# Experimental Acres

## 2025 Project Outcomes

Grey County

GREY AGRICULTURAL SERVICES

Going Green in Grey

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# In This Report



# What is Experimental Acres?



Experimental Acres is a micro-grant program for on-farm trials of sustainable agriculture. Local farmers design their own project, experiment on a small scale, and learn about what works best before scaling up. Sustainable agriculture practices can be applied in as many ways as there are farms. Building soil health through good practices contributes to long-term stability in a changing climate. Adopting new practices comes with a learning curve, but Experimental Acres is here to help.

The Experimental Acres pilot program was developed as a part of Guelph-Wellington Our Food Future, a project with goals for creating a circular food economy built on a foundation of local agriculture and carried out through a climate lens. The program was designed with the hope that its framework could be adopted and implemented by other municipalities in the future, broadening its reach and encouraging sustainable, circular practices beyond Wellington's borders. Although the initial project was funded by Infrastructure Canada, it also aligns with municipal climate goals, thus a tangible action step in county or municipal Climate Action Plans.

Grey County joined the Experimental Acres program with a pilot program in 2023, with coordination provided by Wellington County. In 2024, Grey County launched their own program, coordinated by Grey Ag Services.

The Experimental Acres program provides funding, project monitoring support, and networking opportunities to small scale agricultural trials. Funding is designed to de-risk the learning process, allowing ideas to be explored on farm and increasing the likelihood of larger scale adoption of practices down the road.

Since 2023, Grey County Experimental Acres projects are funded by Grey County as part of Going Green in Grey, the County's Climate Change Action Plan. The program aligns with Action 3: Capacity Building in Sustainable Agricultural Best Practices and aims to support farmers in implementing new practices with the potential to build soil health, reduce greenhouse gas emissions, and increase carbon recapture.

Examples of past projects have included cover cropping, silvopasture, rotational grazing systems, tarping to avoid tillage, intercropping, livestock bedding trials, vertical farming, no-till establishment of crops, companion planting, use of drone technology, novel soil amendments, net-zero greenhouses and more.

Projects are designed by the producer and can involve trialing an established practice which is simply new to the farm, or a production idea that has never been attempted. Projects are selected based on the proposed project's feasibility, design, replicability, potential for reducing greenhouse gas emissions, innovation, and alignment with one the five program objectives: keeping roots in the ground; maintaining green cover; integrating animals into the rotation; reducing mechanical intervention; and, increasing biodiversity.

# Why Sustainable Agriculture?



“Agriculture is one of three core sectors in Grey County, contributing $240.5M in exports, 2,246 jobs, and 1,869 businesses - more than any other sector” (Economic Development, Tourism and Culture Annual Report, 2024). Farmland accounts for approximately 40% of all land in Grey County. With such a large footprint of physical scale and economy, agriculture is poised to play an important role in reducing and adapting to the impacts of climate change.

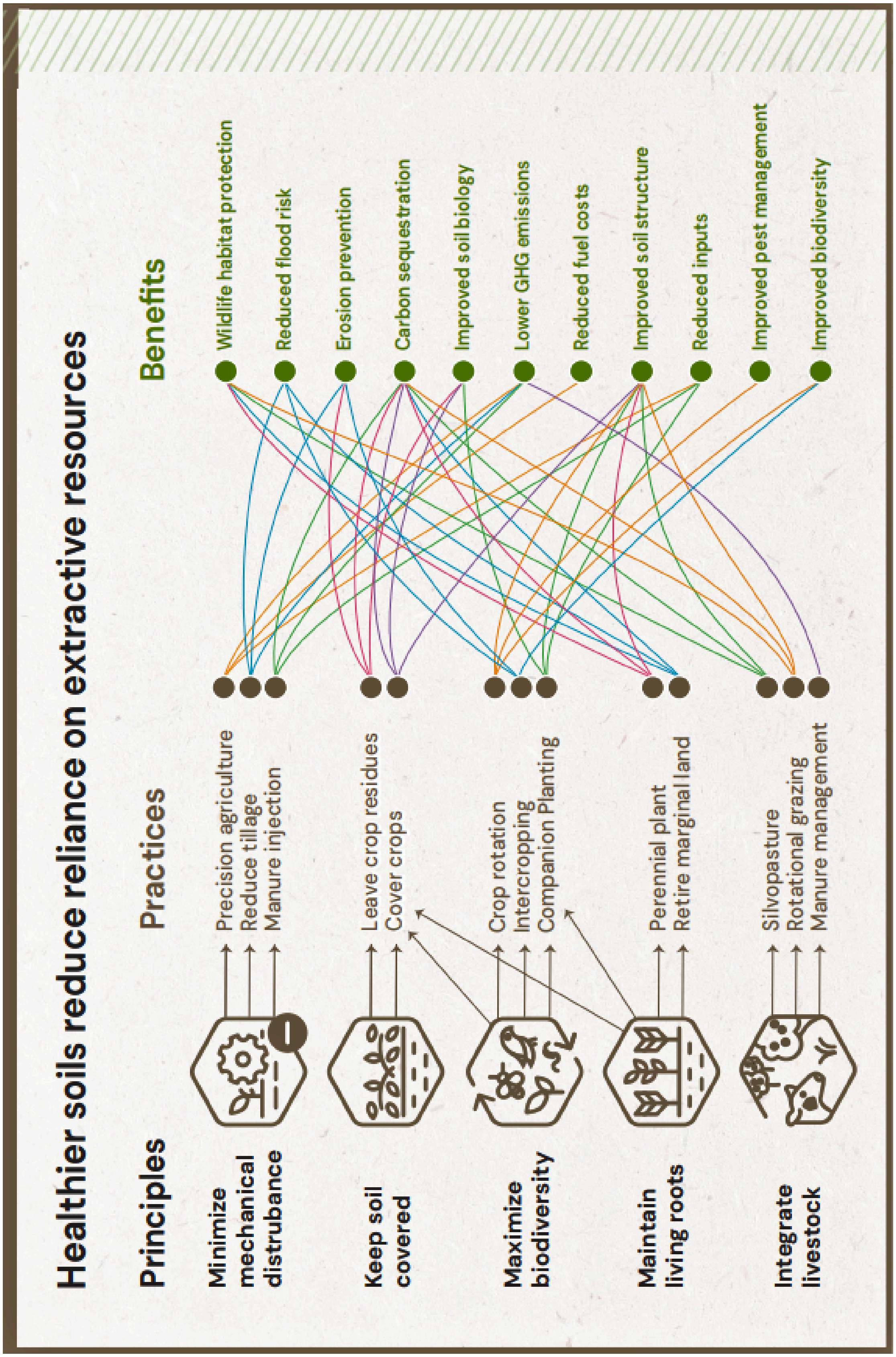
Agriculture is one of few industries that has the ability, with conscientious sustainable practice, to sequester carbon from the atmosphere back into the soil. Stewardship practices which target soil health have the potential to improve the farm’s ability to store carbon. Practices which reduce tillage, maintain soil cover, keep living root systems year round or enhance soil biodiversity all create a more robust soil system with greater ability to transform atmospheric carbon into storable nutrients. These practices have a host of other environmental and economic benefits as well. Healthy, well managed soils have improved water infiltration rates, are less prone to erosion, and are more productive. There is no downside to investing in good soil management practices and the benefits can ripple out to improve farm health (physical and financial), the environment and by means of those two, the community around them!

