

Conservation



Weevils used for Canada Thistle control



Kennedy Creek Riparian Health Assessment



Winter Watering System



Hay & Straw Mulch Demonstration



Planting trees in CARA's Shelterbelt, Organic Mulch Project

Riparian Health Assessment of Kennedy Creek

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 practises 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.

Objective:

To determine the general state of riparian health along sections of the Kennedy Creek in the MD of Acadia.

To provide producers with information about their riparian zones.

Description:

Lacey Ryan, Environmental Conservation Agronomist, completed Riparian Health assessments at 3 new sites along the Kennedy Creek in 2013. She 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, Lacey 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.

Invasive weeds enter these sites in many ways. Overgrazing by livestock, clearing of vegetation and exposing bare soil by ATV, vehicle, livestock and/or wildlife traffic all create an opportunity for weeds to flourish. Many invasive species of weeds and non-native grasses compete with the native species and can choke them out.

Another factor Lacey 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 banks 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. It must also be monitored properly throughout the summer and fall,

There are other management practices which can help move an assessment from 'functioning but at risk' to 'functional and healthy', including the creation of a buffer zone between cropping fields and the riparian area. A vegetative buffer provides several benefits to a watershed, including the filtering or trapping of soil residue, chemicals and excess nutrients entering the waterway. The buffer also slows down the movement of snow melt runoff and downpours, reducing the potential of washing out portions of the bank.



Description and Observations:

Some of parameters looked at when investigating Kennedy Creek riparian health:

- 1) **Potential and existence of woody species on site** – Not all riparian zones can support trees and/or shrubs; however on those sites where woody species belong they play an important role in the system. Their root systems are very good bank stabilizers and their spread provides protection to soil, wildlife, and livestock. Plains Cottonwood, choke cherry, silverberry and sandbar willow are some of the woody species that could survive at various points along the Kennedy Creek.
- 2) **Invasive plant species** – Invasive plants are alien species whose introduction does or is likely to cause economic or environmental harm. Presence of these species in riparian zones reduces the overall health of the site. Invasive plant species found in the Kennedy Creek riparian zones include perennial sow-thistle, scentless chamomile and Canada thistle.
- 3) **Total vegetative cover** – Vegetative cover helps stabilize banks, control nutrient cycling, reduce water velocity, trap sediments, reduce erosion and provide habitat for fish and wildlife. Each site on the Kennedy creek varied with its vegetation cover depended on the disturbance it has had. Over grazing decreases vegetative cover as well as cropping and industrial practices.
- 4) **Disturbance-increaser undesirable herbaceous plant species existence** – A large cover of disturbance-increaser undesirable herbaceous species, native or exotic, indicates misplacement from the potential natural community and reduction in riparian health. They generally are less productive, have shallow roots and poorly perform in most riparian functions. Undesirable species found in the Kennedy Creek riparian zone were dandelions, foxtail barley, brome grass, Kentucky blue grass and sweet clover.

- 5) **Woody shrub utilization** – Evidence was found that both wildlife and livestock have had an impact on the woody species in the riparian zone of Kennedy Creek
- 6) **Stream bank stability** – Stream banks can be altered by human activity which impair the structural integrity of the stream bank. Stream banks which have been altered due to livestock and wildlife hoof shear and concentrated trampling, vehicle or ATV tracks are more susceptible to cracking and/or slumping. Stream bank stability is also hindered when undesirable species increase or when desirable trees decrease. Root mass along the Kennedy Creek was dependent on whether or not livestock had access to the Creek or at which point they crossed it
- 7) **Human-caused bare ground** – Bare ground is soil that is not covered by plants, litter, downed wood, or rocks larger than 6 cm. Bare ground caused by activities such as livestock grazing, recreation, roads or industrial presence indicate a deterioration of riparian health. Human-caused bare ground was found on the Kennedy Creek Riparian zone.
- 8) **Trend of the riparian zone**, if its improving, degrading or static – Trend here, refers to general apparent health of the zone. This changes from year to year, by weather, human activity and plant species present. Currently the Kennedy Creek shows degrading aspects in a few areas while improvements in others, based on location and activity. Going back to the same area every 3-5 years will give a better indication of the Trend.

The Kennedy Creek encompasses several plant community types. The MD of Acadia as well as the Special Areas, falls within the Natural Grassland region of Alberta, and the sub region of dry mixed grass land characterized by Brown Chernozemic soil. The investigation of the Kennedy Creek riparian found just that: lots of various mixed grass and shrub species. The project also investigated various human impacts on riparian zones, such as impeding or bordering crop land, grazing of livestock grazing, industrial activity and damming or other alteration of the stream.

Understanding which stages a riparian zone is in will help identify steps which can be taken to improve the health of the zone and thus ultimately increase water quality.



