

# NEWSLETTER

## Driftless Ag Update

Ag news for La Crosse, Vernon, and Crawford Counties from UW-Madison Extension



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Here's your April Driftless Ag Update!

Hello and congratulations on receiving our April Driftless Ag Update! This newsletter is co-written by your local UW-Madison Extension Ag Educators, Beth McIlquham (livestock) and Sam Bibby (crops).

**Please contact your local extension office for the print version of any article included in this newsletter.**

## **Notes from your Regional Crops Educator- Sam Bibby**

- Two Nitrogen Optimization Pilot Program (NOPP) Grants awarded in our tri-county region! This is great news. Finally, some more UW research comes to the Driftless. We will be conducting a 6-nitrogen rate trial in Corn and a 6-nitrogen rate trial in oats over the next two years. Stay tuned for updates.

## **Notes from your Regional Livestock Educator- Beth McIlquham**

- Decision Tool Reminder: Just a reminder that UW-Madison Extension offers decision tools and software to assist beef, small ruminant, and swine producers make informed financial choices. All tools can be found on the UW-Madison Extension Livestock website. If you have any questions, please reach out.

-Watch for Artificial Insemination Course: This summer, there will be a two-day artificial insemination course held in Richland Center. More information will be out soon. If you are interested, I encourage you to sign-up quickly after information comes out, as the class will fill up fast. More information will be advertised in this newsletter and on your local Extension's Facebook page.

-Disease Digest: To see HPAI updates in dairy herds in Wisconsin, check out the Extension Dairy webpage. HPAI was confirmed in poultry flocks in Dane, Jefferson and Walworth counties in March. To see HPAI updates in poultry flocks, visit the Extension Livestock webpage. There have been no cases of New World Screwworm in the U.S. in livestock, but more information can be found [here](#). For information on Asian Longhorned Ticks, check out the recorded Beef Roundup Webinar session where Dr. Olds presented the latest information. For animal owners of all kinds, please evaluate your biosecurity protocols, including pest management.



## Winter Camelina: Coming to a field near you

Farm margins tight? Issues with weed management? Soil health concerns?  
Soybean Cyst Nematode hindering your soybean potential?

Please join Cargill and our event partners to learn more about growing winter camelina on your farm and how they could address the questions above. Whether you are starting with winter camelina as a cover crop or diversifying your rotation by adding a cash crop you will learn something new!

We are covering markets, agronomy, farmer experiences and soil health topics.  
1.5 CCA CEUs will be available!

April 14th 2026 Galesville, WI

9:00 Agronomy Basics and Field Walk

Sam Bibby and Karl Geske- UW Extension and Geske Family Farms

9:45 Market Drivers and Access

Anna Teeter-Cargill

10:15 Break

10:30 Herbicide Considerations in Diversification and Soil Health

Dan Smith- UW Extension

11:00 Q&A and Discussion

### Camelina Field Day, Galesville WI, 4-14-26

Another camelina event! who saw that coming? Join us in the field to talk about the hottest new cover crop ahead of corn and what may be Wisconsin's newest potential oilseed. \*Address will be sent after registration.

**Register:**

<https://tinyurl.com/2yvd6ns5>



### Small Ruminant Webinar Series

One session left! The UW-Madison Division of Extension Small Ruminant Webinar Series returns in 2026 with three expert-led sessions designed to equip sheep and goat producers in Wisconsin, Iowa, and the Upper Midwest with practical, research-based tools to support flock and herd success. Hosted by Small Ruminant Outreach Specialist Carolyn Ihde, the series connects producers with leading specialists in marketing, animal health, and direct-to-consumer strategies.

**Register:**

<https://livestock.extension.wisc.edu/2026/02/16/uw-madison-division-of-extension-announces-2026-small-ruminant-webinar-series/>



### Parasite Patrol Plus FAMACHA Workshop

Sheep and goat producers seeking practical tools to improve herd and flock health are invited to attend Parasite Patrol Plus FAMACHA, a hands-on educational workshop hosted by the University of Wisconsin-Madison Division of Extension on May 1, 2026, from 12:30-4:30 p.m. at the Gays Mills Community Center, 16381 WI-131, Gays Mills, WI.