However, it's about more than just soil building. Experimental Acres projects focus on the following pillars, and of which can be applied through cropping, livestock or innovative farm systems.

- Keeping Roots in the Ground
- Maintaining Green Cover
- Integrating Animals into the Rotation
- Reducing Mechanical Intervention
- Increasing Biodiversity

While projects carried out on farm have a direct impact on farm practices, they also create a ripple effect for the surrounding ag community. Ideas carried out by one producer can be tweaked to fit a neighbour’s farm and the outcome of one trial can inspire a friend to create their own. Experimental Acres supports a small number of farmers each year, but over time that small cohort can have a large impact on the practices used across the region. Experimental Acres kickstarts a community of practice where innovative solutions are explored to the benefit of all.

# Why Sustainable Agriculture?




**Principles, Practices, and Benefits of Sustainable Agriculture (from Wellington County's Experimental Acres Handbook)**

# The 2025 Program



## Making Progress Towards Climate Targets

Going Green in Grey, the County's Climate Action Plan, identifies Capacity Building in Sustainable Agricultural Best Practices as one of four priority actions. This action includes:

- Developing materials, on-farm demonstrations and pilot research projects,
- Improving sustainability, manure management and nutrient loss, programs and guidelines
- Providing incentives for sustainable and regenerative practices to increase the capture of carbon dioxide (collect and store in plants and soil)
- Reducing methane production and improve animal digestion
- Restoring degraded lands and convert marginal farmlands

Each cohort of participants expands the number of farms reached by the county, helping to increase the number of farms using best practices, and putting them closer to the targets listed below.

### 2030 Climate Target:

20% of natural land for pasture and 30% of cropland are under best management practices for carbon sequestration.

### 2050 Climate Target:

60% of natural land for pasture and 90% of cropland are under best management practices for carbon sequestration; 50% of manure is managed under best practices.

## In 2025...

The 2025 program built on the success of twelve Experimental Acres projects which were completed in Grey County in 2023 and 2024. In 2025, six farms received support to conduct Experimental Acres trials. These projects totaled 265 acres directly involved in the pilot, however indirectly impact many more as farmers expand these practices in following years and share lessons learned with other farmers.

Projects were selected in March, and trials began with the growing season in May. Monitoring was carried out over the summer to establish baselines for soil health and nutrient testing. Producers can use these results for soil monitoring in the years ahead. Each trial was evaluated based on the farmers' goals, which included economic viability and the practicality of implementation, both of which are integral to further adoption over larger acreages. Monitoring included soil testing and visual monitoring of trial progression.

# Methods



## Infiltration Testing

Water infiltration testing involves pounding a steel ring partially into the ground and pouring a measured amount of water into the ring. The time that it takes water to infiltrate is recorded as an indicator of the porosity and water holding capacity of the soil. The more “sponge-like” the soil is, the better. Soil that can hold more water will be less prone to erosion.

Tracking infiltration rates over time helps develop an understanding of soil changes, but no single rate indicates good or bad soil health. A heavy rainfall the night before testing would change data entirely from a test done in the same spot after a week of dry weather. Comparing the results of a test and control area taken on the same day, and repeating those tests over time, can give a better idea of whether infiltration stays the same, or whether a trial’s “treatment” is having an impact.

## Soil Testing

Soil testing is another monitoring tool used in monitoring Experimental Acres trials. Soil samples are sent to laboratories for analysis on a host of soil parameters.

Not all changes can be seen in one growing season. When tracking nutrients for a regular soil fertility program, sampling once every three years is the standard practice. This interval is enough time to see changes in nutrient profiles and adapt fertilizer applications to match them.

