

CONSERVATION CROPPING SYSTEMS PROJECT

17th ANNUAL REPORT
2018



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October 1, 2019

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The Conservation Cropping Systems Project is not possible without help we have received from everyone listed above. Whether it be donations of goods and services, financial, or technical assistance; we appreciate everything that we have received to make our local project an asset for area producers, agency personnel, and agronomy businesses.

CONSERVATION CROPPING SYSTEMS PROJECT BACKGROUND

The Conservation Cropping Systems Project (CCSP) was created by a group of local soil conservation districts in North Dakota and South Dakota teaming up to showcase farming practices that not only reduce erosion, improve soil health, and increase water quality; but also prove to be profitable management techniques if implemented correctly.

Historically we rented a field from a local producer just south of Forman and utilized it as a demonstration site to showcase various practices such as crop rotation, no-till/strip-till, and cover crops. Field days were generally well attended with attendance reaching over 100 people. One drawback that we faced is how much from the field days was being taken home and implemented in people's operations. The other drawback from our demonstration site in Forman was that we had a lot of small acreage research plots so that we could analyze and compare results from many diverse crop rotations. This led a lot of people to question how these practices would work on regular sized fields that represent conditions that people would encounter within their operation.

In 2017 we dabbled with maintaining our demonstration site south of Forman on a reduced scale as well as working cooperatively with a cattle producer south of Oakes that wanted help incorporating cover crops on his cropland for forage production and soil health. Maintaining the high level of operation needed on both sites was difficult. In 2018 we transitioned from our site near Forman that was our demonstration site, to only our site south of Oakes which we look at as more of an implementation site where we work within a producer's operation to meet the needs of his farm but also pushed to expand the amount of conservation that he is knowledgeable of and able to implement. The following report will outline weather conditions at the site, site activities, outreach events held, summary, and a final comments section.

