

Learning Circle: Cover Crops

In the early months of 2026, the Regenerative Organic Oats (ROO) program hosted a series of virtual gatherings called Learning Circles that became a place for farmer-to-farmer learning opportunities, focused on key topics in regenerative organic agriculture. They are designed to reflect on previous guest presentations, share on-farm experiences, explore curiosities, and provide a space to learn collectively within a regenerative organic agriculture framework. This resource shares the experiences, insights, and advice of ROO farmers on cover crops, highlighting their unique experiments, methods, and blends that supported their soil's health and built on-farm resilience.

Regenerative Management Framework

The regenerative management framework focuses on the four core ecological functions:

- Water cycle
- Energy flow
- Nutrient cycle
- Community dynamics

Monitoring data helps identify limiting factors within farming systems and guides management decisions. Cover crops can be a powerful practice because they can positively influence all four ecological functions, particularly by improving water infiltration, increasing carbon inputs through living roots, enhancing nutrient cycling, and increasing biological diversity.

Termination of cover crops is often one of the biggest challenges in cover cropping, especially within organic and reduced-tillage systems. While minimizing disturbance is ideal, tillage may still be used strategically if it serves a clear purpose and is followed by rapid re-establishment of living roots. Grazing, mowing, roller crimping, and targeted tillage are all viable options for terminating cover crops.

Farm Case Study: North Battleford, SK

An organic producer from central Saskatchewan shared his experience farming organically for the past 10 years on highly variable soils ranging from sand to heavy clay. He reflected on early mistakes, particularly excessive tillage, which led to erosion and soil degradation. His current goal is to have every acre seeded every year, with roughly 50% of the land in cover crops or perennial cover and 50% in cash crops.

This producer sees cover crops as a solution that addresses all four ecological functions. He described how maintaining continuous cover improves moisture retention, moderates soil temperature, and supports nutrient cycling.

Pea-Oat Cover Crop Mix

The producer from North Battleford discussed using a pea-oat mix on transitional land heavily infested with Canada thistle. The objectives were to suppress weeds, add nitrogen, and keep the soil covered. The mix was roller crimped in early July at flowering, which effectively suppressed Canada thistle by terminating the plant when its energy reserves were concentrated above ground. He noted that two passes with the crimper would have been ideal.

He made some key observations:

- Strong weed suppression where biomass was dense.
- Challenges on hilltops with thin soil, where low biomass limited crimping effectiveness.
- Better residue persistence from oats compared to clover due to higher carbon content.
- Interest in direct seeding into crimped residue, though equipment limitations required light tillage instead

Sweet Clover Experience

While sweet clover excels at breaking compaction and fixing nitrogen, some producers expressed that sweet clover presents termination challenges. Here are a few key points made by some producers:

- Roller crimping alone often failed to fully terminate the clover.
- Regrowth along the ground could continue using moisture and potentially set seed.
- High nitrogen release stimulated weed pressure if not followed by a crop that could quickly utilize nutrients.
- Clover residue breaks down faster than cereal straw, offering less long-term ground cover. If coverage is digested/disappears too quick, weeds can quickly pop up (C:N Ratio).

Sweet clover can be a good cover crop option since it is a bi-annual and is terminated in its second year, but it can be tough to terminate. A good option is to under-seed with a cash crop. 7lbs/acre is a safe seeding rate as an under seed to cash crop. One producer mentioned that sweet clover can significantly dry out soils if not terminated early, which is an important consideration in Prairie environments.

Carbon–Nitrogen Ratio and Biomass Management

One producer reflected on past experience using straight pea plowdowns, noting how quickly pea residue broke down, sometimes disappearing entirely within a week under moist conditions. This rapid decomposition is directly tied to the low C:N ratio of legumes and the stage at which they are terminated. Green, nitrogen-rich material decomposes quickly, while more carbon-rich, mature material persists longer.

There is great value in adding cereals (like oats) to legume plowdowns. Oats contribute fibrous roots and carbon-rich biomass that help:

- Stabilize nitrogen in the soil.
- Support a broader diversity of soil biology.
- Reduce nitrogen losses through leaching or gaseous emissions.
- Carry nutrients forward to the next crop.

Increasing plant diversity also increases biological diversity, leading to a more resilient soil system.