**Register:**

<https://go.wisc.edu/wtj7ki>



## Badger Crop Connect

Twice-monthly in-season webinars for Wisconsin farmers, agronomists, and crop consultants



### Badger Crop Connect 2026

The Badger Crop Connect webinar series returns Thurs., April 9 at 12:30 p.m. and continues every second and fourth Thursday of the month through October. Tune in for research updates and timely topics for the Wisconsin farmer or agronomist. CCA CEUs available.

**Register:**

<https://cropsandsoils.extension.wisc.edu/programs/badger-crop-connect/>



### **Milk Quality from the Udder World**

Designed for those who train dairy farm teams, the Milk Quality from the Udder World (MQUW) course provides practical tools and knowledge to improve milk quality and udder health. Participants will learn how to explain the “why” behind best milking practices, coach their teams in consistent routines, and develop the skills needed to prevent mastitis and achieve high-quality milk together.

#### **Register:**

<https://dairy.extension.wisc.edu/programs/milk-quality-from-the-udder-world-trainer-certification-program/#upcoming-events>



### **Extreme Weather and Climate Services Roadshow Virtual 4-14-26, 12pm**

The Wisconsin State Climatology Office is collaborating with the Rural Partnerships Institute and Wisconet to organize meetings in rural Wisconsin communities to better understand weather and climate information needs and learn the local impacts of extreme weather events. This final event is virtual.

#### **Register:**

<https://climatology.nelson.wisc.edu/roadshow/>



### **Watch: Handling Facilities**

#### **Introduction**

Dr. Ron Gill, Texas A&M Extension Livestock specialist discusses considerations for designing corrals that cattle understand and fit into existing spaces.

# Wisconsin Releases Special Order on Domestic Bird Movement

The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) released an official special order on March 13, 2026, aimed at protecting domestic birds from highly pathogenic avian influenza (HPAI). The order explains why bird movement is being restricted and outlines the counties where these rules apply.

## **Protecting Bird Health**

HPAI is described as a highly infectious and often fatal disease for domestic birds. Once it enters an area, it can spread quickly from flock to flock. There is no known cure for the virus, which makes prevention especially important.

## **Recent Confirmed Cases**

Several cases of HPAI were confirmed in Wisconsin in early 2026, including in Jefferson, Dane, and Walworth counties, with additional cases reported in nearby Midwestern states. These findings helped prompt the movement restrictions.

## **Why Movement Restrictions Are Needed**

Events like shows, exhibitions, and swap meets often bring together birds from many different places. When birds mix and then return home, they can carry the virus back to their flocks. Limiting movement helps reduce the chance of spreading HPAI.

## **Wisconsin Counties affected by Movement Restrictions**

Vernon County, Crawford County, Richland County, Sauk County, Columbia County, Dodge County, Washington County, Ozaukee County, Grant County, Iowa County, Dane County, Jefferson County, Waukesha County, Milwaukee County, Lafayette County, Green County, Rock County, Walworth County, Racine County, and Kenosha County, where live domestic birds are brought together and then disperse.

The map below shows these affected counties shaded in yellow.



Counties affected by the 3/13/2026 DATCP order on banning domestic bird movement.

(Source: <https://datcp.wi.gov/Documents2/26-O-003PoultryMovement.pdf> )

## What Livestock Producers Should Know

- The March 13, 2026 DATCP order prohibits moving live domestic birds to shows, exhibitions, swap meets, or similar events in 20 southern Wisconsin counties.
- These restrictions apply to all domestic birds, including poultry, pet birds, and farm-raised gamebirds.
- The order remains in effect for 60 days after its signing, unless the State Veterinarian ends it sooner.