CONSERVATION CROPPING SYSTEMS PROJECT SITE INFORMATION

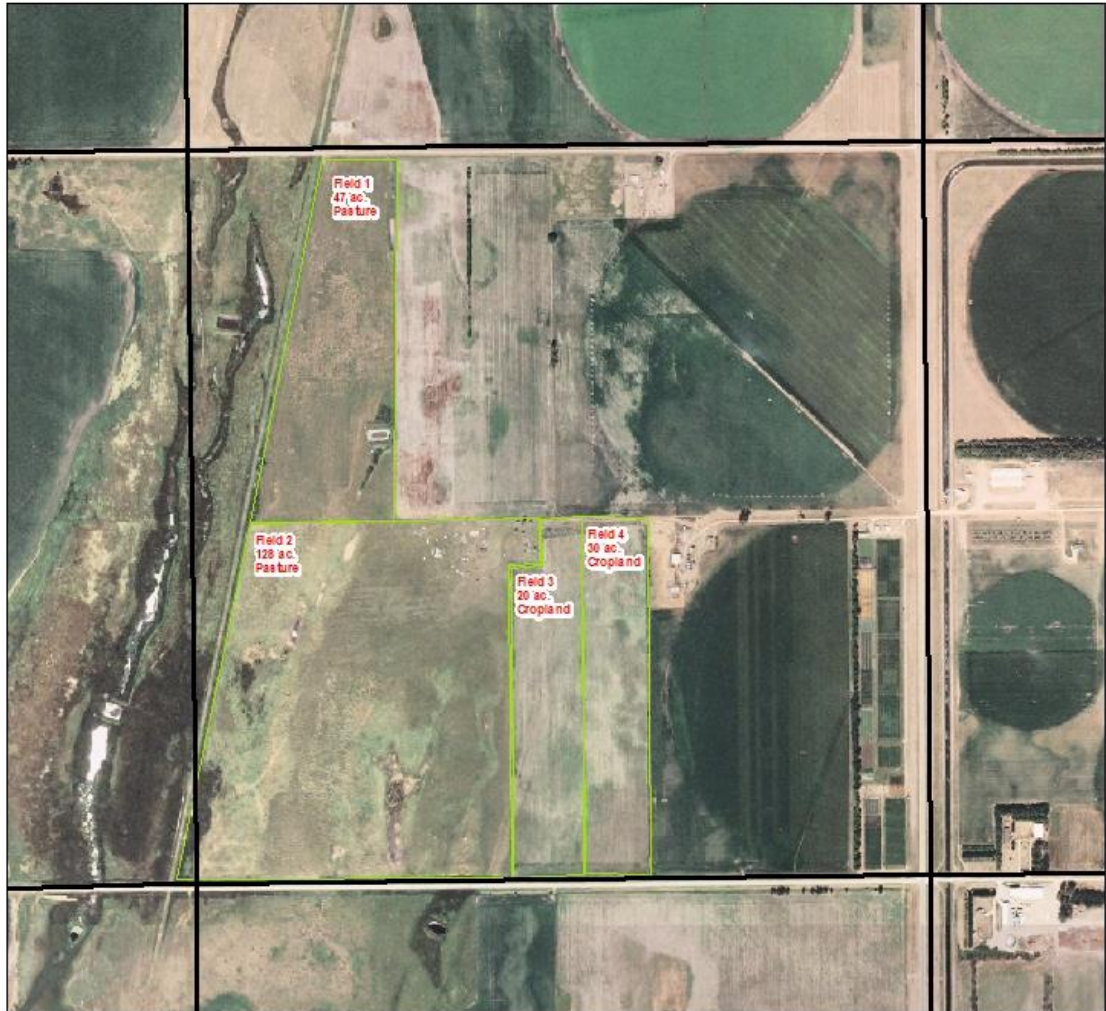
As discussed in the previous section, in 2017 we started working with a producer in Dickey County named Charnell Haak who was trying to increase the amount of forage available for his cattle while also increasing soil health on his property. Charnell was watching some videos of Gabe Brown discussing cover crop options and asked some questions to CCSP Farm Manager Kelly Cooper that made the two believe that there was a great opportunity to work together to meet everyone's needs. The layout of the operation that CCSP is working with Charnell on is shown on the map on the next page denoted as Figure 1.

There are two different pastures totaling a grand total of roughly 175 acres on the west edge of the property. Both pastures showed signs that they were being over utilized in some areas while other areas were under grazed. It was evident that the pasture would highly benefit from being cross fenced and increasing the rotation so that there would be more uniform grazing along with some periods of rest. Charnell was able to work with his local NRCS office to receive cost share to do cover crops, cross fence, pipeline, and tanks on his pasture to increase the value and function of these acres.

CCSP Charnell Field Map

District: WILD RICE SOIL CONSERVATION DISTRICT
Legal Description: 17-130-59

Field Office: FORMAN SERVICE CENTER
Assisted By: Matthew Olson
State and County: ND, Sargent County, North Dakota



Prepared with assistance from USDA-Natural Resources Conservation Service



Figure 1. This map shows the fields that CCSP is involved with.

CONSERVATION CROPPING SYSTEMS PROJECT SITE INFORMATION (cont)

As you can see on the map from Figure 1., there are also 2 crop fields of roughly 20 and 30 acres on the east end of the property that run North and South. The fields have traditionally been utilized for row-crop production; although due to low, depressional slope and proximity to adjacent wetlands there are acres that are subject to ponding in wetter years making crop production difficult.

In the fall of 2017, we started work on integrating some expanded infrastructure for grazing by installing 1 ½ "pipe from the feedlot going to both of his pastures to the west. Due to early snow in our area we were unable to finish connecting all the waterlines and get the tanks installed so those became a priority moving into the 2018 year. Figure 2. on the next page shows the improvements we were able to complete on Charnell's operation in 2018 to create more grazing opportunities and promote more even distribution of grazing on the pastures.

