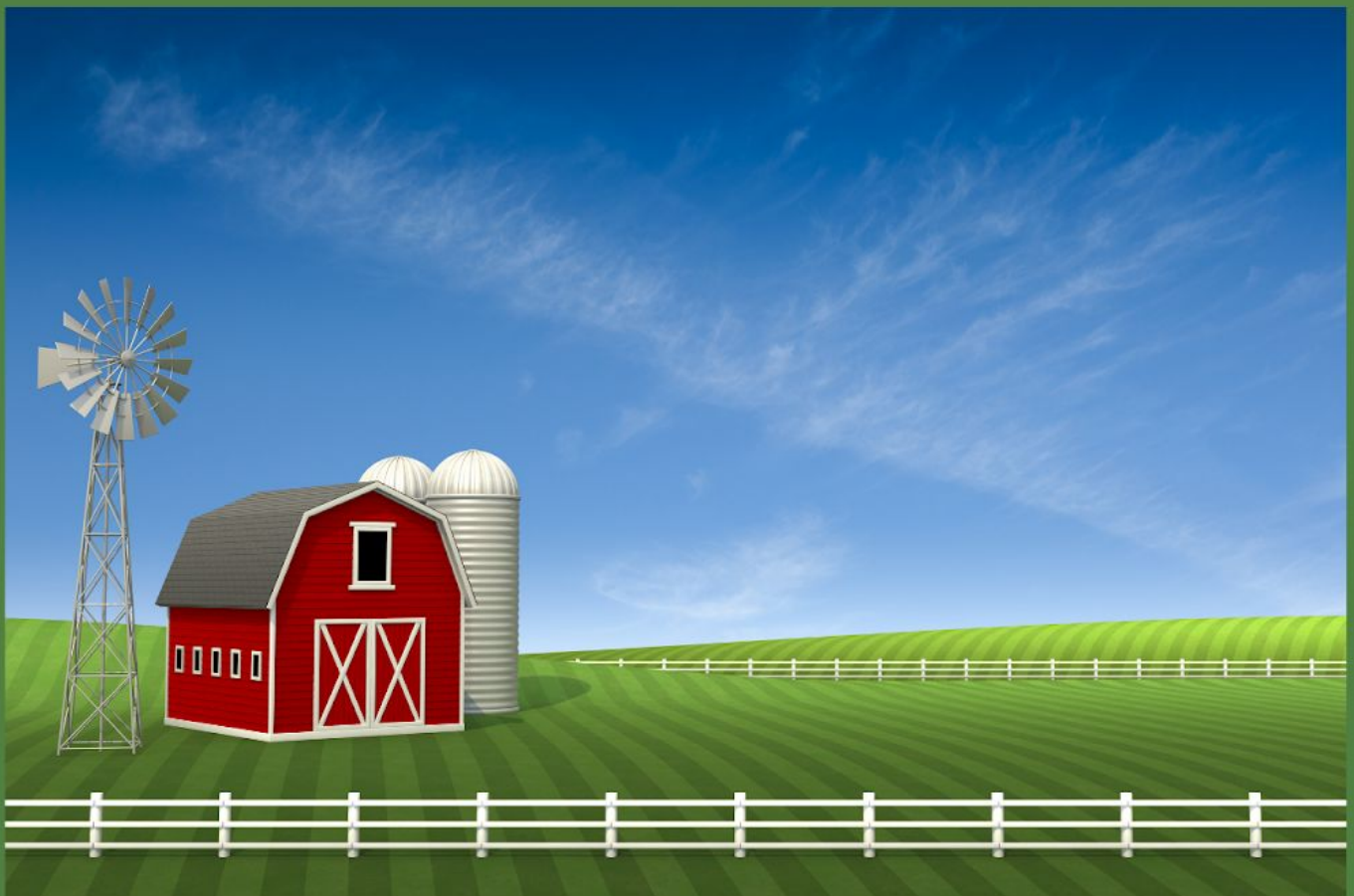




SIERRA CLUB
WISCONSIN CHAPTER

Sustainable Farming Practices



Crop Rotation:

[Crop rotation](#) is the system of growing different crops in the same area, one after the other. For instance, on one plot of land, a crop rotating farmer will cultivate corn. Once that is done, they will use this same area to cultivate wheat. This rotation helps build healthier soil and decreases the need for external nutrient applications. For example, when farmers include crops from the pea/bean/legume family, they likely will need to add less fertilizer. Crops from this family are able to fix nitrogen, which means they take nitrogen gas from the air and convert it into a form that plants can consume. Nitrogen is an important nutrient for plant growth, and conventional farming often uses nitrogen-rich fertilizers to nourish them. Crop rotation decreases the need for fertilizers, which is good for several reasons. For one, there are health risks associated with fertilizers, especially when applied excessively and the unused nitrogen seeps into the groundwater. Using crop rotation actually reduces the chance of nitrate seeping into the groundwater while still keeping the plants nourished.