## More information about HPAI in Wisconsin

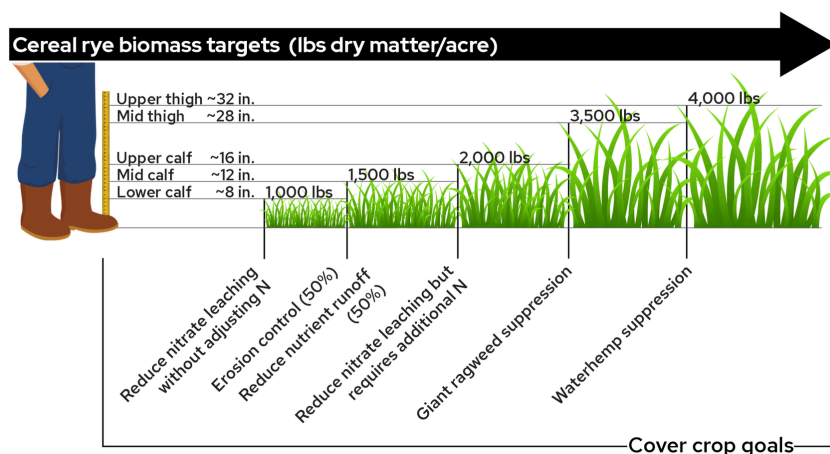
Looking for more information about Highly Pathogenic Avian Influenza?

Visit the UW-Madison Extension Livestock Avian Influenza (HPAI) Status Update for Wisconsin resource center to learn more.

## Biomass Thresholds for Cereal Rye Cover Crop Goals

### What benefits do cover crops provide?

Cover crops can provide a wide range of benefits in dairy and grain production systems, but no single cover crop species or management approach can deliver every benefit at once.



One of the keys to making cover crops successful is starting with a clear goal. Common goals include:

- scavenging nitrogen that might otherwise leach away
- reducing erosion and nutrient runoff
- suppressing troublesome weeds

Once a goal is established, choose the cover crop species best suited to achieve it. Equally important is managing the cover crop so it has the time and conditions needed to deliver on its purpose without compromising the cash crop. A clear goal minimizes risk, helps measure success, and keeps expectations realistic.

Other goals, like building soil health or promoting beneficial insects, are also valuable. However, they tend to develop more gradually and are harder to directly measure on an annual basis. That said, goals like erosion control, nitrogen scavenging, and weed suppression often contribute to long-term improvements in soil health and promote beneficial insects, even if those aren't the primary targets.

Ultimately, the effectiveness of a cover crop depends on one critical factor: the amount of biomass it produces. The biomass required is different depending on the goal for the cover crop. What's adequate for erosion control may not be enough for weed suppression. It's also essential to consider the trade-offs between increasing cover crop biomass and managing the cash crop.

To help farmers set realistic biomass targets, researchers in Wisconsin have studied one of the most widely used cover crops—cereal rye (also known as winter rye or annual rye, but not to be confused with annual ryegrass)—and identified biomass thresholds that align with three common cover crop goals: reducing nitrate leaching, minimizing erosion and runoff, and suppressing weeds.

### **What Affects Cereal Rye Biomass Accumulation?**

Cereal rye growth and biomass accumulation are primarily driven by planting date, termination timing, and seeding rate. The period between planting date and termination date is tied to growing degree days, and earlier planting allows the cover crop to experience more growing degree days. Environmental conditions like temperature and precipitation can also affect biomass production.

#### **Planting Date**

The prior crop matters. Cereal rye after an earlier harvested crop like corn silage creates a longer fall growing window. This allows rye to tiller and establish more roots before winter, setting the plant up for more biomass earlier in the spring. Corn or soybean hybrids with earlier maturity can allow for earlier cereal rye planting. Rye biomass can be suppressed after a high-yielding corn crop.

Cereal rye planted in mid-October or later will have minimal fall growth but can overwinter and provide some biomass in the spring. Note that open-winter (no snow) conditions combined with extreme cold temperatures may result in cereal rye winter kill, although this is a rare occurrence.

#### **Seeding Rate**

The standard seeding rate (assuming high seed germination) to optimize biomass is 60 lbs/acre if using a drill. Increase by 5-20% for broadcast seeding to counter lower germination and seed loss by predation.

If planting after an earlier harvested crop like corn silage, seeding rates can be reduced to as low as ~40 lbs/acre. This rate will still allow you to meet water quality and erosion control goals while reducing the risk of overproduction. Too much biomass in the spring before corn can tie up nitrogen.

