PROJECT NEWSLETTER

Allamakee County Soil & Water Conservation District

LEOPOLD CENTER

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Manure and Cover Crops: Working Together to Improve Soil Health

There are 5 main principles for improving soil health:

1. Keep the soil covered as much as possible
2. Disturb the soil as little as possible (tillage or chemicals)
3. Keep plants growing throughout the year to feed the soil
4. Diversify as much as possible using crop rotation and cover crops
5. Integrate livestock into the operation

Cover crops combined with no-till and manure meet all of the principles. Manure is a valuable fertilizer source that adds much more than just N, P, and K to the soil. It helps jumpstart soil biology and adds carbon in varying amounts, depending on the manure source. Increased levels of organic carbon help increase water holding capacity, porosity, aggregate stability and infiltration. Combining cover crops with manure application helps to reduce nitrogen leaching and improve many soil health indicators. Liquid manure application alone has been shown to have little impact on the soil organic carbon levels and other soil qualities due to the easily decomposable organic carbon. However, combining it with cover crops has been shown to improve aggregate stability and increase microbial biomass. While some soil health properties show signs of improvement with one year of cover crop use, many properties take many years of continued use to be impacted. Some producers may feel that it is difficult to time manure application along with cover crop planting, but many local producers have found ways to make it work.

Cover Crop and Manure Demonstration Sites

Ross and Dave Weymiller worked with the Allamakee SWCD to set up 4 demonstration sites to showcase manure application and cover crop seeding methods. Sites ranged in size from 5 acres to 20 acres and were all seeded with 1 bu/acre of cereal rye. Hog manure was injected either before or after cover crop seeding, depending on the trial site. Corn silage was harvested the first week of September, 2017. Sites were seeded between September 8 and September 12 with manure application in the same time frame.

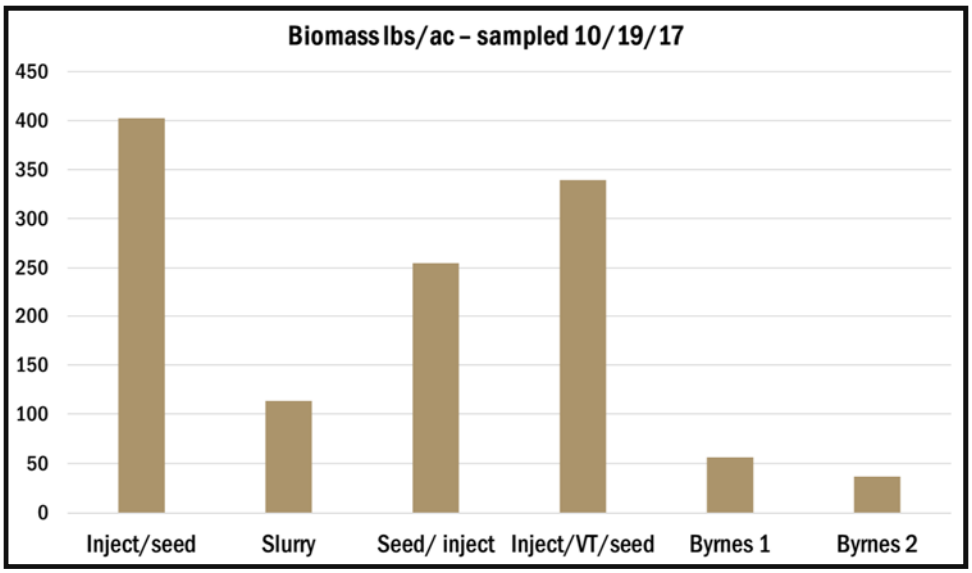
The four sites were:
1) Manure injected before cover crop seeding
2) Slurry-seeding—seed mixed in manure tank and applied with the manure
3) Manure injected after cover crop seeding
4) Manure injected, field vertical tilled, and then cover crop seed drilled.

Slurry seeding is an uncommon method that we wanted to test to see how it would work for people who do not have a drill or who wanted to minimize the number of passes across a field. The Weymillers' tank has an agitation auger, which helped mix the seed in. Many people have said that they think hog manure is too "hot" to work with cover crops, but this slurry-seeding trial showed that is not the case. The seed grew, but the seed dispersal was not consistent. It's thought that the seed either floated or sank in the tank and the slope of the ground caused the seeding to be heavy in spots and very light in others. It may help to pour the seed in when the tank is half full rather than full to help it mix in better.

