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The Verdant Element

A WAR ON WEEDS

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This year has been a challenge between a dry spring, to monsoons, cool weather and then a few days of scorching heat. The only thing predictable is how unpredictable it all is. It seems this year that the only thing unfazed by the inclement weather are the weeds. It looks like snow in some fields with how much white cockle or daisies there are blooming. As a weed inspector in my previous life, it is hard not to want to drive down the roads with blinders on, as it appears like there are invasives everywhere. This year has posed a greater challenge with controlling them as it is hard to carve out a period of time where it is not windy or raining to spray, and even mowing has become an ordeal to get out there.

Weeds are often a reflection of management, or mis-management in most cases. Invasive species frequently indicate issues with disturbance (tillage), fertility (too much or too little specific nutrients), compaction or bottom line poor soil health. For instance Canada thistle, which is one of the most common weeds on operations and been a long standing species on the weed act since 1907, is a symptom of low calcium, phosphorous, manganese and copper; high potassium and iron; a high degree of compaction and very bacterial anaerobic conditions. Ox-eye daisy likes a low calcium, phosphorous, humus, bacterial soils that are high in potassium and magnesium. Tansy favors a low calcium, phosphorous, humus, bacterial soils with low porosity and are waterlogged that are high in potassium, manganese, copper and magnesium. Looking at plant species can tell you a lot about the condition that the soil is in, nutrient deficiencies or abundance as well as structure.

What are your weeds telling you?

Clubroot

Clubroot is a serious soil-borne disease in cruciferous crops, most notably canola. The disease causes galls or clubs to form on the root structure of the plant and causes death of the plant prematurely. Yield losses are estimated to be half of the percentage of infected stems. If you had 100% infestation you should expect 50% yield loss. Once clubroot infests a field it is impossible to eradicate. Spores can reside in the soil for 20 years!

Clubroot is spread by soil, and can occur through soil transport by wind or water erosion, on farm machinery, in manure from animals fed infected feed, and soil attached to seeds (earth tags). It is often first detected in fields at the entrance. Anyone accessing the field can potentially infect a field including: construction, utilities, petroleum industries, recreation vehicles, hunters, and custom operators/sprayers; as well as through livestock, manure, hay, straw, seed, rental equipment and even footwear.

The spread of clubroot has been rapid across the province since it was first detected close to Edmonton in 2003. Prevention is paramount to protect yourself against clubroot. The best defense is to practice good sanitation, at a minimum, by removing soil clumps and crop debris. Washing equipment with hot water or steam, and disinfecting equipment with a weak 1-2% bleach solution and letting it sit for 10-15 minutes will remove any remaining spores on your equipment. Restrict access to your fields and be cognisant of equipment purchases (especially used) as it may be coming from an area with clubroot. Practice soil conservation to reduce the amount of erosion on your fields. Avoid the use of straw or hay from areas that may contain clubroot. Manage weeds and volunteers, especially those in the mustard family, dock and hoary cress or Brassica family as they are all hosts to clubroot. Use long rotations, it will not prevent clubroot but rather slow progression of the disease as the spore half life is 4 years.

Scout your fields! The optimal time to scout your fields is 2 weeks prior to swathing when the galls are most evident. To scout your fields:

- * First assess the field as a whole. Look for patches of the crop that exhibit wilting or stressed symptoms, premature ripening, stunting and yellowing of plants.
- * If you find plants with any symptoms, dig up a few plants to check for galls on the roots (it takes 6 weeks from initial infection for the galls to form) to properly diagnose clubroot infection.
- * Take steps to ensure no soil is transported from one field to another while scouting.

