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Press Release

FOR IMMEDIATE RELEASE
For the week of June 15, 2008

Six inches, Part I

By Mark Watson
Panhandle No-Till Educator

One of the great attributes of a no till farming system is the ability this type of crop production system provides to manage water. In previous articles I have written about no till farming and managing the moisture Mother Nature provides to produce crops and forage under dry land farming. I feel no till farming practices will allow us to also manage our irrigation water to the best of our abilities and help us conserve this valuable resource.

Throughout the state of Nebraska water is becoming a major issue. Governor Dave Heineman has called water the issue of the decade for the State of Nebraska. Compliance with other states over water management of our rivers and depletion of groundwater in the Ogallala aquifer are major concerns in the management of the state's water. These resources, both surface and groundwater are intertwined in their relationship to one another and management of one affects the other. It is a very complex water system that our Natural Resources Districts and Department of Natural Resources are in charge of managing to meet the demands required by agriculture, recreation, and municipalities across the state.

Agriculture is the primary user of our state's water resource, using 96% of the state's water annually. The burden of conserving this resource while remaining profitable is going to fall directly upon our farmers and ranchers. This is a challenge those of us involved in agriculture should take seriously as the decisions we make now will affect generations to come.

The Ogallala aquifer is slow to recharge with an annual recharge of ½ to 1 inch per year. For every foot we deplete the aquifer, it will take 12-24 years of recharge to fill this depletion. There are areas of the Panhandle, particularly in Box Butte County, where the depletion since the 1970's is over 50 feet. Given the slow recharge rate, the depletion would take 600-1,200 years to fill if irrigation ended today. This is a rather sobering statistic which shows the magnitude of the problem we are facing given our current water usage of the Ogallala aquifer.

Six inches, Part VIII
By Mark Watson
Panhandle No-Till Educator

As we discussed in previous articles, our total soil stored moisture and rainfall during the growing season is as follows; for corn there is 6 inches stored in the soil and 11.02 inches of precipitation during the growing season for a total of 17.02 inches before irrigation. Winter wheat receives 3.92 inches from planting through the dormancy period till March. April-June adds an additional 7.33 inches of precipitation which brings our total precipitation to 11.25 inches. Edible beans have 6 inches stored in the soil, receive 6.75 inches during the growing season, for a total of 12.75 inches.

If we add six inches of irrigation to each crop, the totals would be 23.02 inches of moisture for corn, 17.25 inches for winter wheat, and 18.75 inches for dry edible beans. These are all within the range or above the moisture requirements for these crops under a no till crop production system. We may need to move moisture from a crop that doesn't need the full 6 inches of irrigation, such as the edible beans, and use this water for a corn crop which may not have available moisture during the drier months when it is filling grain. This will allow flexibility to the irrigation season depending on when the rains come and what stage each crop is in during development.

I'm not sure we can attain such the goal of using only six inches of irrigation water during the growing season on average for each pivot, but it is a goal to see how well we can manage water and produce profitable crops. It will be interesting to see how this plays out during the growing season. I will continue to post rainfall totals and irrigation use on our farm during the remainder of the growing season.

No till farming methods are still developing and changing each year. New ideas and new machinery development will keep improving the no till farming systems. As we learn more about our soil and all the intricacies that play a part in the soil's relation to crop production, there will be new developments in managing the quality of our soil.

No till crop production systems will play a key role in managing our water resource. The use of new technologies in soil moisture management, crop variety selections, and irrigation management will all have a significant role as we learn to farm with less water and remain profitable in agriculture.

We got .2 of an inch last week, bringing our total for July to .75 inches, normal is 2.13, so we're 1.38 inches below normal for the month, yearly totals are 6.57 inches, normal is 10.72, so we are 4.15 inches below normal. On our irrigation we put 7.5 inches on the wheat, 4 inches on the corn, and 3 inches on the beans.

