

Minnesota Irrigator

PUBLICATION OF THE IRRIGATORS ASSOCIATION OF MINNESOTA **SPRING 2017**

Comments by the IAM President



Dear Irrigators,

It has been a busy start to the year for the Irrigators Association. We have introduced a bill in the legislature; HF 1387 and SF 1290. This bill has language dealing with calcareous fens and permit transfers. It also includes language that requires the DNR to do an economic impact study before making a change to a management plan for appropriating water. Another section in the bill will require that anyone who has been denied or issued a reduced or restricted groundwater use permit from the original request, be given all information used in making the determination. Lastly, there is language to help clarify the responsibility of an irrigator in well interference cases.

The House and Senate versions of the bill differ slightly so they will go to a conference committee and then be added to the Environment and Natural Resources Policy and Finance bill. What we have added for changes in these bills is nothing drastic so I am hoping for a favorable outcome.

The Irrigators Association had a day on the hill, at the state capitol, on March 2nd. Approximately 40 irrigators came to the capitol and had the opportunity to visit with about 20 legislators that stopped by to discuss irrigation issues. We talked about calcareous fens, trout streams, and the buffer law. In addition to irrigation issues, we also discussed

PRESIDENT continued on page 9

2016 Minimum Irrigation Study in Bonanza Valley near Westport

Josh Stamper, Jeppe Kjaersgaard, Dan Langseth

Josh Stamper, former University of Minnesota Extension Irrigation Specialist, initiated a study in 2016 to document the yield impacts of reduced irrigation applications and plant populations in corn at the Rosholt Farm located at Westport, MN. The study was designed to address concerns brought up during several Groundwater Management Area meetings in 2015-2016 – about groundwater pumping for irrigation. Deficit irrigation was suggested as a strategy to reduce water withdrawals in the Bonanza Valley Groundwater Management Area. This study represents an initial step in moving toward true deficit irrigation by using ‘minimum’ irrigation practices – restrict water application at different levels throughout the growing season.

In addition, the study was designed to address the following long-term questions:

- What are the yield impacts in corn experiencing different levels of water stress, and specifically, what is an inch of water worth?
- Does reduced irrigation force the crop to pursue water deeper in the soil? (Would it improve water use efficiency?)
- Could reducing plant populations stabilize yield in periods of water stress?



Arvilla is the dominant soil type found on the Rosholt Farm. Arvilla soils total over 120,000 acres in the Bonanza Valley, most of which are irrigated, making the Rosholt Farm a pertinent and fitting location for the study. A side objective of the study was to gain a better understanding of the relationship between rooting depth and water use in these stratified soils. Three levels of irrigation were imposed:

- 100% Full Irrigation Treatment (irrigated according to the checkbook with minor adjustments)
- 75% Full Irrigation Treatment (skip 1 out 4 irrigations)
- 50% Full Irrigation Treatment (skip 2 consecutive irrigations out of 4)

A 97-day drought tolerant corn hybrid was selected for the study. The plant populations were:

- 20,000 seeds per acre
- 30,000 seeds per acre
- 40,000 seeds per acre

STUDY continued on page 4

NRCS Environmental Quality Incentives Program

Trying to Keep Pace with New Irrigation Technology

Brad Wenz, Stearns County Soil and Water Conservation District, April 4, 2017

The USDA Natural Resources Conservation Service (NRCS) and local Soil and Water Conservation Districts (SWCD) are committed to offering technical and financial assistance to producers who want to apply sound irrigation water and energy conservation technology. However, it has been a challenge for these agencies to keep up with the constant advances in this technology being offered to producers today.

NRCS has recently added more options to the Environmental Quality Incentive Program (EQIP) payment schedule to help irrigators improve the efficiency of their systems. The following is my attempt to categorize the wide array of irrigation related funding assistance available through EQIP. Please remember that this information is based on EQIP 2017 which is currently fully obligated for this year. The best chance that producers have for EQIP assistance would be through the 2018 program. Producers can apply for EQIP 2018 at any time, but they must apply before the application deadline to be considered. Unfortunately, NRCS has not announced this deadline date yet but they expect it to be sometime this summer or early fall.

PRECISION IRRIGATION

Practice 442 – Sprinkler System, has traditionally been used to convert high pressure center pivots to low pressure. Applicants can receive funding for sprinkler packages, drop tubes, and pressure regulators when existing high pressure pivots are converted to low pressure. The base payment rate in 2017 was \$4.08 per linear foot of the machine. The “base” payment rates listed here are the lowest rates. The payment rates on most EQIP practices could be higher depending on the eligibility status of the applicant or other initiatives. A major addition was made to this practice in 2016 when NRCS added funding for VRI (Variable Rate Irrigation). Under this scenario the producer would renovate an existing pivot by adding GPS (global positioning system) and control panel updates

NRCS continued on page 12

Welcome to the Spring 2017 Newsletter



Jerry Wright, IAM Membership Secretary

Wish you all a safe startup this spring. This newsletter comes to you thanks to the support of the enclosed advertisers, current IAM irrigators & industry membership and those Extra Mile Supporters listed.

Directors on the IAM Board welcome and encourage you to become a member if you have not already joined. We all benefit by each other's ideas, experiences and support to continue the IAM activities in the new year including keeping a watchful eye on **MN Irrigation Water Rights**; telling

personal stories about benefits of irrigation with **Legislators** as well as represent the interests of irrigation practices across the state.

To renew your membership or become a member, return the application form included on the last page of this newsletter. There are many benefits in belonging to IAM with the best one being simply knowing that you have joined in partnership with your neighboring irrigators in supporting your IAM officers and the board of directors' legislative and agency contact activities. As a member, you can also be placed on the IAM email alert list if you submit your email address.

If you are not interested in receiving future newsletters from Irrigators Association of Minnesota (IAM), “please send a note to wrightsj@charter.net or IAM, 24 S. Edquist St., Appleton, MN 56208

If you have a topic that you would like to see discussed in a future issue, drop a note to IAM president, Alan Peterson at alpetefarm@frontiernet.net. Articles for the newsletter are solicited and gathered by the IAM officers and Membership Secretary Jerry Wright whom can be contacted at: wrightsj@charter.net. Crow River Press in Hutchinson manages the advertiser space and edits, prints and mails the newsletter.

