Dane Demo Farms

# 2024 DATA SUMMARY

## About the Research

At the Dane Demo Farm network, we've got something really special going on! Our research is driven by farmers, for farmers, which means we're all about finding answers to the real questions you have about adopting different conservation practices. Each demo farm has its own unique projects, along with some exciting initiatives that are hosted across all farms.

We're excited to share some data from the 2024 growing season! Before diving into the results, we'd like to give you a little background on how these on farm projects were conducted.

All the work in these plots is entirely carried out by the participating farmers or their service providers. They handle everything from planting, harvesting, tillage, pesticide applications, and managing manure and fertilizer. Dane Demo Farms surveyed the plot areas and marked them out for the farmers, provided plot maps identifying the different treatments, gathered the soil and plant tissue samples, and completed data analysis. The plot sizes vary based on the farmers' equipment, ranging from 30 to 90 feet wide and 200 to 500 feet long. Just a heads-up, these plots are not replicated.

When it was time to harvest, the farmers took care of that too. Some had calibrated yield monitors, while for others, we weighed the plot harvest by using weigh wagons, portable scales, or scales right on the farm. We also collected samples of the grain or forage and dried them at the UW-Arlington Research Station to check moisture levels. The yields were then adjusted based on that moisture data.

Keep in mind that the results you're about to see reflect just one year of data—because let's be honest, no two years are ever the same in farming! So, feel free to draw insights from what's shared here, but keep in mind that 2025 might tell an entirely different story. Enjoy exploring the data!

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# Methods

Each project has their own set of protocols based on the the project goals. We collected baseline data on all plots that included routine soil tests, soil nitrate tests, soil health tests, and more. We'll use this data to track progress over the coming years.

2024 Projects:
1) cover crop termination timing
2) nutrient stratification in a no-till system
3) liming in a no-till system
4) manure placement (in-furrow, between rows)
5) soil health comparison between systems
6) P & K availability from digested solids and composted digested solids

New Projects for 2025:
1) transition to no-till (from chisel-plowing)
2) the use of cover crops to replace tillage on low-lying acres
3) edge-of-field monitoring




**1)** Before the termination of each cover crop, we collected multiple plant biomass samples within the plots, dried them, and sent them in to a lab for analysis - luckily we have UW-Arlington Ag Research Station close by to access their plant driers.
**2)** All soil nitrogen samples were taken at two depths, 0-12" and 12-24" - beginning in the fall of 2023, and continuing in early spring 2024 **3)** up until mid-July, and ear-leaf samples were taken at tassel.

We used portable weigh pads, weigh wagons, scales, or information from calibrated monitors to gather yield data.