The first project completed was fusing together all the pipelines that were ran out in Fields 1. and 2. in 2017 as well as fusing the fittings to connect to the tanks when installed. The dugout that was in the north pasture was fenced off as research has shown that cattle have better gain on fresh water. It also improves water quality for the wetland where the dugout was located. Then the tanks were installed on the pasture to increase fresh water for the cattle. Cross fencing is planned to be completed in 2019 on the two pastures to divide it into 11 pastures to better utilize available grass.

This paragraph is a little background as to where our fields were at going into the 2018 growing season. In 2017 both crop Fields 3 and 4 had rye applied to them in the fall. Field 3 had rye flown onto the standing corn on August 29th at a rate of 90 lbs./acre across the entire 20-acre field. Due to drier conditions in the fall after we cut the corn for silage it looked like it was going to be a poor stand going into 2018. Manure was spread on the field after the silage was chopped as well. On the 30-acre Field 4 we drilled in winter rye at 90 lbs./acre, sorghum at 1 ½ lbs./acre, and annual ryegrass at 1lb./acre on August 15th. This field had a good catch initially so we tried returning to a grazing system in mid-September but there wasn't enough forage to sustain 30 head, so we left the remaining cover crop out there for spring regrowth.

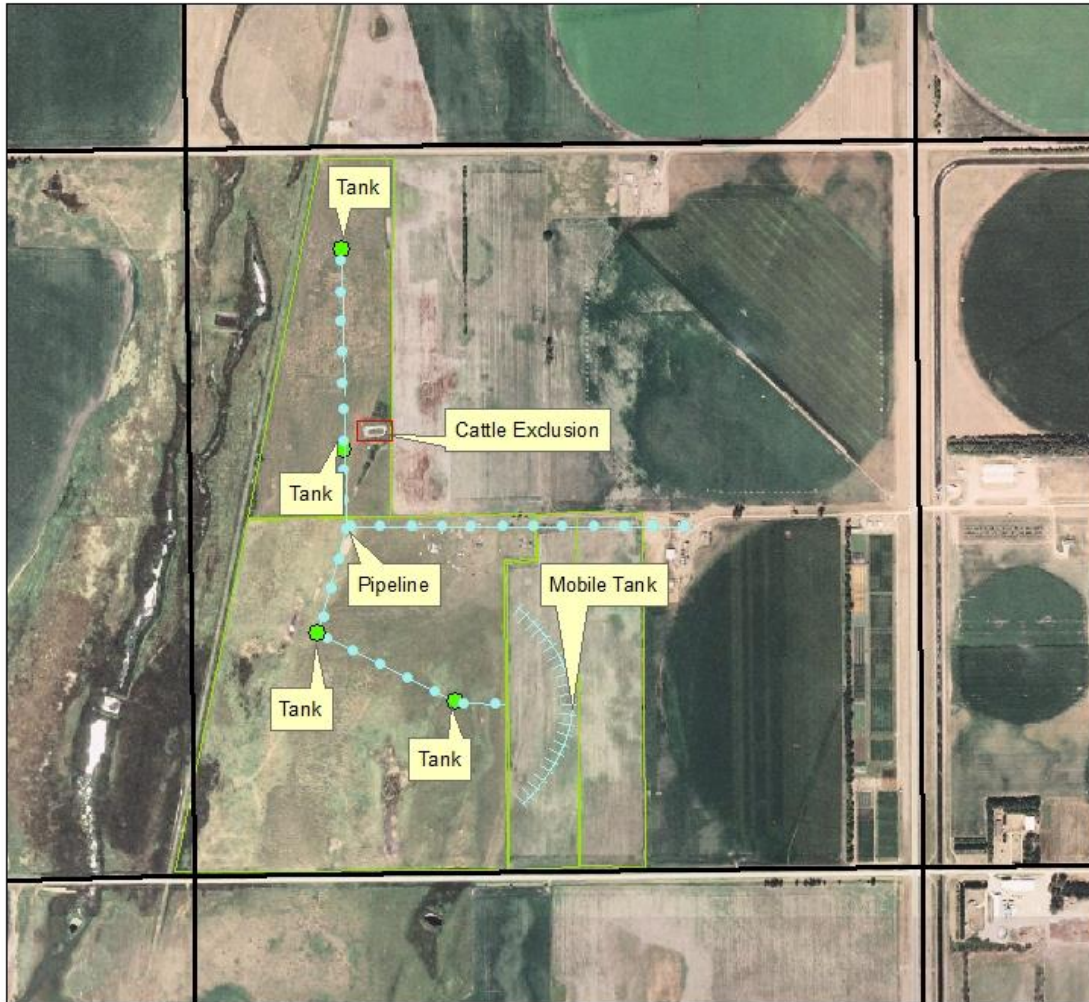
Moving into spring of 2018, we saw highly variable temperatures paired with low precipitation which made for a rather unorthodox planting season. Ironically this made for great growing conditions for the rye that was planted/broadcasted. The broadcast field was similar to the planted field as far as population of rye with the only visual difference being that the stand was less uniform on the broadcast field. The rye was cut and used as baleage. The baleage from the 20-acre field that had manure spread on it was to be used primarily for bedding whereas the baleage on the 30-acre field was to be used for feed. After that Fields 3 and 4 were sprayed out with glyphosate.