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Spring Awakening Summer Plans

By: Hannah Barrett

The signs of life are starting to re-emerge. Grass begins to slide its tender, green spears through the soil. Robins and blue-birds begin to trill their songs in the cool, refreshing spring mornings awash in the rosy hues of dawn. My personal favorite is the newborn animals on the farm. Watching baby calves as they bounce across the pastures, is always a favorite pastime in the spring.

Spring at the Ag and Energy Center has been slow in awakening. Low commodity prices and changes in political leadership have caused careful forethought in 2017 growing season plans. In recent months, plans have begun to form and solidify. Areas of interest in research this year are nitrogen management through timing of applications, in-furrow seed applications, and cover crop research.

Nitrogen management continues to be a topic of interest. Staples is unique in the fact that the soils are coarse textured, sandy soils primarily under irrigation. Leaching becomes an issue in this type of situation. This year a research project that we plan to implement is varying starter fertilizer application amounts. The typical amount of N that is applied is around 35 units. It was suggested to us by an area agronomist that we should try decreasing the amount of nitrogen to 10 units in the starter fertilizer. His reasoning behind this was that there is no live active roots in the soil at the time of application making that first pre-plant application vulnerable to leaching. By decreasing the amount of starter fertilizer and increasing the amount



applied when there are active roots in the soil, we hope to decrease nitrogen leaching potential, while still maintaining yields.

In-furrow seed applications is another area of interest as we received a Specialty Crop Grant from the Minnesota Department of Agriculture to test the effects of in-furrow applications of fertilizer and fungicide on dark red kidney beans. The in-furrow application consists of Aventine Complete, Headline, and a combination of the two to determine effects of these applications on yield. Top dress applications of nitrogen will also be examined in this trial.

Cover crop research continues to remain a headline in research at the Ag and Energy Center as well. The plan this year is to

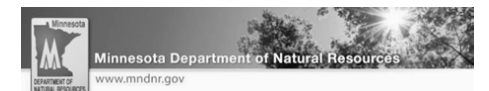
look at the procedures to establish a cover crop in a corn stand to keep a living cover of armor on the soil all year round even through harvest and to look at the economic feasibility of rotational grazing across this stand once established. The thought is to compare a control with no cover crop established to two different treatments of a cover crop established at V4 and V6. The goal is to apply the seed with the top dress applications at these corn growing stages. The cover crop species that will be floated on will be annual rye grass as it is more tolerant to shade. Effects of yield will be determined as well as forage biomass for grazing.

My goal this year is to post the results of the research projects on our updated website with help from the CLC staff. Another way to obtain results from these studies is through our annual field day which will be held Friday, August 25, 2017. Hope to see you there!

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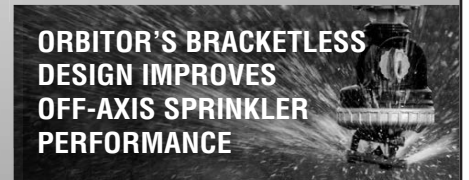
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The research plots were established as a randomized complete split-plot arrangement with irrigation being main plot effect and population being split plot effect with three replications, resulting in 27 plots total. The corn was planted at 42K, and hand thinned to 40k, 30k and 20k plants per acre. Volumetric water content (VWC) information was collected weekly using a neutron probe and a FieldScout TDR soil moisture meter.

The 2016 growing season at Rosholt Farm was wetter than average and had several timely rains and severe water stress did not occur, **Figure 1**. The irrigation application for the 100% treatment totaled 4.2 inches. Because of the rains, the expected negative impact of reducing the irrigation application rates on the yield was relatively small and statistically non-significant, Table 1. On the other hand, there was a strong correlation between population densities and yield. The study is intended to continue for several years. Other preliminary results from 2016 indicate that:

Defined periods of limited rainfall allowed the irrigation treatment regime to be imposed twice in 2016 - at the end of June and early of August.

There was no statistical difference in volumetric water content below 18 inches, which may indicate the effective rooting depth assumptions made for corn (3 feet) for irrigation scheduling may be overestimated.

Did not show significantly more water use

from deeper in the soil profile between the treatments – crop did not use water from deeper in the soil profile under minimum irrigation.

WHAT'S AHEAD?

Continue the study in 2017 to gain another year of data collection

Install soil moisture monitoring equipment and rain gauges to provide additional water balance data.

Figure 1. Rainfall and irrigation for the plots receiving 100% irrigation treatments at the Rosholt Farm during 2016. The depletion levels shows the soil moisture content in inches for the plots receiving 100%, 75% and 50% of full irrigation treatment, respectively assuming a three-foot root zone and a 3.8" soil water holding capacity. A soil water content below the 45% depletion threshold indicates beginning water stress.

Table 1. Effect of irrigation rate on corn yield at the Rosholt Farm during 2016. Same letters in the column Stat Diff indicate no statistical difference in yield among the irrigation treatments.

Table 2. Effect of plant population on yield at the Rosholt Farm during 2016. The different letters in the column 'Stat Diff' indicate a statistical difference in yield among the population treatments.

Table 3. Irrigation application for the yield vs. plant population vs. irrigation application study at the Rosholt Farm. (Information provided by Joshua Stamper)

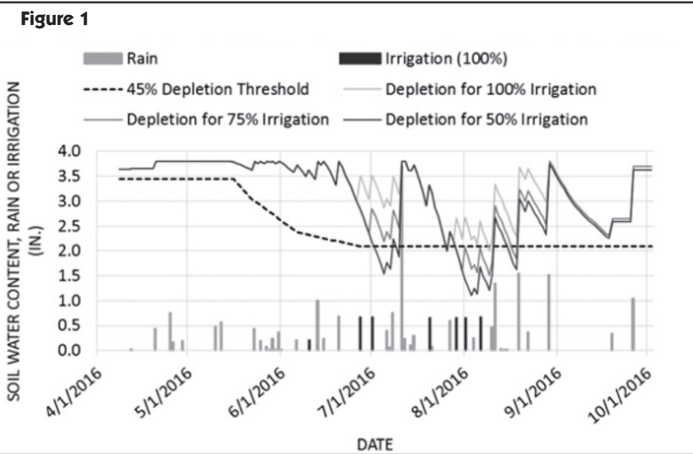


Table 1

Irrigation Tmt (%)	Population (x1,000)	Yield (bu/ac) @ 15.5%	Ave Yield	Stat Diff
50%	20	218.03	228.37	A
50%	30	220.42		
50%	40	246.65		
75%	20	211.83	231.77	A
75%	30	241.94		
75%	40	241.54		
100%	20	219.75	242.09	A
100%	30	241.16		
100%	40	265.36		