Crop rotation can also greatly benefit farmers economically. In addition to eliminating the cost of fertilizers, since farmers utilizing this system will plant many different types of crops, their market and weather risks are reduced. If the demand for one crop goes down, the farmer still has multiple other crops that they can rely on. On top of this, farmers can plant crops at many points of the year, giving them a more steady stream of income. If one or two crops do not survive due to poor weather that year, there are still other crops that may have fared better.

Sustainable Practice-Crop Rotation

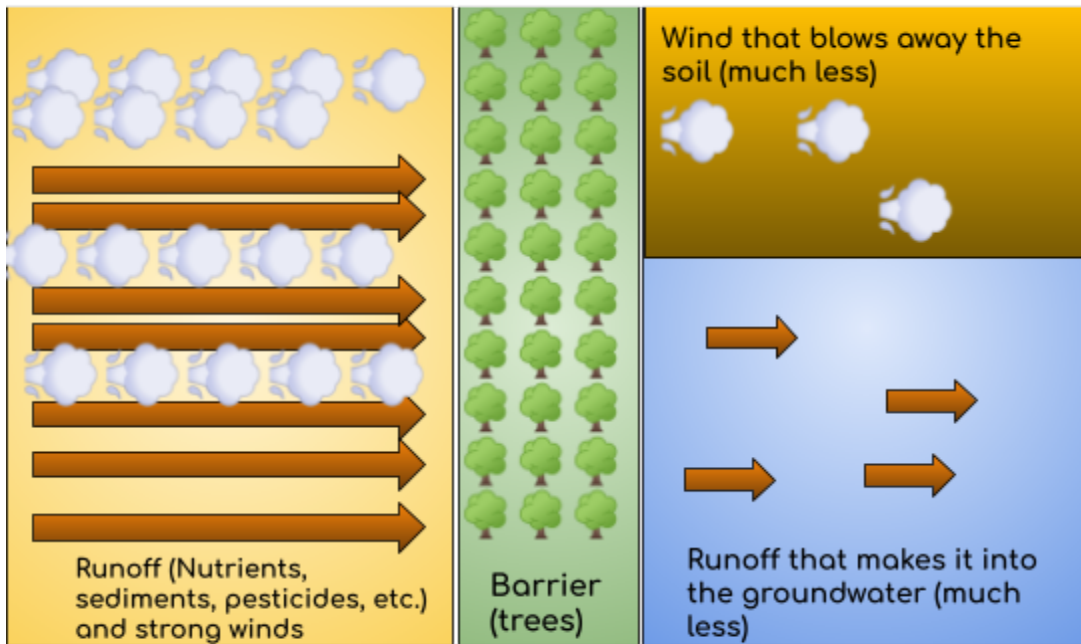
Crop Rotation Example	Field A	Field B	Field C
2010	Tomatoes 🍅 🍅 🍅	Blue Lake 274 🌿 🌿 🌿	Cabbage 🌿 🌿 🌿
2012	Cabbage 🌿 🌿 🌿	Tomatoes 🍅 🍅 🍅	Blue Lake 274 🌿 🌿 🌿
2014	Blue Lake 274 🌿 🌿 🌿	Cabbage 🌿 🌿 🌿	Tomatoes 🍅 🍅 🍅

Crop rotation is the practice of switching where crops are grown each season. This is beneficial, as it not only provides farmers with a multitude of different crops to sell, but also could also reduce the amount of fertilizer needed to grow crops.

Buffer Strips:

[Buffer Strips](#) are rows of trees and plants that serve to limit pollution runoff from crops into nearby rivers. They trap sediment, excess nutrients (partly from fertilizers), and pesticides before they can reach and contaminate nearby waterways. They also serve to prevent strong winds from blowing away soil (which is crucial to the ecosystem). Since buffers act as a source of food and shelter from the elements for many animals, they have the potential to increase biodiversity (the different types of organisms living in a certain area) and protect livestock. According to the [National Organic Program](#), a federal group that enforces national standards for organic agriculture, "[Many certifying agents use 50 feet as a common starting buffer width between organically managed crops and potential sources of contamination.](#)" [Furthermore](#), buffer strips help protect nearby roads and buildings from the elements and curtail flooding-possibly preventing costly repairs. They also reduce odors and noise.