Field 3 was planted to 3 different grazing cover crop mixes on June 28th. The first mix was the Grazing Brand™ cover crop mix that was donated from Agassiz Seed & Supply. This mix is seeded at 28.5 lbs./ac. And consisted of forage oats 53%, forage pea 14%, common vetch 7%, foxtail millet 7%, sorghum sudangrass 7%, Frosty clover 4%, forage radish 4%, sunflower 2%, and hybrid brassica 2%. The second mix was the Premium Graze™ cover crop mix donated by Millborn Seeds. This mix is designed to be seeded at a rate of 15 lbs./acre and

CCSP Charnell Field Activities Map

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Prepared with assistance from USDA-Natural Resources Conservation Service



Figure 2. This map shows the grazing infrastructure improvements completed in 2018

consists of 25% millet, 25% turnip, 20% sorghum sudangrass, 20% Winfred brassica, and 10% Graza radish. The last mix was a hybrid mix that CCSP staff put together to be seeded at 17 lbs./ac. that had Pasja turnip 17.5%, Graza radish 27%, Winfred brassica 14%, sorghum sudangrass 17%, forage oats 7%, and sunflower 17.5%. We did have some equipment problems that caused for some skips as well as some acres that were flooded out due to heavy rains where we had to go in over the following weeks and reseed those areas. We divided the field into 3-5-acre paddocks that we would rotate every 2-3 days. We purchased enough Gallagher Wheels to try to make it easier to move the cattle but ran into issues with the fence not working well with some of the cover crops.

When we grazed the full season cover crop last year with 28 head, we really struggled to keep up with the biomass being produced in the field. This year we tried bumping up the animal units (AU's) to 48 head to keep up with the production with the goal of take half, leave half. This process worked well the first time we went through the paddock when there was a large amount of forage but with the increased AU's we were generally moving them every day or two after the first rotation and after the 3rd rotation we pulled the cattle to try and get some re-growth. Annual weed control became an issue as we had an infestation of cockaburs across field 3 with heaviest pressure on the west and south edges. With minimal forage left and slow regrowth due to lack of precipitation we elected to mow the areas that had the worst pressure as cattle were avoiding them anyway. All together we were able to get about two weeks of grazing of the cover crops before we took the cattle off to leave the rest of the cover crops for soil health.