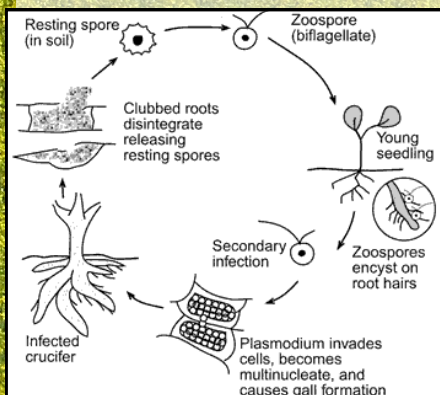
If you have fields infested with clubroot it will require long term management. Using long rotations (four year) will help prevent the accumulation of resting clubroot spores, but it will not eliminate or prevent the clubroot from spreading. Use clubroot resistant varieties, however even these varieties are not immune to clubroot (1-4% of seed is susceptible), expect some infected plants which can be

attributed to volunteers and weeds. Minimizing traffic into the fields and committing to performing good sanitation practices will prevent the disease from spreading to new areas. Avoid working in wet fields as mud will easily stick to equipment and be transferred to other fields. If you have an infested field, work in this field last so you are less likely to spread the disease to other fields. Manage the disease with best management practices, being proactive and scouting your fields.

To learn about the Alberta Clubroot Management Plan contact your local Agricultural Fieldman or Lakeland Agricultural Research Association



Severe clubroot galls or 'clubs' on canola root. [Photo courtesy of T.K. Turkington, AAFC Lacombe]



Life cycle of *Plasmodiophora brassicae*, the pathogen that causes clubroot (source: Ohio State University).

To report prohibited noxious weeds call the Alberta Pest Surveillance System at :

310-APSS (2777)

Western Water Hemlock and Cow Parsnip



Western water hemlock is a very toxic native member of the parsnip family. Its toxins are concentrated in the hollow rootstock, but are also found in the leaves and stem. It can easily be mistaken for Cow Parsnip as both grow in marsh areas such as wetlands and along roadsides with moist ditches and have umbel flowers.

Western water hemlock can be distinguished by its compound pinnate leaves with coarse teeth. Flowers are white or greenish in color. It takes very little of the toxin to be lethal and can cause death in as little as 15 minutes after consumption. Symptoms include: stomach pain, nausea, vomiting, diarrhea, fever, labored breathing, tremors, convulsions, and weak and rapid pulse.

Cow parsnip, part of the carrot family, can grow to 1 to 2 meters tall. It has large hairy heart-shaped leaves with small white flowers that grow in flat-topped clusters and produce flat seed pods. The leaves can cause skin irritation and blisters in humans and livestock. Cow parsnip can also be

confused with Giant Hogweed, an introduced ornamental which contains phytotoxins.



Above: Cow Parsnip. Top Right: Cow Parsnip flowering. Below (from right, clockwise): Western Water Hemlock flower; Water Hemlock leaves; Water Hemlock entire plant.



Woolly Burdock

Woolly Burdock is a biennial species that can reach heights of 2.5 meters and is considered noxious. It has a large tap-root that can go to depths of 1 meter. Lower leaf stalks can either be hollow or solid and the stem is grooved and rough with many branches. Leaves are heart shaped, are very large (40 cm) and alternating. Clusters of purple globular flowers with the flower head are surrounded by whorls of bracts that are densely cobwebby. These bracts are curved allowing them to stick like Velcro to anything that touches them, allowing for seed distribution. This species only reproduces by seed, growing the first year as low-growing rosettes. Herbicide is most effective to control first year growth rather than digging out the large taproots. Woolly burdock matures in the second year of growth and flowers, producing seed.



For control it is best to clip the heads and burn them, or mow the plants before it flowers to prevent seed from being produced.



Tall Buttercup



Tall Buttercup is a perennial that spreads by seed. It produces an oil called protoanemonin that is toxic to cattle and grazing animals. Most poisonings occur when the plant is juvenile and the young leaves and stems are consumed; but is mostly avoided by grazing livestock. Dried plants pose no harm as the oil is not present. Symptoms of poisoning can include: blistering of the skin, mouth and digestive tract; paralysis; convulsions; and death.

Tall Buttercup prefers wet soils, so the population may recede in drier years, but then repopulate in wet years. It can grow to almost a meter in height, with an erect hollow stem. Leaves on the lower stem are 3-8 cm long and are deeply divided into 3-5 lobes. The upper leaves are smaller and hairy, divided into 3-4 narrow segments. Flowers are bright yellow on long stalks with 5 petals that are 10-14 mm long. The flowers can appear shiny. Each plant can produce about 250 seeds that remain viable in the soil for up to 4 years. The seeds are easily transported by water.