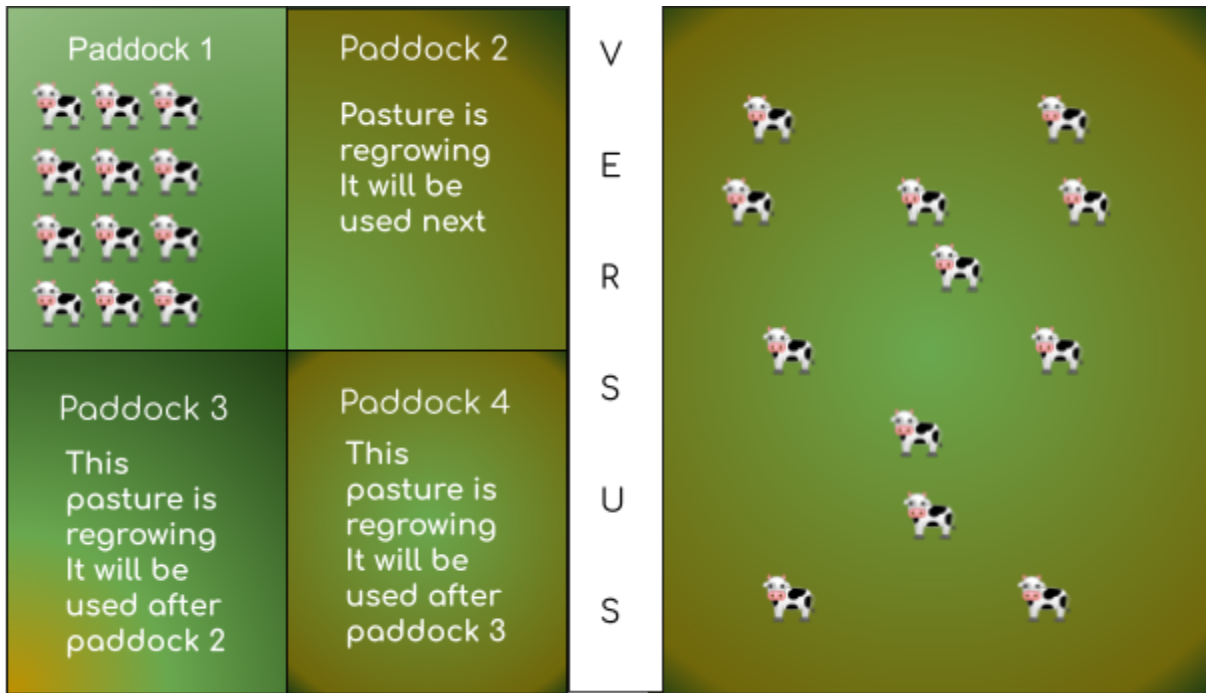
Sustainable Practice-Buffers



Buffers are strips of trees and plants that limit pollution runoff from crops into nearby rivers. It also serves to prevent strong winds from blowing away soil (which can hurt the soil) and damaging buildings.

Rotational Grazing

Farmers practicing [rotational grazing](#) divide their pasture into two or more sections (called paddocks). Farmers will let their livestock graze in a paddock for a period of time, then move them to the next paddock. This rest period helps to prevent soil erosion, as pastures are not being [overgrazed](#). The paddocks not being used are given time to regrow and develop deeper roots. Deeper roots means the pasture is able to absorb nutrients like nitrates and phosphate to a greater degree, reducing the amount of runoff. Because livestock will be grazing in specific areas for even periods of time, rotational grazing has the potential to evenly distribute manure. Farmers using rotational grazing will not need to spend as much time [harvesting and storing forages](#), as the pasture will have time to rest and regrow. This can save time and money.



Rotational Grazing

Non-Rotational Grazing

Rotational grazing improves the health of pastures by dividing them into paddocks. Livestock will graze in one paddock while the others regrow with deeper roots. Deeper roots means the pasture is able to absorb nutrients like nitrates and phosphate to a greater degree, reducing the amount of runoff.

