

# CONSERVATION CROPPING SYSTEMS PROJECT

15th ANNUAL REPORT  
2016



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Kelly Cooper Farm Manager

March 22, 2017

CONSERVATION CROPPING SYSTEMS PROJECT  
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CONSERVATION CROPPING SYSTEMS PROJECT  
ADVISORS

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*North Dakota State University*

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Dr. David Franzen, Blaine Schatz  
Dr. Abbey Wick  
Greg Endres, Melissa Seykora

*South Dakota State University*

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Dr. Dwayne Beck

*NRCS*

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Ted Alme, Hal Weiser

*Ducks Unlimited*

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Tanner Gue

## PROJECT DESCRIPTION

The Conservation Cropping Systems Project (CCSP) is located on a 130-acre tract of farm land two miles south of Forman, ND, along Highway 32. A 14 member Board of Directors composed of local producers in northeastern South Dakota and southeastern North Dakota advises the CCSP staff. In 2016 the farm has gone to predominantly large plots for cost savings and efficiency.

The effective use of crop rotations to break weed, disease, and insect cycles is demonstrated. The placement of legumes in rotations reduces dependence on fertilizer Nitrogen. Recent work by Dr. Dave Franzen of NDSU has shown that long term no-till requires 50 lbs less nitrogen fertilizer to grow the same crop as conventional tillage when organic matter is 5% or greater.

This project is a living classroom to demonstrate that agriculture can produce food, fuel and fiber in an environmentally favorable manner, preserving and enhancing soil, wildlife habitat and water quality, while providing producers with competitive to superior economic returns.

## PROJECT PURPOSE

Our goal is to demonstrate profitable farming methods, machinery, and philosophies that promote soil and water conservation.

## PROJECT SPONSORS

The Conservation Cropping System Project is funded through the sponsorship of governmental, corporate and private parties. The Wild Rice Soil Conservation District is the principle cooperating district, supplying office space and other facilities for the project. The other soil conservation districts supplying board member leadership in North Dakota are from Ransom, Richland and Dickey counties. In South Dakota, the districts from Marshall and Day counties also supply leadership board members. Other cooperating agencies are the Natural Resources Conservation Service (NRCS), North Dakota State University (NDSU), and South Dakota State University (SDSU). Sponsorship is either as a cash donation, in-kind or both. There are four levels of sponsorship: Platinum (\$10,000 or greater), gold (\$5,000 - \$9,999), silver (\$2,500 - \$4,999) and bronze (\$500 - \$2,499). We wish to thank our sponsors for their support! Without them this project would not exist.

## 2016 Project Sponsors

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### **Platinum**

North Dakota Corn Council  
Titan Machinery  
North Dakota Community Foundation  
North Dakota Soybean Council

### **Gold**

Ducks Unlimited  
Pioneer Hybrids  
Richland County SCD  
South Dakota Wheat Growers  
Wild Rice Soil SCD

### **Silver**

Croplan Seed  
Bayer Crop Science  
James River SCD  
K & S Soil Analysis  
Monsanto  
Ransom County SCD

### **Bronze** *continued*

AgVise  
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First National Bank of Milnor  
Full Circle Ag  
Hanson Farms  
Meridian Seeds  
Millborn Seeds  
Starion Finacial  
Valent USA

### **Special Thanks**

Bill Smith  
Day County SCD  
Joe's Ag Supply  
Marshall County SCD  
Walt Albus



## AGRONOMIC PRACTICES AND YIELD

A detailed outline of agronomic practices used is listed in Figure 6.

**Spring Wheat:** “Prosper” spring wheat was planted April 6-9, 2016 at 120 lbs/acre with an Amity twin disk air drill. The Amity drill plants in a paired 6 inch row separated by a 9 inch gap. Within the 6 inch gap a deep band fertilizer coulter allows the application of deep placed fertilizer. Fertilizer rate was 200 lbs/acre 46-0-0 with 50 lbs/acre MESZ. Two applications of fungicide were used. Harvest was August 5-7, 2016. The Amity drill was pulled by a CaseIH MX340 with RTK autosteer. The combine was a 4400 John Deere.