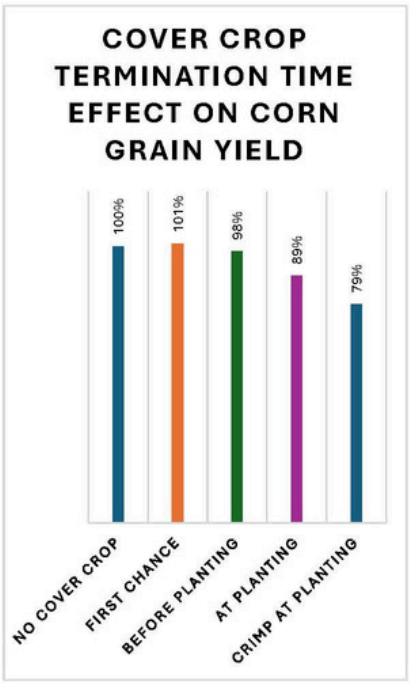
# Summary of 2024 Research Data

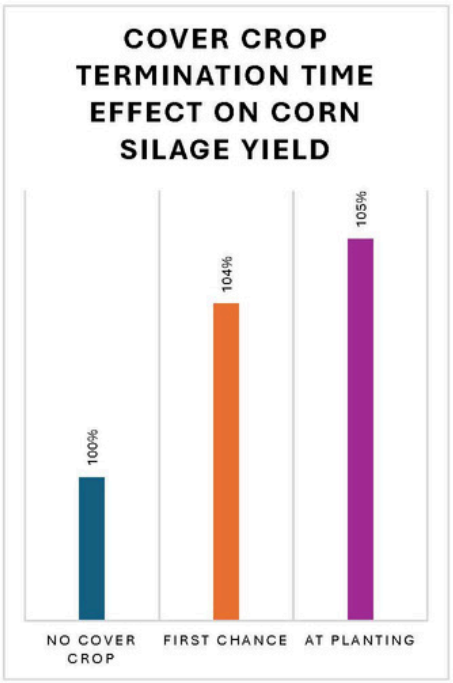
**Cover Crop Termination Timing**

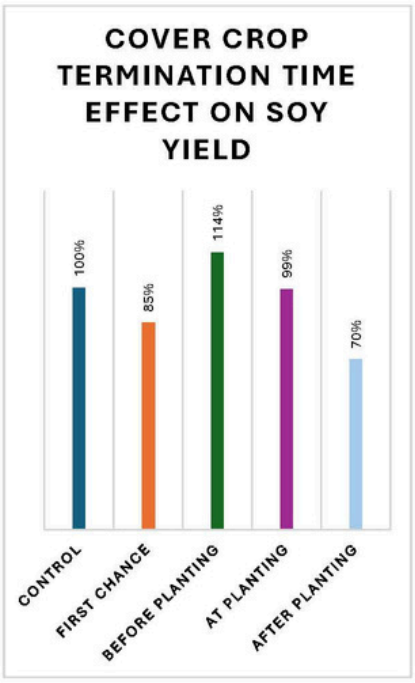
A study that was conducted on all participating farms is focused on cover crop termination timing. The main idea here is to find out the best time to end a cover crop so we can boost soil health while still maintaining good yields.

Each farm set up at least four plot strips for experimentation. This setup includes one strip with no cover crop at all, plus three strips with cover crops that were terminated at different times: the first opportunity in spring, just before planting, and right at planting. Two of the farms even added *extra* treatments, using crimping at planting and another for terminating after planting.

In 2024, each participating farm grew different crops—one farm planted soybeans, another grew corn for grain, and the third planted corn for silage. **See the yield charts below** to see how it all turned out. The no cover crop treatment serves as the 'baseline,' representing 100% of the target yield. All other treatments were compared to this baseline, with anything below 100% indicating a yield loss from the cover crop termination, and anything above 100% showing a boost in yield for the cover crop treatment. Please note that this is data from only one year.



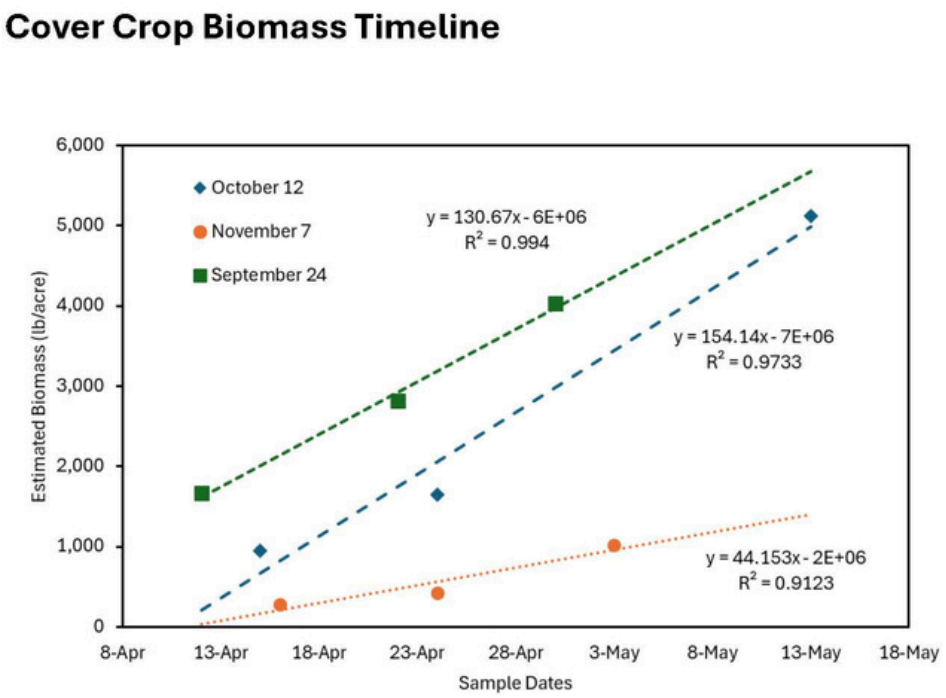




**What about biomass of the cover crops?** If you're looking to suppress weeds by growing cover crops, data from the UW Cropping Systems Weed Science highlights that you'll need nearly 5,000 pounds of biomass per acre for effective suppression, specifically when it comes to soybeans.

