Land Stewardship Project Fact Sheet #30

Why Do MN Farmers Do What They Do?

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A Farming Practices Primer for Landowners Who Don't Farm

www.landstewardshipproject.org

The following document is meant to help you understand some of the basics of how and why farming practices are what they are today. This fact sheet can be used to inform the conversation with your renter as you begin talking about ways to build soil health on your land. This information is not meant to judge current practices or to direct what practices you and your renter decide to pursue. Many of these practices have been considered good farming practices in the past (or currently) that in one way or another reduce financial risk. However, as farmers, landowners, and scientists are learning, some of these practices do not directly support soil health or soil building. We hope to dispel beliefs that some of the soil health building practices "don't work in Minnesota" or that they aren't being done in this region. This is not an exhaustive discussion of any one of these particular practices. You may have further questions and we encourage you to ask them. We hope this document helps you begin to decide which topics you'd like to investigate further.

For reference, the five principles of soil health are:

- Keep the soil covered year-round with residue and/or living plant cover.
- Minimize disturbance from tillage and chemical applications.
- Increase crop diversity with cover crops and longer crop rotations.
- Keep living roots in the ground throughout the year with cover crops in row crops, rotations that include small grains and perennials or perennial cropping systems.
- Integrate livestock onto the land, especially ruminant livestock.

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Tillage

Why do farmers till, and why in the fall rather than the spring?

Tillage is used to bury residue, incorporate manure, and provide seed bed preparation in the spring. Deep tillage might be used to break up compaction from heavy equipment or from years of tillage at the same depth.

Fall tillage was long considered a "best practice" that was widely promoted by University Extension Services and industry as a good way to help soil dry out and warm up more quickly in the spring. There is also a perception that good farmers who get everything done till their fields in the fall, and conversely, if one doesn't get tillage done in the fall, one hasn't gotten all the work done. It is not uncommon to fall-till next to the visible roads first, just in case all the fields don't get done. There is a perception of neatness with a tilled field, amplified by the common term for residue as "trash."

There is the factor of scale and custom hired work. An un-tilled field that could be wetter longer in the spring might make it more difficult to plant on a tight schedule with a large operation or with a custom hire's schedule. Fall tillage is often a way to save time in the spring in a tillage system.

Finally, organic agriculture depends heavily on tillage for weed control, although that is rapidly changing with creative use of crop rotations and cover crops.

"Conservation tillage" is any tillage and planting system that covers 30 percent or more of the soil surface with crop residue, after planting, to reduce soil erosion by water. This includes no-till systems, strip-till systems, and some shaft or chisel plow systems.

Why don't farmers switch to no-till?

It is difficult to switch "cold turkey" to a no-till farming system. One hurdle is equipment. No-till planters and drills are expensive, and there are not a wide range of used implements to choose from. Local Soil and Water Conservation District (SWCD) offices often have small no-till drills that can be rented or hired to plant small fields or experimental plots. These can often be a good low-risk option for a farmer to experiment with. For those who depend on custom hired work, the custom planter may not have no-till equipment available.

One of the difficult realities of a tillage system is that the water and nutrient cycles have been compromised and have come to depend on tillage to make water and nutrients available to young plants. Switching to a no-till system, especially without the help of cover crops, can cause significant yield reductions for one to several years. No-till also requires the farmer to develop a different set of skills for a new system. Because of the risk involved in yield drag and the learning curve needed to master a new system, many farmers are worried about this risk, and rightly so when profit margins are very tight. Finally, sometimes the argument that "no-till simply doesn't work in Minnesota" will come up. However, many Minnesota farmers have transitioned into no-till systems with excellent results. Minnesota farmer Myron Sylling writes about his experience with no-till and why it can make sense for other farmers in a series of LSP Soil Builders' Network Fact Sheets: "No-till for Beginners," "No-till & Fertilizer," and "No-till Planter Set-up." You can find them at **www.landstewardshipproject.org/lspsoilbuilders**.