Human activity



Livestock access



Cropland disturbance

Plant Community Dynamics

Succession is the process of change in which biotic communities replace each other as well as alteration of the physical environment over a period of time. This was observed in the plant communities of the Kennedy Creek. Most areas are in a secondary succession stage which occurs when the primary plant community has been disturbed (for example by a fire, flood, human alteration or livestock activity) allowing secondary plant species to grow.

Secondary succession can move toward or away from the climax community, or mature phase of the natural community. For example, Manitoba maple seedlings under an overstory of cottonwoods would represent progressive succession towards the natural Manitoba maple/choke cherry habitat type. Regressive succession would be a failure to have Manitoba maple seedlings establishment, or a dormancy stage in the seedlings, due to overgrazing. Regressive succession is seen quite frequently when unmanaged grazing of riparian zones is allowed as it can drastically affect the growth of preferred species. Increasers (plant species which increase with disturbance) and invasive plant species (undesirable species or weeds) become abundant in areas where preferred specie seedlings are in a dormant phase.

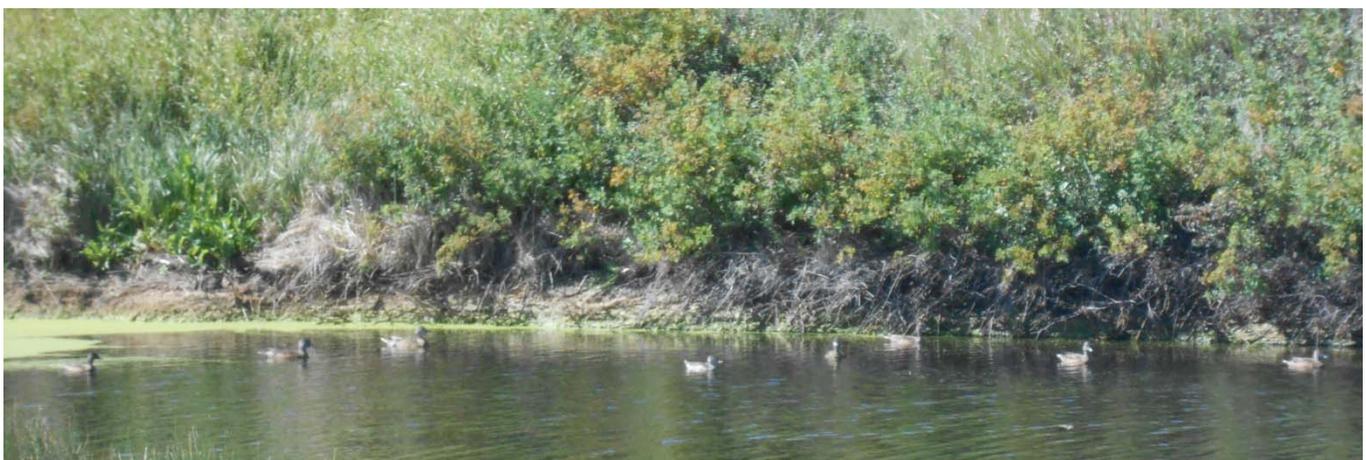
Examples of some plant community types found in the riparian zones surrounding the Kennedy Creek in 2012 and 2013.

- 1) Creeping Spiked Rush in its secondary phase with abundance of increaser and invasive species.
- 2) Silverberry/Creeping Spiked Rush with high amounts of buck brush (snowberry) and rose in its secondary phase.
- 3) Spiked Rush in its primary phase with increased invasive species
- 4) Sandbar Willow/Plains Cottonwood (highly adaptive to disturbance)
- 5) Plains cottonwood/Buck Brush – which originates from a disturbed plains cottonwood/red-osier dogwood habitat type in its secondary phase (Regression succession example).
- 6) Choke Cherry Community type

Additional community type found during 2013 assessments:

- 7) Red-Oiser Dogwood/ Buckbrush community type

Contact CARA if you are interested in knowing the health score of your riparian area and what you can do to improve its quality.



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 seem 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 are imported from Montana 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 ARECA member groups to evaluate establishment, survival and impact of the *h.litera* at several locations in Alberta.