Two of the treatments hit that mark— those that were established by mid-October and not terminated until planting. *This data is displayed on a chart on the next page.* The chart also reveals that cover crops planted in November the previous fall yielded very low biomass. This could be due to the unusually dry conditions we faced in early spring 2024. It wasn't until after participating farmers had terminated all of their cover crops that we finally got a good amount of spring rain here in Dane County.

# Summary of 2024 Research Data



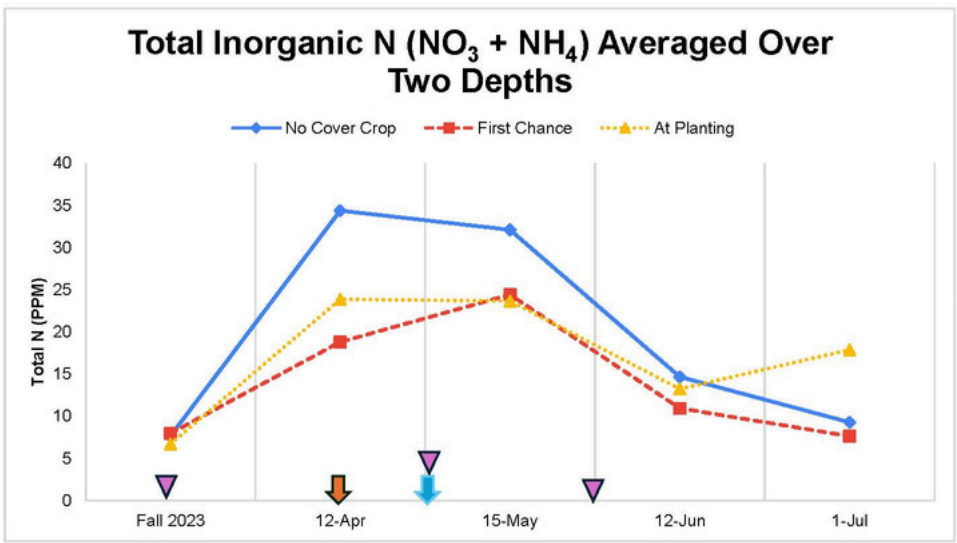

Corn Silage (green line)
Cover crop:
50/50 wheat & barley
Planted: September 24

Corn Grain (blue line)
Cover Crop: winter rye
Planted: October 12

Soybeans (orange line)
Cover Crop: winter rye
Planted: November 7

So, let's chat about the nitrogen from the cover crop and whether it gets released in time for the corn to make the most of it. In early spring, the **corn silage field** showed elevated levels of nitrogen in the soil. It makes sense, considering the field received a fall manure application. Interestingly, we noticed that the area without a cover crop had higher nitrogen levels in mid-April compared to those with cover crops. This just shows how effectively those cover crops are doing their job by soaking up the nitrogen. As we moved into May, nitrogen levels remained pretty stable.

**Remember all the rain we had in the spring of 2024, especially from mid-May to mid-June?** This field in particular got a bit more rain than the other farms, and our data revealed a significant drop in nitrogen levels in the soil during this rainy period. There was a side dress application of 32% UAN in June, but guess what? More rain followed! The surprising twist is that the only plot to show an increase in soil nitrogen was the one that had a cover crop terminated at planting.