For Experimental Acres, soil testing helped to develop a baseline that farmers can build on in years ahead. Some projects looked specifically at soil fertility and had several soil samples taken throughout the season.

Whatever the project, knowing the nutrients available in soil is a crucial step in making good stewardship decisions and an important best management practice.

## Compaction Testing

Compaction is a major challenge to soil health, particularly on farms where large equipment is used, fields are crossed frequently, crossed in wet conditions, and/or a lot of tillage is practiced.

Compacted soil has fewer air and water pockets, leaving it less capacity to absorb water. It is also more difficult for plant roots to penetrate, therefore less productive.

A penetrometer was used to monitor compaction in Experimental Acres projects. It measures the pressure needed to push a probe into the soil and allows that pressure to be gauged at varying soil depths. The penetrometer helped us understand compaction at the beginning of the trials, look at how different practices affect the soil, and plan future practices accordingly.

# Project Summaries



The rest of this document outlines projects which were completed through the summer of 2025. It includes information about how the projects were set up, the importance of the investigation, and what the outcomes were.

Our hope is that by compiling this information other producers are able to apply the same ideas on their farms, potentially while taking into account lessons that the Experimental Acres participants gained as they worked through the program.

If you have any questions about the projects, please reach out to Emily McKague at Grey Ag Services: 519-986-3756.

In this project, Peter attempted to establish a relay cropping system that would see turnip begin growing in fields where wheat and triticale cereal crops neared harvest. The goal was to leave turnip and red clover underseeding behind after harvesting the cereal crops, resulting in additional forages for Peter's cow herd.

The trial spanned multiple fields across Georgian Bluffs and West Grey. Triticale and spring wheat crops were planted in the spring. Red clover underseeding was either drilled or broadcast into the fields at the same time, adding two more variables to the experiment. Once the cereal crop and red clover were well established, turnip was broadcast on as well, using an ATV mounted broadcaster.

**Project Size:** 210 acres

**Why It's Important**

Establishing a turnip cover crop while a cereal crop was still in the field would enable two products to be harvested during the same growing season - cereals for human food and forage for livestock feed. Increasing the output per acre builds also efficiency and profitability for the operation.

Leaving a turnip cover crop behind when cereals are harvested provides major soil health benefits. Living plants maintain soil cover, protecting the field from wind or water erosion. Turnips are know for their large taproot's ability to tunnel through hard soil, opening channels for air and water infiltration, and potentially reducing compaction. Grazing livestock after the "cash crop" introduces another level of biodiversity to the field. Fossil fuel use is reduced on farms which can extend their grazing season - less stored feed is required to keep animals and livestock deposit manure directly on the field, no spreading by tractor necessary.

**Peter with a small section of ungrazed turnip and triticale in the background in mid September.**

**Results**

- Summer seeded turnip establishes well when broadcast from an ATV, as long as conditions for germination are met
- Shade significantly suppressed growth, and moisture availability was also limiting for good germination of turnip - it didn't compete well with thick stands of cereals or clover
- Broadcasting turnip is an economical option for filling in bare spots in fields - where the original crop was thin, turnip established well
- Turnip is an excellent forage plant for grazing

**Reflections**

Peter noted that turnip provides good feed volume from a small amount of seed and is very economical. The low seeding rate (one to two pounds per acre is adequate) means that broadcasting by ATV is a practical option. A number of conditions need to be met for a successful stand. Peter found that turnip needs adequate sunlight and moisture for germination - parameters which were not achieved across many of the fields in this year's trial. He commented that turnip established well along field edges and anywhere that red clover hadn't formed a dense canopy. Fields where red clover had been broadcast seeded had slightly thinner clover stands and more turnip germination. Fields where clover was drilled did not support turnip growth well. He mentioned that field edges and headlands always have slightly thinner stands, and that turnip was excellent for filling in those areas. It also responded well after wheat and triticale were harvested, with increased growth in relation to the increase in sunlight or moisture availability.

Peter was able to get multiple grazing passes from the turnip, especially when manure was applied to the fields. He commented that turnip is a nitrogen loving crop and responds well to increased nutrients.

**Other Comments**

This was the first year that Peter grew triticale as a forage crop. He noted that other producers have had good experiences with it, but felt that it did not perform as well as oats in his operation. He was disappointed by the lack of tillering, feeling that other oats produce more volume. One trial field was not able to be harvested in the correct window and so was grazed instead. His cattle trampled the triticale instead of eating it - something he attributed to the awns on the seed heads, and he was disappointed by the lack of regrowth from the triticale after the cattle's first grazing pass as well.

**A section of field in mid August where turnip had come in more densely.**

Wade's goal was to establish a new hay stand following wheat harvest without seeing dense swaths of volunteer wheat growth that would deteriorate field quality in subsequent years.

Small amounts of wheat grain are lost from the combine during harvest, and deposited back on the field along with straw. Normally, straw which is to be baled would be placed in rows behind the combine, allowing for easy pick up by a baler. The escaped seed is dropped in the same rows and the regrowth is know as "volunteer" wheat.

Volunteer wheat poses problems for a prospective hay crop. The plant does not persist past the second year, leaving strips of bare soil or poor producing crop where the wheat swaths were. Bare ground presents an opportunity for weed growth and means less yield from the hay field overall.

Wade's plan to address this included spreading the straw across a 25 foot pattern behind the combine (not dropping it in rows). He then went back into the field the following day and raked the straw into rows from which it was baled. The theory was that grain would be spread with the straw, but not picked up by the rake, leaving it distributed evenly across the field.