Table 2

Irrigation Tmt (%)	Population (x1,000)	Yield (bu/ac) @ 15.5%	Ave Yield	Stat Diff	Gross Income (\$3 corn)
50%	20	218.03	216.54	C	\$649.61
75%	20	211.83			
100%	20	219.75			
50%	30	220.42	234.51	B	\$703.52
75%	30	241.94			
100%	30	241.16			
50%	40	246.65	251.18	A	\$753.55
75%	40	241.54			
100%	40	265.36			

Table 3

Date	100%	75%	50%	Depth of Irrigation (in.)*
June 10, 2016	Irrigated	Irrigated	Irrigated	0.21**
June 27, 2016	Irrigated	Not Irrigated	Not Irrigated	0.67
July 1, 2016	Irrigated	Irrigated	Not Irrigated	0.67
July 20, 2016	Irrigated	Irrigated	Irrigated	0.65
July 29, 2016	Irrigated	Not Irrigated	Not Irrigated	0.65
August 2, 2016	Irrigated	Irrigated	Not Irrigated	0.65
August 6, 2016	Irrigated	Irrigated	Irrigated	0.66

The Irrigation Study is supported by Pope SWCD, Stearns SWCD, CHS Prairie Lakes, the University of Minnesota and the Minnesota Department of Agriculture.



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CATION EXCHANGE CAPACITY AND NITROGEN RATES

Dr. George Rehm, retired U of M Extension Soil Scientist @ rehmx001@umn.edu

It seems that each year there is a promotion for a bogus concept that relates to soil fertility and/or fertilizer use. This year is no exception. This year, there have been several questions about the Cation Exchange Capacity (CEC) of soils and their ability to hold applied nitrogen. There have also been claims that CEC can be used in making fertilizer recommendations. This is wrong! In order to understand some of the claims, an explanation of some fundamental principles is needed.

In soils, the clay size particles and soil organic matter exhibit a negative electrical charge. Since opposite electrical charges attract each other, these negatively charged soil components attract and hold against leaching hydrogen (H^+), and the positively charged plant nutrients. These are: ammonium (NH_4^+), potassium (K^+), calcium (Ca^{++}), magnesium (Mg^{++}) and the micronutrients. These nutrients are held against and, except for ammonium, can be easily absorbed by plants.

The CEC of soils is a fixed property that does not change. So, for anyone interested in this property, it is necessary to measure only once. This may be a useful piece of information if, for some reason, it is helpful to know soil texture such as in irrigation scheduling.

Since the clay content of soils varies with soil texture, the CEC varies with soil

texture. For example, the CEC of a sandy loam is in the range of 8 to 10 millequivalents/ 100 grams of soil. The millequivalents/ 100 grams is the unit of measure for CEC. By contrast, the CEC of a silty clay loam soil is in the range of 25 to 30 millequivalents /100 grams.

Now, let's consider the lack of any relationship between CEC and rate of nitrogen fertilizer needed for crop production. It's important to understand that all forms of nitrogen added to soil must first be converted to nitrate-nitrogen (NO_3-N) before they can be used by the growing crop. This includes the ammonium-nitrogen held on the clay particles. However, all of the ammonium-nitrogen held on the clay particle is not converted to nitrate-nitrogen. This conversion depends on such factors as soil temperature and soil moisture. In other words, there is no fixed rate of conversion. So, even though the amount of ammonium-nitrogen held on the clay particles can be measured, there is no way to predict the amount of nitrogen that can come from this ammonium. Therefore, there can be no relationship between the amount of ammonium-nitrogen on the exchange sites in soils and nitrogen fertilizer recommendations. In addition, since there is no relationship between CEC and the amount of nitrate-nitrogen formed from the ammonium on the negative sites, the CEC cannot be used

to predict the amount of nitrate-nitrogen leaching through soils.

Looking at a lot of the unbiased, independent research, there is none that supports the claims that relate nitrogen rates and leaching of nitrate-nitrogen to CEC. It is wrong to think that this relationship exists.

In Minnesota, nitrogen fertilizer recommendations for corn production are based on the combination of the cost of a pound of nitrogen and the value of a bushel of corn giving credit to a previous legume crop and a measure of residual nitrate-

nitrogen at a depth of 0 to 24 inches. **These recommendations are published in University of Minnesota Extension bulletins.** With the current commodity prices, there is a much more economical approach to nitrogen recommendations other than CEC.

SOILS & FERTILITY related publications found at the University of Minnesota Extension website, <http://www.extension.umn.edu/>




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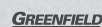
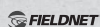
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IRRIGATED ACREAGE CONTINUES TO GROW

The Minnesota DNR water appropriation data base as of 10th of January 2017 indicates that there are 6,200 registered irrigation ag/hort related permits within 79 counties containing a total of 766,275 permitted acres. Adjacent graph shows growth trend since 1970.



The January 2017 permitted acreage split ups into 721,490 acres for major ag crops; 10,663 acres' sod; 3,583 acre's nursery; 669 acres orchard; and 29,870 acres wild rice.

The top 16 counties with permitted acres includes: Otter Tail (99,563), Dakota (67,529), Stearns (64,557), Pope (56,294) Sherburne (44,984), Swift (42,236), Morrison (35,301), Wadena (31,549), Hubbard (25,387), Todd (24,039), Stevens (22,249), Becker (19,099), Benton (18,712), Kandiyohi (16,093), Meeker (9,953) and Mower (9,762)