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Corn, Soybeans, Small Grains & Alfalfa

Why do farmers plant mainly corn and soybeans?

Currently, the agriculture industry in the Midwest has a very well-developed market system that is streamlined for two crops: corn and soybeans. Our system of acquiring seed, selling crops, accessing storage and transportation, utilizing a variety of equipment new and used, and insuring against losses is tailored for these two crops. They are the simplest crops to grow, with well-developed support industries. Custom hire operations, crop consultants, land managers, chemical and fertilizer companies, seed companies, and financial institutions are focused on these crops. Research and innovation in both seed genetics and technology have similarly focused on corn and soybeans. There are also established risk management systems for corn and soybeans, including commodity farm programs and crop insurance. Because of these systems and support industries, these crops also carry less risk than most crops and are therefore preferable to lending institutions.

Given the focus on corn and soybeans, most farmers have a complement of equipment best suited to the planting, harvesting, and transporting of these crops. Also, in land assessment, corn and soybeans are often considered the highest yielding and best use of land, according to appraisers. The actuality of this value can fluctuate according to crop markets, but the perception persists. Finally, this is what farmers know well and do well, and they've built their businesses and identities around corn and soybeans. The American public has come to understand that this is what farming looks like in the Midwest.

Why do farmers plant corn-on-corn several years in a row?

At times, corn has been more profitable than soybeans and it has been attractive to plant corn year-after-year on the same field. Corn creates a lot of residue, which can be seen as building soil organic matter. Farmers manage the higher nitrogen needs of corn following corn with nitrogen applications. There can be issues with insects such as corn rootworm, as well as leaf and stalk diseases. Soybeans following soybeans is discouraged, since it can result in more insect and disease problems, as well as a quicker and greater yield drag after each consecutive year. A December 2016 article in the *Wisconsin Crop Manager* addressed where to plant a second year of soybeans after they were projected to be more profitable than corn in 2017: "If it were my land I would stick to my rotations on my owned land and consider 2nd year soybeans on the rented ground," wrote the author.

Why don't I see more small grains (wheat, oats, rye, barley, etc.)?

As discussed above, there is a lot of structure and support for the growing, management, harvest, storage, transport, sale, and management of risk for corn and soybeans. Conversely, the structure and support for small grain crops such as oats, rye and barley have significantly decreased over the years. Small grains are much harder to find a market for outside the regions where small grains are commonly grown, such as the northern Plains states. Farmers raising small grains must be more creative and active marketers, and often have to travel longer distances to sell them. There

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are few elevators that accept small grains, and usually only wheat. There are fewer small-scale livestock operations, a common market for small grains, and large confinement livestock operations are moving away from including small grains in their rations, further reducing local markets. Small-scale livestock operations also used to provide a market for the straw from small grains (they used it for bedding). And small grains are often less profitable per acre than corn or soybeans.

When and why are some farmers planting small grains?

Some Minnesota farmers have never stopped raising small grains because they see the value of a three-crop rotation over a two-crop rotation. This can help break up weed cycles, build organic matter, and give some flexibility in a planting and harvest season, spreading out the timeline. More recently, many farmers have started growing small grains in order to more easily integrate a cover crop, either for soil building, for grazing, or for both. Sometimes they can find good local markets for small grains by, for example, growing for local livestock producers, growing cover crop seed for neighbors and seed companies, providing grains to small mills and breweries, etc.

Many farmers with livestock, especially hogs and poultry, find that diverse, locally-produced small grains make superior and more cost-effective feed than corn and soybeans. Some find that a non-GMO small grain feed can bring a premium for direct-marketed livestock. Many also use the straw from small grains for winter and spring livestock bedding. Hunters and wildlife supporters find that a mixture of small grains can provide better feed and seasonal cover in wildlife food plots.

Why don't farmers grow more alfalfa?