**Project Size:** 20 acres

**The newly seeded hay field September 15th, 2025.**

**Why is this project important?**

Hay crops are perennial and fields are normally harvested for at least three or four years before being terminated and rotated into another crop. Some hay fields persist for far longer. If the stand establishes poorly, the yield produced from that field will suffer for years down the road. This is costly for the producer and could limit feed available to livestock on the farm. Demonstrating the ability to successfully disperse wheat before establishing a new hay field could make fall-seeded hay a much more attractive option for producers.

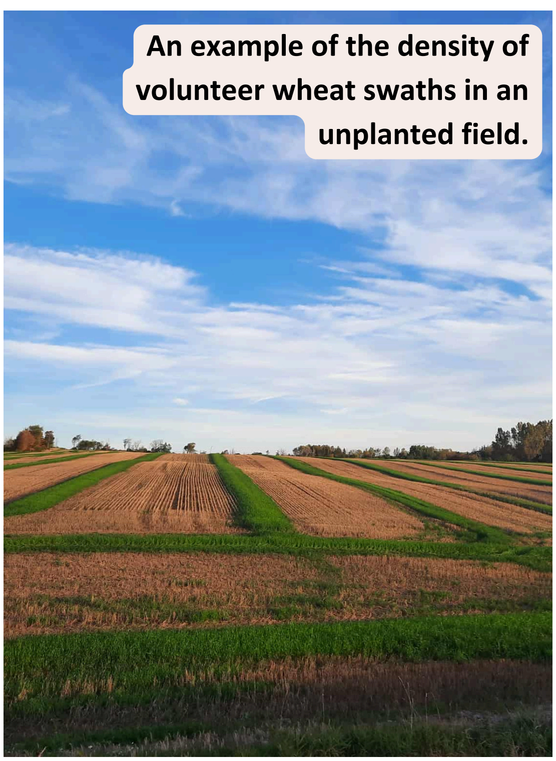
Establishing a consistent stand in the fall is beneficial for the producer in several ways.

1. The fall seeded crop has a head start on a spring seeded crop and will theoretically produce better yield in its first year
2. The fall seeded crop acts as a cover crop through its first winter - soil in the field is kept covered, reducing the potential for wind or water erosion
3. Maintaining a living crop directly from wheat harvest onward is beneficial for soil micro-organisms which live symbiotically with the living crop's root systems

Lastly, for producers already looking to seed hay in the fall, dispersing wheat seeds could eliminate the need for other methods of controlling volunteer wheat, such as spraying additional herbicides or working the field - meaning less time and cost involved with establishing the new crop, and likely better soil health as well.

**Results**

A timely gentle rain following drilling of the hay seed saw excellent early establishment and by the time a small group toured the field in mid-September, the crop was six inches tall and very consistent. The field was planted with 85% alfalfa and 15% grasses - a combination of fescues and festuloliums. Wheat was well dispersed to the point that it was difficult to differentiate the volunteer wheat from the seeded grasses and little to no swaths could be seen.



**An example of the density of volunteer wheat swaths in an unplanted field.**

**The newly seeded hay field September 15th, 2025.**

**Josh Bye**



## Comparison of Warm and Cool Season, Annual and Perennial Forage Mixtures

This project planned to seed 15 acres which had previously been used for over wintering cattle with various cover crop mixtures, comparing them on establishment, practical application, benefits to soil health, and ability to add forage to the grazing rotation.

Josh's goal was to seed the entire 15 acres with a warm season annual mix in early June. This would be grazed by their cow herd during the hot summer months when cool season perennial pastures don't perform as well (known as the "summer slump").

Following grazing:

- 5 acres would be left to regrow its warm season annuals
- 5 acres would be no-till seeded with a cool season annual mix
- 5 acres would be no-till seeded with a warm season perennial mix

**Project Size:** 15 acres

**Why It's Important**

Cool season pastures - which are the most common pasture type in Ontario - do not perform well during hot summer months. Being able to rotate animals onto a crop which performs best at that time is beneficial for the producer, field and livestock. Typically warm season annuals are used in an opportunistic manner, planted when fields are available or in years when other feed sources are limited. Josh wanted to identify opportunities to incorporate these alternate crops into standard crop rotations as part of a plan to rest cool season pastures, improve soil health and supply high quality feed to their cattle. By experimenting with multiple forage varieties, Josh could demonstrate which was best suited for their operation.