Hadroplontus litura

DESCRIPTION: Weevil - 2 to 3 mm mottled-grey color with white cross marking on back



BACKGROUND		LIFE CYCLE				
Habitat	Adult Emergence	Egg Laying	Larva Development	F1	Adult Life Span	Over Winters
Dense stands 5 to 10 plants/m ² surrounded by bare soil	Coincides with rosette stage	May to June eggs laid in mid vein of leaf (generally in clusters of 2-5, up to 120 eggs are laid)	Eggs hatch between 5-9 days, they then mine down the stem to root collar	Late June to early July	10 months	Adult in leaf litter
ATTACK		COLLECTION		NOTES		
Stage	Damage	Life Stage	Method	Adults can withstand some spring flooding		
Larvae	Stem and root miner	Adults on warm sunny August days	Sweep net, aspirator			
Adult	Minor rosette and leaf damage					

Objective:

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

Project Description:

CARA along with other ARECA member groups introduced the Stem-Mining Weevil as a bio-control agent to help control Canada thistle populations at various points in Alberta. 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, one in the MD of Acadia and to the second in Special Areas 4. Weather conditions and thistle stand qualities were recorded. Winter started early in the Special areas and the MD of Acadia and there is concern that this may impact the survivability of the weevils.

The sites were visited in June 2013 to investigate winter survival rate of the weevils. Although no stem mining weevils (*Hadropluntus litura*) were observed at the MD of Acadia site, Canada thistle Bud Weevils (*Larinus planus*) were found. Damage was found in the plants, so there is optimism that the stem mining weevils are living and reproducing in this stand. Further staff training will help identify specific weevil damage. Plans are to continue to monitor this site in 2014.



Weevil Damage



Canada Thistle Bud Weevils

No weevils were found but significant damage to the Canada thistle stand at the Special Area 4 site was observed in June. The damage was not likely due to weevils, however, as the plant loss was more extensive than weevil activity could have made in the time period since they were released. Exact cause of the damage has not been determined. The site was revisited in late July and again in September with no sign of weevils. We will monitor this site and check for any survival in 2014.

Observations will continue at both sites for a 5 year period to monitor overall control of Canada thistle population. Follow our newsletters for updates on this project.



Dead and dying Canada thistle from unknown cause at Special Area 4 site



Chickens and Shelterbelts

Background

Shelterbelts are used on almost 90% of homesteads to reduce wind, reduce erosion and for aesthetic purposes. Most of the time weeds will appear in shelterbelts due to the disturbance of the ground when planting the trees. These weeds can flourish and can be difficult to control because the trees are sensitive to herbicide applications and rototilling between them can just provide a good seedbed for more weeds. There are many animals which find weeds desirable and chickens are one of these. Many weeds such as Canada thistle have high protein, however to some animals are very unpalatable. Chickens on the other hand seem to have a higher tolerance for weed species, similar to goats.

Objectives:

To determine if chickens are successful at weeding shelterbelts

To determine the long term effects of grazing chickens in shelterbelts, including weed reduction, grass quality, health of chickens and trees within the shelterbelt.

Cooperator: Gould Ranching Ltd, Consort

Project Description:

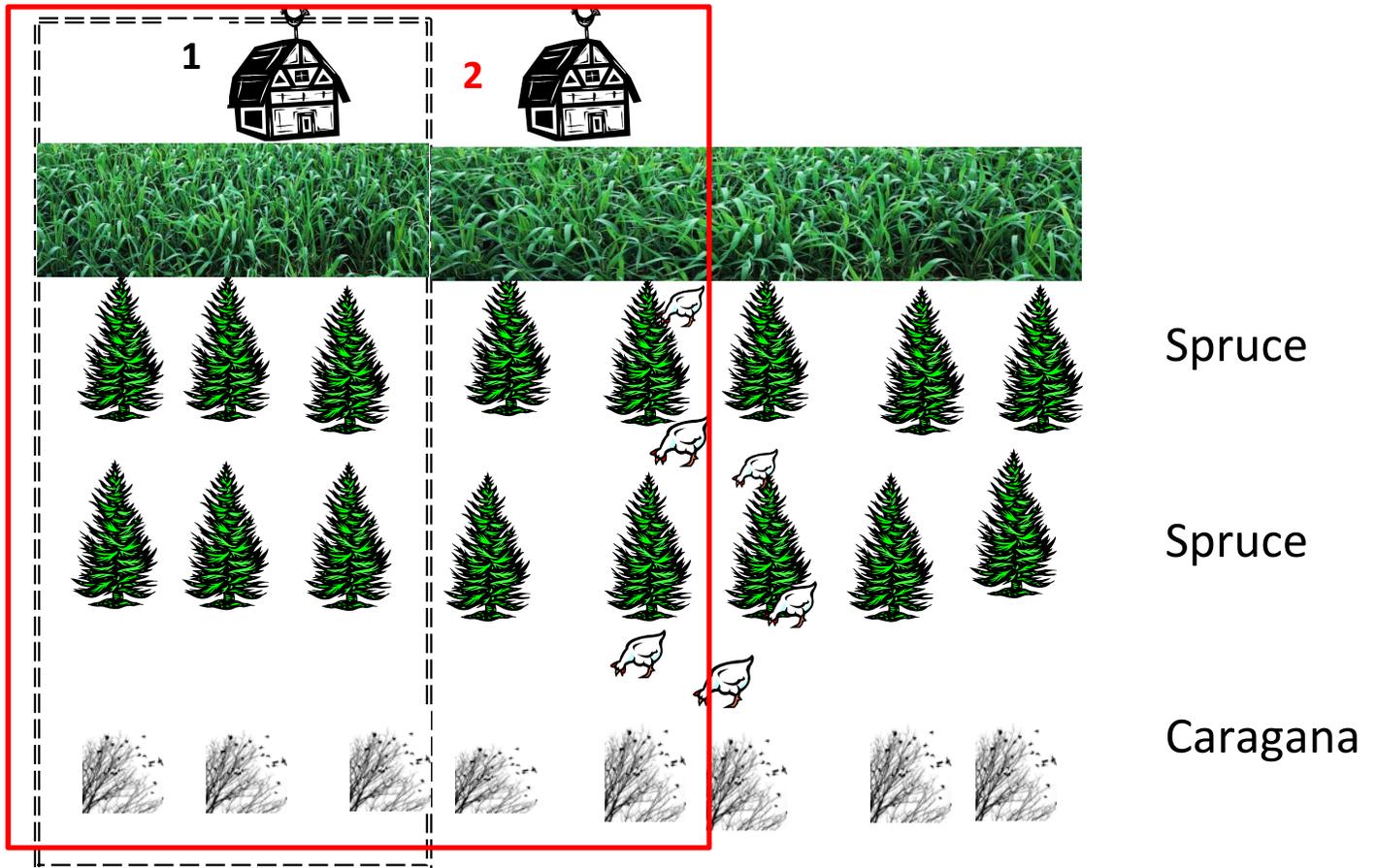
CARA, along with cooperator Gould Ranching Ltd, repeated an environmental project initiated in 2012 which demonstrated using chickens a biological method for weed control within shelterbelts.

