

Field Restoration With Cover Crops: How We Converted Cropland to Pasture

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A Field of Buckwheat Cover Crop in Flower

When we purchased our farm in 2011, the land had been used for growing crops for many years. The farm was leased to a farmer who grew soybeans, using conventional methods. Year after year, the crops were planted in the spring, harvested in the fall, and the land was left open during the winter. In the spring, the fields were covered with weeds, and herbicides were used to kill them before planting. Chemical fertilizers were applied at planting time, and herbicides were sprayed a couple of times during the growing season. Over time, these practices left the soil in terrible condition, depleted of normal soil biological life. Soil testing showed there were chemical imbalances (excess phosphorus and low levels of potassium), and it was very compacted, causing poor water drainage. When it rained, a lot of standing water would remain in some areas, sometimes causing the planted crop to die and allowing moisture-tolerant weeds to proliferate. We needed to add fertility, suppress the many species of weeds, add biological life (microorganisms such as beneficial fungi, bacteria and protozoans) and work on erosion control.

Our long-term goal is to manage our farm in a sustainable and environmentally sound manner. This includes reducing reliance on tillage, and not using herbicides, pesticides, or chemical fertilizers. Pasture-based systems using livestock are an ideal way to achieve these goals. While we planned to convert the cropland to pasture for grazing livestock, because it was in such poor condition, we needed to restore the soil to a healthy state before planting our pasture mix. In order to establish a balanced and healthy farm ecosystem, we realized it would take a number of years and a variety of practices to restore the land to a state of health. We decided to pursue our field restoration by using a program of cover cropping for a few years before planting our pastures. Specifically, we wanted to work on the following items:

- Improve soil structure/tilth
- Decrease soil compaction
- Re-establish biological life in the soil (microbes, protozoa, beneficial fungi, etc) - the soil food web

- Reduce/eliminate weeds
- Increase organic matter in the soil
- Correct chemical imbalances in the soil

Cover crops are well known for their use in keeping farmland covered in the winter when a crop is not being grown. But these plants can be used to help correct many other problems with fields and soils on farms. Cover crops can be used during any season, helping to prevent soil erosion, they can be used to add biomass to help restore fertility to depleted soils, and to suppress weeds. Cover crops can be used by themselves as a cash crop, if allowed to mature. And cover crops are ideal to plant in a rotation with other cash crops to help with maintaining the health of the land. Some cover crops can also be used as forage for grazing animals.

With the soil and the fields being in poor condition, we decided to approach the rejuvenation of our fields in a fairly slow time frame. We wanted to take advantage of the many different features of the various types of cover crops. By growing different types of cover crops for several seasons, we could ensure that all of the issues with our soils and land were addressed. And planting, mowing, and plowing the crops was fairly time-consuming as well as expensive. So we chose to approach it in a gradual manner rather than all at once. We tried to match the cover crop the specific items that needed to be addressed on our land. Here is a list of the crops that we used, what season they were used in, and our notes about how they performed:

Season	Crop Name	Selected For:	Notes about Performance
Spring	Oats	Early season growth to suppress spring weeds	Fair weed suppression; not as good as winter crops for spring weeds. Not a lot of biomass
	Peas	Early season Nitrogen fixing - add fertility to soil	Grew well
	Mustard	Weed suppression Help reduce soil compaction	Did not grow well in our area
	White clover	Nitrogen fixing	Performs well in our area
Summer	Buckwheat	to keep ground covered between the spring crop and fall crops Weed suppression	Grew well Grew fast, blooms in about 42 days after planting Provided a good nectar source for pollinating insects, honeybees, butterflies, etc Fairly good at weed suppression Tolerated drying during the summer when it didn't rain much

