Grow With Us

2025, Issue 2

LARA
LAKELAND AGRICULTURAL RESEARCH ASSOCIATION

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Icebergs and native forages: What you can't see can sink you

by Reynold Bergen, Beef Cattle Research Council

In April 1912, the RMS Titanic sank off Newfoundland's coast after an iceberg tore a hole in her hull 25 feet below the waterline. Only a tenth of an iceberg is visible above the water; most lurks beneath the surface. Forage plants are similar; how things look on the soil surface may not reflect what's happening below.

Forages use sunlight to convert carbon dioxide into plant sugars that drive plant growth. To do this, roots must absorb water and minerals from the soil. You've probably seen old pictures of a healthy grass plant with enormous roots extending deep into the soil, and overgrazed grass plants with shallow root systems.

With drought recurring in many regions, you might wonder what affects pastures more — the drought, or overgrazing during drought. James Cahill and co-workers at the University of Alberta studied how grazing season and intensity affected forage yield and root mass under drought conditions *(Differential sensitivity of above- and belowground plant biomass to drought and defoliation in temperate grasslands; doi.org/10.1016/j.agee.2023.108660)*.

What they did: This team collected data at seven predominantly

native grassland sites in Alberta representing a range of average annual precipitations (Gem, 312 mm; Onefour, 318 mm; Oyen, 321 mm; Twin River, 358 mm; Kinsella, 401 mm; Sangudo, 492 mm; Stavely, 533 mm). Extreme drought was imposed by installing transparent rainout shelters over half the plots to divert nearly half the precipitation during the growing season. Plots were clipped instead of grazed because cattle would have demolished these shelters.

Five clipping treatments were designed to represent different grazing intensities and timings. The control treatment remained unclipped in June and September (None/None). The Heavy/None treatment was clipped heavily in June (to three cm stubble height) but not in September. The None/Heavy treatment was not clipped in June but heavily clipped to three cm in September. The Light/Heavy treatment was clipped to a seven cm stubble height in June and three cm in September to mimic light early-season grazing followed by heavier grazing after vegetation growth slows. The Heavy/Heavy treatment was clipped to a three cm stubble height in both June and September.

The combination of two rainfall treatments and five clipping treatments allowed them to test grassland responses to 10 different grazing management and moisture scenarios. Each combination was replicated four or five times at each site. Treatments were imposed during the 2017, 2018 and 2019 growing seasons.

After three years, total above-ground forage production was measured by harvesting part of each plot to ground level in July, and 15 cm deep soil cores were collected to measure root mass.

What they learned: During the three years of the experiment, natural rainfall was consistently lower than normal at the driest sites (Gem, Onefour, Oyen and Twin River) but above normal in at least one out of three years at the Kinsella, Sangudo and Stavely sites. The rainout shelters imposed historically harsh or near-record drought conditions at all sites.

Extreme and prolonged drought did not significantly reduce forage productivity or root mass on its own. Native grasses are adapted to environmental challenges.

Clipping plots heavily once in June did not affect forage yield compared to a single heavy defoliation in September, regardless of moisture. But early clipping was more harmful

While native plants can tolerate significant drought, they can't tolerate heavy grazing under drought, especially in spring.

to the roots, particularly under drought conditions. The Heavy/None treatment reduced root biomass by eight per cent under normal rainfall and by 16 per cent under extreme drought. This supports long-standing recommendations to avoid grazing native grasslands heavily, particularly early in the year.

As June clipping intensity increased from None/Heavy to Heavy/Heavy, forage yields declined by 15 per cent under both normal and drought conditions. Root biomass responded similarly, decreasing by up to 23 per cent under extreme drought.

There were differences between locations. Drought had consistent effects on root biomass regardless of how much precipitation each study site received. However, the additive effects of clipping during drought affected root biomass differently among sites. More severe clipping (especially in spring) damaged root growth the most when drought was imposed on grasslands with greater normal rainfall (Kinsella, Sangudo and Stavely).

What does all this mean to you? Heavy grazing may not depress forage productivity at first. But as roots shrink in size and depth, especially from spring grazing, plants gradually take up less water and nutrients. This will reduce their long-term ability to support above-ground forage growth.

Remember that it may take pastures some time to recover from being grazed through repeated years of severe drought. To regrow lost roots, plants need to transfer energy from shoots to roots. But they can only do this if they have enough leaves to begin with! That's why heavy, early-season grazing

should be avoided.

The finding that forages acclimated to higher rainfall areas may be more susceptible to heavy grazing during drought is important for Canada's wetter regions. Grasslands may be less adapted to drought in regions where drought is less common, and more heavily affected when it occurs. A moderate drought in a region that normally sees more rainfall may be more damaging than a moderate drought in a normally dry region. Careful grazing management is important everywhere, regardless of what "normal" rainfall looks like.

Bottom line: While native plants can tolerate significant drought, they can't tolerate heavy grazing under drought, especially in spring. Neglecting what's below the surface can get you into trouble with both forages and icebergs.

