cools it in the summer. It also conserves moisture, supports and encourages numerous beneficial organisms such as earth-worms and reduces stress in shallow-rooted plants. Mulch improves soil structure and drainage and can provide aesthetically pleasing and beneficial effects. Overall, the healthiest plants are those that have access to a consistent supply of water and nutrients and mulch helps with this. Mulches allow for moisture retention, weed reduction as well as increased competitiveness and survival in shelterbelts.

Objectives:

To demonstrate the benefits of various mulches for weed reduction and moisture retention in new shelterbelts.

Mulch	Application	Weed Reduction	Comments:
Landscape Fabric/ Large Rock	High Labour	Medium	Fabric can be costly for long lengths of shelterbelts; good
Landscape Fabric/ Large Rock with Gravel	High labour	High	Can be costly for long lengths of shelterbelts; good
Landscape Fabric/ Gravel	Medium	High	Can be costly for long lengths of shelterbelts
Wood Chips	Medium	Low*	Cost depends on availability
Hay	Easy	High	Low cost
Straw	Messy/Medium	Medium	Low cost
Grass Clippings	Easy	Medium	Low cost
* Flax Straw	Easy	Undetermined	Low cost

Summary of mulch application and weed control:

*buckwheat seed came along with the chips

*Flax straw was applied in the summer of 2015

*More wood chips were applied in the early summer of 2018.

Observations:

Weed growth was monitored in 2018:

- Perennial sow thistle has been a huge issue in the past 2 years in the straw, hay and grass mulches. We had to pull back the majority of the mulches in 2017 to remove the creeping root system to prevent further weed spread
- The most weed growth appeared in the rototilled area & the straw mulch.
- The landscape fabric and rock had minimal to no weed production.
- Buckwheat weed seeds were inadvertently imported with the wood chips when they were replaced in 2013, demonstrating the importance of knowing where the mulch material is coming from and what may come along with it.
- The hay & straw mulches have deteriorated over the past two years, so we have added more wood chips to that mulching portion as well as a portion of the straw mulch was replaced with flax straw in the summer of 2015.
- Moisture retention in the mulched strips was significantly better than that of the rototilled area. The trees required watering after re locating to re-establish the root systems.

Bio-Control of Canada Thistle With the Stem Mining Weevil

Background

Canada thistle (*Cirsium arvense*) is a competitive noxious weed that is widespread across Alberta and much of North America. This perennial herb can grow up to 4 feet tall, has prickly leaves and urn-shaped purple flowers. It causes intensive crop losses from its extensive, horizontal creeping root system. Canada thistle is attracted to sites that have had disturbance and moisture, either by overgrazing, tillage and/or earthmoving. It is listed under the Alberta Weed Control Act as noxious. Canada thistle has a high tolerance to many different environmental conditions and is highly competitive with other vegetation. It is prevalent in many locations such as riparian areas that do not allow for chemical or mechanical control methods. Biological control agents, such as the weevil are of interest in controlling Canada thistle in sensitive areas.

There are 4 beetles that are considered as potential biocontrol agents for Canada thistle including the Stem-mining weevil, scientifically known as *Hadropontus litura* (*formerly Ceutorhynchus litura*). *H.litura* has one generation per year with 3 distinct stages of life: larva, pupa and adult. The adult lifespan is approximately 10 months as they overwinter in the soil and leaf litter, emerging in the spring to feed on rosette leaf foliage and stem tissue. Eggs are laid in May and June in the mid vein of the leaf and hatch 9 days later. The larva tunnel down the stem into the root collar consuming plant tissue and when several larva are present the stem turns black from tunneling and dies several days later. Early summer, once fully fed, the larva will emerge from the thistle shoot. This is the where the main damage happens to the thistle because it opens up holes to where secondary invaders, such as nematodes, parasite and fungi enter and further damage the stems. They then enter the soil, and the pupal stage begins, in which they transform into adults. A few weeks later (late June and July) these new adults emerge from the soil and feed on the thistle foliage until heavy frost occurs in fall.