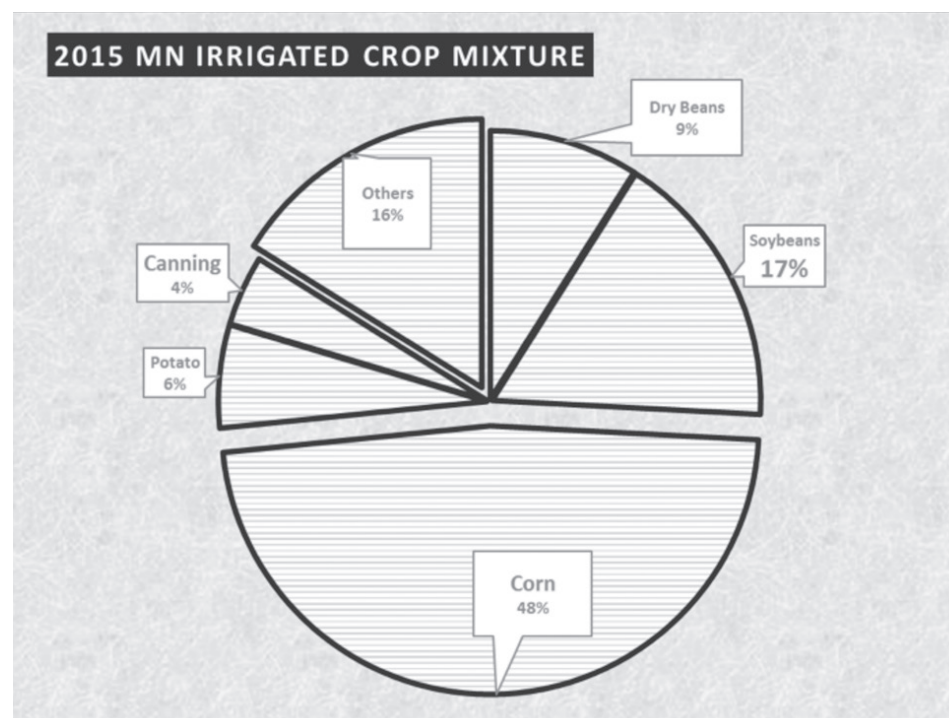
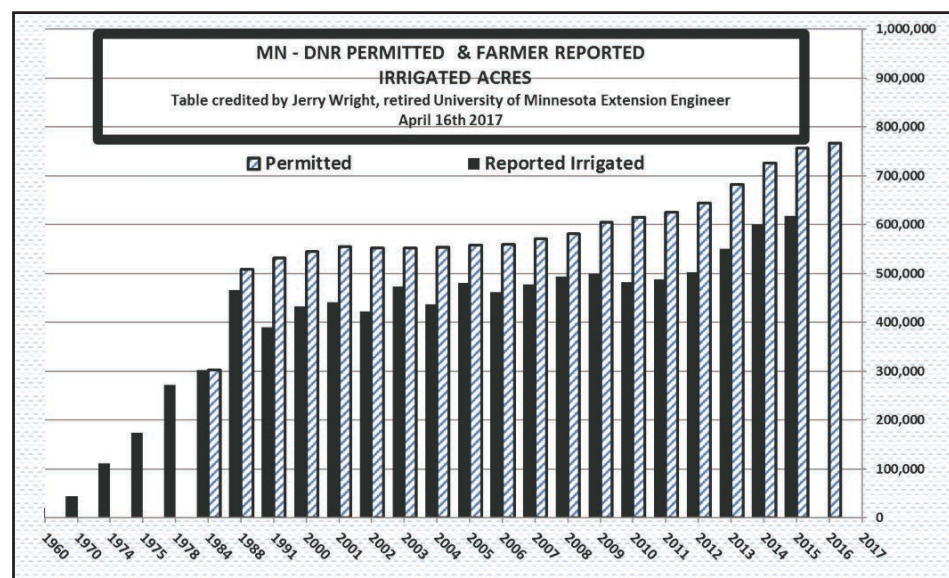
Per the Minnesota irrigators' annual DNR water pumpage reports for the 2015 growing season, they irrigated 617,473 acres. The adjacent pie chart shows the percent-

age distribution of the major irrigated crops in 2015.

Actual 2015 acreage breaks out to 306,820 acres' corn; 108,626 soybeans; 57,919 dry beans; 39,961 potatoes; 27,320 canning crops 8,358 sugar beets; 23,809 alfalfa; 10,936 small grain; 5,973 fruit & vegetables; 6,001 field crops, 4,995 sod/nursery and 15,224 wild rice.

Irrigated crop acres for 2016 season as reported by farmers to the DNR is currently being reviewed and tabulated.

If you would like a more detailed summary on permitted and irrigated acres by county contact, Jerry Wright, Agricultural Engineer at wrightsj@charter.net Jerry Wright, e-mail wrightsj@charter.net, file: MN Irrigated Acreage Growth – April 2017



Long Term Sediment Research Project in South Central Minnesota Concludes

The Collaborative for Sediment Source Reduction (CSSR) in the Greater Blue Earth River Basin project was a five-year effort to evaluate strategies for reducing sediment making its way into the Minnesota River via the Blue Earth River. The goal of the project was to incorporate the best available science to develop a decision-making model to reduce sediment pollution through a strategy that is effective, cost-efficient, fair and supported by all stakeholders.

Through a series of nine meetings, stakeholders considered various sediment sources, sediment delivery mechanisms and actions that may reduce sediment

transport downstream. Sediment sources were categorized into three primary areas—uplands, ravines and bluffs—each with its own associated reduction strategies.

Overall, the primary sediment reduction target identified by the project was reducing peak flows. This could potentially be accomplished by increasing temporary water storage through strategic wetland restorations, settling ponds, drainage design and increasing the water holding capabilities of soils. These practices provide the greatest benefit when water management can apply the principal of “catch and release,” in contrast to catch and hold strategies.

The water holding capacity of soils can be improved by increasing infiltration, often associated with reduced tillage intensity and higher organic matter levels, along with increasing soil health by reducing the duration of saturated soil conditions, often associated with improved drainage.

One example of a multi-faceted project that could potentially address peak flows and sediment levels came to fruition in parallel to the CSSR project. Led by a group of local landowners, with the support of professional engineers and funding from the Legislative-

Citizen Commission on Minnesota Resources (LCCMR), changes were

made to Blue Earth County Ditch 57 that enhanced crop production through improved tile drainage, helped protect city infrastructure, and provided increased water quality treatment of drainage water. You can find more information about this project, including monitoring data, here- <http://www.is-grp.com/project/blue-earth-county-ditch-no-57/>.

The MAWRRC is a non-profit research and education corporation comprised of 24 agricultural organizations working together to address water issues.

For more information, go to www.mawrc.org.