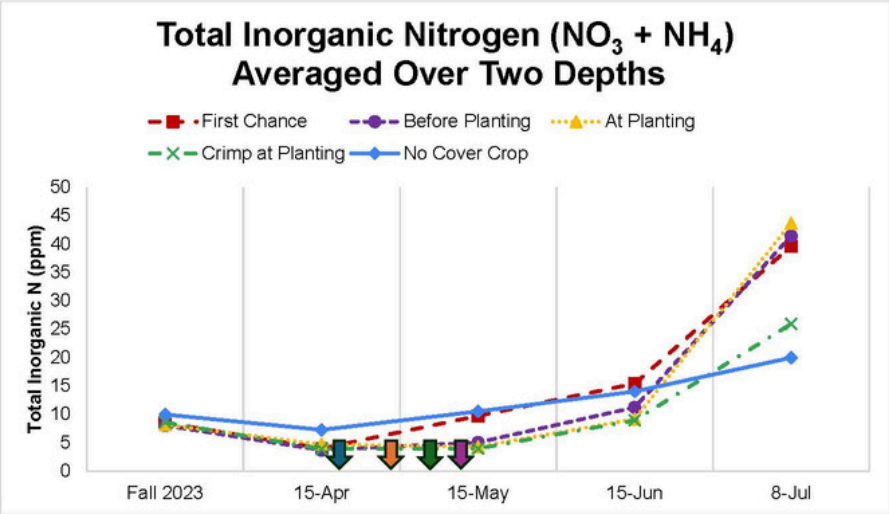

**Cover Crop Management**

- **Wheat/barley drilled** 9/24/23
- **Fall Sample** taken 10/2/23
- **Manure** applied 11/20/23
- **First Chance** termination 4/12
- 10-14 days **before planting** termination 4/30
- **Corn planted** 4/30/24
- 4/30/24 applied **UAN**
- **Side-dressed** 6/13/24
- **Harvest** 9/10/24

The corn grain plots had very different results, check them out on page 5.

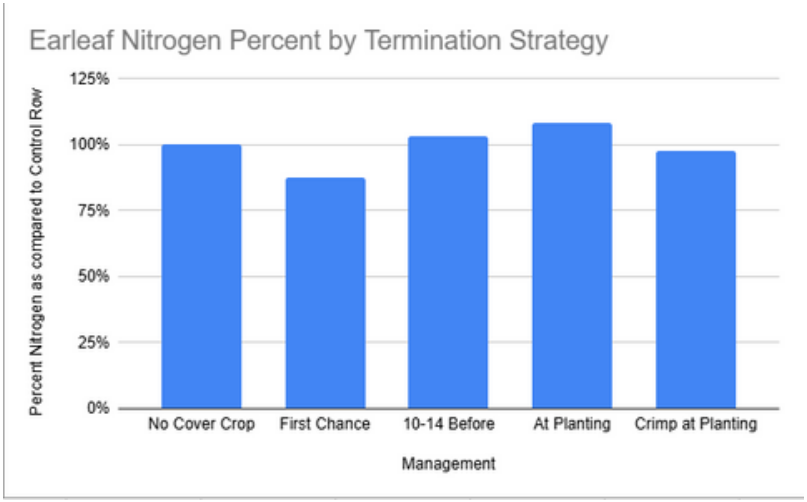
# Summary of 2024 Research Data

In early spring, the **corn grain field** showed some low nitrogen levels in the soil overall, but after side dressing in mid-June, the soil levels jumped up right when the corn really needed it, between V12 (corn with 12 leaves) and R1 (silking). During this period nearly 40% of the nitrogen needed for the corn plan is taken up by the crop. By July, we noticed that the lowest levels were in the plots without cover crops and those that were crimped. However, when the earleaf samples were taken, a few weeks later, it showed that all treatments had good nitrogen levels in the actual corn plant, although the early termination plots were a tad lower overall.




**Cover Crop Management**

- **Winter rye** drilled 10/12/23
- **Fall Sample** taken 10/23
- **First chance** termination 4/16
- **Before planting** termination 4/25
- **At planting** termination 5/8
- **Crimp at planting** 5/13
- Spray crimped plot 5/15
- **Corn planted**, N applied 5/15
- Side dress 6/15
- Harvest 10/17
- **Fall sample** taken 10/18/24
- **Winter Rye** drilled 10/21/2024




**What about the yield?**
If you took a look at page 3, you probably saw that the yields in the corn grain plots were a bit lower for both the termination at planting and the crimp treatment. The chart above and the earleaf samples on the left show that nitrogen levels were actually pretty good in the termination at planting treatment, so it makes you wonder - what's responsible for the yield loss?

These plots are situated on a field with drain tile, but despite that, the heavy rainfall we experienced from mid-May through June was just too much for the tile lines to handle. Unfortunately, the plots with cover crops terminated at planting and the crimped plots ended up with some wet areas that impacted their yield. We're not exactly sure how much of the plots were affected, so those less productive sections are included in the overall yield calculations, which brought down the total yield for the plots.


