



Sand Bedding and Soil Health



Cleaning out sand-laden manure from a manure pit

If you use sand bedding on your farm, you may have noticed a crumbly-loose top inch or two of soil on your fields. Caused by factors like dry conditions, heavy traffic, or sand-laden manure, this texture change can significantly alter your farm's soil quality over time.

The UW Arlington Agricultural Research Station faced sand issues with its manure handling system from 2008 to 2016 before installing a mechanical sand separation system with a 90% reclamation rate.

To determine how sand-laden manure affects soil, researchers evaluated three fields featuring the same Plano silt loam.

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The third year of fieldwork adds to our growing farmer-led research dataset.



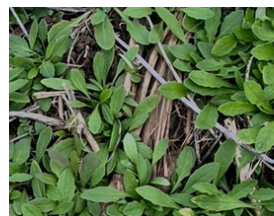
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On-farm training opportunities to learn how to assess your fields soil health.



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A two year project sheds light on the potential benefits of using seperated solids on your farm.



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All of your questions answered about this up-and-coming overwintering cover crop.



Sand Bedding and Soil Health

- Field A: Received near-yearly applications of sand-laden manure from the bottom of the pit.
- Field B: Received liquid manure applications.
- Field C: Had no manure history.

Ten 12-inch soil cores were taken from each field and split into 3-inch depth increments.

Key Findings

Silt loam is predominant across Dane County, providing some of the most productive farmland in Wisconsin. However, shifting from a silt loam to a sandier loam causes soil to lose essential productive qualities.

The research revealed that over 10 years without a sand separation system, both manure-treated fields saw a 4.5% increase in sand across the overall 12-inch profile. The contrast in the top 3 inches was stark:

- The field with no manure history measured 28% sand.
- The field with sand-laden manure from the bottom of the pit measured 42% sand.

Table 1. Soil particle size percentages and textural classes for four depths from fields with similar soil (Plano silt loam) but different manure application history during the 10 years before soil sampling.

Field	Manure History	Sample Depth	Sand %	Silt %	Clay %	Soil Texture Name
A	Bottom of pit	0-3"	42	38	20	Loam
A	Bottom of pit	3-6"	28	50	22	Silt Loam
A	Bottom of pit	6-9"	26	50	24	Silt Loam
A	Bottom of pit	9-12"	22	54	24	Silt Loam
B	Liquid manure	0-3"	30	50	20	Silt Loam
B	Liquid manure	3-6"	26	54	20	Silt Loam
B	Liquid manure	6-9"	26	52	22	Silt Loam
B	Liquid manure	9-12"	34	42	24	Loam
C	No manure	0-3"	28	52	20	Silt Loam
C	No manure	3-6"	18	60	22	Silt Loam
C	No manure	6-9"	24	52	24	Silt Loam
C	No manure	9-12"	28	44	28	Clay Loam

Soil Health Impacts

Dr. Francisco Arriaga, Professor of Soil Science at UW, explains why this shift matters:

- **Water Retention:** Sand retains far less water than silt. As sand content increases and silt decreases, plant water availability drops.
- **Biological Ecosystems:** Soil microorganisms live in the water-filled pores between soil particles, driving carbon and nutrient cycling. Changing how water is stored alters these biological communities and degrades overall soil health.
- **Structural Stability:** A sandier surface can reduce aggregate stability and disrupt broader soil physical and chemical properties.

Practical Solutions for Farmers

For farms experiencing sand buildup, Dr. Arriaga offers several management strategies:

- **Incorporate Manure:** Injecting manure deeper into the ground helps distribute sand through the soil profile rather than letting it accumulate in the top 3 inches. It also maximizes nitrogen credits and lowers phosphorus runoff risks.

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Sand Bedding and Soil Health

- **Implement Reclamation:** Mechanical sand recovery systems significantly reduce the volume of sand in manure applied to fields.
- **Explore Alternative Bedding:** Switching to alternatives like composted bedding can eliminate sand input entirely, though farmers must manage the material differently and monitor bacterial counts.

Changing soil texture can happen rapidly, but addressing it is a long-term goal. Taking steps over the next few years helps preserve soil health and protect your land's legacy for future generations.

To hear the full conversation, tune into the Dane Demo Farm Podcast: "Sand Bedding and Soil Health with Dr. Francisco Arriaga" on your favorite streaming platform.