Similar to small grains, there are fewer support structures for growing and marketing alfalfa. And with a decline in small-scale livestock operations, there is less of a local demand for alfalfa. As milk prices have gone down in the past few years and many dairies struggle to stay viable, alfalfa rations have been decreased by significant amounts and replaced with corn silage, rolled corn, and, in the West, almond hulls. For similar reasons, there has also been a decrease in foreign markets for alfalfa.

Alfalfa is a more labor-intensive crop than corn or soybeans, with two-to-three cuttings per year, and is a difficult crop to manage in wet weather. Alfalfa requires significant equipment that is different from corn and soybean equipment and costs more to transport than grain.

Why do some farmers plant alfalfa?

In a multi-crop rotation, alfalfa can be planted with a small grain nurse crop in year one; the nurse crop is harvested and the alfalfa grows to maturity, with no cuttings in the planting year. For the next two-to-three years, depending on the soil, alfalfa variety and weather, farmers can get two-to-four cuttings per year off those fields. Generally, after its final year, the alfalfa is tilled to kill the roots and corn is planted the following year, often with a 10 percent to 15 percent yield boost for the corn.

Farmers with livestock can have some alfalfa in their rotation to provide high quality feed for their animals, often as a supplement to grains or lower quality hay. These farmers rotate their alfalfa acres with corn, soybeans, and usually small grains. Like with small grains, some farmers have continued to include alfalfa in their crop rotations, finding that there is great benefit in soil quality and available nutrients for following crops. An alfalfa rotation can help interrupt weed and pest cycles. Other farmers have found that having alfalfa can be a way to diversify and protect their farm business; when drought

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or other severe weather impacts corn and bean harvests and/or prices, alfalfa prices often rise and help fill the income gap.

Farmers have found that alfalfa is a good way to line their waterways—along ditches or drainage paths, or next to public bodies of water. Some have used alfalfa to meet buffer law requirements. Organic farmers may use alfalfa or clover plantings in longer rotations.

Cover Crops

What are cover crops?

Cover crops are plants—primarily annual—that keep living roots in the soil and the ground covered when a cash crop is not growing. Cover crops can be interseeded into growing crops or seeded after the harvest in late summer or early fall. With their living roots in the ground during times when the cash crop is dead or removed, the cover crop maintains a living biological community in the soil, protects the soil from wind and water erosion, continues to build organic matter with its growth above and below ground, increases the diversity of your crop rotation, and can contribute to farm income through forage production or through input reductions. Farmers are experimenting a lot with various ways to plant, hay or graze cover crops. Check with your local Soil and Water Conservation District (SWCD) office or the Land Stewardship Project to find out what farmers are doing near you. Minnesota farmer Myron Sylling writes about his experience with cover crops and why it can make sense for other farmers in LSP's Soil Builders' Fact Sheets: "Cover Crop Considerations" and "Frost Seeding Cover Crops." They can be downloaded at **www.landstewardshipproject.org/lspsoilbuilders**.

Where/when do cover crops work best?

Cover crops are easiest to use when planted after the harvest of a small grain in August/September/early October. This also depends in part on the varieties that are used and the goals driving the use of the cover crop. For example, winter wheat and winter rye are not expected to produce much growth in the fall. They over-winter and are used to create a full cover early in the spring. Tillage radishes, turnips and other deep-rooted plants used to break up compaction are better when planted in August/September, giving them time to develop a large hardpan-busting taproot.

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What goals could be met with cover crops?

As mentioned, depending on the variety, cover crops can:

- ◆ Maintain healthy soil biology with living roots.
- ◆ Reduce wind and soil erosion.
- ◆ Increase crop rotation diversity.
- ◆ Increase organic matter in soil.
- ◆ Increase the water holding capacity of soil.
- ◆ Break up compaction layers.
- ◆ Help control weed pressure.
- ◆ Increase available nutrients for cash crops.
- ◆ Provide forage for livestock or wildlife.
- ◆ Help transition to a no-till system.
- ◆ Help reduce chemical inputs.
- ◆ Increase long-term productivity of land.
- ◆ Increase long-term resilience of land when it's exposed to extreme weather events.