## Seeding Method

Drill seeding after cash crop harvest can provide more precise planting depth, accurate seeding rates, and good seed-to-soil contact which leads to more biomass accumulation compared to pre-harvest planting methods like broadcasting and interseeding. Optimal drill seeding depth for cereal rye is 0.75-1.5". Be sure to verify seeding depth when planting into residue.

Broadcasting is also an option. It is quick and economical, but results can be more variable than drill seeding and are dependent on soil moisture and precipitation.

Interseeding cereal rye into standing corn early (V3-V7) or late (corn drydown) via highboy, drone, or aerial-seeder in the growing season is a viable strategy for maximizing fall growth, but success varies and is dependent on corn row spacing, low weed pressure in the corn crop at the time of interseeding, adequate soil moisture, herbicide program, and forecasted precipitation.

## Variety

Earlier maturing cereal rye varieties (e.g., ND Gardner) will grow more quickly in the spring to maximize biomass earlier.

## Spring Termination

Delaying termination in the spring can allow for more biomass production, especially if the cover crop is planted late, or there is minimal fall growth. Cover crop biomass is 35% greater, on average, when planting green instead of terminating the cereal rye two weeks before soybean planting.

## Termination Timing Tradeoffs

When shooting for different biomass thresholds to meet cover crop goals, there are tradeoffs to be considered, especially when pushing termination later into the spring. Adaptive management is key. For example, if there is no rain in the 2-week forecast around planting time, farmers should consider terminating earlier to adapt to the risk of the cover crop's water use impeding cash crop growth. The tables below provide a rundown of the different tradeoffs stemming from cover crop termination timing by crop.

Risk to Cash Crop Growth Legend:

Risk	Meaning
😊	Reduced risk to cash crop, no intervention needed
⚠️	Chance of risk, likely a wash
⚠️⚠️	Elevated risk, perhaps requiring management intervention
⚠️⚠️⚠️	Risk of yield drag to the cash crop, management intervention necessary, <i>recommended intervention</i>

## Conclusion

Success with cereal rye cover crops begins with a clear goal and managing to meet the biomass thresholds determined through years of research in Wisconsin. It is critical to recognize tradeoffs to biomass accumulation to minimize risk to the following cash crop (water competition, nitrogen tie-up, seedling disease, etc.) through adaptive, weather-aware management decisions. Over several years, consistently managing specific biomass targets based on cover crop goals will build soil health and support beneficial organisms, improving long-term farm sustainability.

## Smart Potassium Management

Crop removal of potassium (K) is high in common Wisconsin crops like alfalfa, corn silage, and high-yielding soybeans. When soil test levels slip too low, yields and crop quality can both suffer.

Recent University of Wisconsin research updates reinforce one clear message: **potassium is one of the best nutrient investments on the farm when managed wisely.**

### A Soil-Test-Based Philosophy to Potassium Guidelines

The University of Wisconsin potassium guidelines are grounded in a simple but powerful concept: start with where your soil is today.

Soil test potassium levels fall into three broad management ranges (Figure 1):

- Build-Up Range
- Maintenance Range
- Drawdown Range

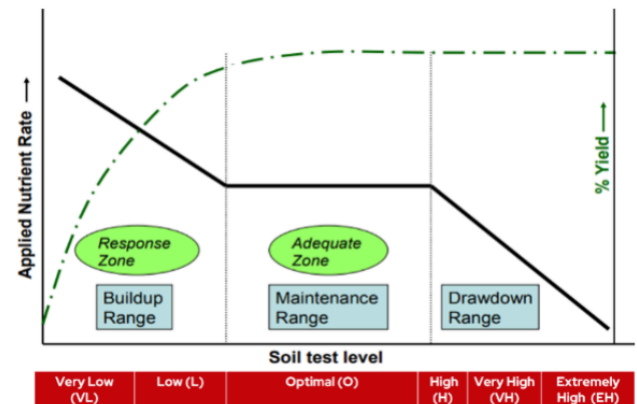


Figure 1 compares applied nutrient rates with soil test levels. The green, dashed line shows percent yield rising quickly at low soil test levels and leveling off at optimal and higher levels.