Reported success of the weevils seems to vary according to geographic locations. Research in the Eastern States, California and British Columbia have indicated that *h.litura* provides poor to moderate control when used alone; however, integrating additional tactics may enhance its efficacy. Research carried out in the mid-western states (i.e. Idaho and Montana) and Alberta indicate higher incidences of impact on Canada thistle populations. This could be open to a number of different interpretations but conjecture on the part of some researchers is that stronger winter conditions could be a factor in the geographic locations where Canada thistle are being negatively impacted by the stem mining weevil. Other biological factors, such as rust, might also be more readily apparent in these regions and so add to Canada thistle decline when the stem mining weevil is introduced.

The weevils we initially imported from Montana for this project in dishes of 105 individuals at \$125 (US). The weevils do procreate every year and while some documentation indicates that they will migrate, as long as they have a food source they remain rather sedentary and populations expand within a thistle stand. As they reproduce and feed on Canada thistle, an absence of this habitat will eliminate their existence. Adults can fly very well and are active on warm summer days, however they are content to stay among the thistle patch.

Weevils are not 'a be all and end all' for the eradication of Canada thistle but may have a place in controlling the weed in sensitive areas of the environment. CARA is working with other producer groups to evaluate establishment, survival and impact of the *h.litura* at several locations in Alberta.

Objective:

To evaluate establishment, survival and affect of the stem mining weevil on Canada thistle.

Project Description:

CARA, along with other producer groups, introduced the Stem-Mining Weevil as a biological control agent to help control Canada thistle populations at various points in Alberta in 2012. The purpose of this project is to decrease and control Canada thistle populations in sensitive areas such as riparian zones, organic farms and native pasture. It is hoped the weevil may be a tool to reduce the use of chemicals to control weeds in sensitive areas.

The h.litera were imported from Montana and introduced to two sites in September of 2012 and again in September 2014, one in the MD of Acadia and to the second in Special Area 4. Weather conditions and thistle stand qualities were recorded. The two sites were re-visited in June 2015 and every June after to investigate winter survival rate of the weevils. Although no stem mining weevils (*Hadropluntus litura*) were observed, damage was found with in the plants at the MD of Acadia site, so there is optimism that the stem mining weevils are living and reproducing in this stand.

At our Special Area 4 (Altario area) weevil location we have noticed a greater impact as the weevils have almost eradicated the Canada Thistle patch where they were initially released. They appear to be slowly eating away at the rest of the Canada Thistle patches that remain (*shown in pictures below*). If the weevils continue to survive the winters and thrive at this location we will be looking at potentially harvesting the weevils to move to other locations.

We received 10 trays from Montana in October 2018 and were able to release the Stem Mining weevils at two new locations within the Special Area 2 & Special Area 4. We will continue to monitor the survival and potential impact of the weevils within these sites. We hope to be able to find the weevils in the spring and visually see the impact that these insects have on the Canada Thistle patches in the fall of 2019.



Bio Control of Western Snowberry with Sheep

Background:

Western Snow berry, commonly referred to as buckbrush, is a perennial forb that reproduces both by seeds and rhizome. Rhizome is a horizontal creeping root system growing within 2-12 inches of the top soil. The rhizomes can access soil moisture from a deeper profile at a much faster rate than fibrous roots of pasture grasses, giving the buckbrush the competitive advantage over grasses, especially in dry years. Heavy stands can reduce grass production as much as 80%, especially in dry years and should be controlled.

Buckbrush plants usually start growing in sparse groups (patches or clusters) and then spread further if not controlled. Buckbrush has relatively no feed value for most livestock because of its palatability. When grazing within a mixed sward, however, sheep prefer forbs. Sheep's preference for forbs makes them well-suited to biological landscape management.

Objective:

To determine the biological control of Western snowberry using selective grazing by sheep.

To determine the initial state of the range field and continue to monitor specific buckbrush locations overtime to measure how the sheep grazing affects the range health and the potential depletion of buckbrush.

To determine the impact of different grazing intensities and timing of grazing by sheep on the range conditions and the western snowberry populations at two locations.