**Peas:** Agassiz Peas were planted at 150 lbs/acre with the Amity twin disk air drill on 4/30/16 with no fertilizer. The peas were inoculated. Harvest was August 7, 2016. The Amity drill was pulled by CaseIH MX340 with RTK autosteer. The combine was a 4400 John Deere.

**Corn:** Croplan 3337VT2P/RIB was seeded with a JD 7200 8 row planter. The following plots were seeded: Variety, strip till, DDG, Nitrogen/sulfur research and bulk plots. Planting was from May 3-6, 2016. The strip till/variety trial was done May 6, 2016 and planted at 32,000 seeds/acre. The rest of the corn was planted at a population of 29,000 seeds/acre. Fertilizer at planting was: nitrogen 111 lbs/acre, phosphorus 45 lbs/acre as 10-34-0 in-furrow and sulfur 11 lbs/acre as ammonium thiosulfate. Harvest was from October 8-14. Strip tilling was done with a CaseIH NTX 5310 on the appropriate plots on November 4, 2015. The 7200 John Deere planter and strip-till machine was pulled by a CaseIH MX340 with RTK autosteer. The combine was a 4400 John Deere.

**Soybeans:** Pioneer P09T74R2 soybeans were planted May 7, 2016 at 150,000 population on the rotation plots. Eight gallons/acre of 10-34-0 applied 2X2 for 32 lbs P/acre. The planter was 7200 John Deere Planter pulled by CaseIH MX315 with RTK autosteer. The combine was a 4400 John Deere with 15 ft flexhead.

**Alfalfa:** Only two plots of the alfalfa were kept. Dairyland Magnum IV alfalfa was seeded this fall on approximately five acres. The drill used was John Deere 1590 pulled by a CaseIH MX340 with RTK autosteer.

Crop	Planting Date	Harvest Date	Planting Rate	Chemical	Rate/ac	Date
Alfalfa (established) Dairyland Magnum V	8/9/2016		20#	32 oz RU preplant		
Only 2 of the alfalfa plots were kept after plot rearrangement. Alfalfa was planted around the 2 existing Plots and through a low area. This planting will possibly be planted to corn in 2017 or 2018.						
	<u>Planting</u>	<u>Harvest</u>				
HRSW Prosper	3/28-29/2016	8/5-7/2016	120#	Wolverine	1.7 pt	05/24/16
				Starane	20 oz	05/24/16
				Axial	8.2 oz	05/24/16
Note: 1/2 of wheat sprayed with Wolverine other 1/2 sprayed with Starane.				Adigor	9.6 oz	05/24/16
Roundup preharvest spot sprayed on old alleys				Stratego	4 oz	05/30/16
				Prosario + NIS	6.5 oz	06/16/16
				Roundup Ultra Max II	32 oz	07/23/16
	<u>Planting</u>	<u>Harvest</u>				
Corn Croplan 3337VT2P/RIB	5/3-6/16	10/8-14/2016	32,000	Roundup Ultra Max II	32 oz	05/24/16
				Diflex	8 oz	05/24/16
				Harness or Dual	2 pt/1.5 pt	05/24/16
Strip/variety trial	5/6/2016	10/14/2016		Interlock	4 oz	05/24/16
				ams	10 lbs/100	05/24/16
				Preference	8 oz/100	05/24/16
				Roundup Ultra Max II	32 oz	06/23/16
Strip tilling done 11/5/15				Laudis	3 oz	06/23/16
				Interlock	4 oz	06/23/16
				ams	10 lbs/100 gal	06/23/16
				Preference	8 oz/100 gal	06/23/16
	<u>Planting</u>	<u>Harvest</u>				
Soybean Pioneer P09T74R2	5/7/2016	9/26/2016	150,000	Fierce + 2-4-D	3 oz + 0.5 pt	05/01/16
				Roundup Ultra Max II	32 oz	06/28/16
				Interlock	4 oz	06/28/16
rolling 6/8/16				Preference	1 pt	06/28/16
				Ultra Blazer	8 oz	06/28/16
				Roundup Ultra Max II	32 oz	06/28/16
				Cadet- spot spray	0.5 oz	07/15/16
	<u>Planting</u>	<u>Harvest</u>				
Peas	4/30/2016	8/7/2016	150#			05/01/16
<b>Fertilizer</b>						
Corn: 111 lbs nitrogen/acre at planting						
Corn: 45 lbs P/acre, infurrow 2 x 2 as 10-34-0 and 1 pint zinc chelate, (25 lbs and 19.7 lbs)						
Spring wheat: 200 lbs 46-0-0/acre and 50 lbs mezs/acre at planting						
Soybeans: 8 gallons/acre 10-34-0, infurrow 2x2						