Field 4 was planted with a John Deere 7200 to an 85-day corn that was donated to us by our local Pioneer Seed dealer (variety P8542AM); Delahoyde seed in Forman. We started planting the corn on June 7th and finished all but 1 pass on the 8th of June. The last pass was completed on June 10th. Our goal was to show that corn could be planted late and then grazed while standing in the fall as an alternative forage. The corn was planted at a population of 32,000 seeds/acre at 30-inch row spacings. The field had 35 lbs. of Phosphorus and 110 lbs. of Nitrogen applied. We then went in on June 21st and sprayed the field with 48 oz./ac. of glyphosate, 3 oz./ac. of Laudus, 8 oz./ac. of Atrazine. We used Interlock as the adjuvant, Preference as the surfactant, and AMS as the defoamer. Ironically, we had a very ideal summer for corn and found that in the fall our corn not only made cobs but had decent yield potential. While standing corn can be utilized as a forage you must be cautious of acidosis and other digestive issues that may develop in the cattle, so we elected to harvest the corn instead. We began harvest on Field 4 on November 15 and finished up on November 21st. We used our John Deere 4400 combine. The yield on the field averaged 89 bushel/acre and moisture content varied from 30-35%.

CONSERVATION CROPPING SYSTEMS PROJECT OUTREACH

Two field days were held at Charnell's in 2018. The first field day was held on June 28th, 2018. The goal of this field day was to show people how to utilize different machinery to implement conservation practices on their operation. We educated attendees on how to calibrate and seed cover crops on both an Amity and a John Deere drill. We also showcased the Wild Rice Soil Conservation District's pipe plow by giving a demonstration on the operation of that piece of equipment as well as how to fuse various fittings on the pipe as well to meet the needs of producer's watering systems.

CONSERVATION CROPPING SYSTEMS PROJECT OUTREACH (cont.)

Our second field day held at Charnell's was on September 18th. For this event we had a couple of great guest speakers on our agenda. First, we had Darrel Oswald; manager of the Menoken Farm, come and talk about some of the diversified cropping systems that they have at the Menoken Farm and how he integrates his work there into his own operation. Our second speaker was Ken Miller from Fort Rice, ND. Ken was the 2017 Aldo Leopold award winner for North Dakota. Ken spoke about the holistic approach that he has adopted on his operation. No till farming, cover crops, and rotational grazing are a few of the practices he spoke about on his operation. Perhaps one of the more interesting subjects was his piece of irrigated cropland that he planted back to perennial grasses to ensure ample forage for his cattle. For our eastern North Dakotan attendees, it was interesting for them to understand the differences and challenges across North Dakota.

CONSERVATION CROPPING SYSTEMS PROJECT SUMMARY

In looking back at our work on Charnell's over the last year there were a few key takeaways that I can pinpoint that I would like to highlight. The first item of interest was the rye that was planted versus broadcasted in the fall of 2017. In looking at the rye stands going into winter it appeared that the rye that was planted was going to far exceed the rye that was broadcasted. However, when we evaluated the two stands side by side in May of 2018 there was very little difference other than the broadcast field had a little bit less uniformity than the drilled field. Otherwise both fields still met the goal of having an actively growing crop utilizing as much sunlight for as long as possible prior to planting our crop. The site is generally a wetter site that is difficult to get planted so having a high-water use stand of rye growing as soon as conditions allow is highly beneficial.

The second item for discussion is the 3 cover crop mixes planted on Field 3. In the future I am planning to avoid multiple mixes on small acreages. There is a much higher chance of operator error when trying to seed small acreages through a bigger drill. From this experience I would always encourage producers to plant areas of at least 10 acres and always plan 10% extra seed to account for calibration and drill variability. We also struggled utilizing the Gallagher Wheels on the cover crops. If I were to try to utilize the Gallagher Wheels again, I would avoid broadleaf varieties. The wheels seemed to get caught up in the sunflowers and the turnip and radishes made it difficult for the wheel to get a good ground, so the cattle were rough on them. I was very impressed with the grazing variety cover crops versus their more generic forms. If I were only focused on available forage for cattle, I would highly recommend utilizing these.