Description:

Lacey Gould, Conservation Agronomist and Animal Nutritionist and Olivia Sederberg, Conservation Technician and Extension Coordinator, completed a Rangeland Health Assessment in the spring of 2017 at the two pastures chosen for the evaluation of buckbrush control by grazing sheep. Exclusion cages were placed at each location to help determine the growth of the pasture and western snowberry. Range health of the sites was to be monitored for at least 2 years to determine if there is significant depletion of the western snowberry in the chosen pastures.

Arial imagery from a drone was used at certain locations to create a general picture of the site. The imagery will be overlapped with future images to see the progression of the western snowberry.

Unfortunately, the sheep were not available in 2018. We did continue to monitor the impact of the 2017 grazing season growth of the buckbrush and the pasture condition in 2018 even though there were no longer sheep grazing.



Riparian Health Assessments within the Special Areas & MD of Acadia

Background:

Riparian health is critical to water quality and quantity, stream stability and habitat for fish and wildlife. A Riparian Zone is the interface between the upland area and the aquatic zone. Riparian communities usually include or border water in the form of a river, wet meadows, creeks or springs. The Riparian Community includes a vast and productive diversity of plants and fungi which are sought out by livestock and wildlife. The structure, function and management of these areas are not well understood compared to other types of land area. Many agricultural and industrial practices can and have drastically altered these zones. A healthy Riparian Zone, in terms of plant species, plant vigor and bank stabilization, will have enhanced filtering ability and thus less risk of water contamination from outside sources.

The constant need for consumable water for ourselves, our pets, our livestock and the fish and wildlife that surround us, requires us to focus on what is needed to keep that water clean and flowing. There are many benefits to a healthy riparian zone such as sediment filtering, stream bank building, water storage, aquifer re-charging, fish and wildlife habitat and dissipating stream energy. Evaluating the health of water systems requires a hands-on assessment.

CARA staff members have been monitoring locations along several local creeks during the past 4 years. Riparian Health Assessments have been completed and will be a reference point for future assessments. Points at the following creeks have been monitored to date:

- Kennedy Creek, MD of Acadia
- Berry Creek, Special Area 2
- Blood Indian Creek, Special Area 2
- Sounding Creek, Special Area 3 & 4
- Natural Springs, Special Area 2 & 4

Objective:

To determine the general state of riparian health along different sections of the creeks and natural springs within the Special Areas MD of Acadia.

To provide producers with information about riparian zones.

Description:

Olivia Sederberg, Conservation Technician & Extension Coordinator, and Jennifer Dick, (Summer Technician) completed six new Riparian Health assessments at numerous sites within Special Areas 2, 3 and 4 in 2018. They found the overall quality of the creek vegetation is very good, including a remarkable variety of native species of both flowering and non-flowering plants and trees. Unfortunately, they also found invasive species at each of the sites, resulting in a 'functioning but at risk' status for these areas. Invasive species can be a major obstacle in improving the areas to a 'functional and healthy' assessment. With the result of dry summers in the recent years there was overgrazing in a few these areas which resulted in lack of competition for the invasive species, allowing these species to intrude into the areas. Another factor they had noticed was detrimental impact (both old and recent) on parts of the bank. Wildlife and/or livestock can significantly damage a stream bank in the spring when as the frost melts away and the bank becomes soft. When animals are allowed access at this time they can breakdown the banks and inhibit vegetative capabilities. A best management practice for riparian areas is to limit or restrict access of livestock to steam banks, particularly in the spring. The sites will be re-visited in 2020.



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Insect Forecast for 2019

CARA participated in the provincial pest monitoring program by monitoring Bertha Army Worm, Cabbage Seedpod Weevil, Wheat Midge and Wheat Stem Sawfly populations. To view the insect forecast summaries compiled by Scott Meers, Provincial Entomologist with Alberta Agriculture and Good, please go to the Alberta Insect Pest Monitoring Network Website. ([http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/All/prm13779](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/All/prm13779))

Alberta Insect Pest Monitoring Network