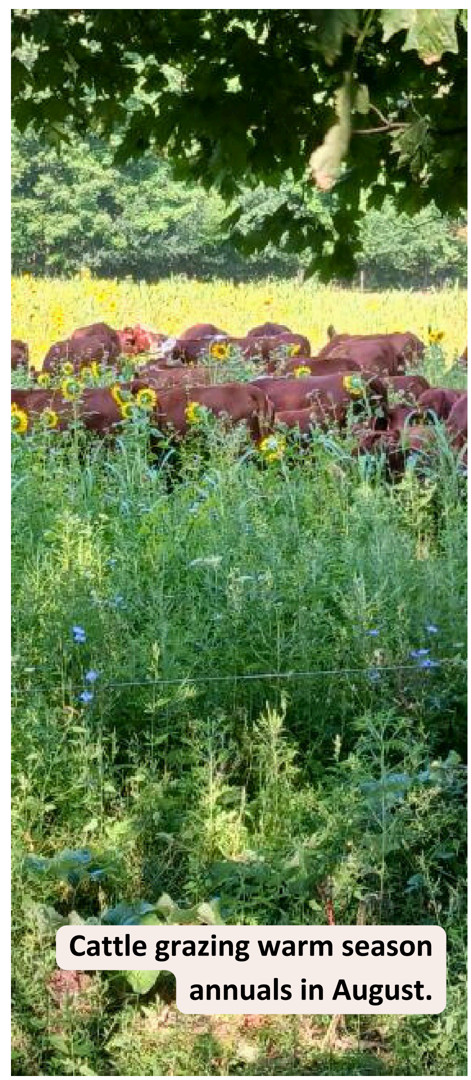
**Results**

Weather through May and June was cold and wet which caused poor germination of some of the warm season annuals. Most notably, none of the cow peas germinated. They had composed nearly 25% of the total seed mix and their loss significantly decreased the canopy provided by the establishing crop, allowing weeds to set in. An extremely hot dry summer followed, further stressing plants and delaying growth and grazing until mid August.

The combination of a delayed start to grazing and heavy weed pressure meant that fields were not able to be reseeded for the second phase of the project. Residue from trampled pig weed, ragweed and sunflowers would have prevented effective seeding with the no-till drill and the window for

***Species Included in the Warm Season Annual Mix:***

Non GMO Soybeans
Cow Peas
Pearl Millet
Brown Top Millet
Dwarf Sorghum
Forage Sorghum
Forage Collards
Forage Turnip
Sunflower
Buckwheat
Okra
Nitro Radish



**Cattle grazing warm season annuals in August.**

seed to establish before potential frost was too short. That said, they did see good regrowth from the crop after the first grazing, and cattle were rotated across the fields from the second week of August until the middle of September, and then again through the month of October.

Josh also noted that he saw good aggregation in the soil compared to a wheat field sharing the fence line with the pastures, and that compaction caused by cattle during the previous winter was broken up by the cover crop roots. A penetrometer showed less compaction in the trial fields than in neighbouring wheat and pasture fields.

Despite setbacks from the weather, Josh and his father felt that they'd achieved good takeaways from the project, and were pleased with the feed supplied by the first stage. They are keen to continue experimenting next year, accommodating for some of the things they observed in this season.

**Soil Testing**

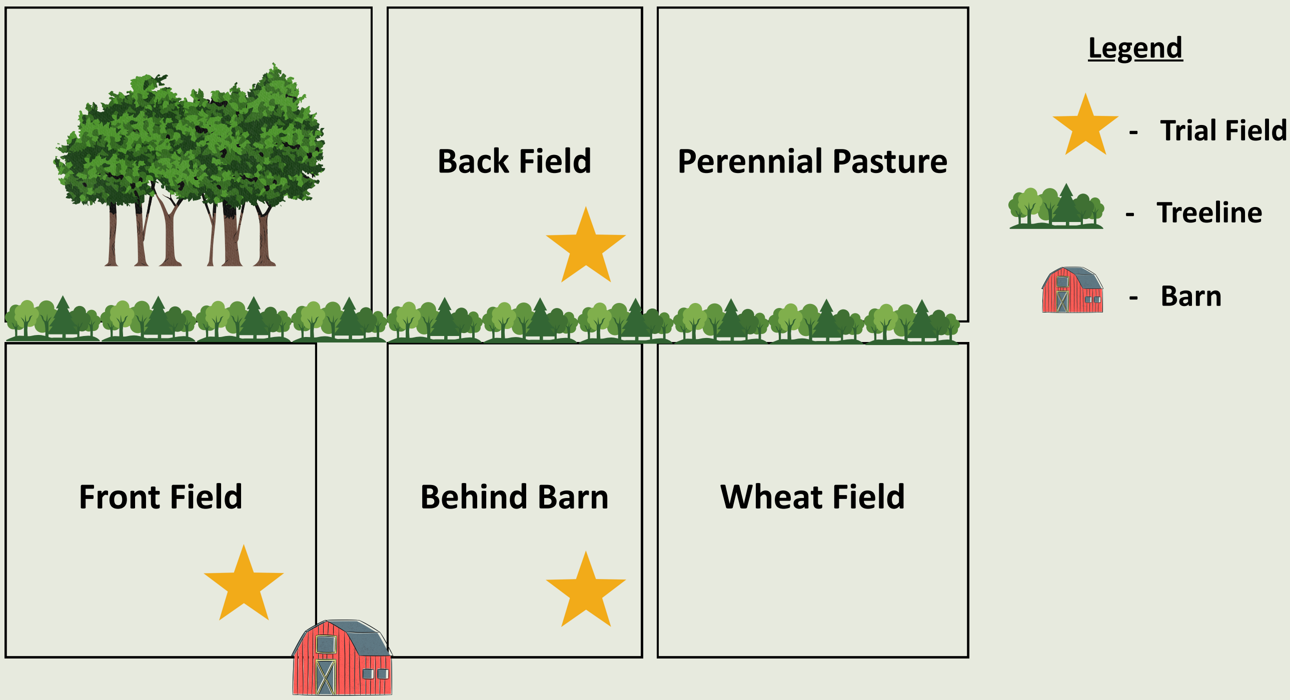
Josh was interested in comparing soil health between the project fields, older pasture fields, and a cash cropped field which all intersect with each other. Soil health testing was conducted to establish baseline nutrient values and Josh will continue to monitor changes with additional soil testing down the road.

Soil test results are shown on the following two pages. Both basic soil analysis and full soil health testing were completed for each of the areas. The "behind the barn" field and "back field" test areas were combined for soil sampling as they are side by side with similar topography and management. Soil samples were also taken from the adjacent wheat field, and an old treed fence line, to compare soil health values for areas with conventional management and with zero soil disturbance.

