



Grain, Grass & Growth April 2026

CARA staff and equipment will soon be ready to hit the field!

Some 2026 program highlights:

Crop Variety Trials: Watch for **CARA's cereal trials** at 4 locations across the region plus Alberta and Saskatchewan RVT's. We are also adding **field pea and lentil trials** at 2 locations, alongside the provincial RVT's.

Evaluation of Humapost at 2 locations

Management Alternatives for Soil Health (**MASH**)

The final year of our **Kochia Control Project** (see page 2)

The final year of evaluating **early seeded winter cereals for forage**

Demonstration of **virtual fencing technology** at 2 locations

Evaluation of **tools to monitor water quality** during the grazing season at 4 locations

Assessing **the impact of soil minerals and water quality on conception rates** in beef cattle

Western Canada Conference on Soil Health and Grazing (December)

Farm Safety Camps for Students (Consort and Oyen)

Investigating **Soil Microbial Communities and Plant Nutrients**

Partnerships with **Lakeland, Medicine Hat, Olds and Lethbridge Polytechnic colleges**

Welcome new staff!

CARA is pleased to welcome Breanne Follensbee to our Team! Breanne will be spending most of her time in the Soil Health Lab, assisting with processing and biological evaluations.

She brings skills in laboratory procedures from her Lab Tech training, shifting from a human focus to soils. Brianna is originally from Eatonia, Saskatchewan but has relocated to the Acadia Valley area with her boyfriend.



Combating Kochia: Armed with Forages

By Kaitlyn McMurphy,
PAg, Agri-Environmental Specialist,
Sask Agriculture, Yorkton, Sask
March 2026

Kochia thrives in areas where competition is limited. Limited competition can be caused by a multitude of factors such as nutrient deficiency, seasonal flooding, poor soil structure or salinity. A soil sample is an important first step, as it helps determine what conditions a producer is facing and why some annual crops may not thrive in certain areas. Seeding perennial *Kochia infestation on annual cropland.*

forages can be used as a management tool for marginal acres within a field that is struggling with a kochia infestation. Choosing forage species that are well adapted to the soil conditions, rather than seeding an annual crop, can help win the fight against kochia.

Nutrient Deficiency

Legumes such as alfalfa, clovers and vetches have low nitrogen requirements but should be properly inoculated. Grasses have higher nitrogen needs, but when seeded with nitrogen fixing legumes, less fertilizer is required.

Excess Moisture

Species such as timothy, tall fescue, orchard grass, meadow brome grass and reed canary grass tolerate high moisture and can establish successfully in wet conditions.

Soil Structure

Using a variety of tap rooted and creeping rooted forages can help to reduce the effects of soil compaction, increase organic matter, enhance infiltration and improve soil stability. Many forage blends include both creeping rooted and tap rooted alfalfa varieties to maximize the benefits of each root system.

Salinity

Some forage species show greater salinity tolerance compared to annual crops. Green wheatgrass, tall

wheatgrass and Dahurian wildrye have good- to high-salinity tolerance, while salt tolerant alfalfa exhibits moderate salinity tolerance.

Management

Interim management of kochia is important because perennial forages take time to establish. A potential option is mowing kochia during the growing season to prevent seed production. If kochia is cut for livestock feed, remember that seeds can remain viable after

passing through the rumen.

Before feeding kochia, consult a livestock nutritionist to ensure nitrate, oxalate and sulfur concentrations are within safe limits.

Although kochia is a challenging weed to manage, incorporating well adapted forage species can provide a long term, sustainable solution. Ultimately, using forages as both a restorative and competitive tool allows producers to successfully combat kochia while improving soil health and productivity.



Kochia infestation on annual cropland.

Kochia Control in Field Pea Trial

Since 2024, CARA has been studying the effectiveness of eight fall applied residual herbicides for kochia control in field pea. Results were inconclusive in 2024 due to inconsistent kochia levels; however, significant findings were observed in 2025. Initial findings suggest that fall application of Group 14 or Group 15 herbicides, individually or in combination, results in significantly better yields and lower kochia levels than Group 3 herbicides or no herbicide applications. A high degree of variability within treatment means has been observed at all locations due to varying levels of kochia within the selected sites.

