

# FARM & RANCH GUIDE

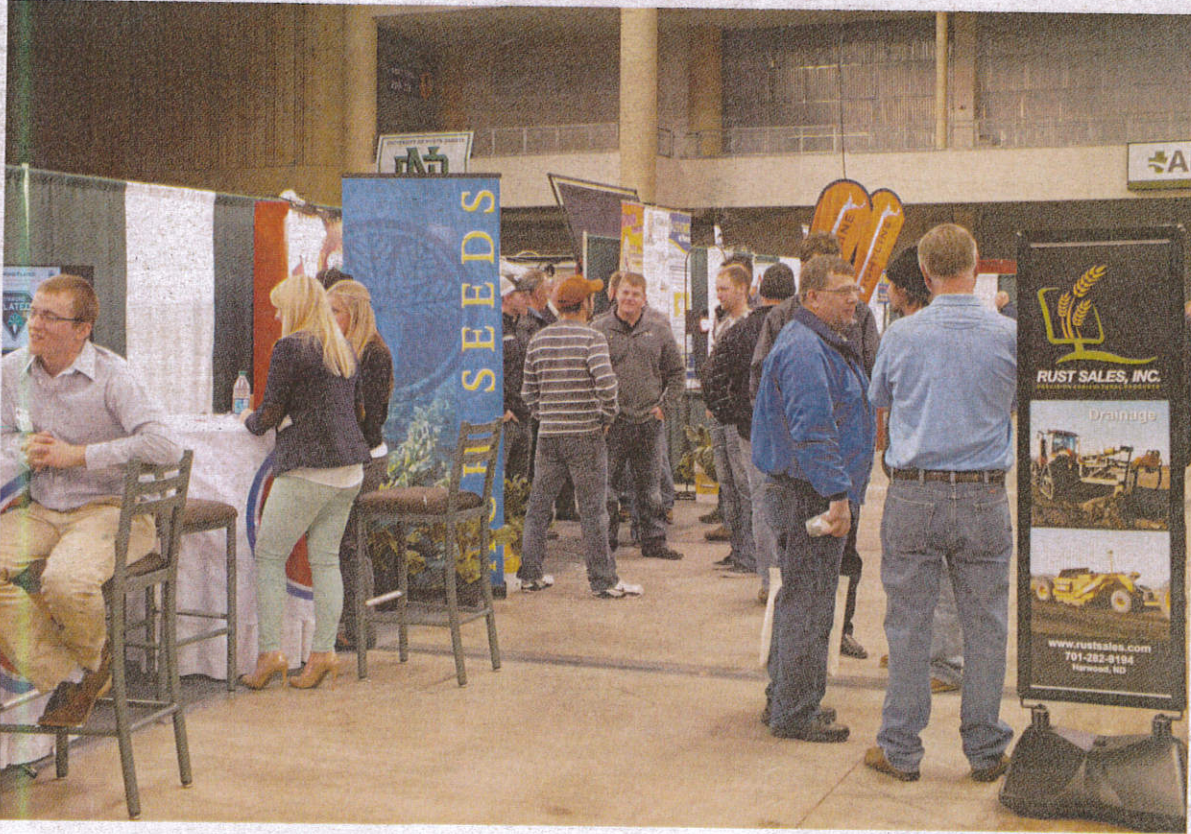
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## PRODUCTION NEWS

# Cover crops: Multi-species best way to renovate soils

By SUE ROESLER  
Farm & Ranch Guide

MANNING, N.D. — Cover crops are all the rage in renovating soils these days but it is important to start slowly, according to Doug Landblom, NDSU animal scientist at Dickinson Research Extension Center.

Landblom, who has been working with several projects integrating livestock and cover crops into a diverse crop rotation, spoke to a group of producers at the 45th annual Taylor Farm Institute in Taylor, N.D. His research is partially funded by a Sustainable Ag Research and Education (SARE) grant.

Grazing livestock on cover crops is one way to utilize the crops. However, a multi-species cover crop mix will improve soil quality regardless of whether livestock are involved or not, according to Landblom.

"Grazing livestock on cover crops gives producers flexibility for using the cover crops while at the same time, it

helps the cropping system," he said.

With cover crops as part of the cropping system, the grazing season can be extended.

In Landblom's research, he is studying the potential for producing two crops of cover crops in the same year by seeding winter triticale along with hairy vetch in the fall, after spring wheat harvest. In addition, he cuts hay out of the crop in June the next spring.

After harvesting the hay, Landblom said a seven-way multi-species cover crop is seeded before July 1, when there is a "high probability for precipitation to germinate the crop."

The cover crop is then used for grazing cows after weaning the calves.

However, Landblom said, the cover crop is high-quality and could be grazed in various ways, depending on what a given rancher's needs are. For instance, the cover crop could be used for backgrounding calves after weaning, or as one of several crops in a crop sequence



Doug Landblom, NDSU animal scientist at Dickinson Research Extension Center, and Chris Augustin, NDSU area Extension soil health specialist, lead the cover crop demonstration at the center last August.

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The double-cropping of the winter triticale-hairy vetch hay and the spring-seeded cover crop has yielded a combined average of 5.25 ton/acre, Landblom said.