Figure 3. Crop Inputs and timing.

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

Month	Precipitation			Average daily temperatures		
	2016	15-year average	25-year average	2016	15-year average	25-year average
	-----inches-----			-----°F-----		
April	2.87	1.56	1.54	43	44	43
May	2.02	3.41	3.11	58	56	56
June	2.58	4.70	4.23	70	67	66
July	5.52	2.85	3.27	73	71	71
August	5.06	2.52	2.28	71	69	69
September	1.02	2.43	2.70	63	61	60
October	3.15	2.13	2.21	50	46	46

Table 2. Growing degree units<sup>1</sup> at the Oakes Irrigation Research Site.

Month	2016	10-year average	15-year average	25-year average
May	366	312	298	306
June	579	512	511	500
July	683	654	654	632
August	640	586	580	581
September	433	389	388	375
Total	2699	2453	2432	2395

<sup>1</sup>Growing 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.

	2016	10-year average	15-year average	25-year average
Last frost in Spring				
32 °F or less	17-May	8-May	8-May	5-May
28 °F or less	14-May	25-Apr	28-Apr	27-Apr
First frost in Fall				
32 °F or less	6-Oct	6-Oct	3-Oct	2-Oct
28 °F or less	7-Oct	12-Oct	9-Oct	8-Oct
Frost free period (days)	142	150	148	149

The above table submitted by Leonard Besemann.