The three labeled zones, Buildup, Maintenance, and Drawdown Ranges, are labeled with corresponding soil test levels (Very Low, Low, Optimal, High, Very High, Excessively High).

### **Build-Up Range: Very Low (VL) and Low (L) soil test categories**

These soils require potassium to meet crop removal plus additional fertilizer to raise soil test levels into the desired optimal range. This soil test category is where potassium delivers the highest return on investment with a greater than 76% chance for a return on investment. Additional fertilizer for building up, or the amount needed above and beyond expected crop removal, is typically between 30 and 45 lbs. K<sub>2</sub>O/ac. Potassium response studies in Wisconsin suggest that, in general, corn and soybean yield potential is significantly lower in Very Low (VL) and Low (L) testing soils—regardless of K<sub>2</sub>O application rate—than in Optimum (O) or higher-testing soils.

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### **Maintenance and Crop Removal Range: Optimum (O) soil test category**

Fertilizer rates are designed to match expected crop removal (based on a realistic yield goal) and to keep soil test levels within the optimum range over the crop rotation. UW research suggests that this is the desired soil test category to stay in from an agronomic and profitability standpoint.

### **Drawdown Range: High (H), Very High (VH) or Excessively High (EH) soil test categories**

Fields testing High (H), Very High (VH) or Excessively High (EH) require less K from fertilizer (or no K, such as on EH soils) than lower testing fields. On these soils, yield increases from applied K<sub>2</sub>O are much less than those on Very Low (VL) and Low (L) testing soils; however, lesser amounts of applied K<sub>2</sub>O are still profitable in H and VH soils.

Potassium fertilizer application guidelines are still provided on H and VH soils, but they are at reduced rates of half (on H soils) or one quarter (on VH soils) of expected crop removal rates. Fields testing in this range present an opportunity to reduce or eliminate K<sub>2</sub>O applications in the short term, especially with tight farm budgets, low commodity prices, and high fertilizer prices.

### **Where Potassium Pays the Most: Probability of crop response**

**Are you playing catch-up on building soil test K? Do you have rented ground, and how long are those agreements? Do you have high K-demanding crops in your rotation? What do your historical (6 to 8 years) soil test results show?** These are all great questions to consider when deciding how to manage potash inputs moving forward, especially in high production cost and low commodity price years.

Potassium is the quality and the quantity nutrient. Beyond yield, it influences:

- Nitrogen use efficiency
- Stalk strength and lodging resistance
- Alfalfa winter hardiness
- Soybean oil content
- Kernel weight and kernels per acre

Recent UW research shows similar probabilities of profitable crop response to K<sub>2</sub>O in VL, L, and O testing soils as compared to previous research ([Table 1](#)). Probabilities of crop response to K<sub>2</sub>O on H and VH testing soils, however, were found to be substantially higher than in previous work. Despite the high probability of response in H and VH testing soils, keep in mind that the recommended K<sub>2</sub>O rates are one-quarter to one-half of those on O testing soils.

**Very Low and Low testing soils** have a 60–91% probability of yield increase from potassium fertilizer.

**High and Very High testing soils:** Even here, updated research shows up to a 45% probability of response to half or quarter application rates.

Soil Test Category	Probability of Yield Increase (Table 3.2 A2809)	Probability of Yield Increase for Potassium in Corn & Soybeans
Very Low (VL)	90%	91%
Low (L)	60-90%	76%
Optimal (O)	30-60%	51%
High (H)	5-30%	45%
Very High (VH)	2-5%	23%
Excessively High (EH)	Less than 2%	N/A

The higher-than-expected observed probability of a positive yield response to potassium surprised the UW phosphorus and potassium recommendation team but reinforces a key point: **UW fertilizer guidelines are accurate in predicting response, even if they are not perfectly precise for every field.**

### Why Potassium Can Be Tricky

Potassium exists in several pools in the soil:

- **K<sup>+</sup> in soil solution** (1–2%) is immediately available to crops and is what is measured by soil tests.
- **Exchangeable and slowly available K pools** (1–2%) replenish K through drying/wetting and freezing/thawing cycles.
- **Mineral forms** (90–98%) are fixed and unavailable to the crop.