Our challenge as irrigated producers is to manage our irrigation to the best of our abilities while remaining profitable. The economies of our towns and cities depend upon agriculture to be profitable. Agriculture in the State of Nebraska is the largest industry in the state. We need a strong agriculture economy while balancing the use of our water so we leave water for generations to come.

This is a daunting task to take on and will require all our resources in research and technology to overcome. This is also a challenge I feel agriculture can handle and remain profitable. I feel no till farming practices will go a long way in helping us meet this challenge. The ability no till farming practices allows us to conserve our irrigation water by slowing soil evaporation from the surface with residue, eliminating tillage practices that dry the soil, and storing more water in the soil with increased organic matter levels. In the next series of articles I plan to show how adoption of a no till farming system can conserve our irrigation water.

I think on our farm growing winter wheat, corn, and dry edible beans I can grow fully irrigated and profitable crops with an average of six inches of irrigation per pivot if we have a normal precipitation year using no till farming practices.

Over the next several articles I will explain how no till crop production systems allow us to better manage the moisture we receive from Mother Nature by capturing and storing this moisture in the soil more efficiently than we can with conventional tillage. No till farming practices also reduce the loss of moisture through soil evaporation. Increasing organic matter content of the soil also improves water infiltration and water holding capacity of the soil.

I will provide updated totals of the rainfall we receive on our farm. I will also track the amount of irrigation water we apply to our crops during the growing season. Depending upon rainfall totals and the timeliness of the rain, we will see how much irrigation is required to produce corn, wheat, and edible beans in a continuous no till crop production system.

I'm submitting this article on June 7, 2008. At this time we have received for the year 4.02 inches of precipitation through the month of May. Our average precipitation for this time would be 5.71 inches, so at the end of May we are running 1.69 inches below normal for the year. We have received 1.4 inches of rain so far in June. Up to this point we have applied three inches of irrigation water to our winter wheat crop. No irrigation has been applied to our corn or dry edible beans.

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In the previous article I talked about the need to manage our groundwater and surface water to the best of our abilities while remaining profitable. As irrigated crop producers, the burden of conserving our water resource is squarely upon our shoulders. I also feel I can raise irrigated corn, winter wheat, and dry edible beans using an average of six inches per pivot of irrigation water growing fully irrigated crops if we have normal precipitation of 15 inches per year.

Over the past four years we have been keeping track of our water use on our farm by monitoring our center pivots. During the years from 2004-2007 we have used on average 8-9 inches per pivot raising winter wheat, corn, and edible beans. These years have been below average in precipitation.

When we look at these crops, the water requirements for corn are 23-25 inches. Winter wheat requires 17-18 inches and dry edible beans require 15-16 inches. These water requirements take into consideration the total amount of transpiration through the plant, along with total soil evaporation. These water requirements are based on conventional tilled soils.

If we look at the soils on our irrigated farm, they are primarily Keith, Hemingford, and Alliance silt clay loam soils. These soils are capable of storing approximately 2.2 inches of moisture on average per foot of soil. Unfortunately, we also have relatively shallow soils, on average somewhere between 18-24 inches deep. Underneath the topsoil layer is a limestone type soil which will store around and inch of moisture per foot of soil. I'll assume that our typical moisture holding capacity of our soil is about 6 inches in a 4 foot soil profile. When looking at the management of water, it is very important that you know the water holding capacity of the soil on your farm. Capacities vary widely when looking at all the different types of soils around the Panhandle of Nebraska.

On our farm we typically plant corn behind our winter wheat crop. If we look at the fallow period between when winter wheat stops using moisture, around early July, to the time when we plant corn in early May, the moisture received on average is 9.37 inches. In an average year we should be able to plant our corn into a soil that has a full soil profile of 6 inches of moisture. (This is also the fallow period where I feel we can utilize a cover crop to produce forage for cattle or cover crops to produce nitrogen and soil organic matter. We receive 3.37 inches of precipitation during this time period that our soils can't store, so we should try to utilize this additional moisture to produce a cover crop or forage.)