A noticeable difference between the wheat field and other areas was reflected in the soil test results.

The cover crop prior to grazing in August.

## Layout of the Farm and Test Fields




**Forage Testing**

Forage nutrient sampling was done just prior to the cattle being turned out to graze, with samples taken from the three trial fields and also from a perennial pasture field on the farm. Results are shown below. Sorghum samples were collected from the three project fields to check nitrate levels in the drought-stressed plants. Nitrate levels were low.

| Forage Nutrient Test Results | | | | |
|---|---|---|---|---|
| **Field** | **Dry Matter** | **Crude Protein** | **Total Digestible Nutrients** | **Neutral Detergent Fibre** |
| Behind Barn | 23.35 | 14.89 | 67.33 | 44.25 |
| Back Field | 27.03 | 13.13 | 69.48 | 46.57 |
| Lower Front Field | 30.12 | 14.03 | 65.35 | 50.22 |
| *Average of the 3 Trial Fields* | 26.83 | 14.02 | 67.39 | 47.01 |
| Permanent Pasture | 49.30 | 11.69 | 61.29 | 60.02 |
| Sorghum | 31.53 | 11.40 | 62.60 | 63.16 |

| A&L Labs Basic Soil Analysis | | Front Field | Behind Barn & Back Field | Wheat Field | Treeline |
|---|---|---|---|---|---|
| | | May | May | May | May |
| Organic Matter | | 6.2 | 8 | 3.9 | 8.8 |
| Phosphorus – Bicarb | | 17 | 46 | 11 | 9 |
| P ppm Bray-P1 | | 23 | 69 | 22 | 11 |
| Potassium K ppm | | 327 | 374 | 57 | 178 |
| Magnesium Mg ppm | | 281 | 303 | 101 | 478 |
| Calcium Ca ppm | | 1430 | 2100 | 1430 | 1900 |
| Sodium Na ppm | | 15 | 15 | 14 | 13 |
| pH | | 6 | 6.7 | 5.8 | 6.9 |
| CEC meq/100g | | 11.6 | 15.2 | 10.6 | 15.1 |
| Percent Base Saturations: | % K | 7.3 | 6.3 | 1.4 | 3 |
| | % Mg | 20.2 | 16.6 | 7.9 | 26.3 |
| | % Ca | 61.8 | 69 | 67.5 | 62.7 |
| | % H | 10.1 | 7.7 | 22.6 | 7.6 |
| | % Na | 0.6 | 0.4 | 0.6 | 0.4 |
| S | | 8 | 11 | 12 | 8 |
| Zn | | 3.2 | 5.3 | 1.8 | 15 |
| Mn | | 57 | 57 | 36 | 102 |
| Fe | | 71 | 116 | 66 | 70 |
| Cu | | 1 | 1.8 | 0.8 | 1.3 |
| B | | 0.7 | 1.1 | 0.3 | 0.9 |
| Soluble Salts | | 0.4 | 0.4 | 0.3 | 0.3 |
| NO3-N | | 31 | 30 | 22 | 22 |
| Cl | | 13 | 20 | 7 | 17 |
| Saturation % P | | 4 | 13 | 3 | 2 |
| Aluminum Al ppm | | 779 | 661 | 866 | 662 |
| Saturation % Al | | 0.6 | 0.1 | 1 | 0.1 |
| K/Mg Ratio | | 0.36 | 0.38 | 0.18 | 0.11 |
| Ca/Mg Ratio | | 3.1 | 4.2 | 8.5 | 2.4 |
| ENR | | 75 | 93 | 51 | 101 |

| A&L Labs Soil Health Analysis | Front Field | Behind Barn & Back Field | Wheat Field | Treeline |
|---|---|---|---|---|
| | May | May | May | May |
| General Fertility Index | 68 | 80 | 65 | 58 |
| Electrical Conductivity | 0.39 | 0.42 | 0.34 | 0.33 |
| Potentially Mineralizable Nitrogen | 51 | 54 | 45 | 51 |
| Organic Carbon | 148.4 | 215.4 | 122.1 | 315.2 |
| Inorganic N | 37.55 | 37.22 | 24.23 | 28.55 |
| Organic N | 17.76 | 18.7 | 12.97 | 32.66 |
| CO2-C (Soil Respiration) | 118 | 141 | 90 | 123 |
| Reactive C | 878 | 1132 | 620 | 1184 |
| Soil Health Index | 40 | 46 | 35 | 35 |
| % MAC (Microbially Active Carbon) | 79.5 | 65.5 | 73.9 | 39 |
| Organic C:N Ratio | 9.4 | 11.5 | 9.4 | 9.7 |
| NRCS Soil Health Calculation | 15.1 | 18.1 | 11.5 | 18.7 |
| Biological Quality Result | 5 | 5 | 4 | 5 |
| Approx. Quantity of Mineralizable N/yr | 102 | 108 | 90 | 102 |
| Water Extracted Organic Carbon | 148 | 215 | 122 | 315 |
| Mineralizable Nitrogen | 51 | 54 | 45 | 51 |
| Water Extracted Soil Nitrate | 31 | 30 | 22 | 22 |
| Water Extracted Total Nitrogen | 55 | 56 | 37 | 61 |
| Water Extracted Soil Ammonium | 7 | 7 | 2 | 7 |
| C:N Ratio | 10.2 | 10 | 10 | 11.5 |
| Active Carbon | 878 | 1132 | 620 | 1184 |

Gillian's project explored whether manure from pastured poultry could effectively offset nutrient needs for creating new cut flower garden beds. Typically, Gillian applies compost to meet fertility needs. The goal of the project was to evaluate whether the amount of compost applied could be reduced after birds were moved over the area.