Control: the best way to control tall buttercup is out-competing it with a good stand of grass or forage. New buttercup plants germinate in the bare patches

as they have a hard time in established tall vegetation. Buttercup seeds germinate in the late fall, so go into winter with a healthy pasture (ensure adequate carryover). In severely infested pastures, cultivation for several years with an annual

crop planted can reduce the stand.

Mowing prior to

the seed set will help to reduce the infestation. If found in small patches, hand picking is an option but wear gloves and long sleeves as the oils can cause skin blisters. The best control is early spring spraying (when the average daily temperature is above 15°C) with a herbicide combination including 2,4-D.

During past years' poor hay production, hay that was brought in may have contained tall buttercup and can be seen in areas that it was fed out.



Ox-Eye Daisy



Ox-eye daisy is similar to scentless chamomile. It tends to have larger flowers than scentless chamomile and spoon-shaped lobed basal leaves, with its upper leaves being linear (narrow and long). It reproduces by rhizomes and seeds. Each plant produces hundreds of seeds. Ox-eye daisy has an unpleasant odour.

Greenhouses and nurseries may sell Shasta daisy, which originated from ox-eye and are supposed to be sterile but can revert back to ox-eye

parentage and become invasive.

Control: Do not mow as it can spread the seed, and can cause the stems to re-sprout. Cultivation can be used as ox-eye has shallow roots. Several herbicides are registered to control ox-eye daisy.



Tansy

Tansy is a creeping perennial that reproduces by both seeds and short rhizomes. Leaves are fern-like and tend to be aromatic. Flowers occur in dense yellow button-like clusters. It grows in a variety of conditions, from pastures, fence lines and riparian areas with full sun.

Control Options: cultivation is not recommended as re-growth can occur from severed roots. Regular mowing can reduce the amount of seed produced, but works best with the inclusion of a chemical control method. Encourage competitive growth from native species.

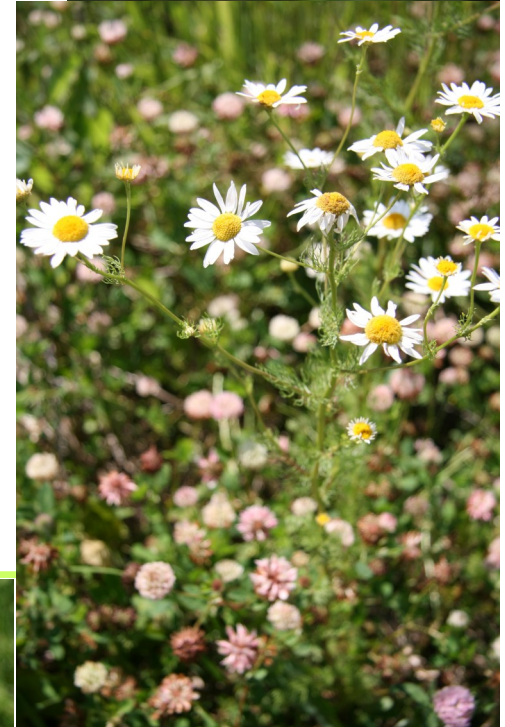
This plant contains pyrrolizidine alkaloids which are poisonous to humans and livestock. It can cause liver damage and reproductive issues in cattle.



Scentsless Chamomile



Scentsless Chamomile is easily confused with pineapple weed and German chamomile, both of which have distinct scents. Scentsless chamomile has very fine smooth leaves, which are scentless when crushed. Flowers are daisy-like, yellow disk centered flowers with white ray petals. It reproduces by seed, and can have one million seeds per plant per year. The seeds can remain viable and dormant for 7—10 years. These plants can grow quite tall and without competition can cover a 1 meter squared area. Scentsless Chamomile grows indeterminately which means it will continue to flower and go to seed continually over the growing season. It is a poor competitor, but can establish quickly on disturbed sites.