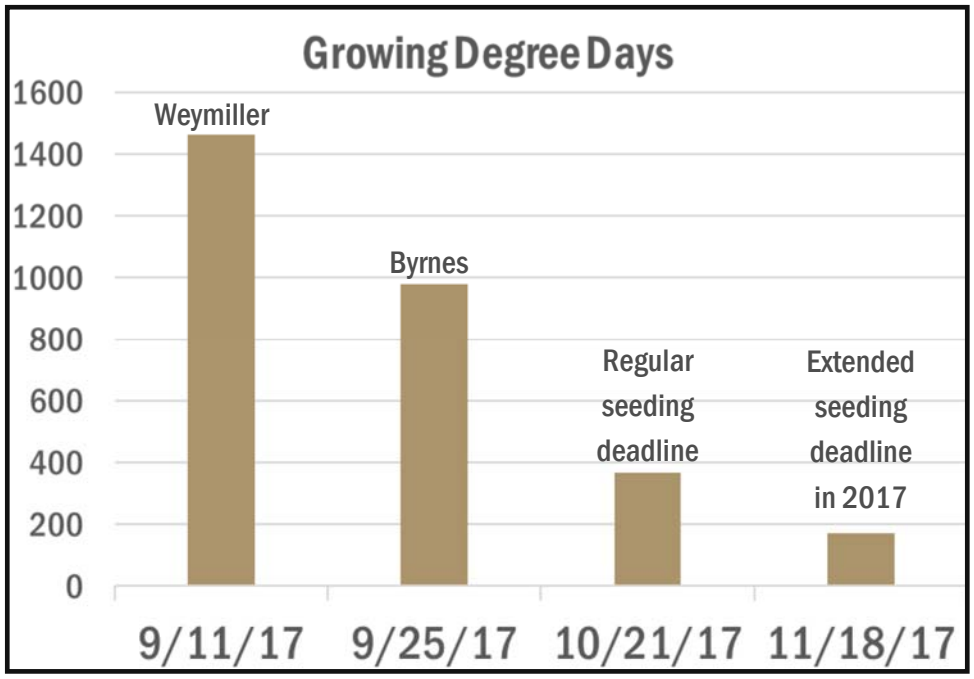
Above-ground biomass samples were taken on October 19. This date was chosen because the standard seeding deadline is October 21 if you receive cost-share for cover crops. Photos of each site were taken on the same day. We wanted to compare these results to what other producers have tried in the area. Matt Byrnes broadcast 66 lbs./ac of cereal rye on September 25 on silage acres with his pelletized lime. He surface applied 10,000 gallons of dairy manure 2 days later. The photos below show the four Weymiller sites with the Byrnes site at the bottom. Biomass samples were also taken on October 19 at the Byrnes site.

1. Inject manure then drill seed
2. Slurry-seed
3. Drill seed then inject manure
4. Inject manure, VT, drill seed
5. Byrnes: broadcast seed then surface apply manure

Data Results



Although the slurry-seeding had mixed results, it still had higher biomass on October 19 than broadcasting the seed. Keep in mind that the slurry-seeding was done 2 weeks before Byrnes broadcast his cover crop. Other sites that were seeded on or after October 21 had very little (to no) fall growth. This shows the importance of early seeding. The growing degree days were calculated for cover crops for several different dates to show the potential for fall growth last fall.



We encourage producers to get cover crops seeded as early as possible. If you are waiting for soils to cool before applying manure, you can still go ahead and seed cover crops. Several local producers have injected manure into growing cover crops or surface applied manure to growing cover crops and been very successful. If you harvest corn silage, we strongly recommend that you plant cover crops. Silage ground is left bare much earlier in the growing season. This early harvest creates the opportunity to plant more diverse cover crops if you'd like to try something other than just cereal rye. You could plant brassicas like radishes or turnips to

help break up compaction or red clover or Austrian Winter peas to provide nitrogen. However, winter-kill species need to be planted by September 9 if receiving cost-share.

Field Day Follow-up

Weymillers hosted a field day on April 9. Project Coordinator, Sara Berges, presented on the results of the demonstration sites. The NRCS Area Agronomist, Neil Sass, talked about the benefits of including cover crops on acres that have manure application as well as results of a study showing how seeding date, seeding rate, and termination date can affect the amount of cover crop growth. His data showed that if you are able to get a cover crop seeded by early October (and are NOT receiving cost-share), you can likely back down the seeding rate. However, if you get it seeded late, you may want to let it grow longer in the spring to get the most out of it. Thank you to the Weymillers and other producers who were willing to talk about their cover crop experiences.

There was a lot of good discussion at the field day and many interesting questions.

Q1. If you apply manure to cereal rye, but then plan to harvest it for grain (seed), is it likely that there will be lodging issues?

It depends on the amount of manure applied, the timing of manure application, the existing soil nitrogen level, and the variety of rye planted. Excess N will increase the potential for lodging, but some varieties are more susceptible than others and we would suggest reading the variety trials from the University of Minnesota or other sources. Rye is less prone to lodging than oats.

Q2. Can you follow rye with alfalfa? Are there issues with rye reseeding?

Alfalfa can be seeded in August following rye harvest. There will likely be volunteer rye, so you will probably need to spray with glyphosate. Light tillage may also be necessary to ensure a proper seedbed, although no-till seeding can work. Rye straw will likely need to be baled if no-till seeding. If you don't plan to plant something following rye harvest, some producers who harvest rye gain/seed allow the rye to reseed to serve as their cover crop for the fall.

Q3. Do you need to change your herbicide program for fields that will have cover crop?

Read the labels on your herbicides to determine the crop rotation restrictions. If you plan to use the cover crop as forage/feed, the restrictions will be even more limiting than just looking at the potential for carryover injury. Two factors affect the potential for carryover injury; the length of herbicide persistence and the sensitivity of the cover crop to the potential herbicide residue.