Winter wheat is planted directly behind our edible bean crop, so there is a short fallow period from the time the edible beans no longer use moisture to the time the wheat is planted. I will use the September monthly rainfall total of 1.4 inches for our soil moisture at planting. Winter wheat also has a long dormancy period, from October through March, which is an additional 2.52 inches of precipitation, for a total of 3.92 inches of soil moisture.

Edible beans are grown behind our corn crop, so there is a fallow period from October to June for this crop. Our average annual precipitation during this time is 6.88 inches. Our bean crop should be planted into a full soil moisture profile if we receive normal precipitation.

We try to end each irrigation season with a soil profile that is dry throughout the 4 foot soil profile. Obviously, you want to give the crop all the moisture it needs to reach full yield potential. At the same time you want to leave the profile as dry as possible and let Mother Nature replenish the soil moisture for you. If you end the irrigation season with too much moisture in the profile, you will not get the benefits Mother Nature should provide by filling the soil profile for you, thus wasting valuable moisture.

As of the third week of June, 2008 we have received 1.6 inches of rain for the month. Up to this point we have applied 4.5 inches of irrigation water to our winter wheat crop. No irrigation has been applied to our corn or dry edible beans.

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Six inches, Part II

By Mark Watson
Panhandle No-Till Educator

In the previous article I talked about the need to manage our groundwater and surface water to the best of our abilities while remaining profitable. As irrigated crop producers, the burden of conserving our water resource is squarely upon our shoulders. I also feel I can raise irrigated corn, winter wheat, and dry edible beans using an average of six inches per pivot of irrigation water growing fully irrigated crops if we have normal precipitation of 15 inches per year.

Over the past four years we have been keeping track of our water use on our farm by monitoring our center pivots. During the years from 2004-2007 we have used on average 8-9 inches per pivot raising winter wheat, corn, and edible beans. These years have been below average in precipitation.

When we look at these crops, the water requirements for corn are 23-25 inches. Winter wheat requires 17-18 inches and dry edible beans require 15-16 inches. These water requirements take into consideration the total amount of transpiration through the plant, along with total soil evaporation. These water requirements are based on conventional tilled soils.

If we look at the soils on our irrigated farm, they are primarily Keith, Hemingford, and Alliance silt clay loam soils. These soils are capable of storing approximately 2.2 inches of moisture on average per foot of soil. Unfortunately, we also have relatively shallow soils, on average somewhere between 18-24 inches deep. Underneath the topsoil layer is a limestone type soil which will store around and inch of moisture per foot of soil. I'll assume that our typical moisture holding capacity of our soil is about 6 inches in a 4 foot soil profile. When looking at the management of water, it is very important that you know the water holding capacity of the soil on your farm. Capacities vary widely when looking at all the different types of soils around the Panhandle of Nebraska.

On our farm we typically plant corn behind our winter wheat crop. If we look at the fallow period between when winter wheat stops using moisture, around early July, to the time when we plant corn in early May, the moisture received on average is 9.37 inches. In an average year we should be able to plant our corn into a soil that has a full soil profile of 6 inches of moisture. (This is also the fallow period where I feel we can utilize a cover crop to produce forage for cattle or cover crops to produce nitrogen and soil organic matter. We receive 3.37 inches of precipitation during this time period that our soils can't store, so we should try to utilize this additional moisture to produce a cover crop or forage.)

Winter wheat is planted directly behind our edible bean crop, so there is a short fallow period from the time the edible beans no longer use moisture to the time the wheat is planted. I will use the September monthly rainfall total of 1.4 inches for our soil moisture at planting. Winter wheat also has a long dormancy period, from October through March, which is an additional 2.52 inches of precipitation, for a total of 3.92 inches of soil moisture.

Edible beans are grown behind our corn crop, so there is a fallow period from October to June for this crop. Our average annual precipitation during this time is 6.88 inches. Our bean crop should be planted into a full soil moisture profile if we receive normal precipitation.