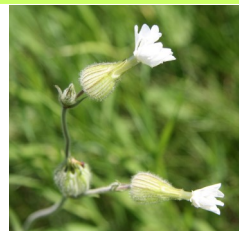


Control: DO NOT mow. These plants will adjust to mower height and flower closer to the ground and can re-sprout from the crown. Hand pulling small patches can provide effective control. Picked plants should either be burned or double bagged and sent to the landfill. Several chemical control methods are available. Biological control methods are available and include a seed-head feeding weevil (*Omphalapion hookeri*), and a gall midge (*Rhopalomyia tripleurospermi*).

White Cockle



White cockle is commonly found in hay fields, fence lines and orchards. Leaves are opposite, hairy with prominent veins on mature leaves. There can be several stems per plant growing up to 120 centimeters tall, turning purplish when flowering. The plants are dioecious with the flowers having five white notched petals. The male flowers have 10 veins at the base, whereas the female has 20 veins which inflate when the seeds are ripe. White cockle



produces large quantities of small seeds that are similar to clover and often are found to be in forage seed.

White cockle is commonly mistaken for night-flowering catchfly (which is sticky to touch and hairy) and bladder campion (hairless and smooth).

Control: cultivation is not recommended as white cockle can re-sprout from root pieces. Frequent mowing will prevent the plants from producing seed, but white cockle is a perennial, so will continue to grow from the root system. Herbicide options are usually limited due to occurrence in pastures and hay fields. There is some herbicide resistance with white cockle. Cutting and fertilizing to get grass and other species to compete is another possible control method.



Himalayan Balsam

Himalayan Balsam is a prohibited noxious weed, which means that you must eradicate them. They have the potential to take over native vegetation, forming a monoculture and destroying wildlife habitat and waterfowl breeding grounds. They can outcompete cattails, rushes and sedges in riparian areas and due to shallow roots allow for erosion and destruction of shorelines.

Himalayan Balsam is an annual, which grows at an impressive rate, achieving heights of 1 to 3 meters. It has a hollow bamboo-like stem with prominent ridges. When under stress, it can grow in a spindly grass-like fashion, flowering close to the ground. The leaves and stem are tinged reddish purple colour, with whorls of three leaves



twirling up the stem. Leaves are lance shaped and have prominent veins and serrated edges. The flowers can come in a multitude of shades from white to pink to dark purple. Flowers are heavy with nectar and can attract bees away from native species. Seed capsules can contain up to 16 seeds and explode, shooting seeds up to 10 meters away, and can stay viable for seven years. An average sized plant can produce 700-800 seeds in total.

Control: Hand pulling works best but needs to be done early in the season before seeds form. Disposal by bagging and burning is recommended however for large patches this is ineffective. At Jesse Lake we have used the “pick, break and drop” method which is pulling out the plant and breaking it apart a few inches above the roots and dropping them on drier lands where they dry out and die. After August, you should bag the tops to prevent seed dispersal. Some herbicides are effective, however sprayed flowering plants can still produce viable seed.



Example of how Himalayan Balsam can outcompete native riparian vegetation.

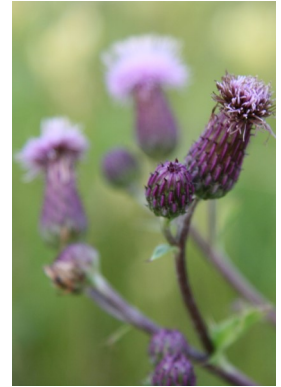
Canada Thistle



Canada thistle has been on the weed control act since 1907. It is an aggressive perennial with an extensive root system that has been found to go down to depths of 6 meters. It is a dioecious plant meaning it has both male and female flowers. It spreads primarily by creeping roots to form colonies that can be found in a variety of habitats.

Prevention is the best in non-cropland areas by maintaining healthy plant cover and re-seeding disturbed areas as soon as possible with desired species. Avoid overgrazing of pastures to prevent thistle establishment.