See more on the potassium cycle in our publication, **Elevate Your Knowledge of the Potassium Cycle**.

Below are situations where potassium deficiency symptoms may show up in crops even when soil test K levels are adequate. Soil testing remains the foundation of smart potassium management, so how and when you sample matters.

## What Affects Soil Test Potassium (K) Levels?

**Soil Tests:** Soil tests are the best tool we have to predict plant-available K<sup>+</sup> in soil samples

### Seasonal Variability:

- Spring vs. fall sampling
- How close after harvest did you sample soil? K can be held in crop residue until a rainfall or snowfall flushes it out.

### Actual Crop Removal:

- UW K<sub>2</sub>O rate guidelines assume a specific removal rate (lb K<sub>2</sub>O per bushel of yield).
- Removal rates are not always uniform, and there may be value in doing grain (or forage) testing on your farm to assess local crop removal rates.

### Representative Sample:

- Depth of sampling (stratification of K, if too shallow, elevates K test result)
- Number of cores
- Change in number of samples per field
- Field variability

## Do Not Overlook Crop Removal of Potassium

High yields mean high potassium removal. This involves harvesting whole plants plus grain/straw or multiple cuttings. Examples include:

- Corn silage
- Alfalfa and multiple-cut forage systems
- High-yield soybeans

If you have yield maps, grain tests, or forage analyses, or add a with/without test strip. These tools can further refine crop removal estimates and fertilizer decisions.

## What Affects Potassium (K) Uptake By Crops?

### Starting Soil Test Category:

- Soil tests Low (L) or Very Low (VL) for K
- Sandy soil
- Low organic matter (OM) soils

### Soil Moisture:

- Crops uptake K via diffusion — water must be present. Therefore, short- and long-term drought conditions will reduce K uptake
- Prolonged periods of cool soil temperatures and/or waterlogged conditions can reduce K uptake

### Natural Cycles Contributing to K Release:

- Drying and wetting
- Freezing and thawing

### Unhealthy Crop Roots:

- Compaction
- Pest or disease damage to roots

## When to Spend and Save Potassium Dollars

Recent UW–Madison Extension fertilizer surveys estimate potash prices average around \$460 per ton, down from recent highs. That makes potassium a more attractive investment, especially in low-testing or rented fields. Potassium economic takeaways include the following:

- **Low (L) and Very Low (VL) Testing Soils**

- The probability of crop response to applied  $K_2O$  is high (~ >60%) on these soils. Yields are severely reduced when  $K_2O$  is not applied at removal plus build rates. If possible, do not cut back on  $K_2O$  on fields with L or VL soil test K values.

- **High (H) and Very High (VH) Testing Soils**

- Reducing or eliminating K for one year likely has minimal impact on yield (for grain crops) and soil test levels. For example, a 60-bushel soybean crop removes about 76 lb  $K_2O$  per acre. Without replacement, soil test potassium could drop by roughly 10–11 ppm in a single year. Long-term elimination or reduced-from-recommended rates of  $K_2O$  is not advised.

- **Rented Land**

- Fields testing Low (L) may require attention, especially if high-demand crops like corn silage or alfalfa are planned in the future. If rental agreements are short-term, and building soil test levels are too risky, consider applying crop removal rates instead of recommended build-rates.

## Key Potassium Management Takeaways

Smart potassium management protects yield, improves efficiency, and supports long term soil productivity. Using UW potassium guidelines and careful planning, potassium remains one of the best nutrient investments on Wisconsin farms.

- Follow UW fertilizer guidelines and manage potassium across the entire crop rotation.
- Prioritize potassium applications on Low (L) and Very Low (VL) testing soils.
- Use soil test trends, yield maps, and crop removal data to refine decisions.
- Consider variable-rate potassium on highly variable fields.
- Choose potassium sources strategically. Use potash for general potassium needs and consider potassium sulfate when sulfur is also required.