On May 15th, electric poultry fence was erected along an established shelterbelt. The fence stands 42 inches tall with built in spiked-posts every 12 feet and netting with 3 inch squares. 60 year old laying hens were confined in the shelterbelt which consisted of two rows of spruce and one row of caragana. Their impact on weed control and grass growth was monitored during the growing season.

This was a different shelterbelt than was utilized in 2012's demonstration. A week after the chickens were put in the shelterbelt, it was found that the chicken coop was too small to house all 60 hens, so 15 were removed leaving 45 laying hens in the shelterbelt. The chickens were allowed access to a larger area of grass at the cooperator's request in 2013 as compared to 2012.



Two different pens were used in 2013 as illustrated below:



We did not see the results this year in weed reduction as was seen in 2012. The hens consumed some weeds, in particular lambs quarters and sweet clover at its very early stages. There are many factors that could have influenced these results. One of which is the increased amount of grass provided to the hens – they like the grass and would choose it over the weeds as seen in both 2012 and 2013 trials. We also let them into a much larger area, so although the chickens were pecking at the weeds, the damage was not extensive. Weed growth was faster than the chickens were eating. Another theory is that we had only young chickens in this 2013 year trial where as in 2012 older chickens were used in the demonstration. Perhaps the younger ones were not so inclined to eat the weeds. As in 2012 the electric mesh fence used to contain the chickens in the pens in the shelterbelt also provided protection from predation. No chickens were lost to predators or died during either year of the demonstration. Placement of the chicken coop, water and supplements influenced the chickens' behaviour; as they tended to remain near these necessities. Burrowing nests and dust bathing were still highly evident in 2013 under the trees indicating the trees being a secure area for the chickens.



Dust bathing under the trees

Cooperator Nora Gould says about the demonstration: *“It was a huge success, the chickens were happy and comfortable”*. That being said, even if there is minimal weed reduction it seems that the overall health and wellness of the chickens was not compromised by being held in a shelterbelt setting compared to that of a coop or open field.

In 2014 we plan to place old and new chickens together into the shelterbelt and have smaller pens with access to a limited amount of grass.



CARA Shelterbelt Demonstration

Cooperator: Donna Scory, Oyen

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 summer of 2004 with seedlings obtained from the PFRA Shelterbelt Enhancement Program. Eight tree species, including Colorado Spruce, Green Ash, Manitoba Maple, Chokecherry, Villosa Lilac, Hawthorn, Sea Buckthorn and Silver Buffaloberry were planted in rows 100 metres long on May 28, 2004. Once the seedlings were planted, a drip tape irrigation system was laid out at the base of the trees. Black plastic mulch, which comes in rolls four feet wide, was placed along the entire length of the row out 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 tape 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 consists of two 1250 gallon water tanks on either side of the equipment storage shop. Rain water is collected from the roof of the shop and then piped to the trees. Rainfall was abundant in 2010 so the drip tape was only used in the fall when the water tanks were drained for the winter. In 2011, the trees were watered twice during the summer and once late in the fall. Strips of lodge pole pine and spruce trees were added to the nursery in the spring.