**Plot R13**
Plot treatment: termination at planting

Dry area = 248 bu/ac

Wet area = 134 bu/ac

The wet area resulted in a **46% reduction** in yield when compared to the dry area

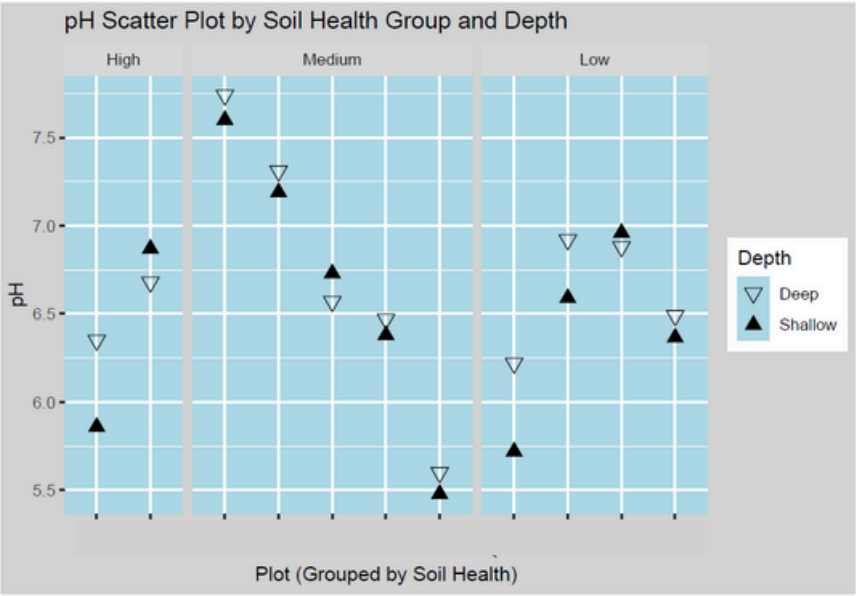
# Summary of 2024 Research Data

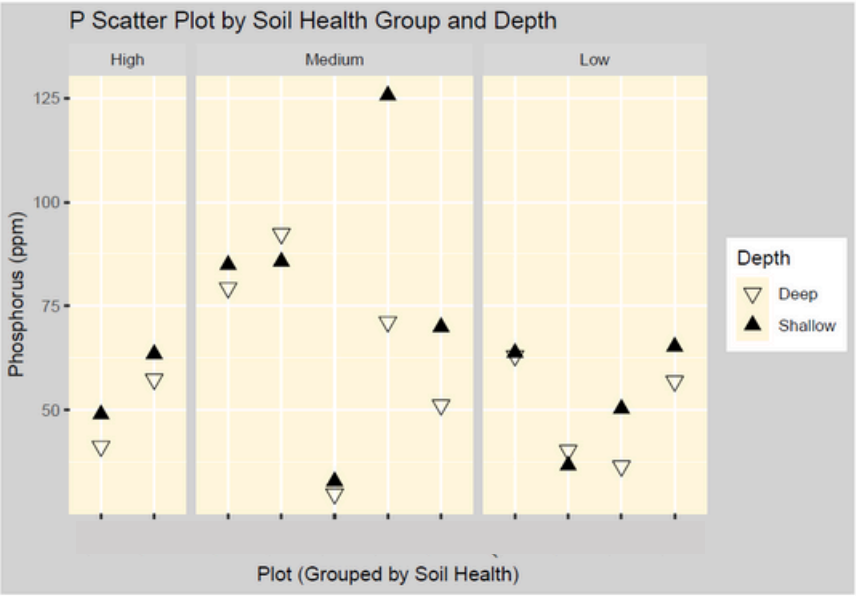
**Nutrient Stratification in a No-Till System**

One of the participating farms has been utilizing no-till for quite some time and they had a concern about nutrient stratification. There was no evidence that stratification was occurring, but based on information from no-till enthusiasts, it is something to watch out for in long-term no-till. This farm has also implemented cover crops for over a decade and felt that the increase in soil health and the boost earthworm activity would help reduce or eliminate any stratification issues, but it was all speculation.