Summer Research Recap

This spring provided excellent field conditions to conduct fieldwork, but those changed by the time July rolled around. The last soil sampling we conducted in mid-to late-July required the use of extra oomph - and sometimes a rubber mallet - to get soil probes in the ground to the proper depths. From April through July, we collected the following data:

- **Nitrate and ammonia samples** at 0-12" and 12-24" depths (all farms)
 - sampled in April, May (before planting), June (before sidedress), and July
- **Cover crop biomass samples** prior to termination (all farms)
 - analyzed for nitrogen, sulfur, and C:N ratio
- **Slugs and beneficial insects** (3 farms)
 - weekly counts and collections from April through June
- **Moisture and temperature monitoring** at 3" depth (4 farms)
 - collected April through June
- **Water infiltration tests** (4 farms)
- **Earleaf samples at tassel** (2 fields with corn)
 - analyzed for nitrogen and sulfur



These data will be analyzed and combined with past years' data to continue to build our dataset of local farmer-led research results.

To get a glimpse of what this data collection looks like, find us on Facebook, where we post short videos directly from the field.



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Do-It Yourself Soil Health Assessment Training

With most things in life, it's good to know where you are and where you want to go. When managing soil on your farm, knowing your soil's current health, setting goals, and monitoring progress over time can guide your decision-making and help you gauge whether your practices are actually working.

You can perform several simple assessments right in the field without sending samples to a soil health lab. That's where Do-It-Yourself Soil Health Assessments come in.

With just a few simple tools—a shovel, a metal rod, and a tin can (or tube) for testing infiltration—you can evaluate your fields for:

- Soil structure,
- Water infiltration,
- Soil compaction, and
- Soil life.

Attend one of our upcoming hands-on learning opportunities to learn how to conduct an assessment on your farm. It's a quick, worthwhile event and a great way to connect with other farmers who share an interest in building healthy soils. ***Plus, attendees who farm in Dane County will receive a complete set of soil health assessment tools to take home,*** saving you the hassle of scrounging up your own supplies!

Upcoming DIY Soil Health Assessment Trainings:

- August 25 at 11:00 AM - noon, Hosted by Laufenberg Farms, 6973 Riles Rd, Waunakee, WI
- August 27 at 1:00 PM - 2:00 PM, Hosted by Grove Farms, 2441 Bristol Rd, Columbus, WI

Register by calling, texting or emailing Kim Meyer at 608-445-1474, meyer.kim@danecounty.gov

County Soil Health Cost-Share Opportunities

Thinking about making a shift in your crop management? You don't have to do it alone—or shoulder the financial investment by yourself. Dane County offers cost-share funding to help you bring new soil health practices to your fields.

Financial assistance is available to support a variety of improvements, including:

- Cover crops to build organic matter and prevent erosion,
- Nutrient management planning to maximize efficiency,
- Equipment upgrades tailored for conservation practices,
- ...and more!



Now is the perfect time to get your name on the list for cost-sharing so you can hit the ground running with your 2027 conservation goals.

To explore available funding and learn how to apply, check out the Dane County Land & Water Resources Department page > what we do > agriculture > conservation funding. You can also talk to someone at the Land Conservation office directly.

West side of Dane County: Shawn Esser, 608-228-6347 or Katie Nicholas, 608-228-6219

East side of Dane County: Marie Raboin, 608-228-6324 or Eric Krueger, 608-516-9173

Soil Fertility of Digested Seperated Solids

Are separated solids from the two digesters in Dane County worth the hassle? Some farms have anecdotally seen a decrease in yield when using the product to grow corn, so we wanted to find out if there was truth to those claims. In 2024, we located a field with no known manure history and laid out four test strips to compare treatments:

- 1. Separated solids
- 2. Composted separated solids
- 3. Commercial fertilizer
- 4. No P & K fertilizer (control)

Initial sampling showed that the separated solids had a high C:N ratio—meaning a high level of carbon in the product—which can immobilize (or "rob") nitrogen in the soil. With this in mind, we decided to evaluate how these products function with lower nitrogen-demanding crops, such as soybeans and wheat.



10 ton/ac of digested seperated solids

The trial field had a low pH and low overall fertility, so lime was applied prior to starting the project. In the spring of 2024, the farm planted soybeans. At harvest, we saw no yield difference between treatments; even the control strip (no P & K fertilizer) performed the same as the others. Following soybean harvest, winter wheat was planted. During the summer 2025 harvest, a clear difference emerged: the separated solids treatment yielded 9% more than any of the other treatments.