Control: most of the Canada thistle biomass is in the root system so the only effective control is to kill the roots. Cultivation spreads small root pieces around, allowing for the establishment of new plants from those roots. Repeated mowing will eventually deplete root energy reserves, however this will take several years to be effective. There are over 280 registered herbicides for Canada thistle, however one with a residual would be more effective. The best time to spray is when the plant is in early bud stage (such as the picture above), or in the fall when the plant is moving energy into the root system.



In 2012, LARA released 1260 Canada thistle Stem Mining Weevils (*Hadropontus litura*) to determine if the weevils can establish native populations for Canada thistle suppression. The weevils are host specific to Canada thistle, and as adults, feed on the leaves of plants and when reproducing the eggs are laid in the stem and the larvae mine down in the stem to the roots feeding on plant tissue. It was found that the weevils after a year or two suppressed thistle populations.



Toadflax

Toad flax has a snap dragon-esque yellow flower that may have orange coloration on the throat of the flower. Leaves are pale green, very soft, long and narrow. This plant primarily spreads by its extensive creeping root system to create large colonies, but does have some seed production. Toadflax can grow up to one meter tall.



Control: Once established, toadflax is very difficult to eradicate. Repeated cultivation can be effective. Chemical control can be used for management, but is much more effective if used with other suppression methods such as repeated mowing or cultivation.



Environmental Farm Plans

The environment is becoming a more prominent issue. It is a large factor in marketing agriculture and food products in today's global markets. Consumers are demanding more transparency and are demanding high quality and safe products. Reputation of food safety is critical to retain and gain access to domestic and international markets.

Environmental Farm Plans (EFP) provide a tool for producers to self analyze their operation and identify environmental risks, current standards, areas for improvement and also highlight what they are doing well. Having a completed EFP allows producers to access different funding opportunities, such as the Growing Forward Stewardship Program. It is also useful in product branding that demonstrates specific environmental standards.

The EFP Process

An EFP can be completed through workshops, online or one-on-one session(s). The EFP first identifies the soil and farm site characteristics. Following this, the producer completes only the relevant chapters that apply to their operation; such as wintering sites, fertilizer, pesticides, crop management etc.

Upon completion the EFP is submitted to a Technical Assistant for review. Once reviewed the EFP will be returned along with a letter of completion.

The EFP is a living document and should be reviewed and updated periodically.

If you wish to complete an EFP or have any questions regarding EFP please contact Kellie at the LARA office at 780-826-7260

Riparian Health Assessment

The riparian zone is the interface between the upland and a water course. A healthy riparian area: traps and stores sediment; builds and maintains banks and shorelines; stores water; recharges aquifers; filters and buffers water; creates primary production and much more!

A riparian health assessment is a tool designed to evaluate the site and can provide a foundation to build an action plan and identify priorities.

If you would like a FREE Riparian Health Assessment conducted on your property or more information please call Kellie at 780-826-7260 or email sustainag.lara@mcsnet.ca



CANADIAN AGRICULTURAL PARTNERSHIP

The Canadian Agricultural Partnership is a five-year, \$3 billion federal-provincial-territorial investment in the agriculture, agri-food and agri-based products sector set to begin in April 2018, and is the successor of the 2013-18 Growing Forward 2 partnership. In Alberta, the Canadian Agricultural Partnership represents a federal - provincial investment of \$406 million in strategic programs and initiatives for the agricultural sector.

Currently accepting funding applications is the Environmental Stewardship and Climate Change program and Farm Water Supply.

Funding Opportunities Stewardship covers projects such as:

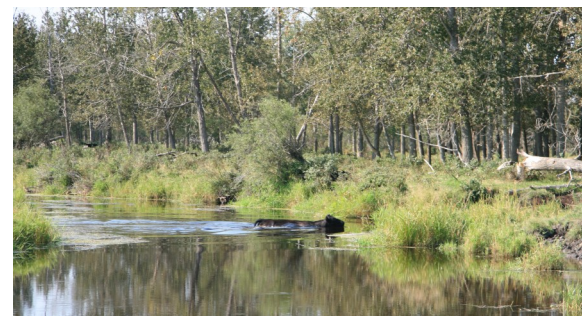
Riparian Area Fencing and Management	Permanent fencing and potentially cross fencing	Funding Maximum: \$75,000 Cost Share: 30% or 50%
Year-Round / Summer Watering Systems	Portable or permanent systems that are not in your yard site	Funding Maximum: \$50,000 Cost Share: 30% or 50%
Watercourse Crossings	Construction materials needed for watercourse crossing in accordance with the Water Act	Funding Maximum: \$10,000 Cost Share: 30% or 50%
Riparian Management Strategies - OPEN	Activities which are not explicitly ineligible and which can be shown to meet or exceed the program goals. Potential projects include: pond levelers for beaver management, riparian buffer establishment, native prairie management, grazing management consulting, wetland restoration	Funding Maximum: \$100,000 Cost Share: 30% or 50%
Relocation of Livestock facility or confined wintering site	Relocate a livestock facility that poses a significant risk to water quality or the environment, and properly remove the existing facility	Funding Maximum: \$100,000 Cost Share: 30% or 50%
Improved Land Application of Manure	To adopt technologies that result in more efficient nutrient use and decrease nutrient loss through run-off and volatilization. Eligible costs include: load cells, flow control meters, on the go nutrient analysis technology, compost turners and much more.	Funding Maximum: \$100,000 Cost Share: 30% or 50%
Agricultural Input and Waste	Improved pesticide management; improved nutrient management (sectional controls); plastic rollers; shelterbelts; wetland assessments	Funding Maximum: \$7,000 - \$15,000 Cost Share: 30% or 50%

More Information On Funding Opportunities

For more information on these funding opportunities go to: <https://cap.alberta.ca/CAP/index.html>

Call the LARA office to set up a time to go over funding possibilities and for assistance with the application forms.

Please note that applications must be approved prior to work being done or purchases made to be eligible for the funding.



Stuck in the mud? Consider an offsite watering system.

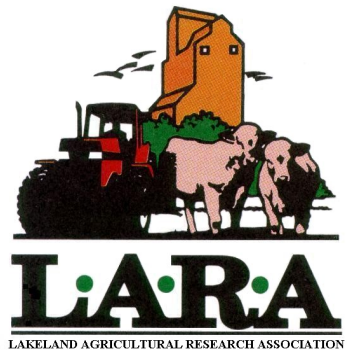
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Sustainable farming encompasses a wide range of practices and principles; combining environmental stewardship with profitability and ensuring that the family farm will be there for generations to come.



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Weedy References

- ◆ **When Weeds Talk** by Jay L. McCaman
- ◆ **Alberta Invasive Species Council** <https://abinvasives.ca/>
- ◆ **GoA Alberta Invasive Species** <https://www.alberta.ca/invasive-species.aspx>
- ◆ **Alberta Invasive Plant Identification Guide** <https://open.alberta.ca/publications/6740590>
- ◆ **EDDs Map** <https://www.eddmaps.org/alberta/>

WWW.LARAONLINE.CA

Cyanobacteria or Blue Green Algae is becoming a more common occurrence in both the lakes and dugouts of the area. It is estimated that cyanobacteria have been in existence for over 2 billion years. Blue green algae are primitive bacteria that are capable of photosynthesis. They are a competitive species and can fix their own nitrogen so they are limited by phosphorous in the environment. They are very unique in the fact that they can regulate their buoyancy and move vertically in the water column depending on light requirements and temperature.

Cyanobacteria produce several different forms of toxins some of which are lethal in minutes to ones that bioaccumulate and can cause long term damage to vital organs such as the liver and kidneys. Anatoxins have been known to be lethal within minutes of consumption by affecting the nervous system. The toxins are deactivated by ultraviolet light so do not last long in the environment, but are potent at very weak concentrations. Saxitoxins affects the nervous system and may aggravate pre-existing conditions such as asthma. They also can cause severe contact dermatitis. Microcystins accumulate and can persist in the water for several weeks following the bloom and will cause organ damage to the kidneys and liver. If blue green algae is present in your dugout, if possible find an alternative watering system for your livestock/household or treat the water and do not use for three weeks as the bacteria die and release the toxins.



Blue Green Algae