This trial has been duplicated by the Battle River Research Group near Forestburg. No significant findings were reported from this location in 2025 due to lower than anticipated kochia levels. 2026 is the third and final year for the project with the final report expected in 2027.




Making Crop Variety Choices?

2025 Crop Trial Results Are Available

- ✓ Wheat, Durum, Barley Variety Trials
- ✓ Silage Trials

Call the **CARA Office (403-664-3777)** or
email (cara-1@telus.net)







2026 RDAR OFCAF
PROGRAM

INTAKE OPENS
APRIL 10, 2026

New to the program:

- ✓ Program cap increased to \$100,000 (up from \$75,000)!
- ✓ Drone funding for seeding – apply for 50% cost-share up to \$20,000 back (max \$40,000 drone)!
- ✓ Amendment BMP – capped at \$20,000 per operation for lifetime
- ✓ Seed 80 acres of cover crops (85% seed coverage)!
- ✓ Virtual fencing collars from approved Gallagher and Halter collars!

Call [Chinook Applied Research Association](https://rdar.ca/funding-opportunities/applying-for-ofcaf), (403) 664-3777, if you need help filling out your application or have any questions.

Apply here: <https://rdar.ca/funding-opportunities/applying-for-ofcaf>



The CARA Soil Health Lab has a dual focus, one of evaluating and monitoring soil health indicators. The second is increasing the understanding of soil health and all the biological, physical and chemical interactions which take place in the soil. The Lab has been designed with dedicated training space to engage producers, youth and others in witnessing biological activities in their soil.

Further to the training function of the CARA Soil Health Lab, Dr. Yamily Zavala, Manager and resident Soil Scientist, has been providing the Canadian Organic Growers (COG) with sessions designed to enhance monitoring of soils amongst their members. In partnership with COG, the following material has been developed to enhance knowledge of soil health. Additional installments of the training document will be shared in future newsletters.



Soil Microorganisms as the Nutrient Engine: From Biology to Plant Uptake.

COG Webinar Series. March 5, 2026 Yamily Zavala



Session 11: Soil Biology:

The Regenerative Engine of Nutrient Cycling

Session Notes: Biology

As the Key to Unlocking Nutrients

Soil fertility is often measured mainly through macronutrients like nitrogen (N), phosphorus (P) and potassium (K), while the biological processes that make these nutrients available are frequently overlooked. Soil microorganisms act as a “living nutrient engine,” unlocking nutrients that may otherwise remain tied up in organic matter, microbial biomass or mineral bonds in the soil. Without strong biological activity, many nutrients (including nitrogen, phosphorus and micronutrients) remain unavailable to plants and organic residues decompose slowly, which can sometimes be observed in fields where crop residues persist for several years.

Microbial Interactions Drive Nitrogen Cycling

Bacteria store nutrients, such as nitrogen, within their biomass while decomposing organic material. Protozoa and nematodes then graze on these bacteria, releasing excess nitrogen in plant-available forms, such as ammonium. This occurs because protozoa require a different carbon-to-nitrogen ratio than bacteria; when they consume bacteria, they release surplus nitrogen back into the soil. This grazing process is a fundamental nutrient cycling mechanism that occurs constantly in healthy soils, helping regulate nutrient availability so that plants can access nitrogen when they need it.



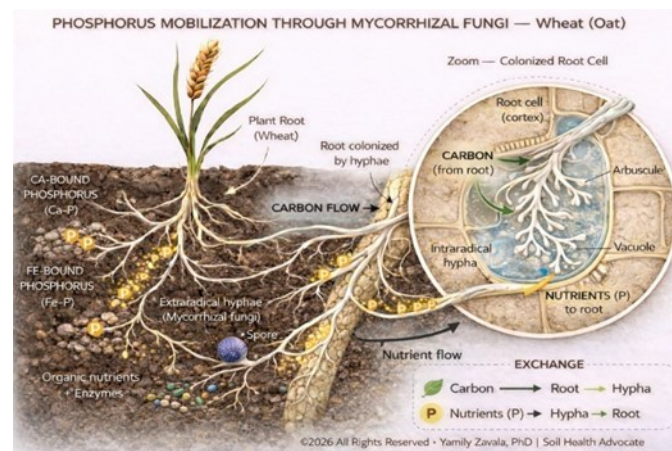
This image shows how protozoa graze on bacteria in the soil and release excess nitrogen as ammonium (NH₄⁺). It illustrates how microbial predation converts nutrients tied up in microbial biomass into plant available forms, supporting nitrogen cycling and crop nutrition.