The Beef Cattle Research Council is a not-for-profit industry organization funded by the Canadian Beef Cattle Check-Off. The BCRC partners with Agriculture and Agri-Food Canada, provincial beef industry groups and governments to advance research and technology transfer supporting the Canadian beef industry's vision to be recognized as a preferred supplier of healthy, high-quality beef, cattle, and genetics. Learn more about the BCRC at beefresearch.ca.

Why What Isn‘t Farmed Matters: The Value of Shelterbelts and Wetlands

by Dylan Fiessel, Central Alberta Online

With many producers in Western Canada getting ready for spring seeding and focusing on their seeded acres, it can be easy to overlook those areas that aren’t farmed. Native areas such as shelterbelts, road allowances, and wetlands provide water and nutrient capture for your crop and are key homes for animals and insects that not only benefit agriculture, but the ecosystem as a whole. Dr. Shathi Akhter, research scientist with Agriculture and Agri-Food Canada, talks about the importance of these areas not just from an environmental standpoint, but from an agriculture one as well.

Native habitats such as shelterbelts and wetlands are being removed at an alarming rate, with producers maybe not knowing the benefits they provide. (Photo source: Central Alberta Online)

“Many of us do not focus on those areas because that's not where we are growing the crops but those are important because although we are not directly growing crops, they provide some indirect contribution. By removing those areas, we are exposing the lands again to challenges like soil erosion, but (these areas) can also help increase yields by nearly 10-12% in the affected area.”

Shelterbelts, wetlands, and road allowances allow for the blocking of wind, which can whip away the topsoil and water from your fields. As well, these areas can capture nutrients and carbon material for crops to use and with the winter snow beginning to melt, can hold run-off from going directly to waterbodies and instead keeping it in the field for the crop to use. Dr. Akhter notes that these areas, particularly in the southern portions of Western Canada, are going away at an alarming rate.

“In Saskatchewan, we've lost pretty close to 50% of the wetland that we would have in the past, say 50-60 years ago. It’s even more severe in Manitoba, around the Red River Valley we’ve lost almost 90% and by losing those wetlands and shelterbelts, we are actually making our land more vulnerable.”

This causes producers to be stuck in a hard place. One, you want to remove the shelterbelts and wetlands to not only have more access to farmable land for economic purposes but also for ease of operation such as not driving around headlands. At the same time, you don’t want to remove these natural habitats that provide water and nutrient capture for crops, and are also ecosystems and homes to animals, insects, and plants that make up our beautiful country.

At the end of the day, what producers decide to do with their land is their choice, as long as it’s law-abiding. However, being aware of the losses that come from removing these natural habitats can maybe give a different perspective on how agriculture and the environment work together and why what isn’t farmed matters.

Original article was published on February 28, 2025 on Central Alberta online. The article can be found at the link below: https://centralalbertaonline.com/articles/why-what-isnt-farmed-matters-the-value-of-shelterbelts-and-wetlands?mc_cid=643d1fc7c6&mc_eid=9990cdf9c0

Lakeland Agricultural Research Association

Ag in the Field Tour & Tradeshow

Innovation. Research. Education.

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What to Expect

Door Prizes & Draws!

PLOT TOUR
Tour the research plots and hear from experts in the field on insect pests, polycultures and lupins!
Bus leaves the hall at 3:00 pm

TRADESHOW
View the newest in agriculture technology at the tradeshow
Open 1:30 pm - 8:30 pm

PRODUCER PANEL
Hear from local producers implementing regenerative agriculture practices on their farm. Bring your questions!
Panel starts at 6:30 pm

FREE SUPPER PROVIDED
5:00 PM - 6:30 PM

Come for the day or join us for part of the day!

CALL 780-826-7260 WITH QUESTIONS OR TO LET US KNOW YOU ARE COMING

Smoky Lake County

LARA

Tiny allies may help canola push through drought

by Robert Arnason, Grainews

After multiple years with insufficient moisture and yet another dry summer in 2024, it's become painfully obvious that Canada's canola industry needs varieties with improved drought tolerance.

That's not an easy task for breeders. It is a complicated trait that involves dozens of genes, signals and processes within a plant. There isn't a magic gene that will preserve canola yields in a year with minimal rain.

However, researchers with Agriculture and Agri-Food Canada in Saskatoon are studying the microbes that live near the roots of canola plants to see if a partial solution can be found in the soil.

"We're field testing multiple breeding lines that are either drought-tolerant or drought-susceptible … at our farm in Saskatoon," says Jennifer Town, an AAFC soil microbiologist.

The goal of the project is to identify bacteria and other microbes in the microbiome that may co-operate with canola and provide some help during periods of drought.

"What we're looking for, is there any difference in the microbiome between the susceptible and the resistant varieties."

The microbiome is the bacteria, fungi and other microbes that live within a few millimetres of the roots of plants, inside the roots or on the root surface.

"They can really help with nutrient absorption, drought tolerance and overall plant health," Town said at Ag in Motion near Langham, Sask.