The progress of all species included in the demonstration has been maintained and monitored. Few losses have occurred and most species are showing reasonable 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. Adding wood chips as a mulch to the rows where the plastic mulch was not installed was considered in 2009, but the cost was prohibitive.



In 2012, the trees were not watered until just prior to freeze-up due to adequate rain during spring, summer and fall. The rows were weeded during the summer and grass between the rows was mowed periodically. The Green Ash were pruned in early fall.



Wildlife damage has been observed in the pines located in the outer rows of the nursery, indicating some sort of barrier or buffer may be needed to protect the trees.



In 2013, we added rows of dogwood and hawthorn to the shelterbelt demonstration site which were also used as the base for a mulch demonstration. Dogwood, Green Ash, White Spruce, Hedge Rose, Hawthorn were also planted in a random (forest) pattern near the CARA Center (see following reports). No watering was done at the site except for the new seedlings in 2013.

Wildlife Planting and Shelterbelt Mulch Demonstration

Background

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 earthworms and eliminates 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.

Shelterbelts provide many benefits to a property and can also support local wildlife. With some design considerations, shelterbelts can provide even better habitat for various wildlife species. The treed areas can act as wildlife corridors and provide pest control benefits for farm yards and fields. Shelterbelts increase opportunities for viewing wildlife and also provide an environment for game birds and other hunted species. Additionally, insectivorous birds residing in a shelterbelt will feed on many nuisance pests, perhaps reducing the need for costly chemical insecticides. Predatory birds, such as hawks, kookaburras and owls, will nest in shelterbelts and consume pests such as mice, rats and rabbits.

Traditionally shelterbelts are planted in a straight row pattern. Planting in a curved pattern, however, can make a shelterbelt more “wildlife friendly”. The curves allow various animal species to easily hide from predators and also act as a better windbreak compared to that of straight rows. Curved shelterbelts can be planted to follow the contours of the land, working better with mother nature around creeks, rivers and wetland areas. They will generally take up more space, however, which can take land out of production and result in management issues for large field equipment.

Objectives:

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

To demonstrate benefits to wildlife habitat in curved shelterbelt vs straight row plantings.



Measuring the rows



Digging holes to plant the saplings

After the trees were all planted, we then gathered up various mulches from generous producers and laid them down. We also left a rototilled area for comparison.

Large Rock and Landscape Fabric



Gravel and Landscape Fabric



Wood Chips



Grass Clippings



Straw



Hay



Discussion

Laying the various mulches was definitely an experience! We received the grass hay in a large square bale, as such it came off in large flakes which were easy to handle and seemed to lay down well. The compact flakes allowed no sunlight, which made it a very effective mulch. The straw was also from a large square, however it was not as compact and stayed more fluffy. It allowed the wind to pick it up and sunlight to poke through so it ended up with more weeds and a more “messy” application process and appearance. The landscape fabric under both rock applications was very easy but the rocks called for a lot of manual labour, especially the large rock. The woodchips also took some labour as we shovelled it out of the truck and spread it with a rake once on the ground. The grass clippings were taken from our lawn mower bag and spread so was an easy application.

Summary of mulch application and weed control:

Mulch	Application	Weed Reduction	Comments
Landscape Fabric/ Large Rock	High Labour	Medium	Fabric can be costly for long lengths of shelterbelts; good use for old rock piles
Landscape Fabric/ Large Rock with Gravel	High labour	High	Can be costly for long lengths of shelterbelts; good use for old rock piles
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

*buckwheat seed came along with the chips



Rochelle Abt applying Straw Mulch



Danny Rude, Kale Scarff and Rochelle Abt applying woodchip mulch.

Once all mulches were applied, weed growth was monitored and removed every few days during the summer. Thanks to the 2013 summer staff for all their hard work counting and picking weeds!

Overall we found that the landscape fabric and rock had minimal to no weed production, as expected. Following that, the grass hay mulch had very small amounts of weed production, most likely due to the solid coverage it provided. There were a few more weeds in the straw mulch area and even more in the wood chip and grass clippings. The most weed growth appeared in the rototilled area.

We found fungal growth on some trees within the wood chip mulch where the chips had blown close to the tree trunks. The increased moisture in this area created a good environment for the fungus. The fungus was removed and there were no further problems once the chips were maintained at least 4 inches away from the tree trunks.



Fungal Growth on trees with woodchip mulch

Our woodchips ended up bringing buckwheat seed into the shelterbelt, which demonstrated it is important to know where your mulches are coming from and what may come along with it.