Q4. If broadcasting cover crop after corn harvest, how do you ensure good seed-to-soil contact?

If there is a lot of residue, the seed will not make good seed-to-soil contact and some amount of incorporation would likely be needed. Another alternative on corn ground would be to interseed ryegrass, turnips, buckwheat or other winter-kill species at V4-V6.

Ryegrass seeded using rotary hoes and an air seeder and ryegrass/turnip/radish broadcast with side-dressed urea.

Q5. What are other ideas for getting cover crops seeded on manure ground?

Some ideas are setting up an air seeder on a vertical till machine or somehow seeding with a dragline. If anyone has something they'd like to try, contact Sara Berges at the SWCD and we'll do what we can to help you set up a trial.

Small Grains, Manure, and Cover Crops

There are many benefits to adding small grains to a corn-soybean rotation. There are reduced input costs, many soil health benefits, and decreased weed/pest pressure. There can be a yield drag with continuous corn or corn-soybean systems. Studies have found that by diversifying rotations, you can help counteract this yield decline. Iowa State University has found similar results in a multi-year study comparing 2 year (corn-soybean), 3 year (corn-soybean-oat/red clover), and 4 year (corn-soybean-oat/alfalfa-alfalfa) rotations.

If you are looking for somewhere to summer apply manure, small grains might provide this location. Small grain harvest usually occurs in July, opening up the opportunity for manure application when other fields are still growing corn or soybeans. This can help to manage manure storage issues that arise late in the season. It is advised that you plant a cover crop before or after manure application to help reduce the potential for nutrient leaching and to capture the nutrients for the subsequent crop.

If you'd like to get the most benefit out of cover crops, then following small grains is ideal. This opens up the opportunity to plant a variety of cover crop species. If you are waiting to plant cover crops until after corn or soybean harvest, there are very few species that are winter hardy and will get enough fall growth to reap much benefit. But, planting cover crops in August increases the plant selection options, allowing you to target different cover crop benefits. The alternative to planting a cover crop after small grain harvest is to underseed red clover at the same time as planting a spring small grain like oats or overseeding the clover into an existing winter cereal grain like rye. When the grain crop is harvested, the clover takes off and has the rest of the growing season to fix nitrogen. If you are receiving cost-share for cover crop following small grain, you will either need to seed the cover crop after small grain harvest or interseed additional cover crop species into (underseeded) red clover.

Cover Crop Mixes

If you want to plant cover crop mixes, you have the greatest growth potential after small grain harvest or on silage ground. Early seeding increases the available species options and maximizes the benefits of the cover crops. The first step when coming up with a mix is to establish your goals for the cover crop. Do you want to increase organic matter, reduce erosion, fix nitrogen, suppress weeds, break up compaction, or provide supplemental grazing/forage? Most people who have tried cover crops have planted cereal rye. But, if you are planting earlier, you can plant brassicas like radishes and turnips to help break up compaction, legumes like red clover or hairy vetch to fix nitrogen, or sorghum-sudangrass for additional grazing options. There are tools available online to help develop mixes or we can work with you to customize a seeding plan to meet your goals.

Photo: Jason Johnson, USDA-NRCS

Cropland Conversion to Pasture

One of the soil health principles is to integrate livestock into the operation. Pasture obviously has less soil erosion than cropland, simply because it is covered year-round. Even the best managed row-crop field will have more erosion than pasture. If possible as part of a farm operation, steep and shallow soils should be left in pasture or converted back to pasture simply because corn yields are substantially lower than ridge ground and the erosion potential is very high. Obviously this won't work for everyone, but if you already have nearby pasture and a watering source can be accessed (either by directly accessing a stream or pond or by installing waterline), then it may be something to consider. If you set up a fairly intensive rotational grazing system, moving more often than once a week, you can increase the carrying capacity of the acres, improve soil health, and improve pasture vigor. You may want to consider seeding one paddock (or more) to warm-season natives to help get through the summer slump.

Photo: Jason Johnson, USDA-NRCS

RCPP-EQIP Funds

The Allamakee SWCD has a special project through the USDA to provide higher EQIP cost-share rates for specific practices. Those include cover crops on acres with manure application and adding small grains to a rotation to be followed by cover crops. You are not required to plant cover crops following the small grain, but the cost-share rate for the cover crop is much higher than the small grain payment. There were funds for cropland conversion to pasture (and all associated practices), but those funds have been spent during the first year of the project due to unexpectedly high interest. While the RCPP-EQIP project funds are no longer available for cropland conversion to pasture, standard EQIP can be applied. If you have any interest in any of these practices, please stop in soon to start the planning process. The next application cut-off will likely be in the fall, but planning needs to occur before applying for funds.

Important Information

- EQIP signup deadline for practices installed next year (2019) will be this fall. Plan ahead.
- Small grain—if enough interest, we can try to set up a workshop. Contact the office.
- Cover crop with manure—if you'd like to work with us to set up a demonstration site, contact the office.

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