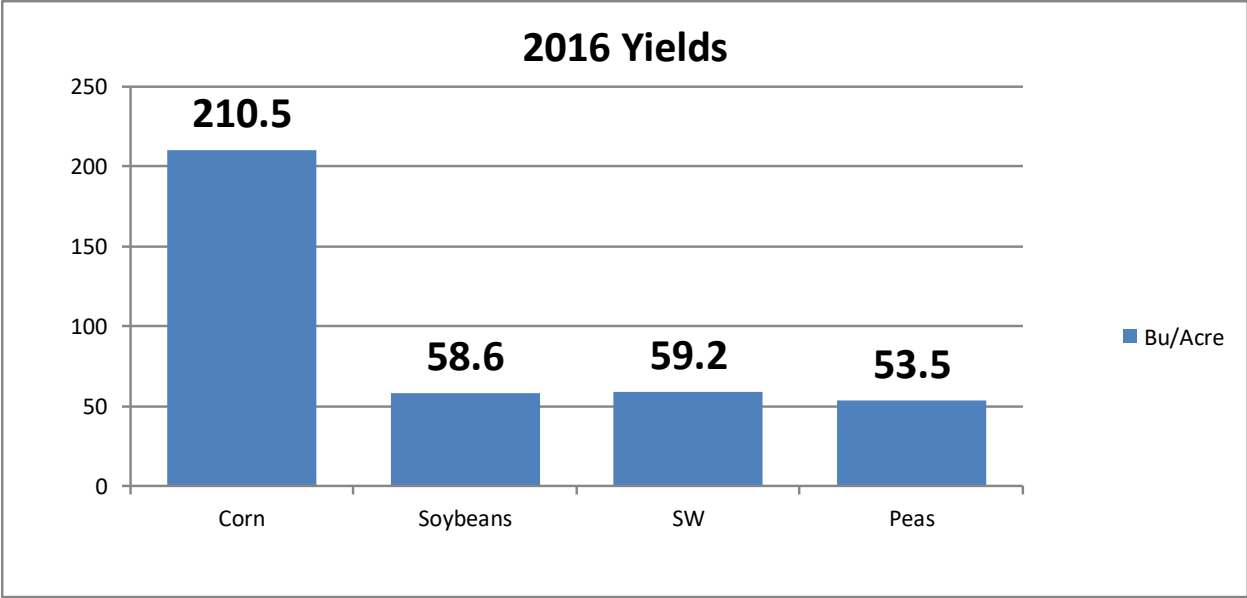


Figure 4. Crop yields at CCSP in 2016.

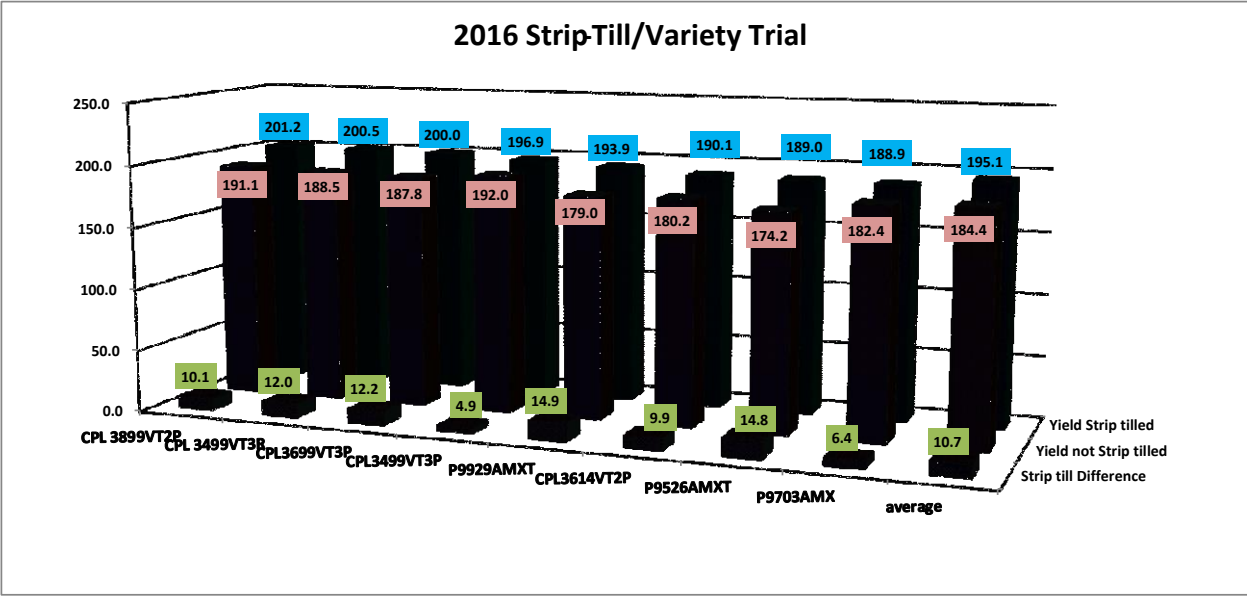
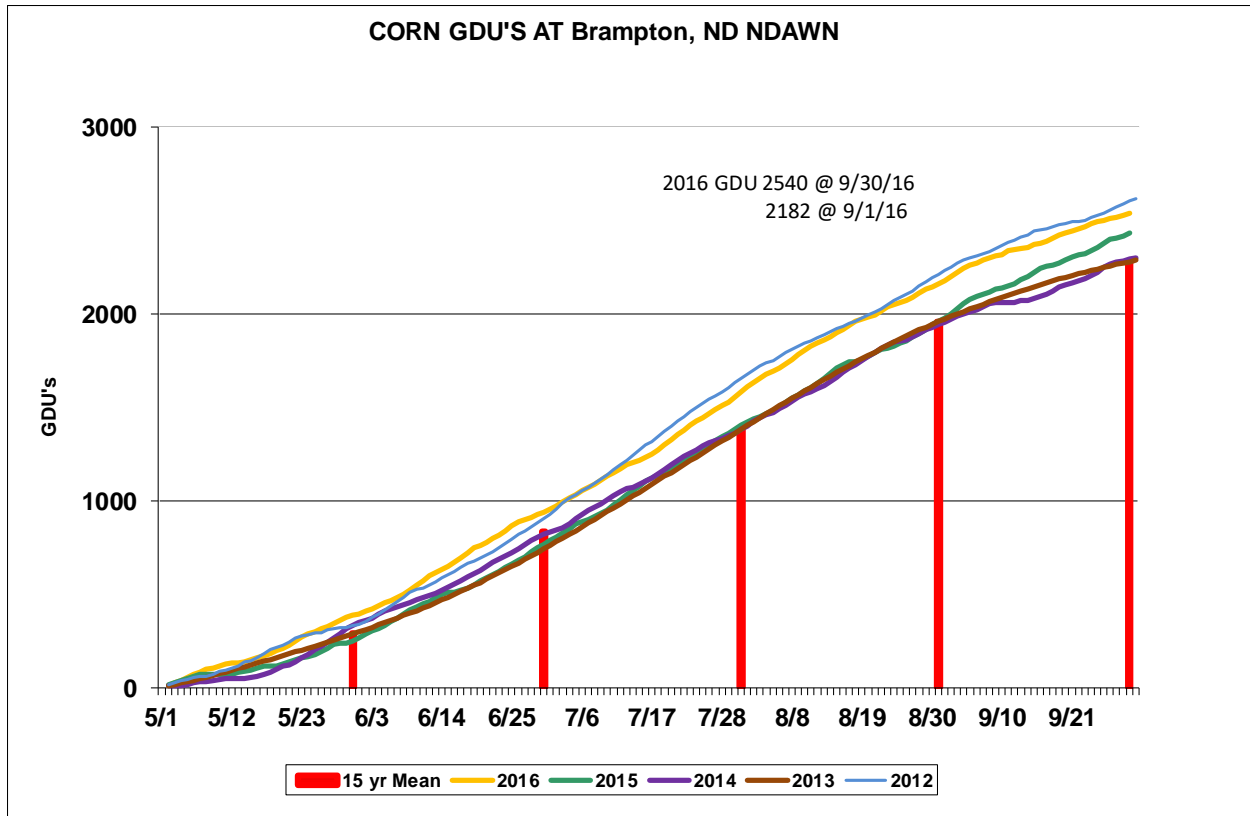


