SOIL HEALTH & LAND MANAGEMENT

NDSU EXTENSION SERVICE

ADOPTATION OF COVER CROPS TO BUILD SOIL HEALTH IN THE NORTHERN PLAINS

Dr. Abbey Wick
Extension Soil Health Specialist
abbey.wick@ndsu.edu
701-231-8973
www.ndsu.edu/soilhealth

Plot Cooperators:

Burkland Farms
Thompson, ND

PDM Farms
Cummings, ND

Toussaint Farms
Wahpeton, ND

Wehlander Farms
Milnor, ND

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Including cover crops in rotation in the Northern Great Plains is not easy. Trying to figure out what to plant, when to plant it, how to use the cover crops effectively to boost soil health and yields can be challenging. A series of four demonstration sites were established in 2015 in Grand Forks, Richland, Sargent and Traill Counties to evaluate use of different cover crop mixes and to help farmers incorporate them in rotation.

In 2015, three mixes were seeded into small grain stubble (see table below). Each mix included cereal rye, which is a winter annual and can survive well in the cold North Dakota winters. The goal of using cereal rye is to manage water and improve trafficability in the spring when conditions can be too wet and limit field access. Radish and turnip were also included in the mix to capture nutrients and to make holes in the soil to improve drainage and reduce compaction. In Mix 2, we added forage peas and crimson clover to build nitrogen reserves and improve nitrogen cycling efficiency. Finally, in Mix 3, we added sorghum/sudangrass and rapeseed to add different rooting structures to the soil. This can help feed the soil biology with a variety of "foods" and the rooting structure can create large and small pores as well as soil aggregates – both important for water and air movement.

Cover Crop Treatments	
Mix 1	Cereal Rye, Radish, and Turnip
Mix 2	Cereal Rye, Radish, Turnip, Forage Peas, and Crimson Clover
Mix 3	Cereal Rye, Radish, Turnip, Forage Peas, Crimson Clover, Sorghum/Sudangrass, and Dwarf Essex Rapeseed

What's in the mix?

Cereal Rye: good for building organic matter, scavenging nitrogen, controlling erosion and weeds. Be careful of the rye drying the soil out too much in the spring – termination timing is key!

Radish and Turnip: good for breaking compaction, increasing infiltration, scavenging nutrients. Be careful of bolting if planted too early in the fall - recommended seeding dates are after July 15.

Forage Peas: good for nitrogen production and efficient nitrogen cycling. Make sure you inoculate to get the most bang for your buck when seeding these.

Crimson Clover: good for nitrogen building and inclusion in small grain rotations. Again, make sure you inoculate.

Sorghum/Sudangrass: good for breaking compaction, weed suppression, building organic matter, nitrogen scavenging. Watch out nitrogen tie up in residue. Plant before August 15.

Dwarf Essex Rapeseed: good for breaking up compaction with fine roots and a tap root. Watch out for bolting and it may overwinter.

In 2016, we plan to seed soybean into the cereal rye. Several farmers have tried this approach and are very pleased with the ease of seeding into the rye cover crop and also value the weed suppression via competition and allelopathy of the rye as a cover crop. What we are seeing on other fields where this approach was used in 2015 is:

(1) excellent erosion control
(2) improved trafficability in the spring for field access in wet conditions
(3) less drown out in areas that would typically hold excess water
(4) weed suppression to help control some of the glyphosate-resistant weeds that emerge prior to crop canopy closure
(5) longer stem on the soybean, bringing the pods up further off the ground
(6) soil moisture retention when the crop needs it as a result of the rye residue

These are just observations and this series of cover crop demonstration sites will help us collect the data we need to make recommendations.

A second year of this demonstration will be cover crop broadcast into the soybean prior to leaf drop. We are still working on the logistics and of course, everything is weather dependent!

Updates and videos will be posted on the NDSU soil health webpage www.ndsu.edu/soilhealth

Also follow these projects on twitter @NDSUsoilhealth