Daily Crop “ET” for 2017 Available

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<http://agweathernetwork.com/>

Benton SWCD

<http://www.soilandwater.org/>

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East Ottertail SWCD

<http://www.eotswcd.org/>

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Pope County SWCD

<http://www.popeswcd.org/>

320-634-5327

Sherburne SWCD

<http://www.sherburneswcd.org/>

763 241 1170 ext3

Wisconsin & Minnesota Crop ET

http://agwx.soils.wisc.edu/uwex_agwx/

North Dakota Ag Weather & Crop ET

<https://ndawn.ndsu.nodak.edu/>

Source: Jerry Wright

Associate Professor Emeritus
and Retired Extension Engineer,
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IRRIGATORS ASSOCIATION OF MINNESOTA_IAM new information table and banners's



Luke Stuewe, MDA Soil Scientist, Fertilizer Management Section updating farmers on "Nitrogen Impacts and Water Sustainability"



Open speaker Warren Formo, Minnesota Agricultural Water Resource Center discussing "Discovery Farms" with president Alan Peterson





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Above – IAM President Alan Peterson showing off IAM's new information table and banners that IAM delegations can use at area farm and commodity shows to introduce IAM goals to farmers

Alan showing off the new IAM phone/tablet recharging table to a convention guest



CONVENTION TEAM SPEAKERS Holly Kovarik– Pope Co. & Katie Breth–Stearns Co SWCDs' sharing "Irrigation Assistance" options from their respective SWCDs office staff.

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PRESIDENT continued from page 1.

health insurance and real estate taxes; specifically special levies such as school levies and the impact they have on agricultural land. We also stressed to legislators the importance of refilling the University of Minnesota extension irrigation position.

Your state board has been working very hard to advocate responsible irrigation. Please make sure your membership is up-to-date. If you irrigate, it is important that you support IAM.

Alan Peterson, IAM President



Center Pivot “END GUN” Maintenance Check-UP

Jerry Wright, Agricultural Engineer

During the first irrigation, it is a great time to examine the performance of your end gun. Is it shutting off at the right time as it approaches a road? Does it appear it is doing a good job at applying water where you want it? By mid-summer re-check how uniform does the current crop look under the wetted zone of the end gun?

Each year there continues to be some concerns raised about end guns spraying water directly onto a road surface, even the edge of the road. This not only is a waste of water but in many cases it is creating a great endangerment to oncoming traffic.

It is the owner and operator's responsibility to manage their center pivot end guns so as there is no direct water discharge to a road surface regardless if it is a state highway or a graveled township road. Some townships have considered creating an ordinance regarding this situation.

If one of your end guns is not functioning properly, contact your local irrigation equipment repairman immediately to come out and fix the problem.

2016 Minnesota Water Use for Agricultural Irrigation

Dan Miller, Water Use Consultant, Ecological & Water Resources, Minnesota Department of Natural Resources

The 2016 growing season was a relatively wet year for most of the state, especially in the southern third of Minnesota. Before we get to how much water was used last year, it's important to understand what we mean by the term, agricultural irrigation. Minnesota DNR-issued agricultural irrigation permits include the following types of water use: major crop irrigation, wild rice, nurseries, sod farms, orchards and irrigated pasture.

The 2016 agricultural irrigation reported water use includes 82 billion gallons of water from groundwater (wells) and 11 billion gallons of water from surface water (lakes, streams and rivers). The total amount of 93 billion gallons of water used for agricultural irrigation is similar to the reported water use in 2014 and 2015.

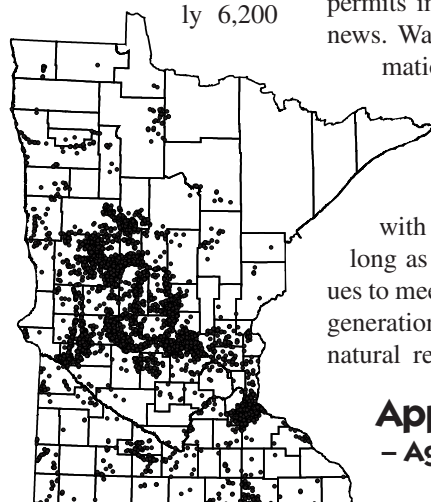
Precipitation is an important component to growing crops and the amount of water that will be used during a growing season. The state climatology office recently published a map of the state for precipitation departure from normal. This map depicts the difference between the water year precipitation totals and the "normal", a 30-year average. The water year time period is from October 1, 2015 to September 30, 2016 because our hydrological systems (lakes, streams and rivers) are typically at their lowest levels near October 1 of each year. See the map titled, "Water Year Precipitation

Departure from Normal." You'll notice increased precipitation over this period for the southern part of the state and near normal to a slight departure from normal precipitation levels in the west-central part of the state. Precipitation amounts during this time period certainly influenced water use for agricultural irrigation over the last growing season. Additionally, as many of you know, precipitation can vary from one field to the next during a growing season.

Number of Agricultural Irrigation Permits in Minnesota

The number of permits for agricultural irrigation has changed quite a bit in the last ten years. In 2007, there were approximately 4,200 agricultural irrigation permits. In 2016, there were approximately 6,200

agricultural irrigation permits. This represents a nearly 150% increase in water use permits for agricultural irrigation over the last 10 years. The map titled "Appropriation Permits – Agri-

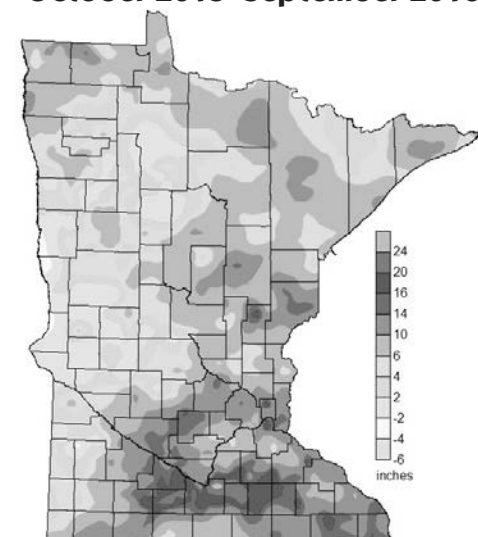


cultural Irrigation 2016" represents the location of MN DNR active agricultural irrigation permits. You'll notice a concentration in several areas of the state. A few of these areas are DNR Groundwater Management Areas, where the DNR and interested citizens and organizations are working to improve water sustainability for all Minnesotans, including agricultural irrigators. For additional information about DNR Groundwater Management Areas see the following DNR website: www.mndnr.gov/gwmp.