We try to end each irrigation season with a soil profile that is dry throughout the 4 foot soil profile. Obviously, you want to give the crop all the moisture it needs to reach full yield potential. At the same time you want to leave the profile as dry as possible and let Mother Nature replenish the soil moisture for you. If you end the irrigation season with too much moisture in the profile, you will not get the benefits Mother Nature should provide by filling the soil profile for you, thus wasting valuable moisture.

As of the third week of June, 2008 we have received 1.6 inches of rain for the month. Up to this point we have applied 4.5 inches of irrigation water to our winter wheat crop. No irrigation has been applied to our corn or dry edible beans.

Six inches, Part III

By Mark Watson
Panhandle No-Till Educator

In my last article I discussed soil moisture in a four foot soil profile. I also pointed out that we receive enough moisture during the fallow periods for corn and dry edible beans to fill the soil profile to a depth of four feet, holding approximately six inches of moisture given the moisture holding capacities of our soil. During the long dormant period for winter wheat from October to April, we receive 2.52 inches of moisture in addition to the 1.4 inches of moisture during September for a total of 3.92 inches.

I also feel it is very important to try to end each irrigation season with as little moisture as possible in your four foot soil profile. If you leave excess moisture in the soil profile, this will be moisture wasted as the precipitation received during the fallow period will be lost through the soil profile due to the excess moisture.

If we look at our total water requirement for corn of 23-25 inches per year, how can we fill this transpiration and evaporation requirement in our semi-arid environment? We can start our growing season off with a full soil profile of six inches of moisture. Add to this is the precipitation received during the growing season from May to September. The average precipitation received during this time is 11.02 inches. This brings our total moisture from the soil stored and rainfall to 17.02 inches.

For the winter wheat crop we have the moisture from September through March, the length of the crop establishment and dormancy period, of 3.92 inches. During the growing season from April until the end of June we receive 7.33 inches of moisture. This brings our total moisture from the time of planting through the growing season to 11.25 inches. Our crop moisture requirement for winter wheat is 17-18 total inches.

The dry edible bean crop moisture requirement is 15-16 inches. We should plant into a full soil profile of six inches of moisture stored in the soil. During the growing season from June until the end of August we receive on average 6.75 inches of moisture. This brings our total moisture for the bean crop to 12.75 inches.

If we add our six inches of irrigation to these crops, our total moisture for the crops including soil moisture stored, precipitation from Mother Nature, and our irrigation is 23.02 inches for the corn, 17.25 inches for the winter wheat, and 18.75 inches for the dry edible beans. All of these totals are within the total evaporation and transpiration requirements for the individual crops and in the case of the dry edible beans actually exceeds the moisture requirements.

I feel our goal of using six inches on average per center pivot is attainable under a continuous no till farming production system. I also feel it is critical for the irrigated producers in our area to strive to reduce their pumping requirements to produce profitable crops in our area. We simply don't have the water resource to use any more water than what is required to produce a profitable crop. So how do we achieve such a loft goal of reducing our water consumption to six inches per center pivot? In the upcoming series of articles I will explain how I feel no till crop production farming system can achieve this goal of six inches per pivot in an average year of precipitation.

As of the June 25 we have received 1.8 inches of rain for the month. Up to this point we have applied six inches of irrigation water to our winter wheat crop. No irrigation has been applied to our corn or dry edible beans.

Six inches, Part IV

By Mark Watson
Panhandle No-Till Educator

How are we going to get by with six inches of irrigation water per center pivot raising winter wheat, corn, and dry edible beans? The first place to start is adopting a continuous no till crop production system for our farming practices. Our irrigated farm has been in continuous no till since 1994. No till crop production systems allow us to store and manage all the moisture we receive. We do this by utilizing the previous crops residue to reduce soil evaporation, increase water infiltration into the soil, and increase the water holding capacity of the soil. Increasing the amount of organic matter in the soil and the overall health of the soil is critical to improved water management. Soil structure also improves allowing for the infiltration of the moisture through the soil profile.