Grazing Land:

[Grazing land](#) (as seen in the [picture](#) below) refers to a plot of land covered with grass and plants that can be consumed by livestock. This has numerous benefits including water storage, improved water quality, improved waste management, and more. Rain and snow that fall on grazing land is absorbed by the soil. This is not only used to help the plants grow, but it is also stored as groundwater. Grazing land acts as a sort of **buffer** zone, as it captures runoff pollution before it reaches nearby lakes, improving water quality. Grazing lands are a great area to

utilize the large amounts of nutrient-rich manure produced in animal production facilities, improving the soil quality.

Sustainable Practice-Grazing Land








Grazing Land- A plot of land covered with grass and plants that can be consumed by livestock. It serves to increase water storage, protect water quality, impede runoff pollution, and more.

Cover Crops:

Cover crops are plants grown primarily to improve soil quality. Similar to manure, cover crops provide the soil with many nutrients. Like **no-till farming** and **polyculture**, cover crops help prevent soil erosion. Cover crops like buckwheat rye, clovers, legumes, etc. are often grown in the off-season, as they prime the soil for growing commercial crops.

Sustainable Practice-Cover Crops

Cover Crops	Commercial Crops
 Ryegrass	 Corn
Legumes	 Potatoes
 Crimson Clovers	 Melons
Off Season	Growing Season (with primed soil)
<p>Cover Crops-Crops that are often grown during the off season. They are not usually grown for commercial use, but rather to improve the soil quality by providing the soil with nutrients and preventing erosion.</p>	

Deep-Bedded Housing:

Farmers practicing [deep-bedded \(or deep-litter\) housing](#) apply around 8 inches of litter made from straw, sawdust, pine shavings, etc. in a confined

area. As [animals](#) defecate, the organic material is absorbed by the litter. Consequently, after the litter has been used, it can be composted and reused as a fertilizer. As a result, farmers will not need to buy as much fertilizer. On top of this, deep-bedded housing [reduces](#) the emission of greenhouse gas such as methane. This could be because composting manure releases very little methane. Lastly, practices like deep-bedded housing and rotational grazing are [beneficial](#) for animals. They have space to roam around, and unlike animals raised in CAFOs, they don't rely on antibiotics to encourage growth.