Finally, the Minnesota DNR appreciates that 99.5% of all agricultural irrigation permit holders have reported their water use for the 2016 calendar year. Given the total number of agricultural irrigation permits in Minnesota, this is really good news. Water use data is important information for farmers, the public, DNR permitting staff and scientists in order to continue to understand water use throughout the state. The DNR is charged with issuing water use permits as long as the groundwater supply continues to meet the needs of current and future generations and the use will not harm our natural resources or reduce water levels

Appropriation Permits – Agricultural Irrigation 2016

Water Year Precipitation Departure from normal October 2015–September 2016



DNR State Climatology Office –
January 19, 2017

beyond the reach of the public water supply or private domestic wells.

Thank you for continuing to help us conserve and manage our water resources for current and future generations.

Dan Miller, Water Use Consultant | Ecological & Water Resources, Minnesota Department of Natural Resources

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for both speed and zone control. The zones can be identified by EM (electromagnetic mapping), yield maps, and/or soils maps. The EQIP base payment rate for VRI was \$2156.25 per pivot in 2017. Practice 442 also offers funding for “Fertigation Retrofit” to integrate fertigation application technology onto a center pivot system to improve placement of chemicals along the length of the pivot. As always, Irrigation Water Management (practice 449) must be included in the contract to be eligible for any of the practice 442 scenarios.

IRRIGATION WATER MANAGEMENT (IWM)

Here is a practice that has changed and evolved tremendously through the years. When I first started working with irrigators 25 years ago, the scenario was simple: follow an approved system of monitoring soil moisture to make irrigation decisions. The current EQIP schedule for this practice offers funding for 3 management levels of IWM: “Basic” (soil moisture determined by “feel” method,

no sensors or telemetry); “Intermediate” (in-field moisture sensors with manual downloads); and “Advanced” (soil or crop moisture sensors with automated data logging and/or “real time” ET data).

Under “Advanced” IWM, irrigation amounts are recorded with a flow meter near the pump and automated soil moisture monitoring stations transmit data to a computer with irrigation software. All levels still must use the “check-book method” for scheduling. The base payment rates ranged from \$6.13 per acre for “Basic” IWM to \$13.39 per acre for “Advanced” IWM in 2017. This payment can be received for up to 3 years. In addition, the EQIP payment schedule for this practice also offered funding for soil moisture sensors in 2017.

VARIABLE SPEED DRIVES AND MOTOR REPLACEMENT OR UPGRADES

EQIP practice 374 – Farmstead Energy Improvement includes funding for variable speed drives and electric motor upgrades for irrigation systems. In both cases a CAP 128 – Agricultural Energy Management Plan, or an energy audit meeting the requirements of an ASABE S612 Type 2 audit, is required prior to deter-

mining eligibility for the practice. The CAP 128 details the energy consuming practices on the farm, the prior year’s energy consumption, and a plan for addressing identified energy concerns. If a VSD or a motor upgrade is identified as viable energy saver, the producer could apply for funding through EQIP practice 374 with a separate application. The 2017 EQIP base payment rate for a VSD was \$124.60 per horse power. Electric motor upgrade base rate was \$66.74 per HP (10-100 HP). There are several other energy saving items that could be funded based on the report such as energy efficient lighting and heating systems. The CAP 128 payment rate is highly variable depending on the operation.

I know there are a few diesel driven pumps left out there. Producers could replace the diesel with a more efficient electric motor using funding available through EQIP practice 372 – Combustion System Improvement. A CAP 128 would have to be performed that would prove at least a 20% advantage in efficiency. The 2017 EQIP base payment rate was \$4273.71 for a 75 to 149 HP electric motor.

IWM TECHNICAL SERVICE PROVIDER (TSP)

Jake Wildman, as of this writing, is the only TSP certified for Irrigation Water Management in Minnesota. Jake can complete a CAP 118 – Irrigation Water Management Plan – Written to help

you set up an IWM plan, especially the “Advanced” version. The CAP 118 can be funded through EQIP. The payment rate is variable, but should cover most of the cost. Jake’s phone number and email address is: 320-424-0713, jakewildman@outlook.com. Contact your local NRCS office for a current TSP list.

The best way to get started is to meet with a conservation planner from your respective SWCD or NRCS office. This person will help you decide which option is best for you and how to apply for funding. For the Stearns County, you can contact Richard Berscheid, NRCS District Conservationist, at 320-251-7800, ext. 3. You can also contact me, Brad Wenz, at the same number.

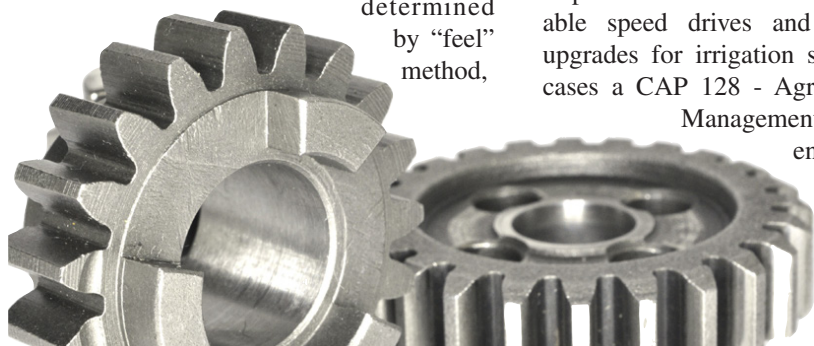
Remember, you can apply for EQIP 2018 any time before the deadline this summer. This deadline will be announced soon.

All programs and services are made available without regard to race, color, national origin, religion, sex, age, marital status, or disability.

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Extension offers one-to-one services for financially distressed farmers

ST. PAUL, MN—University of Minnesota Extension announced on March 22, 2017, it will begin offering one-to-one financial counseling to farmers in serious financial stress.

“We know that due to a variety of factors, including on-going low prices, some farmers find themselves facing difficult circumstances,” said Bev Durgan, Extension dean. “With our new program, Extension offers distressed farmers help in understanding their financial situation and exploring options to keep their farms functioning as a viable enterprise.”