We did sampling across the farm, taking samples at 0-2″ and 0-6″. We focused on fields with a rich history of cover crops as well as those that haven't consistently received them.

After data analysis, we found that there was no significant stratification anywhere on the farm, despite some fields being in a no-till system for multiple decades.




The fields all the way on the left side of the chart are doing great in terms of soil health and have a solid history of using cover crops. As you move to the right, there is a reduction in perceived soil health, with the fields on the far right showing the least exposure to cover crops.

The triangles in the charts represent two different sampling depths. The dark triangle indicates a shallow sample, while the transparent triangle corresponds to a deeper soil sample.

When we think about stratification, the top chart (pH) should have the dark triangles lower down, suggesting that the soil surface has a lower pH. In contrast, the bottom chart (P) should show the dark triangles at the top, indicating that there's more phosphorus at the soil surface. The greater the stratification, the greater the distance between the transparent and dark triangles.

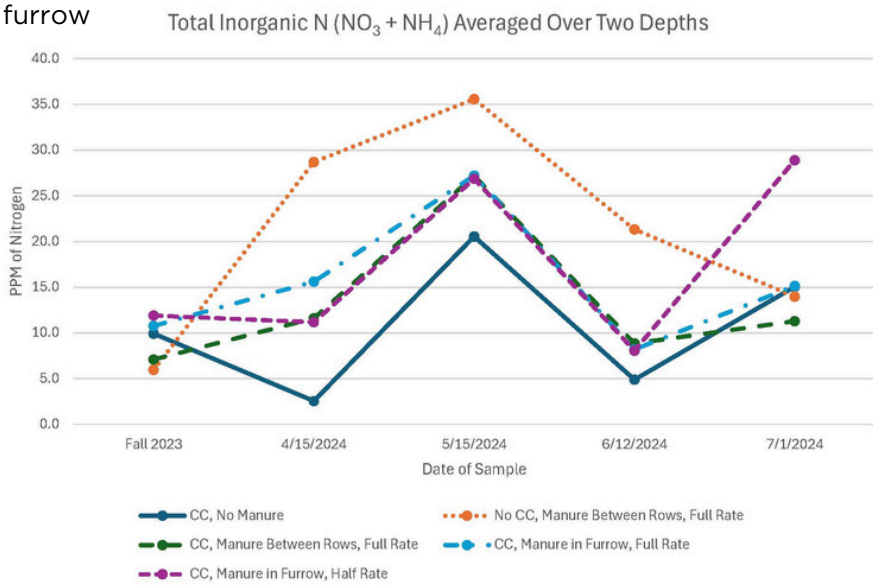
Since these charts don't show a noticeable gap between the triangles, that suggests there's not much stratification happening.

# Summary of 2024 Research Data

**Manure Placement (in-furrow, between rows)**

Over the course of a year, we conducted an interesting study on the benefits of manure placement and its impact on corn. The main goal was to see if applying manure directly into the furrow would make a difference. We set up five different treatment options:

1) No cover crop (No CC), full rate manure, between the rows
2) Cover crop (CC), full rate, between the rows
3) Cover crop, half rate manure, in the furrow
4) Cover crop full rate manure, in the furrow
5) Cover crop, no manure

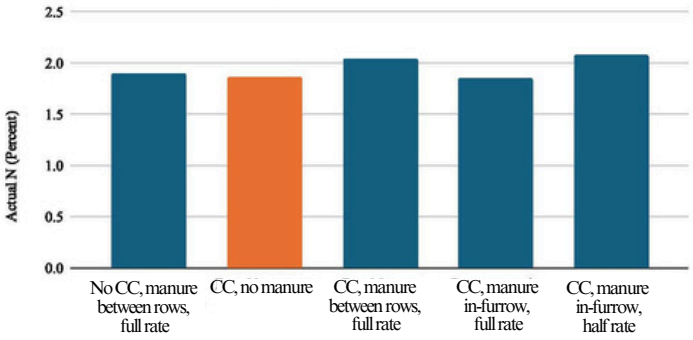



When we analyzed the nitrogen levels in the soil, the results were quite revealing. As expected, the treatment with no manure had the lowest nitrogen levels, while the half rate came in next. Interestingly, the treatment with full manure but no cover crop showed the highest nitrogen levels in spring, although these levels decreased as the season progressed.