The first place to start saving moisture in the soil is to eliminate tillage practices under a no till crop production system. The University of Nebraska has research which shows a loss of a half to one inch of soil moisture each time a tillage operation is performed. The amount of moisture loss depends upon the severity of the tillage operation. In conventional tilled soils there may be a loss of two inches of soil moisture with three to four tillage operations while trying to build a seedbed. Subsequent cultivations during the growing season will also deplete soil moisture. With no till crop production systems this moisture loss is eliminated, thus storing the moisture in the soil for crop production.

I stated in a previous article the water requirements for corn, winter wheat, and dry edible beans as follows: corn 23-25 inches of water, winter wheat 17-18 inches, and dry edible beans 15-16 inches. These water requirements are based on the transpiration of water through the plant and the soil evaporation which occurs during the growing season. These water requirements are based on a conventionally tilled soil.

With a continuous no till crop production system we are able to eliminate some of the soil evaporation which occurs during the year by leaving the previous crops residues on the surface. The University of Nebraska studied this soil evaporation loss under irrigation in a two year study done at the North Platte research center. Under irrigation with no residue on the soil surface compared to soil with residue on the surface there was an average of almost six inches more soil evaporation during the irrigation season where there was no residue on the soil's surface.

The study was also done comparing the two soil surfaces under a crop canopy. Even with the crop canopy to shade the soil surface, the soil with no residue had three inches more soil evaporation compared to the soil with residue covering the surface. Our soils are not protected by a crop canopy during most of the year and soil evaporation occurs even during the winter months. With no till crop production systems we leave the previous crop's residue on the surface, thus lowering the amount of soil moisture evaporation throughout the year. This reduction in soil moisture evaporation leads me to believe we can actually lower the water requirements for the crops we are producing. I'm going to estimate we can lower the crop water requirements by an average of three inches. This will bring our water requirements for corn down to 20-22 inches, winter wheat to 14-15 inches, and edible beans to 12-13 inches of moisture.

Residue left on the soil's surface goes a long way in helping reduce the amount of irrigation required to produce crops in our area. The value of this residue is overlooked until you adopt a no till crop production system into your farming operation. This residue also provides other benefits which I will discuss in the next issue.

We received 1.8 inches of rain in June, 1.08 below normal. This brings our total precipitation for the year to 5.82 inches, with normal being 8.59 inches. We are currently 2.77 inches below normal. For the time period of October to June our normal precipitation is 9.85 inches, and we are at 7.31 or 2.54 inches below normal. The October to June is really the moisture we work with in crop production. Up to this point we have applied 6.75 inches to the winter wheat and 0 to the beans and corn. We may need to water the corn before to long, but as of this writing we haven't applied any yet.

Six inches, Part V

By Mark Watson
Panhandle No-Till Educator

Residue plays an important role in reducing water requirements for irrigation in our semi-arid environment. In the previous article I wrote about the value of residue in reducing the amount of soil moisture evaporation which occurs during the growing season and throughout the year. I estimate the residue left of the soil's surface will reduce evaporation by at least three inches which is a large amount of soil moisture savings. The elimination of tillage also saves valuable soil moisture. This is a significant amount of moisture we can save in our semi-arid environment by adopting a no till crop production system for our irrigated farming operations. The need for reducing irrigation in our crop production practices is very important so we can conserve our valuable water resource

Residue left on the soil surface also provides a layer of protection for the soil. This plays a significant role in water infiltration into the soil. A soil surface which is left bare is subject to severe soil surface degradation. The soil particles which bond to stabilize the soil are known as soil aggregates. These aggregates allow water to penetrate the soil surface by providing open pores which the water can move through. You can visualize the soil aggregates as acting like a sponge on the soil's surface. Tillage, along with rain droplets or irrigation from center pivots can actually crush these soil aggregates. Once this breakdown occurs, water is unable to penetrate the soil surface and a crust is formed which allows the water to run off the field. The previous crop's residue will protect these soil aggregates by breaking up the droplets before they hit the soil surface. This will allow rainfall and irrigation water to penetrate the soil surface and allow the rain or irrigation water to flow into the soil profile.