The Role of Fungi in Phosphorus Availability

In many soils, phosphorus is not actually lacking but is chemically bound to elements such as calcium, iron or aluminum, making it difficult for plants to access. Soil fungi, including mycorrhizal fungi, produce organic acids and enzymes that break these bonds and solubilize phosphorus. Mycorrhizal fungi form symbiotic relationships with plant roots, extending their hyphae into the surrounding soil to access nutrients and water beyond the reach of

the root system. In exchange for carbon produced through photosynthesis, these fungi transport nutrients, particularly phosphorus, directly into the plant.

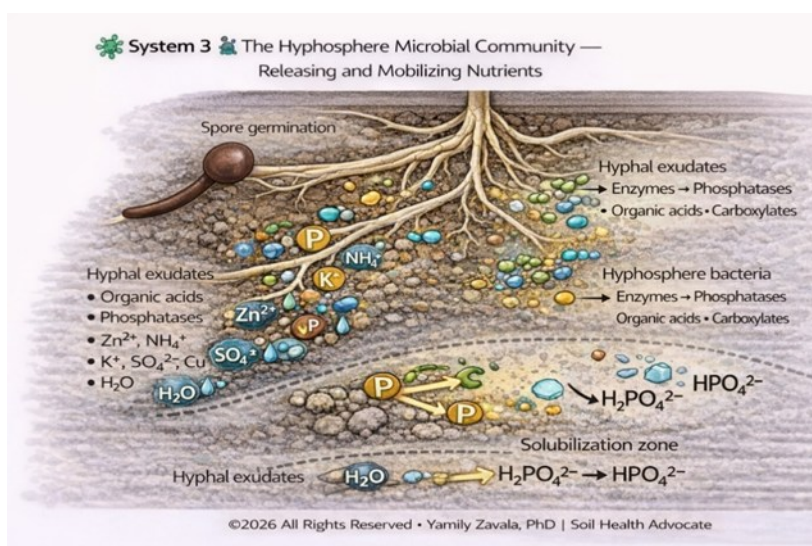
This image explains how mycorrhizal fungi extend beyond plant roots to access phosphorus bound in the soil. In exchange for plant carbon, fungal hyphae mobilize and transport phosphorus back to the root, improving nutrient uptake and root efficiency



What Is the Hyphosphere?

The hyphosphere is the area where fungal spores germinate, just beyond the rhizosphere. It is usually associated with AMF Fungi. The hyphosphere contains a microbial community (microbial consortia). The hyphae do not work alone, they are part of a microbial community. There are five key milestones that contribute to the generation of the hyphosphere:

1. Spore Germination
 - * Spores germinate and hyphae explore the soil.
2. Hyphae Exudates (1st trigger)
 - * As it grows, it releases several exudates.
3. Hyphosphere Forms (A Microbial Hotspot)
 - * A cluster of bacteria form around the hyphae.
4. Solubilization of bound Phosphorus
 - * Phosphorus captured by hyphae and transported to plant roots.



This image highlights the hyphosphere, the biologically active zone surrounding fungal hyphae where microbes and root fungal exudates interact. It demonstrates how enzymes, organic acids and beneficial bacteria solubilize and mobilize nutrients such as phosphorus, zinc, potassium, sulfur and water, which are then transferred to the plant through direct root uptake and/or mycorrhizal hyphal transport.