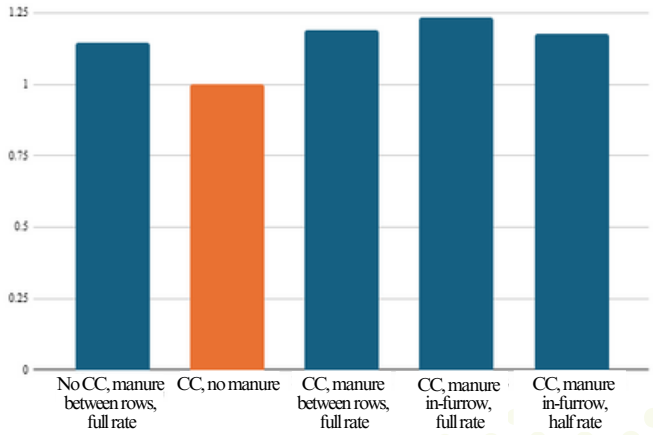
This study took place in the same field as another project looking at corn silage and cover crop termination, which experienced quite a bit of rain from mid-May through June. We also gathered additional samples from both in the furrows and between the rows. By June, it turned out that the nitrogen in the soil had moved around quite a bit, so there wasn't a clear difference in outcomes based on whether the manure was placed between the rows or in the furrows.

Then, in late July, we collected ear-leaf samples and found no significant difference between treatments. At harvest, the in-furrow, full rate treatment did yield the highest, but there was also not a significant difference.

Comparison of Earleaf Nitrogen by Treatment




Yield Compared to Control



# Summary of 2024 Research Data

**P & K Availability from Digested Solids and Composted Digested Solids**

With two community digesters in Dane County, there have been questions about nutrient availability from digested solids, specifically because of the high carbon content of the product. Though difficult to locate, we found a field that had no manure history and was located north of Madison, in close proximity to the products needed for the study.

Due to the high carbon content of the digested solids, the work focused on phosphorus and potassium levels rather than nitrogen. The project involved various treatments including digested solids from local digesters, composted digested solids, commercial fertilizer, and a control treatment that did not receive any extra P and K. These products were applied in the spring of 2024, and when harvest time arrived, we found that all treatments resulted in similar yields. We will be repeating this study in 2025 and will provide an update on those results.

**Liming in a No-Till System**

One of the participating farms recently made the switch to no-till farming. However, they realized they hadn't fully addressed their soil's pH needs before making the change. Instead of going back on the progress they'd already achieved, they're curious if enhancing soil health could eliminate the need for tillage to incorporate lime. The idea is that by improving soil health, promoting living roots year-round, and boosting earthworm and microbial activity, nature itself might handle the lime incorporation. In the fall of 2023, we set up plots with different treatments: 1) no-till + cover crop + no lime, 2) no-till + cover crop + lime (applied at half rate for two consecutive years), 3) no-till + cover crop + lime (full rate), and 4) tillage + lime (full rate). We'll be sampling the soil at depths of 0-2 inches and 0-6 inches over the next few years to see how the lime behaves under these different treatments. It's going to take time before we have any results on this project.

**Plans for 2025**

With the addition of two more farms to the Dane Demo Farm network in 2024, we'll have an even broader range of projects aimed at enhancing soil health. Our goal is to support all farmers, regardless of where they are on their soil health journey, by providing relevant data tailored to their specific needs and aspirations for their farms.

In the fall of 2024, farmers started a few new studies, including a study to monitor a farms transition from chisel-plowing to no-till, exploring whether cover crops can effectively replace tillage on low-lying areas, and setting up a new edge-of-field monitoring system. Stay tuned for updates on both our existing and new projects in our upcoming newsletters!

**Participating Farms**
Endres Berryridge Farm, Waunakee
Prosser Farms, Columbus
Tyler Duerst Farm, Verona/Darlington
Ripp-Vale Farms, Black Earth
Sime Farm, Stoughton

**2024 Research Team**
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Dane Demo Farms is funded by an agreement with the USDA Natural Resources Conservation Service.

https://demofarms.danecounty.gov/

DANE COUNTY LAND&WATER RESOURCES DEPARTMENT

Dane Demo Farms

USDA Natural Resources Conservation Service
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