The function of cover crops, depending on which crops are in the cover crop blend, is to increase water infiltration rate; increase carbon sequestration; increase soil aggregate stability; increase the water holding capacity of soil, and create better mediation of soil temperature and moisture.

"Improving soil water infiltration and holding capacity is facilitated by roots from all of the crops in the multi-crop mix and by some of the crops with deep tap roots such as sunflowers and radishes that dig deep into the soil," Landblom said.

Improving soil quality takes time, but change is evident "within three to four years," he added.

By combining several practices, such as no-till seeding, crop rotation with both cool and warm season grass and broadleaf crops, cover crops, and livestock grazing, soils will improve.

In Landblom's research at the Dickinson Research Extension Center (DREC), a cropping system using all of these practices has been in place for four years, and 2014 will be the fifth cropping season.

The crop rotation being used is as follows, beginning with spring wheat: Year 1 - spring wheat (fall seeded winter triticale-hairy vetch); Year 2 - winter triticale-hairy vetch hay and 7-way cover crop for grazing; Year 3 - corn; Year 4 - field pea and forage barley (grazed); Year 5 - sunflower.

"Many results are coming out of the research, but one of the most significant and visible changes has been a reduction in fertilizer use," Landblom said.

In 2013, fertilizer use was reduced or

eliminated in all of the crops grown, he noted.

Continuous spring wheat is the control that the rotation system is being compared to and fertilized annually according to soil test, Landblom said.

The rotation crops are also fertilized based on soil test; however, because of the organic matter levels in the rotation fields, (which averages about 4 percent), sunflowers, pea-barley, and spring wheat have no nitrogen applied. Chlorine is being applied to spring wheat.

In the crop rotation system, that includes livestock grazing, income is derived from wheat and sunflower as cash crops and beef production from yearling steers that graze the field pea-barley and corn fields, he said.

"Growing the legume field pea and barley together before sunflower has boosted sunflower yields substantially without adding fertilizer," Landblom said.

Sunflower yield in 2013 was 1,959 pounds/acre without fertilizer compared to 897 pounds in 2011 with fertilizer, he said. However, Landblom said, 2011 was also a drier season.

"Overall, utilization of cover crops, crop rotation, livestock grazing, and no-till planting are collectively contributing to feed, time, fuel, and labor savings," Landblom said.

Natural vegetation that has never been tilled is in a steady state, he said, adding that when soils are tilled, soil structure is destroyed.

"Tillage aerates the soil by destroying soil structure, speeding up bacterial activity and carbon dioxide is released into the atmosphere. Soil aeration increases water evaporation," Landblom said. "Soil organic matter

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## PRODUCTION NEWS

### COVER CROPS: Continued from page 6A

declines with tillage."

The goal is to increase and maintain soil organic matter (SOM) at a level in which the system is self-perpetuating without the use of fertilizers, he said.

The function of microbes in the soil is to break down organic matter and provide efficient transport, and storage of moisture and nutrients. That can be accomplished with cover crops.

"Keeping residue on the soil surface is like putting armor on the soil," he said.

Soil microbes are killed, when the soil surface temperature gets too hot. At 70 degrees, most moisture is used for crop growth, Landblom said. Bare soil can reach temperatures of 130-140 degrees, and living organisms in the soil die at these temperatures.

*"Grazing livestock on cover crops gives producers flexibility for using the cover crops while at the same time, it helps the cropping system."*

Doug Landblom  
NDSU Animal Scientist

radishes, can bore down through compaction layers.

"We want to use all the layers of the soil we can. We are increasing soil organic matter with cover crops,"

Augustin said.

At the end of the day, Landblom said, crop yields on even our poorest soils are improving, following the use of rotation, cover crops, and cattle grazing.

"Interest in cover crops is gaining momentum, because it is evident that soils can be returned to more steady state when cover crops are used in a cropping system," Landblom said. \*



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# Brandt

"By keeping a living root in the soil through the use of cover crops, the soil surface is covered and soil temperature is maintained below critical temperatures for soil organisms," he said.

Landblom and Chris Augustin, NDSU Area Extension soil health specialist, showed producers the SARE project with cover crops growing out in the field at the DREC's Beef Cattle and Forage Field Day last August.

The seven-way cover crop mix that was planted the last week of June included brassicas (Hunter leaf turnip and Winfred forage rape) and sunflower for their tap roots, which helps increase water infiltration; Everleaf oat; Flex winter pea and hairy vetch for their nitrogen fixing potential. Ethiopian cabbage produces "a lot of biomass and is very frost tolerant staying green into December" as does hairy vetch, Landblom said.

"The fact that some of the crops stay green up into December facilitates late fall grazing," he said.

Landblom pointed to litter on the soil in the cover crop demonstration. "See the layer of litter on the soil - that is what we're after to build SOM," Landblom said.

Augustin told the group the peas would still be green in the winter under snow in December. He explained that there were all kinds of biological aspects going on in the soil under the cover crop canopy.

"There is a lot of nutrient cycling going on in that soil," Augustin said. "All sorts of different roots are growing out there. We are trying to mimic nature with diversity."

In a soil architecture, the scientists are growing crops of all different sizes of roots, Augustin said. Some improve the top 6 inches of soil while others, like