Watch for the second installment of these Soil Health training notes in the next issue of Grain, Grass and Growth to learn more about biology in the soil

Soil Temperature, Germination Type, and Early Seeding in the Brown Soil Zone

Understanding seedling biology helps fine-tune seeding timing and support optimal yield. With a planting window that opens earlier than in many other parts of the Canadian Prairies, the Brown Soil Zone offers both opportunity and heightened risk for early seeding.

The Benefits and Limits of Early Seeding

Early seeding reduces the risk of fall frost on maturing crops and allows seedlings to use early-season moisture before topsoil dries out. Crops that emerge early are more likely to finish flowering before the hottest part of July, reducing the chance of flower blasting that aborts flowers and cuts yield.

Early seeding also carries risks: emerging seedlings may encounter frost and cold soils that hinder germination. The safest strategy is to base seeding decisions on soil temperature rather than using the calendar. Use a soil thermometer at the intended seeding depth on field mid-slopes, taking morning and evening readings for several days and averaging them.

How Germination Type Affects Frost Tolerance

All crops fall into one of two germination types, defined by what happens to their cotyledons — the seed leaves that store energy for the plant's first days of life.

- **Hypogeal germination:** cotyledons remain below the soil surface.
- **Epigeal germination:** cotyledons are lifted above the soil surface.

This biological difference has large practical consequences. Hypogeal seedlings keep their cotyledons and growing points underground, protected from spring frost, while epigeal seedlings move their cotyledons and growing points above the soil into the frost danger zone.

Hypogeal Crops: Frost Protection Below Ground

In hypogeal crops, during germination, only the shoot is pushed upward by the plant's epicotyl (see Diagram 1). The cotyledons, which stay below ground, feed the young seedling until small leaves form and photosynthesis begins. Key prairie crops that germinate hypogeally include spring wheat, durum, barley, lentil, field pea, and chickpea — making them well-suited to early seeding, except for kabuli chickpea.

In field pea and lentil, cotyledons and growing points remain safely below the soil surface until about the 4–5 leaf stage. This protected position lets plants regrow after a hard spring frost, because early-stage seedlings retain enough energy in cotyledons and buds below ground to send up new shoots if the tops are killed.

In most cereals (wheat, durum, and barley), regrowth can occur as long as the growing point (in the crown) remains below the soil surface, typically up to about the 3–5 leaf stage (see Diagram 2). Beyond this growth stage, the growing point rises above the soil surface and frost injury is much more likely to occur.

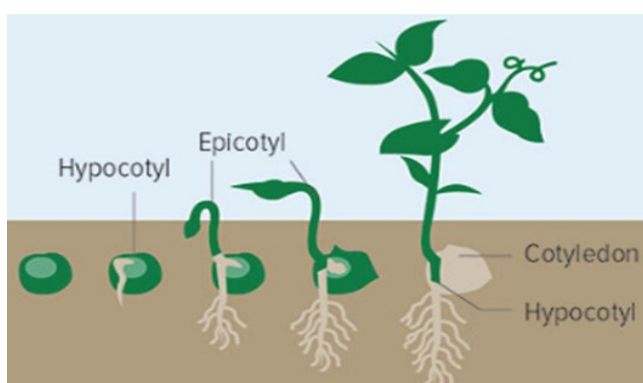


Diagram 1: Hypogeal germination. The growing point and cotyledon (food source) remain belowground. Source: plantscience4u.com

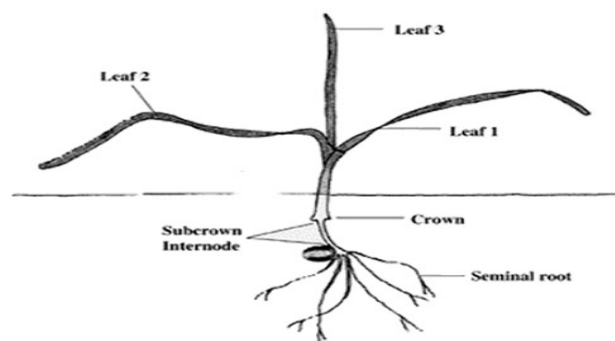


Diagram 2: Cereal seedling showing location of crown where the growing point is.