The hay and straw seemed to settle a few weeks after application so we had to apply another layer to keep it at 4 inches thick which seems optimum to reduce weed production.



Straw mulch



Hay mulch

The large rock/landscape fabric mulch strip initially had areas of fabric showing as well as some weed growth in it. More large rock was added to one half of the area to fill the gaps and gravel was added to the rest of the strip to reduce weed production.



We also found that moisture retention in the mulched strips was significantly better than that of the rototilled area. We only watered the trees once after planting and a couple times during the summer to get the saplings started. The mulched areas had much better moisture retention. The trees in the mulch grew much faster and better than those of the rototilled area. More moisture had to be provided to trees and shrubs planted in the forest seeding demonstration which did not have any mulch.

Overall, our 2013 mulch demonstration showed that all forms of mulch did increase moisture retention and appeared to help the trees grow faster and healthier. All aided in reducing weed growth, with some of the mulches providing better control than others.



Forest Planting Demonstration

Background

Trees provide many benefits, such as produce oxygen, conserve water, provide shade, filter water, prevent soil erosion, prevent flooding, provide food and medicine and create economic opportunities. In a forest situation trees and shrubs of different species can help each other grow but may also compete for growth. Roots of trees and plants share nutrients and if nutrients are scarce, competition occurs. When Nutrients are rich in the soil many plants and trees are able to survive together. Plants and trees of different species form roots in different depths of the soil and are able to reach different nutrient and moisture levels. In natural settings, trees and shrubs co-exist in random, unorganized fashion.

Objectives:

To demonstrate establishment and growth of several trees and shrubs when planted in a random fashion.

To demonstrate adaptability of several trees and shrubs to local growing conditions.

Project Description:

Hedge rose, hawthorn, green ash, white spruce, dogwood samplings were planted in a random arrangement and spacing into a mowed stand of alfalfa/weed mix adjacent to the CARA Center at Oyen on May 29, 2013.



Hedge Rose saplings



Rochelle Abt and Danny Rude planting trees



*Scots Pine Sapling
at time of planting*

After planting we gave the trees a good watering and watched them grow. We run a sprinkler out to these trees from our rain barrels during the summer when we noticed the trees performing poorly. We also kept the area mowed down to reduce competition from the alfalfa field.



We noticed a dramatic difference in growth and plant health from these trees and the ones planted within the shelterbelt with mulch. The lack of water retention in these areas negatively affected the tree growth and there were some sapling fatalities.

In 2014 and onward we plan to monitor the survival rate of these trees and document any fatalities and why they may have occurred. The impact and/or benefits of the random placement will be assessed.

The 'Forest' – flags indicate where and what species were planted



On-Farm Compost Project



Background

Every cattle operation has to deal with manure, whether it is spread out on the fields or left piled up near the corrals. Manure is full of beneficial nutrients, which is why producers spread it on their fields. Manure left in piles, whether for a year or 10 years, can be dangerous to ground water, livestock and humans. After a period of time, these piles can develop an oxygen free atmosphere in which bad bacteria can form and grow. When released, these bacteria can infect livestock, humans and possibly enter the water system. One way to minimize this risk is to turn or stir up the pile, allowing oxygen, and most of the time moisture, into it which helps healthy bacteria grow. You do not need a windrow or compost system to accomplish this – all you need is a front end loader. The good bacteria are able to mineralize nutrients from the manure, making them accessible to the soil and vegetation when it is spread onto the fields. The bacteria can also reduce the pathogens in the manure. You will notice that the manure pile shrinks over time – this is the composting process – providing the additional benefit of decreasing the cost of hauling and spreading it onto the fields.

Applying compost to soil provides an environmentally sound method of treating, handling and disposing of waste products. Composting destroys pathogens and weed seeds, stabilizes organic matter and reduces the solubility and leaching potential of nitrogen. The amending of soils with compost has also been hypothesized to provide non-nutrient benefits for plant growth. Increased organic matter improves plant tolerance to drought stress, enhances water infiltration and reduces surface runoff.

There is little risk of nitrate contamination of surrounding water sources from the application of cured compost as organic nitrogen in compost typically ranges from 10 to 15 percent. If compost to meet nitrogen requirements of a crop, however, there may be an excessive concentration of phosphorus applied which does have some potential to contaminate water sources with run-off. This risk is mitigated somewhat by the positive impact on water infiltration from the compost. Regular monitoring of soil nutrient levels

should be practiced to prevent surface water quality impairment with long term compost application.

Objectives:

To demonstrate management considerations for turning manure into compost.
To compare the benefits of compost application versus chemical fertilizer on soil qualities and subsequent crop production.

