

MANURE & COVER CROPS



Allamakee County
Soil & Water
Conservation District

Allamakee SWCD Project Newsletter

May 2017



Manure injected into growing cover crop
November 14, 2016

Cover crop March 31, 2017

Cover crop April 25, 2017

Allamakee SWCD Hosted Cover Crop Field Day with Area Producers

The Allamakee County SWCD hosted a cover crop field day on Thursday, April 6. Area producers had the opportunity to stop by three different sites and drive by two additional sites to view cover crops. All of the fields also had manure applied before or after seeding the cover crop. Different methods of cover crop establishment and manure application had been utilized and showed that the two practices can work together. This field day was funded through a grant from the Leopold Center for Sustainable Agriculture. Speakers included project coordinator, Sara Berges; NRCS Area Agronomist, Neil Sass; Scott Nelson from the Iowa Soybean Association; and the producers (Scott and Dylan Ness, Nick Rolling, Mike Johannigmeier, and Derek Bentien).

Site 1 had cereal rye cover crop drilled at a rate of 1-1.5 bu/ac into soybean stubble in mid-October with approximately 7,400 gallons of hog manure injected into the growing cover crop approximately 1 month later (see above photos). After manure application, the injection bands did not have cover crops growing in them, but the rest of the field had fairly even cover crop growth. ISU research has shown that this method can have the same or more overall biomass when compared to a field without manure application depending on the amount of disturbance caused by manure injection. The manure helped increase the biomass between the injection bands to make up for the plant mortality from injection.

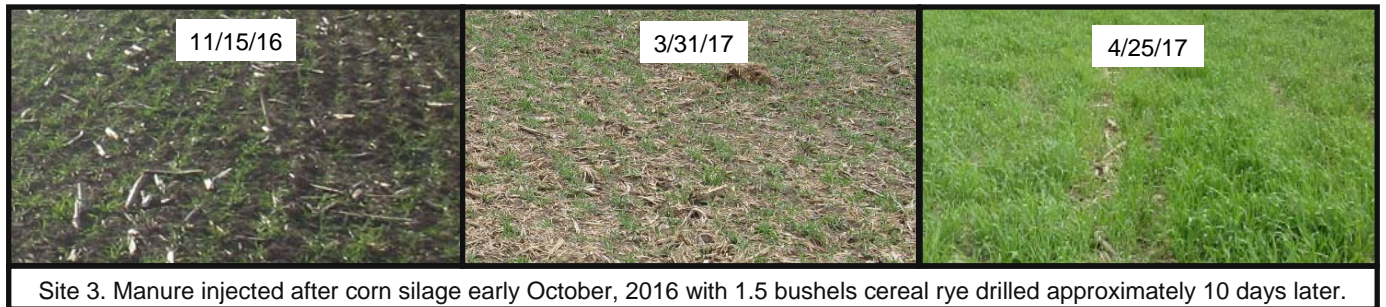
We drove by a site (photos at right) that had cereal rye drilled at a rate of 1 bu/ac into soybean stubble in early October. Bedded pack dairy manure with long hay bedding was spread on the frozen ground from January-March. The producer had been concerned that the manure would be too thick for the rye to survive, but a hearty stand of rye came up through the manure. He also noted that the manure seemed to be breaking down quicker with the rye cover crop than normal, indicating that the increased microbial diversity associated with the cover crop was helping to break down the thick manure.

The third site had approximately 10,000 gallons of dairy manure injected on corn silage ground near the beginning of October. The site was then vertical tilled and 1.5 bu/ac of cereal rye cover crop

Cereal Rye drilled into soybean stubble early Oct. 2016. Bedded-pack dairy manure spread Jan-March 2017.



was drilled in approximately 10 days later. The higher seeding rate and drilled establishment method resulted in an even stand with the highest biomass and highest stand count of the sampled sites. For people wanting to try cover crops, silage acres are a great place to start. The cover crop can get established earlier and have more fall growth, which provides greater erosion protection.



Site 3. Manure injected after corn silage early October, 2016 with 1.5 bushels cereal rye drilled approximately 10 days later.

Site 4 had ½ bu cereal rye and ½ bu wheat broadcast mid-October into soybean stubble. Approximately 3,400 gallons/ac of hog manure was injected two weeks later. The weeks in between cover crop broadcast and manure injection had been dry and the cover crop had little to no growth at the time of manure application. The broadcast method resulted in varied cover crop establishment. Some areas were almost bare, while others had a good catch. It was determined that if rain is not in the forecast soon after broadcasting, the seed should either be lightly incorporated or rolled to ensure good seed-to-soil contact.