Soil Temperatures and Seeding Hypogeal Crops

Lentil and field pea can be seeded once the average soil temperature at seeding depth reaches 5°C¹. For spring cereals such as wheat, durum, and barley, provincial guidelines recommend 4 to 6°C at seeding depth¹. These crops are generally cold-tolerant, but early seeding into cold, damp soils slows emergence and increases seedling disease risk. If seeding into cold (below about 6°C) and moist soils, a fungicidal seed treatment is strongly recommended.

Research Supports Ultra-Early Seeding of Wheat

Recent field research from AAFC's Lethbridge Research Centre reinforced the benefits of early wheat seeding. In trials from 2015 to 2018, CWRS wheat seeded into soils as cool as 2 to 6°C yielded more than wheat planted later into soils warmed to 10°C². Early seeding allowed plants to use residual soil moisture and avoid yield loss from mid-summer heat stress at flowering. When seeding under such cool conditions, producers should consider slightly increasing seeding rates and using a fungicide seed treatment.

How Cereal Seedlings Handle Frost

Cereal seedlings can tolerate considerable cold: the AAFC Lethbridge work found that wheat leaves often survive -8 to -10°C² (leaf tip burn can occur), while barley is injured at milder temperatures around -4 to -6°C. Because the growing point stays below the soil surface until the 3 to 5 leaf stage, seedlings are usually protected from lethal frost during early growth.

Warm, moist soil changes temperature more slowly than dry soil, helping buffer the crown against sudden freezes. Prior exposure to cool weather can harden plants to withstand lower temperatures. Dew also helps protect plant material from frost.

As long as the crown tissue remains firm and green, new leaves can emerge and the crop recovers. If the crown turns brown and takes on a water-soaked appearance, the plant cannot regrow — cereals regrow only from the crown, not from roots or cotyledons.

How Lentils and Peas Handle Frost

Lentils and peas are cool-season crops well suited to early spring prairie conditions, as long as soils are not waterlogged. Germinating hypogeally with growing points (nodes) remaining below ground, these pulse crops tolerate early frosts well.

Two nodes form below the first true leaf, and usually at least one stays beneath the soil surface. If frost burns off top growth before the 4 to 5 leaf stage, plants can often regrow from these lower nodes. After that

stage, cotyledon reserves are largely used up, and severely damaged above-ground plant material is much harder to replace — though by this time, seedlings should be hardened off and temperatures trending warmer.

Kabuli Chickpea: A Special Case

Kabuli chickpea uses hypogeal germination, but its large seed size and thin seed coat make it far more vulnerable to cold, wet soil than most other pulses. The key issue is imbibition — water uptake during germination.

Due to its large size and thin seed coat, water enters kabuli seed very quickly, and in cold soil, this rapid swelling can crack the seed coat, invite soil-borne fungi, and cause seed rot and thin, uneven stands. Warm soil (around 10°C) allows rapid but even imbibition and greatly reduces this risk¹.

Low-temperature imbibition can significantly reduce kabuli germination. Protecting stands means waiting until soil at seeding depth reaches at least 10°C, using a fungicidal seed treatment, and avoiding wet, compacted fields.

For kabuli chickpea, patience pays: slightly later seeding into warm, well-drained soil delivers better germination, stronger emergence, and a more uniform stand.

Epigeal Germination: Growth Above the Ground

Epigeal crops lift their cotyledons and growing point above the soil during the initial period of germination. The hypocotyl elongates and bends upward, pulling the cotyledons through the soil and into daylight (see Diagram 3).

Once above ground, the cotyledons turn green and begin photosynthesizing, providing food until true leaves form, after which they die off (see Diagrams 4 and 5). Although not noticeable in these diagrams, the growing point is situated between the two aboveground green cotyledons.

Canola is the most common epigeal crop grown in the Brown Soil Zone. Because its growing point sits above the soil surface as soon as the seedling emerges, it is extremely frost sensitive. A frost that kills the cotyledons also kills the plant — it cannot regrow from underground plant material the way wheat or peas can.