Cooperator: Gould Ranching Ltd., Consort

Project Description

Gould Ranching background calves and feeds out a few yearlings. Manure from this feedlot typically gets hauled out to the field every second year. In 2013, the manure from two large pens was utilized for the project. A sample of the manure from each pen was taken to determine the initial nutrient content. One lot was retained in a pile to compost for spreading in late 2014. The second was spread in 2013 as wet manure in the same manner as annually practised by the Goulds. Soil samples were taken from the field to determine initial soil quality factors.

The compost pile was mixed with a front end loader three times during the summer and fall of 2013. At each stage and once every two weeks temperature of the pile was monitored with a compost thermometer. A sample from the compost pile will be analyzed for nutrient and bacteria content prior to spreading in the fall of 2014. Soil tests will be taken from the fields in the fall and again in the spring of 2015 to monitor quality characteristics. The 2015 crop yield will also be assessed. Look to the 2014 report for numerical comparisons on our findings.



Water Systems Inventory

Lacey has visited several local producers within the Special Areas and the MD of Acadia during the past year to add to a stock watering system inventory which was initiated a few years ago. At each location she took pictures and gathered information from the producer regarding the set-up and their experience with the system. More systems will be added in 2014. The information is being compiled into a manual which will be an excellent reference for anyone wishing to develop a new watering system or modify an existing setup. The inventory will include energy efficient and off site systems and the details which can save you time and money. Contact the office for more information.



Extension Program



Canola Crop Walk , Pearen Site, June



Crop Tour, Lunch at Acadia Valley



Cattlemen Clinic, Oyen



Farm Safety Day, Crossroad Center



CARA display at Altario Fair



Grain Market Outlook, Oyen

2013 Extension

Newsletters

Eight editions of CARA's 'Grain, Grass and Growth' newsletter were mass-mailed to 1550 producers. The publications included research results, timely agricultural topics and coming events.



Cooperator Appreciation Evening

January 9, Oyen



CARA hosted project cooperators, local funders and other supporters to a banquet to show appreciation for contributions to our program during the past year. Attendees enjoyed a delicious roast beef meal catered by the East Sounding Creek 4-H Beef Club and were then entertained by Daryl Janz as he shared highlights from his career in news



broadcasting and his interest in the history of western Canada.

CARA's Annual Meeting and Projects Review February 28, Cereal

In addition to annual business, CARA staff reviewed results of CARA's 2012 program and plans for 2013. Megan Madden, Southpaw Communications, shared tips and tricks to using various forms of social media.

Crop Market Seminar March 14, Oyen

75 producers heard Marketing Specialist Lee Melvill discuss the grain market outlook; Ron Walker offer information on what's new with the Canadian Wheat Board and Nevin Rosaasen, ARD, share new marketing options.

Succession Planning Seminar March 15, Consort

Reg Shandro, FarmAcist Advisory Services Inc., led producers through a discussion on strategies for transferring ownership of their farms and ranches and the importance of having a succession plan.

Energy Options Workshop March 19, Hanna

Producers gathered in Hanna to hear the following presentations: Electricity Sub Meters (Olivia Sieniewicz, ARD), Solar Energy (Rob Baron, Lakeland College), Wind Energy (Kelly Lund, ARD), Power Unit Traction & Efficiency (Lawrence Papworth, ARD), Geothermal



Energy (Leigh Bond, Threshold Energy Corp), Off-Grid & Grid-Interactive Renewable Energy Systems (Rick Dunsmore, Goose Creek Renewable Energy Inc.).

Canola Growers Meetings *March 20, Consort and March 21, Oyen*

Producers had the opportunity to hear information on diseases, insects, fertilizer, seeding, harvest and storage by Canola Agronomists Keith Gabert and Dr. Mike Harding at seminars in both Consort and Oyen.

Green Certificate Testing *March, May & December*

CARA hosted testing days for the Green Certificate Program at the CARA Center.

Classroom Ag Program *April*

Lacey Ryan and Dianne Westerlund delivered presentations to elementary students at Prairie View Colony, Veteran and Consort schools. Presentations included the importance of safety, care of the environment and the diversity of agricultural production in Alberta.



Farm Safety Program *June 5, Oyen*

CARA staff partnered with Alberta Health Services, the Big Country Ag Society and many local volunteers to bring a Progressive Farm Safety Camp to 225 local Kindergarten through grade six students. A number of local businesses supported the camp with donations of supplies for the day.



Canola Crop Walks *June 13; Oyen*

Canola Agronomist Keith Gabert met with crop producers at the Canola Agronomics Demo site to discuss various seeding, crop scouting and harvesting practices for optimum canola production.