For farms without a recent manure history, applying a manure source can improve both yield and soil health when managed appropriately. Due to the high C:N ratio, caution should be used on corn fields. However, separated solids can safely meet P & K needs for soybean and wheat crops when following proper nitrogen recommendations.

Looking at the four principles of soil health (minimize disturbance, maximize biodiversity, maximize soil cover, and maximize living roots), adding manure products like separated solids can help cash-grain systems meet the maximize biodiversity principle. While trucking costs are higher and the P & K value is lower on a per-ton basis, manure-based products offer distinct soil health benefits that extend beyond standard fertilizer numbers.

Interested in bringing in an off-farm manure source to your fields? Do your own side-by-side trial by applying a manure product on only one side of a field and see the results for yourself.

Manure Samples - Spring Sampling

2024 Averages

	% DM	%P	%K	%S	%TN	C:N	NH4%
Digested Solids	23	0.5	0.9	0.3	2.3	22	0.3
Compost	44	0.5	1.8	0.4	1.5	15	0.006

2025 Averages

	% DM	%P	%K	%S	%TN	C:N	NH4%
Digested Solids	29	0.4	0.4	0.1	2		0.2
Compost	40	0.5	1.1	0.2	1.7		0.02

Winter camelina: a new cover crop for Wisconsin?

Will Fulwider, Sam Bibby, Anastasia Kurth, and Elizabeth McNamee

What is it?

Camelina, also known as false flax, is part of the *Brassica* family, the same family as crops such as canola, turnips, radishes, and even broccoli. Varieties are generally specific to fall or spring planting like winter/spring wheat. Currently, Extension recommends planting Joelle, which is similarly winter hardy to rye.

Why plant it as a cover crop?

While winter rye is a great cover crop before soybeans, the same properties of nitrogen tie up and rapid biomass growth that are desirable for weed suppression in soybeans can reduce yields when planted before corn. Camelina produces less biomass than rye, terminates more quickly, and maintains a lower carbon to nitrogen (C:N) ratio longer than rye, releasing its nutrients more quickly. Being a *Brassica*, camelina may also reduce disease and insect carryover from rye, a grass crop, to corn, also a grass.



Planting green in early May



Setting seed, photo 6/1/25

Planting camelina

- Camelina can also be seeded in a mix with winter rye or other cover crops
 - If seeded in a mix with rye, plant 3-5 lbs/ac of camelina and reduce the rye seeding rate
- Seed is slightly smaller than uncoated alfalfa seed, so drill calibration and a small seed box can help to ensure accurate rates
- Drill seeding at $\frac{1}{4}$ " provides better seed-to-soil contact than broadcast seeding



Camelina seed



Planted 10/5, photo 11/26,
@ 4-5 lbs/acre

- Avoid planting camelina more than $\frac{1}{2}$ " deep
- Drill at 6-8 lbs/ac if seeded as a monoculture
- Drone seeding can be effective if prior to rain
- Camelina is relatively cost competitive with winter rye if seeded at ~6 lbs/ac

Key traits

- Winter hardy and will germinate at temperatures down to 34 degrees Fahrenheit
- Ideal for planting after corn silage and after soybeans through early/mid-October, although later plantings will limit fall and spring growth
- Early spring green-up and rapid growth provide good weed suppression, especially of small-seeded weeds like waterhemp and at seeding rates of 6-10 lbs/ac
- Early flowering provides pollinator floral resources
- Potential for harvesting as a cash crop alone or integrated into a double/relay cropping, especially with soybeans

Herbicides with carryover risk to camelina

- Group 2 such as: Classic, Pursuit, and others
- Group 5 such as: Atrazine, and others
- Group 14 such as: Flexstar, Valor, and others
- Group 15 and group 27 may also cause injury

Refer to Forever Green's *Winter Camelina Growers Guide for the Upper Midwest* for more in depth information. These guidelines are largely for canola as there has been a lack of systematic herbicide carryover work on camelina. Therefore, a bioassay (as shown below) is recommended for any field with residual herbicides applied in the last 2 years.

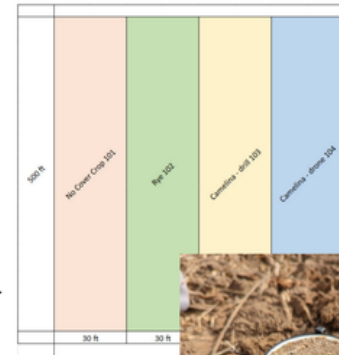


A simple bioassay involves collecting field soil from the top 2 inches from sprayed and non-sprayed areas and potting camelina in the soil just like you would start seedlings for the garden. Contact your local Extension educator for detailed instructions.