Figure 5.



## Crop and Weather Discussions 2016.

2016 brought yet another year the likes of which I have never seen. It was probably the best year for growing corn and beans I could imagine, and it was still a very good wheat year. Location was still important, as most areas in the state of North Dakota were much wetter. Initially, we had perfect planting conditions. It was dry enough to plant, but there was good moisture. As the spring progressed into May, the topsoil began to dry and planting depths were increased. At CCSP, going to a planting depth of 2.5 inches for corn and close to a 2.0 inch depth on beans did not affect stands. In fact, I think I had the most uniform stands of corn, beans, wheat, and peas ever. Soybean aphids were not a problem. Wheat diseases were held in check by fungicides. When it did rain, we received rather large amounts that came slow enough to soak in nicely. There were no hail or high winds to report this year. Temperature and sunshine were also near perfect although, bad weather was not too far away as a major storm did serious damage 15 miles north. The NDAWN site at Brampton, 11 miles southwest recorded a wind gust in July at 72 mph. In a nutshell, you could say we were lucky, but the luck was rather widespread. Harvest across the area reflected the good growing conditions with large amounts of crop coming into the elevators creating the issue of multiple grain piles on the ground. Both corn and beans have had problems spoiling in the piles at this date in midwinter. Corn, obviously did not suffer from anything as reflected by many field averages, exceeded 200 bushels per acre. So, what can you say when things go right weather wise for a change? Guess I can still complain about market prices.