Another attribute of no till crop production systems is it allows producers to increase the amount of organic matter in the soil. There are many benefits to increasing the organic matter content of soil. Increased organic matter increases nutrient availability to the crops, increases the amount and diversity of soil microorganisms and feeds these organisms, lowers soil pH, and increases cation exchange capacity in the soil.

When it comes to water management of the soil, increasing the organic matter content of the soil will increase the water holding capacity of the soil. A 1% increase in the organic matter content of the soil will increase the water holding capacity of the soil by as much as a half inch. Most of the increase will occur in the top one foot layer of the soil, but this is a significant increase in the water holding capacity of the soil. If we can increase the amount of water our soils will store by a half to one inch of moisture, this is a significant increase when we are talking about soils that will only hold four to six inches of moisture to start with.

The benefits of adopting no till crop production systems on irrigated crop production acres are significant. The value of leaving residue on the soil surface to protect the soil's surface is immense. Producers will see significantly less water is required to produce their crops as they adopt more continuous no till crop production systems on their farms. This water savings will go a long way in solving some of our water management challenges as we learn to adapt to farming with less water.

As of July 8, we have had no rain so we are running at 5.82 inches for the year and 2.77 inches below normal. We have put 7.5 inches on the winter wheat, 1.5 inches on the corn, and .75 inches on the beans with irrigation.

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Six inches, Part VI

By Mark Watson
Panhandle No-Till Educator

I have shown how no till crop production systems can help conserve our valuable surface and groundwater resources with improved water management in producing crops. No till farming practices utilize the previous crops residue to protect the soil's surface and reduce soil moisture evaporation. The residue also improves water infiltration into the soil by protecting the soil aggregates from rain and irrigation droplets. Improved soil structure allows the moisture to infiltrate into the soil profile where it can be stored. Increasing soil organic matter actually increases the water holding capacity of the soil, allowing us to store more water in the soil profile. These changes to the soil take time to develop, but once developed will remain a part of the soil's characteristic as long as tillage is avoided. Tillage is a catastrophic event to the soil.

There is another technology we are using on our farm to help us better manage our soil moisture. We are now using soil moisture sensors on all our center pivots to help us better monitor our soil moisture. Soil moisture sensors are placed at varying depths in the soil profile. On our farm we placed sensors at depths of one, two, three, and four foot deep in the soil profile. These sensors are glued to pvc pipe and are placed in the soil at the varying depths. The sensors will be pulled at the end of the irrigation season and placed in storage to be used again the following year.

The soil moisture sensors are connected by wire to a monitor which is placed outside the field. We placed the soil sensors approximately 150 feet into the field, being sure to get the sensors inside the outside tires of the center pivots. The sensors were placed in an area of the field which represents the majority of the field as far as slope and soil type.

The moisture sensors send a reading to the monitor on regular intervals throughout the day. The monitor reads the moisture sensors in centibars, which is a moisture tension reading. The lower the centibar reading, the more moisture in the soil. For our soils a centibar reading around 33 indicates our soils are at field capacity for moisture. As the soil becomes drier, the centibar readings increase. We use these readings to help us determine when to irrigate our crops based upon the moisture available in the soil profile and the stage of development the crop is in.

We also try to monitor the deeper moisture in the soil profile in the third and fourth foot depth of the soil profile. This is the moisture in the profile we want to make sure the crop uses. If the centibar readings at these depths don't increase during the growing season, we are overwatering the crop and not utilizing the deeper soil moisture for crop development. These depths are also critical that you deplete by the end of the growing season so you have room in your soil profile to store more moisture during the fallow period between crops.