To set up a confidential appointment with an Extension farm financial analyst, farmers can call the Farm Information Line at 1-800-232-9077.

The Extension program is expected to run for two years and will be modeled after similar services offered in states including Kansas and Iowa. It will augment services currently available in Minnesota, including the Farmer-Lender Mediation program, which is overseen by Extension, and the state Department of Agriculture’s Minnesota Farm Advocates assistance.

Financial analysts include retired agricultural business professionals from Extension and other organizations. The program is set up to provide analysts at geographically diverse locations in Minnesota.



They’ve undergone training to update their capabilities and will work closely with current Extension colleagues.

“Compared to the 1980s, the magnitude of the financial stress on Minnesota farms is not as widespread. That’s good news, but it may also keep the many farmers in difficult circumstances from seeking the kind of help that they need,” said Extension agricultural economist Kevin Klair, who leads Extension’s Agricultural Business Management program. “That’s why we’re working with a variety of agriculture interests in Minnesota, including the banking industry, to reach out and let farmers know we can help them explore their options.”

Copied off the Extension News website: <http://news.extension.umn.edu/2017/03/extension-offers-one-to-one-services.html>

Media Contact: Allison Sandve, University of Minnesota Extension, office 612-626-4077, ajsandve@umn.edu

Citizen involvement makes Otter Tail River watershed a better place

By Karen Terry, UMN Extension Water Team, Extension Educator, Water Resource Management & Policy, Regional Extension Office - Morris

There are a lot of cool things happening in the Otter Tail River Watershed: state and local entities are in the early stages of the developing the Watershed Restoration and Protection Strategy (WRAPS), the Otter Tail River Watershed Civic Engagement Cohort is wrapping up, and the inaugural Aqua Chautauqua will take place this summer.

The East Otter Tail Soil and Water Conservation District is serving as the project manager for this WRAPS, a 10-year process that is happening all over the state. It begins with intensive biological surveying and data collection throughout the watershed, including fish, invertebrates, and water quality. These data are analyzed, along with information about physical conditions such as soil types, land use, land slopes, stream channel stability, impervious surface, hydrology and climate. Models are then developed to help land managers identify the sources of water quality degradation in the watershed. Citizens are asked to contribute ideas, share their values, and make suggestions, and their input is melded with the

collected data and modeling results to generate a plan to address the problem areas. In addition, the plan identifies areas that are in pristine or near-pristine condition and protects them. The plan will be implemented, results will be evaluated, and then

– 10 years later – the process begins again.

The Otter Tail River Watershed Civic Engagement cohort began last June and will wrap up in May. This yearlong training is designed to equip participants with the skills and knowledge to effectively draw watershed residents into the process of addressing water resources issues. Led by the University of Minnesota’s Leadership and Civic Engagement team, the 17 participants have learned and practiced skills ranging from stakeholder mapping to the art of asking strong, impactful ques-



Extension Educator Karen Terry demonstrates stream processes and function with attendees at the Governor's Water Summit at Morris in January 2017.

UNIVERSITY OF MINNESOTA WATER RESOURCE CENTER - 2017 NIWR grants showcase diversity of water research

The USGS-funded NIWR 2017 grant competition yielded three project award-ees, announced earlier this year. Funding is available to researchers (pending Congressional budget action later this year) through WRC’s selection process, which chooses from submitted competent applied and peer reviewed research submissions each November. This year’s grants highlight methods to mitigate nitrogen and phosphorus from drain tile, open source monitoring of turbidity in surface water and test the efficacy of buffer strips in deterring the export of organic matter and the resulting algal blooms. (For full details of the projects check out the WRC website at <https://www.wrc.umn.edu/grant-award-article>)

Investigation of a novel approach to mitigate nitrogen and phosphorus from tile drainage

PI Jeff Strock and a team of researchers from the UMN have designed a novel bioreactor which when installed in agricultural ditches, treats water from subsurface tile drains, removing nitrogen (N) and phosphorus (P) from the water leaving the farm fields. Unlike other bioreactors this new version removes both N and P, preventing nutrients from entering surface streams and rivers in the Midwest. “This project should lead to greater sustainability of agricultural production in Midwestern regions where corn and soybeans are produced,” said Strock.

Assessing the role of buffer strips in nutrient and organic matter export and mitigation of harmful algal blooms

In 2015, Minnesota enacted a new law requiring the installation of vegetative buffer strips along the boundaries of all public waters and public drainage systems by 2018 to limit the transport of nutrients from the land into aquatic systems. PI James Cotner (Department of Ecology, Evolution and Behavior) hopes his project will inform the shift in land use practices that the implementation of the law will require. This project will also predict the effectiveness of buffer strips in controlling eutrophication in nearby streams and lakes. Eutrophication is a contributing factor in the formation of harmful algal blooms (HABs), which degrade water quality. Cotner will study ten systems in agricultural regions of Minnesota, sampling lakes and inflow tributaries, measuring the effect of buffer strips on the export of organic matter downstream. “Buffer strips are known to be effective traps for inorganic nutrients, but little is known about the composition and reactivity of organic matter that is transported through these zones. Our work will fill this knowledge gap, and show how planktonic communities are affected by buffer strips, evaluate the potential for effects on HABs, and describe potential feedbacks that could either enhance or limit the ability of buffer strips to lessen the impacts of eutrophication,” said Cotner

COPIED NEWS RELEASE FROM THE WEBSITE OF THE WATER RESOURCE CENTER - The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension. APRIL 2017

tions to making sure that everyone feels welcome and included. Cohort participants come from diverse backgrounds: natural resource staff from the local, state and federal levels, farmers, lake association leaders, and local elected officials.

They are currently working on the ‘action phase’, during which they select a project and practice their new-found skills.

The Aqua Chautauqua is a water festival that will take place August 12 along the Otter Tail River in Fergus Falls. The concept harkens back to the chautauquas of days gone by: bringing education, entertainment, and culture to small-town America. Popular in the late 1800s and early 1900s and often characterized by the large tents they set up, chautauquas typically included music, theater, speakers, demonstrations, religious services,

and political ‘stumping.’ Theodore Roosevelt once claimed that chautauquas were “the most American thing in America.” The Aqua Chautauqua will be a series of educational speakers, hands-on demonstrations, interactive stations such as storytelling, music, theatrical presentations, art displays, recreation, and food, interspersed along the river through downtown. Unlike old-time chautauquas, which were for adult audiences, the Aqua Chautauqua will be ideal for families.