With good conditions, it seems as if fertility can be a tricky issue to nail down. We were fortunate to have had a research trial that looked at nitrogen and sulfur in both corn and wheat. The trial was initiated by Jasper Teboh of the Carrington Research Extension Center. The results were quite astounding. We picked a good spot for the study, and by that, I mean a nice flat even plot with some of the best soil in the area.

Precision farming has been around for quite a while. Some of the things that have been determined indicate that good soils are more efficient at producing bushels than poor soils. I think the same goes with weather. Good weather adds to the efficiency. It really explains the spots in the fields where yield monitors were insanely high. Again, we are looking at a year where we wonder what information we can take away and trust to use next year.

I must say when referring to weather, how grateful I am for the NDAWN system. For those of you who are not familiar with this weather reporting network, please check out <https://ndawn.ndsu.nodak.edu/>.

I have been told the system will start using an inversion sensor to help with avoiding spray drift. A few of the stations should have this ability this year. Please keep watch as this will be a very valuable tool, especially considering the challenges of Dicamba tolerant soybeans.

## Education and Field Day



**Figure 6.** Jasper Teboh presenting at the 2016 CCSP field day.

In 2016 the outreach of the farm was done by the Wild Rice SCD. They included CCSP on the Cover Crop tour conducted Friday October 7. It was a cold windy day but we had a great group of speakers who went through the highlights of this year's work at the farm. Abbey Wick did the soil pit that was dug in the middle of a full season cover crop. We looked at the airplane broadcast rye flown on to soybeans and corn. We looked at the cover crop seeded into the spring wheat stubble utilizing Fava beans in the mix with several other species. It was noted the frost the previous night had not damaged the Fava beans.

Melissa Geiszler talked about her project involving the planting of cover crops into corn. And finally, Jasper Teboh talked about his corn plots where he looked at various rates of nitrogen and sulfur. I must add the high nitrogen plots in his trial averaged 275 bushels. It was an outstanding corn year!

## Final comments from the Farm Manager.

“It is not the strongest species that survive, nor the most intelligent, but the ones most responsive to change.”

-Charles Darwin

The CCSP farm has seen economic stress as most all other agricultural enterprises. Resilience is the hallmark of survival. Here’s what makes a business resilient:

Low (or zero) outstanding debt.

Low overhead / fixed costs / operating expenses.

Substantial cash reserve for contingencies.

Multiple independent products / industries / lines of business.

Flexible workers / employees that can handle many responsibilities well.

No single points of failure.

Backup systems for all core processes.

The above applies to agriculture as well. We have had a brief period of easy times, where profit was assured, but now we must think, and work for it. When talking about soil health I think these thoughts are all included. As we have talked about so much, the prairie was a system of many organisms functioning in such a manner as to be resilient through the most dynamic weather and climate shifts known on the planet. The mid-continental geographies of North Dakota and Siberia make for both hot and dry, or wet and cold, or hot and wet, and dry and cold! I think when it comes to weather we get it all, with little warning, and never know when it will change. We are assured however that it will change, which is the only forecast that approaches 100% reliability. Soil health means resiliency. If you have a system with healthy soil, it will not be harmed by bad weather. Just look at how good the soil was when people first arrived. It was doing just fine, producing tons of dry matter, protein and meat. The soil was unattended with no inputs, surviving and thriving in a location of weather extremes. This was easily explainable by the topography, soil mineralogy, and precipitation, but most importantly the type of biology present. The diversity of plants, animals and microorganisms allowed for the ability of species to retreat or advance based on changing conditions. In a word “resilient”. If a farming operation is to survive long term, I seriously doubt it could do so without following those same principals. Let’s apply those principals to soil.

*Low debt:* A healthy soil has what it needs in the sense of good structure, high organic matter, good drainage, high diversity of organisms i.e. crop rotations.

*Low overhead:* A healthy soil needs less inputs of fertilizer, weed control, and fungicides. High organic matter is a source of nutrients and also increases water holding capacity, the equivalent of cash reserves.