Riparian Health Field Day *June 18, MD of Acadia*

Amanda Halawell and Norine Ambrose from Cows and Fish guided producers through the procedure of riparian health assessments and plant identification at points along the Kennedy Creek in the MD of Acadia.

**Southern Alberta Women's Grazing School** *July 25 & 26, Foremost*

Lacey Ryan represented CARA on the planning committee for the SAWGS hosted by Foremost County. Presentations at the 2 day school included rangeland and riparian health, herd health, plant ID, electric fencing and principles of grazing management.

**Crop Tour** *July 16, Special Area 3 and MD of Acadia*

Producers spent a day with Pulse Scientist Dr. Mandula Bandara and Specialists Shawn Gorr, Alberta Barley Commission, Brian Beres, AAFC and Roger Andreiuk, Ducks Unlimited Canada, while visiting sites of CARA's regional wheat, durum, barley, field pea, fababean, soybean trials and canola agronomic demo.

Oyen Centennial Parade *August 3, Oyen*

CARA participated in the Oyen Fair with our small plot seeder August 3, celebrating 100 years of agriculture in the area.

**Buffalo and Altario Fall Fairs** *August*

A display of CARA's program was taken to the Buffalo and Altario Fall Fairs in August, sharing information on various projects with local producers.

Shelterbelt Pruning Workshop *October 22, Hanna and Oyen*

Specialists Nigel Seymour Shelley Barkley provided information on managing pests and disease, basic maintenance and pruning techniques of shelterbelts.

Career Day *November*

Dianne Westerlund and Lacey Ryan discussed career opportunities in agriculture with students at South Central High's Career Day.



Cattlemen Clinic *November 20, Oyen*

20 cattlemen took part in several interesting discussions at the Crossroads Center in Oyen at CARA's 4th annual Cattlemen Clinic: Herd Health Issues (Dr. Cec Ruschkowski); The New Beef Code of Practice (Reynold Bergen, Canadian Cattlemen's Association); Winter Feed Considerations (Lacey Ryan); Buying or Raising Replacement Heifers (Freeman Iwasiuk, ARD) and the Wintering Site Design and Assessment Tool (Dianne Westerlund). Displays and product awareness was provided by UFA Omex minerals.

CowCalfenomics *November 26, Veteran*

CARA helped promote Alberta Agriculture's CowCalfenomics Series which included an event in Veteran. Presentations included what the future looks like in the cattle business, opportunities in today's cattle markets, tips on managing risk and planning for transition on the ranch.

Canola Producer's Meeting *November 28, Oyen*

CARA helped promote the Alberta Canola Council's seminar which included presentations on the agronomics of growing canola as well as the world market outlook and marketing strategies.

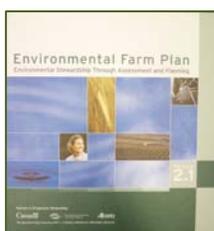
Market Management Workshop *December 11, Veteran*

CARA supported the Canadian Cattlemen and BIXS's 'Manage and Market What You Measure' seminar in Veteran which included discussion of production information tools such as BIXS and

EPD's.

Water Systems Inventory

Information from a number of innovative and energy efficient watering systems was added to the inventory in 2013.



Environmental Farm Plan

CARA staff provided a number of EFP binders to producers and assisted nine individuals with completion of their plans.

Growing Forward

CARA's Conservation Agronomist Lacey Ryan assisted 46 producers with applications to various Growing Forward programs, including Grazing and Winter Feeding, Water Management, Crop, Manure, Energy, Animal Welfare, Health and Biosecurity.

General Inquiries

CARA responded to inquiries from producers on a wide range of topics including crop varieties, diseases, fertility, forage establishment, shelterbelt problems, horticulture, feed, soil and water quality. Farm visits were also made to help diagnose production and pest problems. If the information was not available from CARA's project results, staff sought out answers from other sources.

Feed, Seed and Soil Analysis

CARA provided a number of producers with information, use of bale sampling probes and/or facilitated analysis of over 150 feed, seed, plant, soil and water samples in 2013.



Email Contact Lists

A variety of information is distributed periodically to over 200 producers via an email contact list.



Wintering Site Assessment and Design Tool

Dianne Westerlund represented CARA and all ARECA groups in a committee tasked with the development of material to help producers assess environmental concerns related to wintering sites. Copies of the Tool will be available in March 2014.

Traceability Program

Staff assisted nearly 40 producers with age verification of over 3500 calves in 2013.

Information Updates by Email

CARA maintains email contact lists of over 225 members for regular information and coming event updates.

Website, Facebook and Twitter

CARA's website (www.chinookappliedresearch.ca) has received over 16,000 hits. Watch the site for information on CARA's applied research and demonstration projects; extension events, our newsletters and reports as well as links to other important agricultural information. Check out our information on Facebook and Twitter as well.