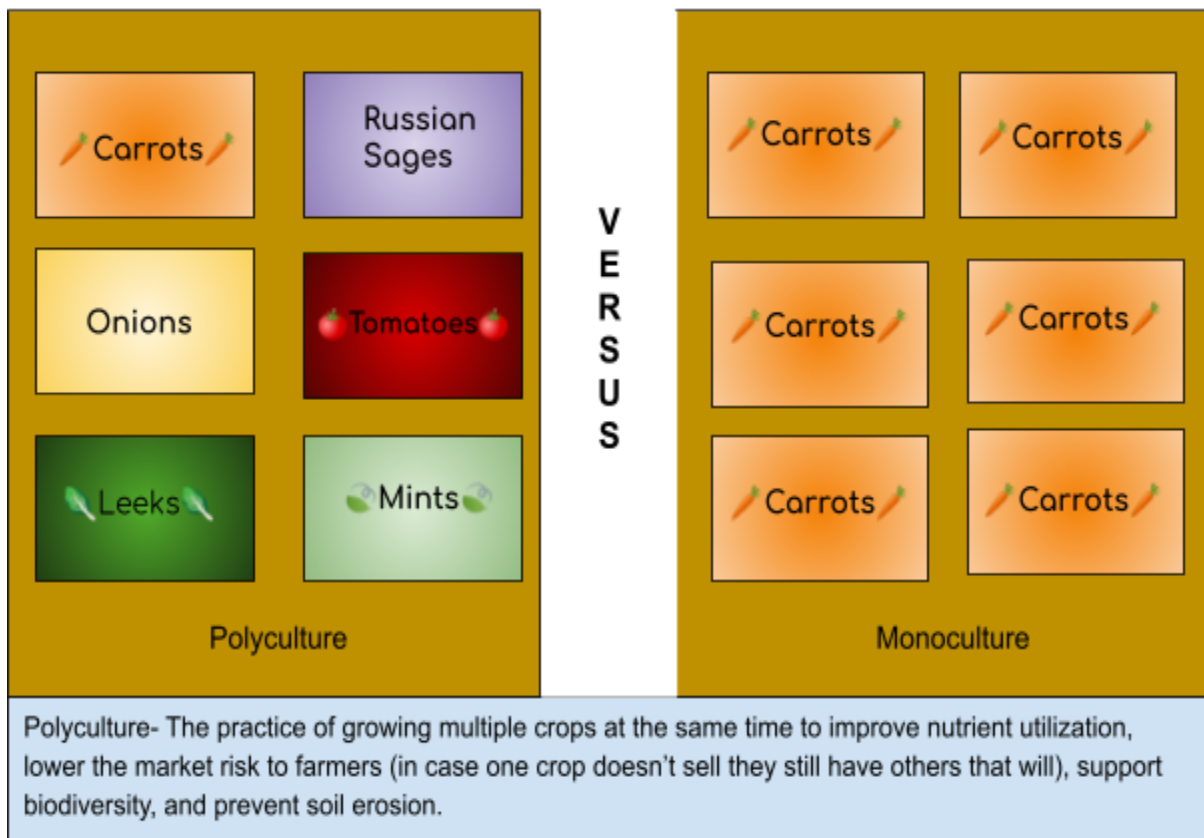


Deep-bedded (or deep-litter) housing involves applying around 8 inches of litter in confined areas for animals like cows, goats, pigs, etc. to defecate in. The animal waste is absorbed by the litter and can be reused as fertilizer. Deep-bedded housing also helps to reduce methane emissions.

Polyculture:

Polyculture is the practice of growing multiple crops at the same time. Like **crop rotation**, this improves nutrient utilization, and as a result, less fertilizer needs to be used. It also shares the benefit of reducing the market risk for farmers, as multiple crops are grown at the same time. Similar to **cover crops**, polyculture that includes perennial plants can be used to help prevent soil erosion. Lastly, biodiversity as a result of polyculture will make the plants more resilient to things like climate change. Biodiversity helps protect ecosystems, and polyculture increases the use of organic materials like manure. This helps the environment because in excess, organic materials act as a source of water and air pollution.

Sustainable Practice-Polyculture (as Opposed to Monoculture)



No-Till Farming



[No-till farming \(left\)](#) focuses on growing crops without harming the land the way tillage ([right](#)) does. Tillage prepares the land for growing crops through plowing, cultivation, [strip-tilling](#), and more. While tillage can provide benefits like nutrient integration and can get rid of weeds, it comes with a price: soil erosion. This is because the land is aggravated through tillage time and time again. No-till farming helps prevent soil erosion by not disturbing the land. Furthermore, no-till farming improves the soil's ability to absorb and retain water. Tilling largely rids the land of crop residue. Crop residue can absorb water when it rains, which helps to lower the amount of water that evaporates from the soil. Consequently, no-till farming, which leaves the crop residue on the ground, helps increase water retention.

Sustainable Practice-No-Till Farming



No-till farming (left) focuses on growing crops without the practice of tillage (right). Tillage includes systems like plowing, field cultivating, chiseling, and more. Its purpose is to prepare the soil for growing crops through killing weeds, dealing with crop residue, integrating nutrients, and more. No-till farming leaves the crop residue, and uses alternative methods to deal with weeds. Having crop residue remain on the soil can be beneficial, as it absorbs water from the rain, reducing the amount of water that evaporates as well as helping the water incorporate itself into the soil. This serves to keep the soil in good condition.

Targeted Fertilizer

Crops have different fertilizer needs depending on their type. As a result, farmers can utilize targeted fertilizer by using specific amounts of fertilizer based on different plants' needs as opposed to the same amount for all crops, reducing how much is used (a benefit also achieved through using **buffers** and **polyculture**). This requires a bit of research to figure out individual crop needs, but it is worth the effort. Reducing the amount of fertilizer used will consequently decrease the amount of fertilizer (as well as nitrate, a nutrient found in fertilizer) runoff. Nitrate contamination has a number of adverse health effects, so it is important to reduce it whenever possible.

Sustainable Practice-Targeted Fertilizer (as Opposed to Non-Targeted Fertilizer)

Crop A ½ Bag	Crop D ½ Bag	Crop A ½ Bag	Crop D ½ Bag
Crop B 1/3 Bag	Crop E ¼ Bag	Crop B ½ Bag	Crop E ½ Bag
Crop C ½ Bag	Crop F 1/3 Bag	Crop C ½ Bag	Crop F ½ Bag
Targeted Fertilizer		Non-Targeted Fertilizer	

Farmers utilizing targeted fertilizer use different amounts of manure for each crop, depending on the individual plants' needs. Because some crops will need less manure than others, targeted fertilizer has the potential to reduce the amount of manure used. This is beneficial, as too much manure can lead to nutrient runoff into nearby rivers, worsening the water quality.