*Multiple independent products and Flexible workers:* This would certainly reference a diversity of the organisms and nutrients, and the work done by them.

*No single point of failure:* As I mentioned, the prairie survived a multitude of droughts, floods, fires, etc. A resilient farmer will also survive, if the system is followed.

In the modern world we tend to think we are smarter, but our intelligence is focused, not broad-based. Our survival is completely dependent on outside resources of materials, knowledge and ingenuity. At a recent meeting a speaker was discussing the characteristics of Baby Boomers, X generation, Millennials and so forth. We are told the younger generations are more technologically proficient than the older; I beg to differ. My mother told me, how during the introduction of automobiles, it was not uncommon for someone new to driving a “horseless carriage” to say “Whoa” to try to get the car to stop, subsequently crashing into a building, post, tree or whatever. We are currently seeing the use of cars that drive themselves, and for those of us in agriculture, GPS guidance is nothing new in our farm implements. But, does sitting in the “driver’s seat” having a machine you don’t understand do the driving for you make you more technologically adept? Or, have we gone backward to previous tech, riding a mechanical horse that understands “Whoa” and does accordingly. The physics, chemistry, mathematics, electronics, algorithms, production techniques, materials, etc. that go into these devices are only understood by a few people. Just because we know how to use them does not make us any smarter than the person riding the horse was 100 years ago. Let us not get lulled into a false sense of security. We are probably closer to going into a new “Dark Ages” than we would like to believe. Don’t think so? Let’s look at GMOs. In spite of the fact there is no credible evidence of any more danger in eating GMO food than the eating of conventionally bred food, a “non GMO” label is used as a sales promotion. Wine is advertised along with organic food. Alcohol is listed by the American Cancer Association as a substance known to cause cancer in humans. Why would someone pay extra money to buy organic food to avoid crop protection products that may be present, if only in parts per million or billion, then wash it down with something containing a carcinogen in parts per ten? Maybe I was not clear. Wine is roughly 10% by volume alcohol. In order to get the same amount of carcinogen from pesticides as from that from alcohol in one drink, you would probably have to eat several thousand truckloads of the veggies raised non-organically. This is thinking on par with medieval witch hunts and fireside stories of dragons. In a free society, we have choice, which is a privilege we should never, never take for granted. One of the joys of choice is to do things that may or may not always be the best for us. Along with choice comes responsibility. You may like to drink, I may like to drive a motorcycle without wearing a new tech device, called a “helmet”. Whether or not there are laws, there are ALWAYS consequences. Does our use of choice affect only ourselves, or does it influence others in a positive or negative way. If I crash my motorcycle while not wearing a helmet, does the EMT have the choice to walk away saying the dummy would not wear a helmet? Why should he or she help me when I won’t help myself? I don’t think you even need to look at research on whether helmets are a good thing to wear, but it is a matter of choice and I would stand by that choice. However, when I start fabricating data, use bad data, and make false statements that somehow try to show it is actually safer to NOT wear a helmet, then we have a problem. Yes, Science is Science, not witchcraft. Witchcraft can be absolute. Science by definition is never absolute. The science the Wright brothers used did not allow them to build a 747, but it did allow them to do something absolutely amazing. Amazing things have already been accomplished with genetic modification, and much more is to come, barring a return to the dark ages.

[Click here to read a balanced article on pesticide risk.](#)

As always, I want to thank all of those who have contributed time, effort, goods and services, facilities, and cash to our project. Soil and water conservation are about as basic and important to life as we know it, as anything can be. We must never take these things for granted for if we do they will surely be lost.

This quote from Wendel Berry sums up my thoughts:

“The soil is the great connector of lives, the source and destination of all. It is the healer and restorer and resurrector, by which disease passes into health, age into youth, death into life. Without proper care for it, we can have no community, because without proper care for it we can have no life”.

Kelly Cooper, CCSP Farm Manager.

Note: If you would like to read this report electronically, it will be available at [www.notillfarm.org](http://www.notillfarm.org).