Sites 4 & 5. Mid-October broadcast seeding of 1/2 bu wheat /1/2 bu rye with manure injected later. Site 4 (left) had soybean stubble and site 5 (right) had corn stubble. The corn site was vertical tilled after the seed was broadcast but before manure.

We drove by the fifth site which had ½ bu cereal rye and ½ bu wheat broadcast on corn stubble. The cover crop was then vertical tilled to lightly incorporate the seed and hog manure was injected within a few days. This site is planted to continuous corn and the producer wanted to see if the cover crop helped to break down the corn residue faster. The cover crop came up well through the corn residue and the producer felt that the cover crop did help to break down the corn residue. Because of this, he intends to plant directly after cover crop termination without doing any additional tillage.

Most of the producers who helped host the field day said that they had tried flying on the cover crop in past years but that the results were quite varied and unreliable. The most popular method of cover crop establishment is drilling due to the good seed-to-soil contact. These producers all plan to chemically terminate their cover crop, however they plan to terminate at different dates in relation to planting their cash crop.

These sites all show how manure can be utilized on sites with cover crops. Cover crops will help to reduce nutrient leaching from manure application and reduce surface erosion as long as an adequate stand is established. **If receiving cost-share for cover crop establishment through state cost-share or EQIP, it is important to note that seeding rates are based on pure live seed (PLS) and so rates need to be increased for seed with lower germination rates. Also, be aware of the seeding deadlines. Non-winter hardy species need to be seeded by **September 9** and winter hardy species need to be seeded by **October 21**.** If you have questions about how manure and cover crops can work together, please contact the SWCD/NRCS office in Waukon by stopping by 635 9th St NW, call 563-568-2246 ext. 3, or email Sara Berges at sara.berges@ia.nacdnet.net.

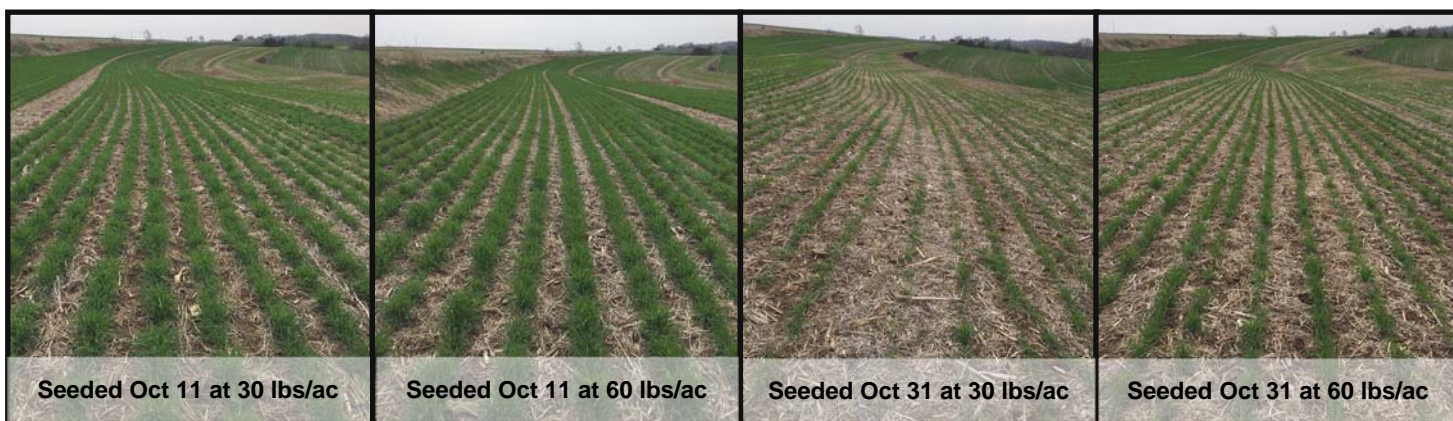
Notes from producers

- Need to ensure good seed-to-soil contact, drilled has worked best for most
 - * Aerial application had highly variable results—very dependent on timely rainfall
 - * Broadcast had mixed results—need to find a way to increase seed-to-soil, maybe use roller or cultipacker
- Important to get early seeding, not much above-ground growth in fall unless planted early (such as silage ground)
- If drilling, ensure proper calibration and seeding depth, especially in fields with a lot of residue
- Cover crops seemed to help breakdown residue faster, including bedded-pack manure and corn residue