Lastly, I will touch on Field 4 that was planted to corn on June 10th. This field was really intriguing as it really went against the trend every step of the way. We went off the assumption that if we planted a short-day variety corn late enough in the year, we would get the forage along with a minimal amount of grain. The hope was to pair this with the baleage rye to offset the high nutrient load. The weather had different plans as conditions straightened out in a big way and led to ideal conditions where the corn exceeded all expectations and was far too robust to graze in the winter.

CONSERVATION CROPPING SYSTEMS PROJECT WEATHER CONDITIONS

Table 1. Precipitation and temperature at the Oakes Irrigation Research Site.

Month	Precipitation			Average daily temperatures		
	2018	15-year average	25-year average	2018	15-year average	25-year average
	-----inches-----			-----°F-----		
April	0.26	1.42	1.47	34	43	43
May	0.86	3.10	2.96	63	57	57
June	5.30	4.44	4.11	70	67	67
July	7.67	2.91	3.22	70	71	71
August	1.42	2.66	2.38	67	68	69
September	2.06	2.48	2.79	58	61	60
October	2.47	2.18	2.30	40	46	46

Table 2. Growing degree units¹ at the Oakes Irrigation Research Site.

Month	2018	10-year average	15-year average	25-year average
May	471	325	316	309
June	592	523	513	510
July	611	646	650	642
August	543	574	567	581
September	324	383	381	378
Total	2541	2452	2426	2421

¹Growing degree units = (Tempmax + Tempmin)/2 - 50. If Tempmax is greater than 86, then Tempmax = 86. If Tempmin is less than 50, then Tempmin = 50. Temperature is in degrees F.

Table 3. Dates of last and first frosts.

	2018	10-year average	15-year average	25-year average
Last frost in Spring				
32°F or less	2-May	10-May	6-May	4-May
28°F or less	28-Apr	27-Apr	27-Apr	27-Apr
First frost in Fall				
32°F or less	28-Sep	4-Oct	4-Oct	2-Oct
28°F or less	4-Oct	10-Oct	9-Oct	8-Oct
Frost free period (days)	149	147	151	151

CONSERVATION CROPPING SYSTEMS PROJECT FINAL THOUGHTS

In trying to tie our efforts together over the past year, we searched for a famous quote to wrap everything together. The quote that was found that really struck home with the highest relevance to our work comes from the Chinese philosopher Lao Tzu who said “Water is fluid, soft, and yielding. But water will wear away rock, which is rigid and cannot yield. As a rule, whatever is fluid, soft, and yielding will overcome whatever is rigid and hard. This is another paradox: what is soft is strong.”

This saying resonated with us the most because it describes the Conservation Cropping Systems Project purpose. Farming is no longer the rock that it used to be in rural North Dakota. There always seems to be countless factors working to erode the rock that is farming. Policy, economics, and an ever-changing environment work to fracture our proudest profession. Not to mention the disconnect between our young generation and their understanding of where and how food gets to the supermarket. So, what do we do?

We must stop looking at farming like the rock and start looking at it like the water. Let's not be rigid with specific crop rotations, tillage systems, and nutrient/pest management techniques. Let's leave ourselves open and flexible so that we may be fluid and utilize new technology and assistance programs geared towards minimizing inputs, maximizing yields, and reducing potential negative impacts on the landscape. If we invest time and effort in educating today's youth on the importance of agriculture, we can all then start to begin breaking down the rigid rocks of cumbersome restrictions, difficult economics, and outdated policies and create new ones that complement people's operations.

Leon Meggison once paraphrased Darwin's Origin of Species by saying, “It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself.” Farming seems to be in a constant state of flux so in order to survive we must adapt. That is what we are trying to accomplish on Charnell's fields. In the face of wet growing conditions, poor grain markets, and limited cash crop options; we have looked to including an annual cover crop as part of the rotation to make sure adequate forage is available for cattle to remain in the operation. We have also had to adapt on the pastureland. By utilizing cost-share programs we are in the process of splitting 2 pastures into several which will allow for greater flexibility in grazing.