Timing Nitrogen Release to Crop Demand

It is important to align nitrogen availability with crop uptake. High nitrogen availability in early spring often precedes crop demand, increasing the risk of nitrogen loss and weed growth. Adding carbon to cover crop mixes slows nitrogen mineralization so that release better matches the needs of the following cash crop later in the growing season.

Crop sequencing is a key weed management tool in organic systems: nitrogen-rich cover crops should be followed by crops that can effectively utilize that fertility, rather than additional legumes.

Managing Clover at Scale

One producer described the logistical and agronomic challenges of managing large acreages of clover. When clover matures too far or dries out, it becomes difficult to incorporate, can excessively deplete soil moisture, and may delay or compromise the following crop. To manage risk, he has diversified termination strategies across acres by using haying, disking, custom tillage, and exploring daikon radish to stagger timing and workload. While abundant biomass is desirable, too much growth at once can overwhelm capacity, especially during narrow termination windows.

Managing Daikon Radish

Daikon radish can be an effective cover crop. It is planted later than other crops and requires effective planning for rotation. One producer reported that he broadcasted at 8-9 lbs/acre

and found that it was very easy to manage in spring. A light harrow will do the trick as there will only be a thin covering on the surface.

Moisture, Erosion, and Tillage Tradeoffs

Several farmers shared experiences navigating the tension between maintaining cover and managing moisture in dry years. One producer contrasted fields with plow downs versus summer fallow, observing better soil packing, moisture retention, and seedbed quality where cover crops had been used. This is a central regenerative challenge: cover crops improve the water cycle long-term, but short-term management decisions can temporarily disrupt it if termination timing is off.

Roller Crimpers: Context Matters

Roller crimpers are situational tools rather than a universal solution. On flat, heavy clay soils with low erosion risk, the cost and limited use may not be justified. However, on lighter soils and rolling land roller crimpers can:

- Reduce tillage passes
- Lower erosion risk
- Preserve surface residue
- Add high-quality carbon

One producer shared challenges using roller crimpers on uneven terrain and short cover crops, noting inconsistent termination. He is experimenting with a cut-and-drop approach using a modified swather as an alternative.

Living Mulches: Promises and Limitations

While appealing in theory, several producers reported challenges with living mulches, including white Dutch clover and sainfoin. Kura clover is of interest. Radish is a good option for covers that allows early seeding in the following years. Some more points to note:

- Excessive moisture competition in dry springs
- Difficulty establishing small-seeded clovers
- Limited seeding windows
- Aggressiveness mismatches (alfalfa too aggressive, some clovers not aggressive enough)

Frost seeding and European continuous cover systems can be potential pathways, though these approaches likely require dedicated establishment years and careful management.

Diverse Cover Crop Blends and Yield Impacts

A producer from Foam Lake, SK shared his experience with a 13-species cover crop blend seeded with oats, resulting in 25–30 bushel per acre yield increases in some cases. It is crucial to tailor blends to end goals, especially in organic systems where volunteer species and seed cleaning must be considered.

One producer highlighted the value of on-farm seed cleaning, noting economic benefits from separating and marketing secondary crops like mustard.

Emerging Tools and Innovations

Some new technologies are as follows:

- Seed destructors on combines to reduce weed seed return.
- An ag company in Nipiwán, SK does drone seeding of cover crops mid-season at approximately \$13/acre, offering flexibility for late establishment and reduced harvest interference.

These tools are promising additions to the organic toolbox, particularly where timing and labour are limiting factors.

Session Highlights

- Cover crops are an effective entry point for regenerative management, but success depends on aligning species selection, timing, and termination strategy with farm goals and conditions.
- Termination planning is critical and should consider biomass levels, carbon-to-nitrogen ratios, moisture availability, and the needs of the following crop.
- Cereal-based cover crops (e.g., oats) tend to provide longer-lasting residue and better weed suppression than legume-only stands.
- Biennial legumes (like sweet clover) offer soil structure benefits but often require some tillage to manage effectively in organic systems.
- Mixing legumes with cereals improves nitrogen retention and soil biological balance.
- Termination timing strongly influences moisture, weed pressure, and nutrient cycling.
- High biomass is beneficial, but only if it can be managed effectively.
- Tools like roller crimpers and living mulches must match soil type, topography, and climate.
- On-farm experimentation and data-sharing are central to adaptive regenerative management.
- Continuous learning, experimentation, and reflection on outcomes are essential parts of regenerative farming.