Questions and Some Answers

1. What is a sufficient seeding rate?

It depends on the goals of the cover crop, when it was planted, method of establishment, and whether or not you are getting cost-share. The photos below were taken April 13, 2017 in Winneshiek County. The cereal rye cover crops were seeded using a Kinze 2000 planter on 15" spacing on the dates shown. The most obvious difference is the impact seeding date has on cover crop establishment and growth. Keep in mind that 30 lbs/ac does not meet the required seeding rate if receiving cost-share. If seeding later, a higher seeding rate would be encouraged. The later into the fall that the seeding occurs, the less benefit there is in the fall and the greater likelihood of seed/plant mortality. However, a higher seeding rate may help increase the spring biomass.



Photos taken April 13, 2017 by Jacob Groth, NRCS

2. How much cover crop growth is there in the spring? How long should we let it grow?

ISU has shown that winter cereal rye that grew an extra three weeks prior to soybean planting produced about 300-400% more above-ground biomass when compared to early terminated cover crops. Look at the photos on the previous two pages and you'll see that we had similar results between 3/31/17 and 4/25/17. Consider how much more biomass there would likely be if the cover crop was allowed to continue growth.

3. How much above-ground biomass vs. below-ground biomass is there?

The Area Agronomist compared root/shoot biomass for cereal rye grown in test tubes and found approximately 50% above-ground and 50% below-ground. Previous field studies have had quite varied

results depending on soil moisture, temperature, and many other variables. A study done by ISU found root:shoot ratios ranging from 0.75-1.9 between 2009-2013.

4. When is the “best” time to terminate?

Once again, it depends. What crop will you be planting next? Nitrogen management tends to be the biggest consideration ahead of corn. It is suggested to apply 20-50 lbs N at planting to counteract nutrient tie-up. Some research has also indicated that cover crops can act as a “green bridge” for pests, but that terminating 10-14 days before corn planting can reduce this risk. The allelopathic impact of rye on corn or soybeans is thought to be minimal. You can “plant green” into a cover crop with soybeans as long as you terminate within 5 days of planting per crop insurance regulations (see photos below). One of the biggest issues regarding planting into a cover crop can be managing the residue. Row cleaners can be very important for keeping the planting strip clean and you should verify that you are getting a consistent planting depth. The longer the cover crop grows in the spring, the greater the benefits including reduced erosion, weed suppression, and soil moisture management.



Photos taken in 2016 in Allamakee County by Neil Sass, NRCS Area Agronomist

5. How much organic matter can cover crops add?

What is the tillage for the field? What is the rotation? What cover crop is being planted and when? Is manure being applied and, if so, what kind? As always, it’s not a simple answer. Some research shows that cover crops can increase organic matter 0.1% per year. One NE Iowa no-till farmer has had anywhere from 0.2%-0.7% increase in organic matter after 5 years of cover crops. Manure can potentially increase this even further. However, studies have found that injected manure is not likely to increase soil organic matter unless paired with a cover crop.

6. How much nitrogen can a rye cover crop capture and when does it release it?

There is a lot of uncertainty about this and studies have had highly variable results. Nitrogen scavenging is obviously affected by the previous the crop, N-application to previous crop, manure application, what cover crop is used, the cover crop seeding rate, when the cover crop is planted and terminated, and what the weather is like. Because of all of these variables, and many more, the amount of scavenged nitrogen can range from 20-100+ lbs/ac. Some studies have shown that the cover crop nitrogen is partially (~50%) released 30-60 days after termination. The C:N ratio of the cover crop at termination will have a big impact on the release rate for the nitrogen. The higher C:N ratio of cereal crops like rye or wheat will take longer for nitrogen to release than the lower C:N ratio crops like legumes (hairy vetch or clovers) or brassicas (turnips or radishes).

Material	C:N Ratio
Rye straw	82:1
Corn stover	57:1
Rye cover crop (anthesis)	37:1
Rye cover crop (vegetative)	26:1
Ideal Microbial Diet	24:1
Hairy vetch cover crop	11:1

For more information about cover crops with manure and potential cost-share options, contact Sara Berges at the Allamakee SWCD at 635 9th St NW in Waukon, call 563-568-2246 ext. 3, or email sara.berges@ia.nacdn.net. Also, visit the Allamakee SWCD website at allamakeeswcd.org.