# Soil Health

## **What is it?**

Soil health, also referred to as soil quality, is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Only “living” things can have health, so viewing soil as a living ecosystem reflects a fundamental shift in the way we care for our nation's soils. Soil isn't an inert growing medium, but rather is teeming with billions of bacteria, fungi, and other microbes that are the foundation of an elegant symbiotic ecosystem. Soil is an ecosystem that can be managed to provide nutrients for plant growth, absorb and hold rainwater for use during dryer periods, filter and buffer potential pollutants from leaving our fields, serve as a firm foundation for agricultural activities, and provide habitat for soil microbes to flourish and diversify to keep the ecosystem running smoothly.

## **Key Soil Health Management Principles:**

### **Minimize disturbance**

Soil disturbance can be the result of physical, chemical or biological activities. Physical soil disturbance, such as tillage, results in bare and/or compacted soil that is destructive and disruptive to soil microbes, and it creates a hostile environment for them to live. Misapplication of farm inputs can disrupt the symbiotic relationships between fungi, other microorganisms, and plant roots. Overgrazing, a form of biological disturbance, reduces root mass, increases runoff, and increases soil temperature. All forms of soil disturbance diminish habitat for soil microbes and result in a diminished soil food web.

### **Maximize soil cover**

Soil cover conserves moisture, reduces temperature, intercepts raindrops (to reduce their destructive impact), suppresses weed growth, and provides habitat for members of the soil food web that spend at least some of their time above ground. This is true regardless of land use (cropland, hayland, pasture, or range). Keeping the soil covered while allowing crop residues to decompose (so their nutrients can be cycled back into the soil) can be a bit of a balancing act. Producers must give careful consideration to their crop rotation (including any cover crops) and residue management if they are to keep the soil covered and fed at the same time.

### **Maximize biodiversity**

Plants use sunlight to convert carbon dioxide and water into carbohydrates that serve as the building blocks for roots, stems, leaves, and seeds. They also interact with specific soil microbes by releasing carbohydrates (sugars) through their roots into the soil to feed the microbes in exchange for nutrients and water.

A diversity of plant carbohydrates is required to support the diversity of soil microorganisms in the soil. In order to achieve a high level of diversity, different plants must be grown. The key to improving soil health is ensuring that food and energy chains and webs consist of several types of plants or animals, not just one or two.

Biodiversity is ultimately the key to the success of any agricultural system. Lack of biodiversity severely limits the potential of any cropping system and increases disease and pest problems. A diverse and fully functioning soil food web provides for nutrient, energy, and water cycling that allows a soil to express its full potential. Increasing the diversity of a crop rotation and cover crops increases soil health and soil function, reduces input costs, and increases profitability.

### **Maximize presence of living roots**

Living plants maintain a rhizosphere, an area of concentrated microbial activity close to the root. The rhizosphere is the most active part of the soil ecosystem because it is where the most readily available food is, and where peak nutrient and water cycling occurs. Microbial food is exuded by plant roots to attract and feed microbes that provide nutrients (and other compounds) to the plant at the root-soil interface where the plants can take them up. Since living roots provide the easiest source of food for soil microbes, growing long-season crops or a cover crop following a short-season crop, feeds the foundation species of the soil food web as much as possible during the growing season.

Healthy soil is dependent upon how well the soil food web is fed. Providing plenty of easily accessible food to soil microbes helps them cycle nutrients that plants need to grow. Sugars from living plant roots, recently dead plant roots, crop residues, and soil organic matter all feed the many and varied members of the soil food web.

### **Integrate Livestock**

Properly managing livestock through rotational grazing, whether on cover crops or diverse forage mixes, as well as raising forage crops as part of a more diverse crop rotation can provide all four of the soil health benefits listed above. In addition, income from livestock enterprises can help pay for the costs of adding cover crops and forages to the cash crop grower's crop rotation. The trend in agriculture has been to separate crop and livestock production. Even if they are present on the same farm, the animal and crop enterprises are usually separated. One benefit of integrating grazing ruminant livestock and crop production is increased diversity. Forages add diversity to the crop system, and can include cover crops. Increased diversity can decrease crop disease, weed and pest pressure. Farmers have decreased fertilizer needs by using livestock manure and urine, and manure can increase microbes and soil organic matter. In addition to the soil health benefits, farmers experience reduced risk through diversification of enterprises.

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