Does camelina reduce nitrate leaching and yield drag in corn?

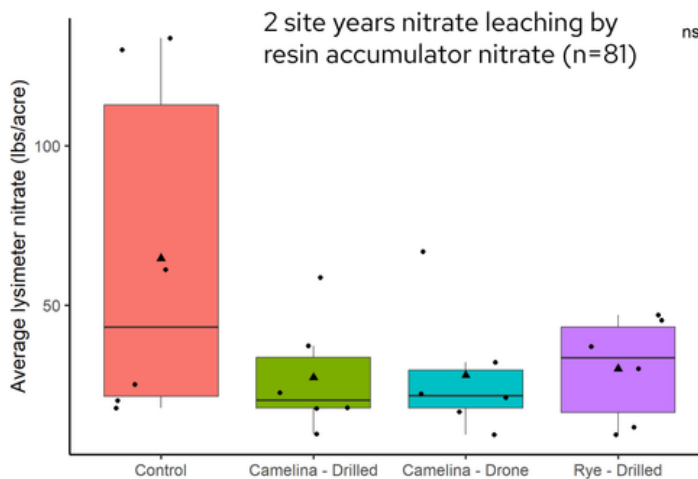
Project summary

- 4 collaborating farmers in Dane, Juneau, and Vernon counties
- Strip trials of rye, camelina (drone and drill seeded), and no cover control replicated 3 times
- 3 resin accumulators (cheap and easy to deploy, but variable method for measuring cumulative nitrate loss below root zone overwinter) installed in each strip
- Covers terminated in spring at corn planting, resin accumulators removed, and corn yield measured in fall



Camelina stand performance

- 6/11 drilled and 2/8 droned camelina saw good stands
 - **Herbicide carryover injury** likely responsible for 3/11 failed drilled stands and 1 droned stand
 - **Non-Joelle variety** drone and drill seeded winterkilled at 1 site
 - Abnormally **dry** fall in 2025 led to failed stand from drone seeding at all sites

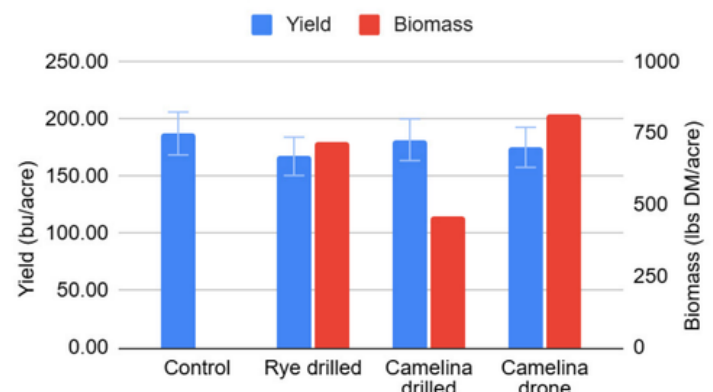


Reduce nitrate leaching?

- Boxes in plots (left) contain the middle 50% of the data, while the lines on top and bottom show the upper and lower 25%, respectively
- Resin accumulator data is highly variable
 - Only measures nitrates lost not volume of water, and some field areas might have more water infiltrating causing resin nitrates to be higher
- On average, **cover crops reduce overall nitrate leaching, and camelina performs similarly to rye**
- Preplant soil nitrate samples (0-24") reflect a similar trend of lower soil nitrates, especially in droned camelina and rye plots with an average of ~20 lbs of N taken up in drone camelina and rye biomass

Reduce corn yield drag after covers?

- Corn yield not significantly different between treatments
- Covers terminated prior to or at corn planting, resulting in less biomass
 - At above 1,000 lbs of dry matter, rye can start to impact corn yield if nitrogen is not added at planting
- 1 site year (pictured above right) faced delayed and slow termination of wheat covers, which resulted in an average 25% yield penalty with camelina yielding the same as the control



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Upcoming Events

DIY Soil Health Assessment Training

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- August 27, 1:00 pm to 2:00 pm: Grove Farms
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(See page 4 for more information)

WI Water & Soil Health Conference

December 15-16, Kalahari Convention Center, WI Dells

Sign up for a scholarship to attend for free!



Find us on Facebook and listen to the Dane Demo Farms Podcast - search for us online!



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