Originally, Gillian intended to pasture turkeys over an area to the north of her established beds, which would then be worked and prepared for flower production in 2026. Gillian tarped the area in the fall of 2024 to ensure bare ground for spring time, and seeded oats and peas in early spring 2025. Her plan was to rotate turkeys across the oats and peas for the summer of 2025. Instead, Gillian ended up needing garden space in early summer, prior to the turkeys' arrival. As a result, they were pastured on the south end of the main garden. A small strip of oats and peas were left along the garden planted on the north side, and soil samples from the cover cropped area were able to be compared with soil samples from the area where turkeys were pastured.

**Project size:** ¼ acre.


**North project area with oats and peas coming in, May 2025**


**North project area with remnants of oats and peas along right edge, August 2025**


**Area where turkeys were rotated. Heavy manure was put down in the space where the shelter is moved over.**

**Why It's Important**

Incorporating livestock on farm increases biodiversity which is important for soil health. Poultry have the potential to put down soil nutrients while also helping to manage pest pressure on farm. Being able to measure the impact made by rotating poultry over future production areas could allow Gillian to reduce purchased fertility, increasing the profitability of the farm and creating a circular ecosystem.

**Results**

Soil samples were taken as a means of monitoring the project. Additional sampling in 2026 would give a more accurate picture of nutrients added to the system, as it is likely that manure and cover crop residue deposited on the soil surface had not been broken down or incorporated into the soil by the end of August. Samples taken in spring 2026 would better reflect the changes in fertility. Note that the sample from the "Established Bed" was taken from Gillian's main flower production area, and already had nutrients added in the form of compost. These levels were sampled as a target to bring the rest up to.

| A&L Labs Basic Soil Analysis | | Established Beds (with compost) | New Ground | Cover Crops | Turkeys |
|---|---|---|---|---|---|
| | | May | May | August | August |
| Organic Matter | | 8.5 | 5.4 | 6 | 5.7 |
| Phosphorus – Bicarb | | 75 | 5 | 6 | 8 |
| P ppm Bray-P1 | | 266 | 6 | 8 | 11 |
| Potassium K ppm | | 419 | 101 | 98 | 142 |
| Magnesium Mg ppm | | 669 | 582 | 518 | 541 |
| Calcium Ca ppm | | 2200 | 1920 | 1750 | 1770 |
| Sodium Na ppm | | 59 | 14 | 22 | 30 |
| pH | | 7.5 | 7.2 | 7.6 | 7.5 |
| CEC meq/100g | | 17.8 | 15.4 | 13.4 | 13.8 |
| Percent Base Saturations: | % K | 6 | 1.7 | 1.9 | 2.6 |
| | % Mg | 31.3 | 31.4 | 32.3 | 32.7 |
| | % Ca | 61.7 | 62.2 | 65.5 | 64.2 |
| | % H | - | 4.3 | - | - |
| | % Na | 1.4 | 0.4 | 0.7 | 0.9 |
| Saturation % P | | 61 | 1 | 1 | 2 |
| Aluminum Al ppm | | 558 | 748 | 679 | 670 |
| Saturation % Al | | 0 | 0.1 | 0 | 0 |
| K/Mg Ratio | | 0.19 | 0.05 | 0.06 | 0.08 |
| Ca/Mg Ratio | | 2 | 2 | 2 | 2 |
| ENR | | 98 | 67 | 73 | 70 |

Anthony was interested in comparing the impact of ramial mulch on microbial populations in soil around newly planted fruit trees and and bushes.

Ramial mulch is produced by mulching branches less than 4" in diameter, with the theory that young, growing wood is less lignified and has a high proportion of plant nutrients contained in it. With nutrients more available, it is thought to be able to support healthier fungal populations.

Anthony investigated this by setting up side-by-side comparisons of ramial mulch and grass mulch around the base of his orchard trees. He monitored growth through the summer and ran a “cotton test” to evaluate microbial populations under each mulch type. This involved burying identical cotton cloths under a replicate of each mulch and waiting for two months before digging them up again. While in the soil, the cloth begins to be digested by microbial populations. The healthier, more robust the population, the greater the disappearance of the cloth.

As an additional soil microbe building strategy, Anthony also rotated chickens through the establishing orchard, hoping to improve fertility and increase soil biodiversity. Soil samples were taken at the beginning of the project and can be repeated in future years to monitor ongoing changes.


**Project Size:** 1 acre

**Why It's Important**

Robust soil microbial populations are the cornerstone of healthy soils. They support nutrient cycling, breakdown organic matter and build soil structure. Their populations are also difficult to measure and research into them is budding. Being able to demonstrate a difference in microbial populations in soils treated with ramial vs. grass mulch is an exciting way to decide whether incorporating ramial mulch into an orchard is a worthwhile investment.

**Results**

Interestingly, after two months of being buried, Anthony did see a difference in the two cloths, with more being broken down from the one buried under ramial mulch than grass mulch. The final weight for the ramial mulch cloth was 58 grams. The final weight for the grass mulch cloth was 77 grams. With less remaining cloth, this indicated more microbial activity in the soil under the ramial mulch.