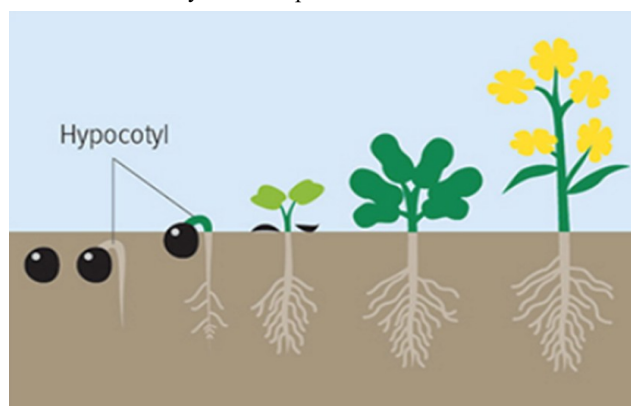


Diagram 3. Epigeal germination of canola. Growing point and cotyledons (food source) are aboveground.

Optimal Timing for Canola Seeding

Canola is often planted after cereals and pulses to allow soil and air to warm enough to reduce frost damage. The usual recommendation is to start seeding when the 3-day average soil temperature at seeding depth is 4 to 5°C. The seed spends several days underground before emerging, so the crop can begin growing while above-ground conditions are still marginal, with air temperatures typically milder by emergence time.

Seeding when the topsoil is 4 to 5°C at seeding depth reduces but does not eliminate frost risk and should be done only with a warming

forecast, good seedbed conditions, and adequate moisture⁵. If a serious cold snap is expected, delay seeding.

Hardened-off canola can withstand temperatures as low as -8°C to -12°C, while unhardened seedlings may be damaged at -3°C to -4°C¹. Once again, morning dew is your friend as it helps prevent plant material from freezing.



Diagram 4. Cotyledon stage of canola. Growing point is between the two green cotyledons, vulnerable to frost injury.
Source: Canola Council of Canada.



Diagram 5: The two canola cotyledons are drying up while the first true leaf emerges.
Source: Manitoba Co-operator.

Final Thoughts

Prairie climate can be unpredictable. There is no single perfect planting date. Each spring brings its own blend of temperature, moisture, and risk. By reading the soil thermometer instead of the calendar — and by understanding how your seeds actually germinate — you can build a seeding plan that is flexible, resilient and reliable.

References

1. Government of Saskatchewan. *Soil Temperatures and Seeding*.
2. Collier, G.R.S., D.M. Spaner, R.J. Graf, and B.L. Beres. 2021. Optimal agronomics increase grain yield and yield stability of ultra-early wheat seeding systems. *Agronomy* 11:240
3. Saskatchewan Pulse Growers. *Environmental Stresses in Pulses*. Canola Council of Canada. *Seeding Based on Soil Temperature*. Canola Council of Canada's *Canola Encyclopedia (Time of Seeding)*.

-Neil Whatley, March 2026



Shelterbelt WORKSHOP *Free!*

MAY 13, 2026 9AM- NOON

KIRBY & RENEE LAUGHLIN'S FARM
NEAR BIG STONE, SPECIAL AREA NO.3

Guest Speaker Tozo Bozic, Certified Arborist

EVENT HIGHLIGHTS:

- Site prep, care & maintenance
- Surviving the Special Areas
- Grafting 101
- Pruning (done the right way)
- Growing fruit trees (yes, you can!)
- Value of shelterbelts & windbreaks

Join us for the 2026 shelterbelt workshop at the Laughlin's. Get hands-on tips for planting, care, and proper pruning, PLUS learn to graft your own trees & see established fruit tree varieties grown right here in the Special Areas.



Contact CARA to reserve your spot!
(403) 664-3777
CARA-1@telus.net



CHINOOK APPLIED RESEARCH ASSOCIATION

Box 690, Oyen, Alberta T0J 2J0

Phone: 403-664-3777 Email: cara-dw@telus.net

Web: chinookappliedresearch.ca

@CARAresearch

Like us on Facebook!



Publication and distribution of this newsletter is supported by Results Driven Agricultural Research and Alberta's Commodity Commissions