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Many farmers are also interseeding cover crops into standing corn at an early growth stage, either along with an early nitrogen side-dressing, through broadcasting or with specialized seed drills. These covers grow slowly as the corn matures, and then often burst into activity after the harvest of the corn. Interseeding can work in soybeans as well.

Finally, livestock production is the easiest way to integrate cover crops into a farm system. Livestock can make the growing of small grains a logical part of the rotation, which, in turn, establishes a planting window for seeding cover crops earlier in the fall. Cover crops make the most immediate financial sense and benefit the soil more quickly when livestock are able to add value to them via grazing. Animals that are rotationally grazed also make soil building more efficient by pressing the residue into the soil and evenly distributing manure across the field. This nutrient-rich disturbance provides food for the soil's biological community.

Why don't more farmers cover-crop?

As we mentioned earlier, farming has been streamlined and specialized to encourage and support the planting of primarily corn and soybeans. Many farmers do not own the appropriate equipment or have access to the local and/or institutional knowledge needed to integrate cover crops into their operations. There is a lot of learning and experimentation necessary to adapt cover crops to one's operation, and that learning curve, coupled with the expense of using and planting cover crops, can present risks that are difficult to justify. One-year leases and top-dollar rental rates make it difficult to justify the investment of time, education and resources needed to build soil on land that could be lost each year and on which any investment would upset an already slim profit margin.

Local perception can influence a farmer's interest in cover crops as well. Sometimes cover crops can be perceived as weeds, or just provoke uncomfortable questions from neighbors. Some people feel a tilled field is "clean" and that when residue or growing plants are present outside the regular growing season, it indicates the farmer is not taking care of business. Fear of ridicule or misunderstanding is a very real obstacle in farm country.

A lack of livestock on an operation reduces the immediate benefits and motivation to experiment with cover crops.

The USDA Sustainable Agriculture Research and Education Program conducts an annual survey of Midwestern farmers' use of cover crops. In recent years, this survey has shown growth in both interest in cover crops and the actual use of them on more acres. Survey respondents who repeatedly plant covers cite how they provide more resilience in the face of bad weather while improving soil health.

Chemical Sprays

Insecticides to kill insects, herbicides to kill weeds and fungicides to kill fungal organisms became widely used after World War II. This increase occurred at the same time as livestock were removed from the fields and placed into separate confinement operations, and monocultural crop production displaced crop rotation, e.g., corn, soybeans, small grains and two-to-three years of perennials for hay. Increased need for tillage and/or herbicides increases with a reduction in crop diversity, since diverse plant rotations interrupt weed cycles.

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Why did glyphosate become used so widely?

Glyphosate, marketed as Roundup and in other formulations, is an herbicide that kills grasses and broadleaf plants. Beginning in the 1990s, biotechnology seed companies that also formulate and sell pesticides started to market patented crop varieties of corn and soybeans that were genetically engineered to be tolerant to glyphosate and a naturally occurring insecticide, Bt. These plant varieties, called genetically engineered organisms, or GMOs, and often referred to as "Roundup Ready," rapidly gained market share and hugely expanded the sales of glyphosate.

Glyphosate has been marketed as a safer alternative to harsher chemicals. Use of glyphosates reduces cultivation in the fields (a form of light tillage to kill weeds) and therefore cuts erosion levels while reducing fuel and machinery costs, as well as the labor costs associated with hiring crews to weed where cultivation was not possible. The "Roundup Ready" system is particularly popular with no-till farmers because it provides weed control without disturbing the soil. However, it has become clear in recent years that glyphosate has some negative side-effects. For example, its widespread use has developed a whole generation of herbicide-resistant weeds that, ironically, now have to be sprayed with extremely toxic chemicals of the kind that glyphosate was promoted to avoid.

What's being sprayed and when?

You can ask your farmer about their spraying regimen, as well as require that they inform you about it in your lease.

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Can I ask my renter to stop using glyphosate?