We also use this monitoring system to try and maintain a soil profile that has room to store moisture if we get an inch or two of rainfall during the growing season. If you have the soil profile at field capacity throughout the four foot soil profile, you won't have room to store the moisture Mother Nature may provide and not be able to utilize the "free moisture".

We have found these sensors to be a reliable way for us to monitor the soil moisture on our farm. It takes a while to get used to using them and determining the centibar readings for your soil type. We would take centibar readings from the monitor, then probe the soil at the depth of the reading to get a feel for how wet the soil is at a reading of say 40 centibars. Once we developed a feel for how wet the soil was at certain readings, we were able to check the monitor instead of probe the soil to determine when to irrigate.

The University of Nebraska is also developing a calculator where you can enter your soil type and centibar readings and the calculator will determine how many inches of moisture are available in your soil profile. We found at the end of the irrigation season when you attempt to determine whether to apply another inch to the crop that this was very useful information. Last year we were able to determine in early September that our corn crop had three inches of available moisture in the soil profile. We decided this was enough moisture to finish the crop, so were able to shut the pivot off for the year.

These monitors are relatively inexpensive, costing about $450.00 per center pivot. If you are able to save yourself one inch of irrigation during the first season you install them, they will more than pay for themselves. You will be able to reuse the sensors for years to come. After the sensors are glued to the pvc pipe, you can install the entire system in less than an hour.

At this point we have irrigated the winter wheat with 7.5 inches and are done watering the wheat. We have applied 2.5 inches to the corn, and 1.5 to the edible beans. We also received .3 of an inch, so our totals for July are .3 and brings our yearly total to 6.12 inches and 3.5 inches below normal.

Six inches, Part VII
By Mark Watson
Panhandle No-Till Educator

So how are we going to fully irrigate corn, winter wheat, and edible beans with a total of six inches per pivot per year in our semi-arid environment? We're going to start by not wasting any water!

Tillage, lack of residue protecting the soil surface, poor water infiltration, poor soil structure all lead to poor water storage in the soil. As we adopt more continuous no till crop production systems into our farming operations, these problems will go away. We will begin to capture and store all the moisture Mother Nature supplies us and use this moisture for crop production. Our irrigation water efficiency will improve because the water will enter the soil rather than move to the low spots in the field due to crusting of the soil surface which produces runoff in the field. We can reduce soil moisture evaporation by leaving the residue on the soil surface.

Use of the soil moisture sensors will enable us to better manage the moisture in our soils. This will help to avoid overwatering of the crop. By depleting the soil profile by the end of the irrigation season we will use the moisture Mother Nature provides to replenish to moisture to the soil profile. By leaving the soil moisture profile relatively empty at the end of the irrigation season we can also avoid excess moisture carrying nutrients out of the soil profile and leaching them into our surface and groundwater.

The University of Nebraska researchers are also actively involved in researching the timeliness of irrigation. There may be stages in crop development where we can have crop stress due to lack of moisture and still maintain high yields. Reducing irrigation during these times will not cause yield loss and may also cut down on the amount of irrigation water we pump.

I realize there are a lot of variables in irrigation management which we need to overcome. We go through prolonged dry spells in this area where we need to irrigate around the clock it seems. There will be times during the drought where six inches of moisture per pivot may be unattainable. We have been getting by with eight-to-nine inches per pivot during these dry years.

If we look at our total crop requirements under no till crop production systems I think we can lower the requirements from the conventional tilled soils. I am going to assume we can lower this total requirement by three inches per crop. For corn this would mean a total moisture requirement of 20-22 inches, winter wheat would be 14-15 inches, and dry edible beans would be 12-13 inches.

Up to this point we have irrigated the winter wheat with 7.5 inches, the corn with 2.5 inches and the edible beans with 2.25 inches. We have received .55 inches of rain so far in July, which brings our total for the year to 6.37. Normal rainfall for July is 2.13 inches. At the end of July our normal rainfall on average is 10.72 inches, so we are running about 4.35 inches below normal with about 1 week left in July to catch up.