			Looks beautiful when a full field of buckwheat is in bloom
	Sudex (Sorghum x Sudangrass)	Large amount of biomass Deep rooting	Huge amount of biomass, good at weed suppression Had to be mowed a couple of times during the summer to prevent it from going to seed too early Used it as a winter cover one year
	Sunnhemp	Fixes nitrogen Large amount of biomass	Grew well Huge amount of biomass Plants are very tall Mow before plants go to flower, or the residue will be difficult to manage as the stalks are thick
Fall	Winter wheat	Winter cover to prevent soil erosion Early spring weed suppression	Grew well Starts regrowing in the spring before weeds; did really well to suppress weeds in the spring
	Winter rye	Weed suppression	Grew well; not as much biomass as the wheat
	Winter barley	Weed suppression	Grew well Fair amount of biomass
	Austrian winter peas	Fixes nitrogen	Grew well
	Tillage radish	Grew well Deep taproots can help break up compaction in soil	Helped with breaking up compacted soil

Our land is naturally divided into two parcels of about 7 acres each, one of which is further divided into two smaller parcels. The table below shows the schedule that we used for planting our fields with cover crops, and when each pasture was planted.

	Field 1 West	Field 1 East	Field 2
2012 Summer	Buckwheat	Buckwheat	Buckwheat
2012 Fall	Winter Rye	Winter Rye	Winter Rye
2013 Spring	Oats	Oats	Oats
2013 Summer	Sudex (sorghum x sudangrass)	Buckwheat	Buckwheat
2013 Fall	Winter rye	Winter Barley	Winter rye

	Winter peas Tillage radish		Winter peas Tillage radish
2014 Spring	Oats and peas Tillage radish	White clover	White mustard
2014 Summer	Buckwheat	Sudex	Sunnhemp
2014 Fall	Pasture planted	Sudex - mowed and left residue over winter	Winter wheat
2015 Spring	-	Oats and peas	Oats and peas
2015 Summer	-	Buckwheat	Mustard Buckwheat
2015 Fall	-	Winter wheat	Pasture planted
2016 Summer	-	Buckwheat and Sudex	-
2016 Fall	-	Pasture planted	-

We did not harvest any of the cover crops. They were cut and either left on the soil surface or reincorporated into the soil when the fields were being prepared for the next planting. The only other soil amendments we added were lime and composted horse manure/bedding.



Sunnhemp Cover Crop

Within two years, we saw a dramatic reduction in weeds on the land. And the soil condition improved as well. Since planting the pastures, the field conditions have improved even more. The pastures established nicely and we have not had to renovate them. The major difference is that there is better water drainage when it rains. Only rarely will we see standing water now after a rain. While we still have some weeds in the fields, they are at a tolerable level, and we continue to manage the pastures to try to keep the weed numbers down. The soil is in good condition - follow-up soil testing showed good fertility and chemical analyses, with only a low pH remaining to be corrected. The pastures are in a state where they can be managed without any added fertilizers. They are resilient, re-growing

nicely after grazing or mowing, and they provide all the nutrients are livestock need. Compared to growing crops, pastures are relatively easy to care for.

Perhaps the most important indicator of a good pasture is that our livestock are in good condition. We do not feed any grain to our sheep (with one minor exception - we use grain as a bribery tool!). During the grazing season, they gain weight, are healthy, and their wool is beautiful.



Healthy Pastures Provide all the Nutrition Our Flock of Sheep Need During the Grazing Season to Stay Healthy and Happy

If you have some fields to renovate or to convert from cropland to pasture, consider doing a year or two of cover cropping. It is well worth the effort, if you can spare the time for your fields to be out of production.

You can see more photographs of our cover crops in the Gallery on our website:

<http://www.smiling-dog-farm.com>

In future newsletters, I will review how we assess pasture condition, estimate forage amounts, and how we manage our pastures and our livestock.



Here are some good references for learning more about using cover crops:

1. Sullivan, P. Overview of Cover Crops and Green Manures. Published by ATTRA, 2003. Accessed at the following website: <https://attra.ncat.org/product/overview-of-cover-crops-and-green-manures/>
2. Sustainable Agriculture Research and Education (SARE) website:
<https://www.sare.org/resources/cover-crops/>
<https://www.sare.org/resources/managing-cover-crops-profitably-3rd-edition/>