It is important to understand:

- The reduction in diversity of crop rotations has increased the weed pressure on row crops.
- The ubiquitous use of a chemical herbicide makes it more likely that target weeds will develop resistance to the chemical. Indeed, there are currently at least 18 plant species in North America, sometimes called "superweeds," resistant to glyphosate. That is why biotechnology companies are "stacking" engineered tolerance to dicamba, 2,4-D and other herbicide modes of action into plants. All of this costs the farmer more money each year.
- GMO seed costs more—sometimes 80 percent more—than corn or soybean seeds without traits engineered to be resistant to glyphosate and other herbicides.
- There are alternative systems that can significantly reduce pesticide use and/or control overall costs. These include use of conventional seed, rotations with very little chemical applications, organic systems, cover crops, and alternative tillage systems.
- It is not simply a matter of substituting one practice for glyphosate or stopping spraying cold turkey. Changing a system entails planning, time, experimentation, and commitment. There may be a need to develop an incremental plan to get there. Landowner commitment and support of renters trying alternatives is important.

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Livestock

Over the past 20+ years, agriculture has separated crops and livestock, with livestock often being raised in feedlots and concentrated animal feeding operations(CAFOs). Fewer farmers who raise row crops have livestock, especially in parts of Minnesota where the land is flat and farms tend to be large, and where much of the infrastructure that used to exist for livestock has now been removed.

Why is it beneficial to have livestock integrated into row crop farms?

Livestock require feed and bedding that give value to a diversity of crops, including small grains and perennials. Alfalfa, pasture forages and small grains are economically valuable in areas where livestock are out of the barns and feedlots and on the land, which benefits the soil and water quality too. Grazing livestock can harvest cover crops in the fall and even winter, adding economic value to a cover crop strategy on a crop farm. The livestock's manure adds fertility to the soil. Well-managed grazing animals can also have a beneficial impact on soil health by boosting the microbiology. The hoof impact of the animals pushing residue in contact with the soil helps to feed the biological community and incorporates organic matter into the soil.

Farms with livestock tend to have more options, thus more resilience. For example, livestock might be able to harvest a crop field damaged by hail, as well as reduce fertilizer input costs and provide off-season income.

Why have many farmers stopped raising livestock?

Agriculture has become increasingly specialized over the past generation. Production has been concentrated into larger-and-larger operations, and farmers have been told to "get big or get out"— many chose to stop raising livestock. Farmers who are interested in soil health are beginning to ask if that was a good thing, but there are challenges to overcome in bringing livestock back. In many places, the infrastructure for raising livestock has been dismantled. We have fewer veterinarians, livestock transporters, and processing facilities. We have also lost knowledge of how to raise animals at the family and community levels. The conventional wisdom in many rural communities is that specializing in corn and soybean production is the most profitable way to farm, although that assumption is being questioned. Livestock production also requires a year-round time commitment that doesn't come with seasonal crops.

How can barriers to integrating livestock be overcome?

- Talk with farmers in your area who are raising livestock. Seek creative arrangements like making a deal with an existing grazing farmer to bring their animals onto your cover crops.
- Seek out beginning farmers who want to raise livestock and are limited by access to enough land.
- Check out the Minnesota Department of Agriculture's Livestock Grazing Exchange at **www.mda.state.mn.us/cropland-grazing-exchange-1**. This exchange matches livestock farmers with crop farmers who have forage (crop residues, cover crops, etc.) to harvest.
- Check with your local Soil and Water Conservation District (SWCD) and Natural Resources Conservation Service (NRCS) offices about public and private programs in your area that support fencing, waterlines, and other infrastructure needed for good grazing management.

This fact sheet is brought to you by the members and staff of the Land Stewardship Project, a nonprofit organization devoted to fostering an ethic of stewardship for farmland and to seeing more successful farmers on the land raising crops and livestock. For more information, call 612-722-6377 (Minneapolis), 320-269-2105 (Montevideo) or 507-523-3366 (Lewiston); or visit www.landstewardshipproject.org.