**Cloth buried at the beginning of July.**

**Final weight on ramial mulch cloth.**

**Final weight on grass mulch cloth.**


**Ramial mulch cloth after being dug up.**


**Grass mulch cloth after being dug up.**

This project involved using permaculture techniques to create biodiverse apple guilds and comparing the nutrient value of guild apples to apples from trees on a mown lawn. The guilds were created at the base of several apple trees in an orchard which had been untended for many years. The goal was to create a micro-environment where complimentary plants could be used for various ecological functions such as nitrogen fixation, nutrient accumulation, pollinator support, pest deterrence, soil aeration, and water retention through ground cover. Plants were also chosen for their edible and medicinal values, which incorporate well with Dr. Cristina's medical practice.

**Project Size:** ½ acre



**Plants Included in the Guild:**

Apples
Calendula
Yarrow
Broad-Leaved Plantain
Narrow-Leaved Plantain
Hawthorne Berries
Black Raspberries
Highbush Cranberries
Motherwort
Chicory
Mullein
Lemon balm
Patience Dock
Asparagus
Red Clover
Strawberries
New England Asters
Evening Primrose
Queen Anne's Lace
Self Heal
Nasturtiums
Sage
Vietnamese Mint
Vietnamese Coriander
Wood Sorel
Elderberry
Marshmallow
Goldenrod
White sweet clover
Bull thistle
Onions
Saskatoon Berries

**Why It's Important**

Dr. Cristina was interested in testing whether differences could be seen in soil tests and apple nutrient levels when comparing trees growing in the extremely biodiverse guilds with trees on a neighbouring lawn. She wanted to investigate the difference in nutrient content of food produced from a mono culture environment vs. a biodiverse one.

The trees she used were part of a heritage apple orchard would have spanned both Dr. Cristina's property and her neighbour's, meaning that the trees were originally part of the same production system, but had been under very different management systems (mown lawn vs. left wild) for many years. Comparative soil testing and apple nutrient analysis from the two properties were carried out to investigate the impact of the two micro-environments.

**The guild in May 2025.**

**The guild in August 2025.**

**Results**

Soil tests showed higher nutrient levels under the guild trees than the lawn. Note that Dr. Cristina added compost to the soil when she created the guilds and this would account for some of the increased organic matter and nutrient levels. Likely the increased biomass from tall grasses and other plants in the guild area over many years was also a major contributor.

Nutrient analysis also showed several higher values in apples collected from the guild area, compared to the lawn area. See results in the following tables. Note that Dr. Cristina took two apple samples from her guild trees, one from her neighbour's trees on lawn, and one from trees on her property which were not part of a guild but which had considerable biodiversity beneath them from many years of being left wild.

| A&L Labs Basic Soil Analysis | | Apple Guild | Apple Guild | Apples on Lawn |
|---|---|---|---|---|
| | | June | August | August |
| Organic Matter | | 8.2 | 8.8 | 3.2 |
| Phosphorus – Bicarb | | 31 | 24 | 8 |
| P ppm Bray-P1 | | 50 | 40 | 11 |
| Potassium K ppm | | 144 | 159 | 91 |
| Magnesium Mg ppm | | 256 | 305 | 85 |
| Calcium Ca ppm | | 3200 | 3370 | 660 |
| Sodium Na ppm | | 11 | 17 | 10 |
| pH | | 7.3 | 7.3 | 5.9 |
| CEC meq/100g | | 18.5 | 19.8 | 6.7 |
| Percent Base Saturations: | % K | 2 | 2.1 | 3.5 |
| | % Mg | 11.5 | 12.8 | 10.5 |
| | % Ca | 86.4 | 84.9 | 49.4 |
| | % H | - | - | 35.8 |
| | % Na | 0.3 | 0.4 | 0.7 |
| Saturation % P | | 4 | 3 | 1 |
| Aluminum Al ppm | | 363 | 378 | 994 |
| Saturation % Al | | 0 | 0 | 1.5 |
| K/Mg Ratio | | 0.17 | 0.16 | 0.33 |
| Ca/Mg Ratio | | 7.5 | 6.6 | 4.7 |
| ENR | | 95 | 101 | 44 |

Apple nutrient analysis.

| Analysis | Guild 1 | Guild 2 | Trees on Lawn | Wild Trees |
|---|---|---|---|---|
| Nitrogen | 0.28 | 0.34 | 0.36 | 0.29 |
| Phosphorus | 0.07 | 0.07 | 0.03 | 0.05 |
| Potassium | 0.97 | 0.95 | 0.61 | 0.88 |
| Magnesium | 0.02 | 0.03 | 0.02 | 0.03 |
| Calcium | <0.03 | <0.03 | 0.03 | <0.03 |
| Zinc | <6.50 | <6.50 | <6.50 | 11.76 |
| Manganese | <4.90 | <4.90 | <4.90 | <4.90 |
| Copper | <3.00 | <3.00 | <3.00 | <3.00 |
| Iron | 10.87 | 9.04 | 8.12 | 14.51 |
| Boron | 28.56 | 26.22 | 15.05 | 30.06 |
| Sodium | <0.01 | <0.01 | <0.01 | <0.01 |
| Sulphur | 0.03 | 0.03 | 0.02 | 0.03 |
| Molybdenum | 0 | <0.00 | <0.00 | <0.00 |
| Crude Fibre | 5.75 | 5.98 | 6.25 | 6.14 |
| WSC | 58.51 | 59.95 | 72.13 | 67.49 |
| Moisture | 82.94 | 84.83 | 85.99 | 83.44 |

Alternate formats available upon request.