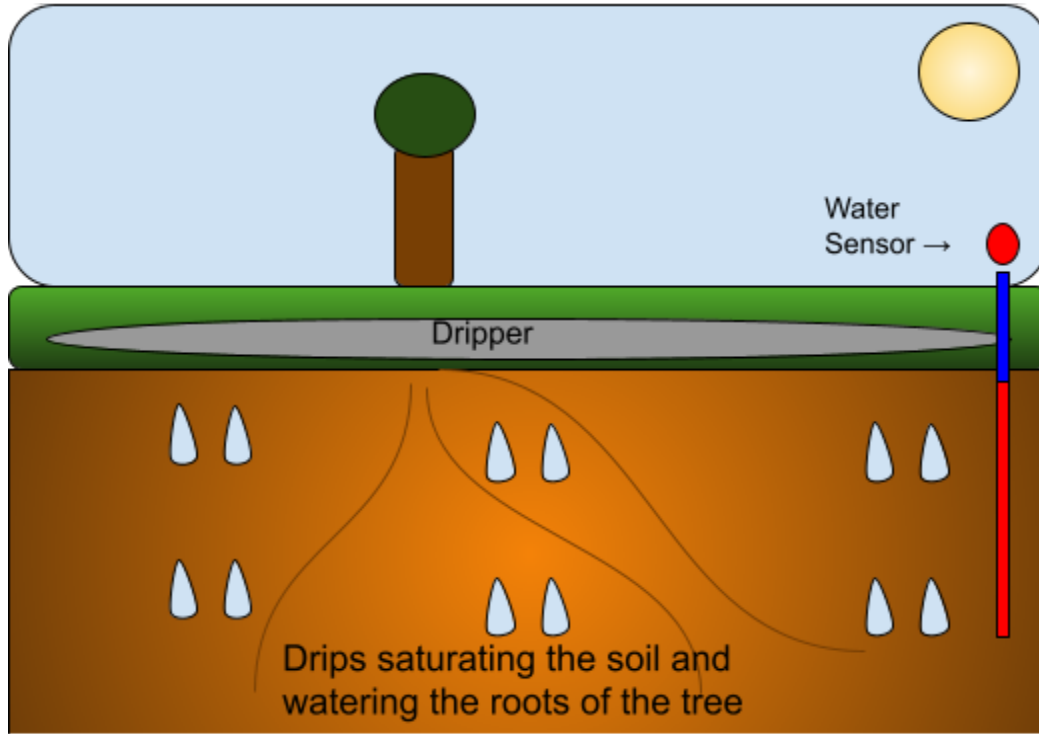
Drip Irrigation & Water Sensors

[Drip irrigation and water sensors](#) are tools utilized to reduce water usage. Drip irrigation gradually adds water to the roots of crops, and water sensors ensure that water is only added when needed. Sensors can be set to turn off the irrigation systems when there is a certain amount of water present in the soil. For instance, if there is heavy rainfall, then the sensors will likely detect the excess water and turn off the irrigation system until it is needed again. This not only prevents overwatering crops but also saves farmers money on their water bill and reduces the amount of nutrient runoff. When soil becomes fully saturated with water (meaning it cannot absorb any more water for the time being), all future water from rain, snow, etc. will not be absorbed by the soil, but rather generates surface runoff.



The images above are examples of drip irrigation in practice.

Sustainable Practice-Drip Irrigation



Drip irrigation uses tools to gradually add water to the roots of crops. Water sensors can be used to ensure that water is only added when needed. Said sensors can be set to turn off the irrigation systems when there is a certain amount of water present in the soil. This is beneficial, as it can reduce the amount of water used to grow crops.



Sustainable Farming in Practice

My coworker Zane Klavina has been interviewing farmers that utilize sustainable practices. She has multiple blog posts that are almost finished and will be uploaded to [Muir Musings](#) in the near future. Keep an eye out for her posts!



Buy Local Grant Program

In Wisconsin, there is a buy local grant program. Under this [statute](#), the Department of Trade, Agriculture and Consumer Protection provides funding to projects that promote locally grown agriculture. The main provision is that an applicant must cover at least 50% of the project costs. This program can aid farmers who, for example, want to initiate a CSA or want to expand their current operations but need financial assistance in hiring extra workers.

Further Reading

- Read about the Hunger Task Force's Wisconsin Dairy Recovery Program [here](#).
- Read about how the Coronavirus has impacted CSAs [here](#).
- Read more about the buy local grant program [here](#).
- Read about how organizations are trying to help the dairy industry [here](#).
- Read about easy ways to help Wisconsin's dairy industry [here](#).