In 2023 and 2024, Town and her fellow scientists planted a selection of canola lines at the AAFC farm in Saskatoon, then they took soil samples and analyzed the community of bacteria and fungi that exist near the roots of canola.

In simple terms, Town hopes to learn if a canola variety with poor drought tolerance has a different community of microbes than a variety with better tolerance.

Town is particularly interested in root exudates and how they

influence the community of microbes that live in association with canola.

"The root exudates are organic acids that are secreted by the roots into the soil," Town says.

"They really help the plant shape the microbiome (and) recruit the microbiomes that it wants to stay healthy."

In 2023, the AAFC scientists did detect differences in the soil microbiome, but the research is still in the early stages.

"The goal is to use the data to breed more (drought-) resistant cultivars and also potentially develop biologicals that can confer drought (tolerance)," Town says.

Breeding challenge

Designing crops that work in tandem with soil microbes to achieve a desired trait is a relatively new concept in the world of crop development — but some scientists believe it has potential.

"One potential method … is to alter host (plant) genetics to promote the recruitment and growth of beneficial microbes," says a 2021 paper, Plant Genetics as a Tool for Manipulating Crop Microbiomes: Opportunities and Challenges, written by Maggie Wagner, a University of Kansas plant scientist and soil microbiology expert.

In an interview, Wagner said it's possible that crops could be designed so they promote the growth of certain bacteria around the roots.

"Imagine you have a particular beneficial microbe … that has an ability to (consume) some chemical that the plant can produce," Wagner says.

"If the plant is optimized to produce that chemical, that would set up a situation where … that beneficial microbe will have a competitive advantage."

Wagner's general comments apply to Town's specific research on canola.

The AAFC scientist is looking for a certain chemistry of root exudates that support a specific group of microbes near canola roots.

Assuming those bacteria help the plant when soil conditions are dry, it might be possible to improve drought resistance in canola.

"The root exudate profile, if there are differences, that might help from a breeding perspective … to help breed more (drought-) tolerant canola," Town says.

Another option is to isolate the beneficial microbes and develop a biological spray that can help canola during periods of drought.

"We have another two years" for the project, Town says. "Hopefully, if we have some success, we can keep it going."

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Navigating Manure Storage: What Producers Need to Know

by Alberta Environmental Farm Plan

When it comes to responsible farming practices, manure management is a critical aspect that farmers in Alberta, need to be well versed in. Proper manure storage is not only essential for efficient agricultural operations but also for safeguarding the environment and nearby communities.

Before setting up manure storage facilities, it's important to determine whether you need permits or approval from relevant regulatory authorities. The permitting process ensures that your manure management practices align with environmental protection standards.

Manure storage is one step in the manure management cycle. The design and construction of manure storage facilities play a vital role in preventing leaks and contamination of soil and water. Alberta's regulations often outline specifications for factors such as size, location, lining, and structural integrity. These guidelines ensure that your storages are built to last and minimize the risk of environmental harm.

Maintaining appropriate distances between manure storage facilities and sensitive areas is crucial. Alberta's regulations require minimum setback distances from water bodies, riparian areas, wells, residences, and public spaces. These setbacks are designed to prevent potential contamination and address odor concerns, fostering harmony between farming activities and neighbouring operations.

Effective management of leachate (liquid draining from stored manure) and runoff is paramount. Regulations often demand systems that prevent these substances from entering water bodies or causing pollution. By implementing proper management strategies, you contribute to maintaining the integrity of Alberta's water resources.

Preparedness is key in farming. Having plans in place to manage overflow or emergencies that could lead to manure spills or leaks is a regulatory requirement. These plans detail steps to mitigate incidents and provide a clear framework for reporting. By being proactive, you demonstrate your commitment to responsible farming practices.

Regulations often stipulate the importance of maintaining detailed records related to manure management activities, including storage, application, and disposal. By keeping accurate records and adhering to reporting requirements, you contribute to transparent practices that support regulatory compliance.

For larger operations, an environmental impact assessment might be necessary to evaluate potential effects on the surrounding environment. These assessments provide insights into the potential impacts of the manure storage and help tailor management strategies accordingly.

Navigating manure storage regulations in Alberta requires a commitment to environmental stewardship and sustainable agriculture. By staying informed about these regulations and following them diligently, you contribute to the well-being of your farm, your community, and the province. To ensure you have the most current and accurate information, regularly consult Alberta's government websites and relevant regulatory bodies.

The Alberta Environmental Farm Plan works with producers to create an action plan for their operation based on their on-farm management practices. The EFP considers setback requirements, AOPA regulations, NRCB requirements within the question relating to manure management and on farm utilization. To learn more about the Alberta EFP, contact Dustin Roth at (780) 812-1036.

Original article published by Alberta Environmental Farm Plan on August 3, 2023 and can be found at https://albertaefp.com/navigating-manure-storage-what-producers-need-to-know/

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IMAGE SOURCE: MANITOBA CO-OPERATOR
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Mission Statement:
Lakeland Agricultural Research Association (LARA) conducts innovative unbiased applied research and extension supporting sustainable agriculture.

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