What do these three things (WRAPS, Civic Engagement cohort, and Aqua Chautauqua) have in common? They all have the goal of making the watershed a better place by involving citizens. When citizens have a greater understanding of the watershed in which they live and are included in the management of the resources that they all share, they will become empowered to act in ways that lead to a healthier, more sustainable environment for all.

By Karen Terry, UMN Extension Water Team Extension Educator, Water Resource Management & Policy, Regional Extension Office, Morris, kterry@umn.edu, 320-589-1711 Extension 2167.



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CHEMIGATION RECORDKEEPING REQUIREMENTS

By Jeff Lorentz, Agricultural Chemical Consultant, MDA

The chemigation permit program in Minnesota is administered by the Minnesota Department of Agriculture (MDA). Applying an agricultural chemical (fertilizer and/or pesticide) through an irrigation system that is connected to a water supply (private well, surface water, or municipal water supply) is prohibited unless a chemigation permit has been obtained from the MDA and the chemigation system is in compliance with Minnesota Rules, Part 1505.2100 – 1505.2800. Permit holders

who have a combination fertilizer/pesticide chemigation permit can only apply pesticides through the permitted system that are specifically labeled for chemigation use and must be applied per the pesticide label.

As a chemigation permit holder there are specific recordkeeping requirements pertaining to the chemigation permit that must be followed. Minnesota Rule, Part 1505.2400, Records and Reports, states



Minnesota Department
of Agriculture

625 Robert Street North, St. Paul, MN 55155-2538
www.mda.state.mn.us

Pesticide and Fertilizer Management, Phone: 651-201-6696

APPROVED CHEMIGATION APPLICATION RECORD

Company Name:		Chemigation Permit Number:	
Contact Person:		Phone Number:	
Address:			
City:		State:	Zip:

Application Date	Label Name of Product Applied	EPA Product Registration #	Location (For center Pivot, Indicate all or partial (which area) depending on application. For Greenhouses indicate house and crop.)

In accordance with the Americans with Disabilities Act, this information is available in alternative forms of communication upon request by calling 651-201-6000. TTY users can call the Minnesota Relay Service at 711. The MDA is an equal opportunity employer and provider.

Approved Chemigation Application Record.indd
3/22/17

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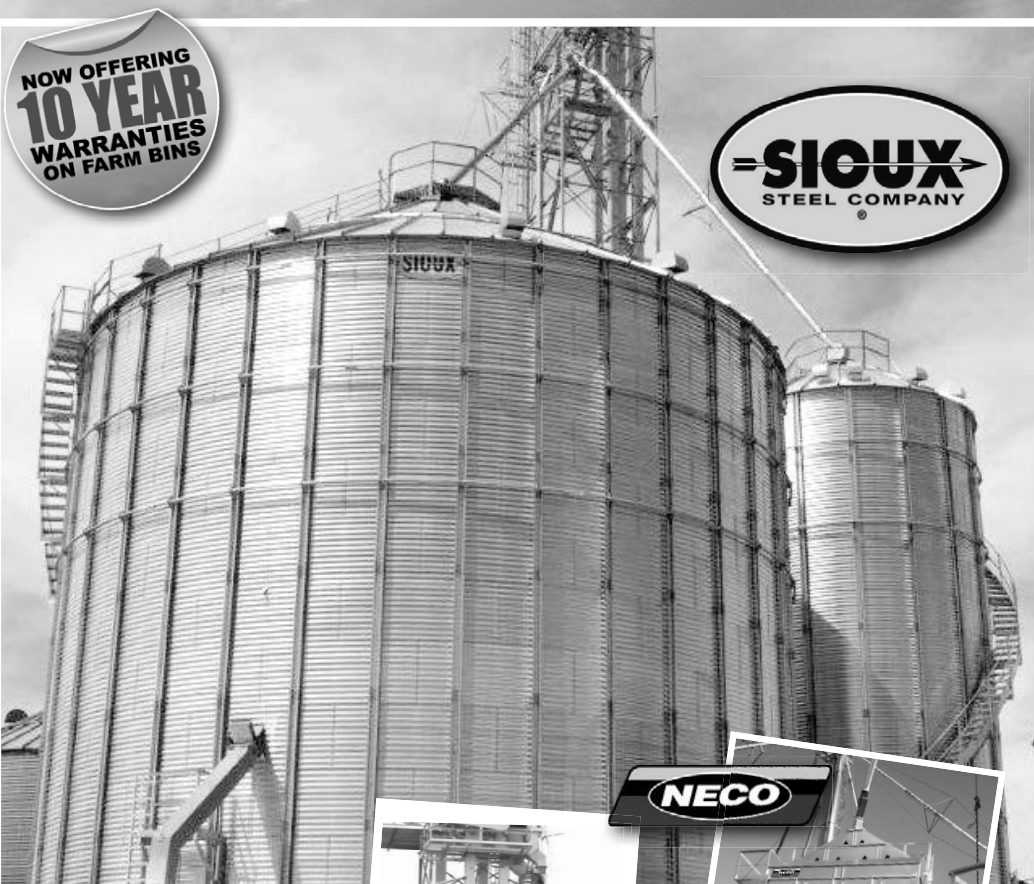
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that you must keep and maintain the following chemigation records:

Pesticide chemigation system application records and fertilizer chemigation system mix and application records must be kept by the chemigation system applicant for five years from the date of application. Records detailing dates of chemigation system inspection, names of persons performing the inspection, and condition of the chemigation unit must be kept on forms provided by the commissioner. System inspection and equipment maintenance records must be retained by the chemigation system permit holder for five years.

As stated in the rule all permit holders are required to keep records for 5 years from the date of—

- 1) chemigation applications (fertilizer and/or pesticide); and
- 2) chemigation system inspection and maintenance.

A copy of an MDA Approved Chemigation Application Record for use by permit holders can be located on the MDA's website at <http://www.mda.state.mn.us/Global/MDADocs/chemfert/others/apprecord.aspx>.



This approved application record includes the minimum documentation required to be recorded for a chemigation application. A permit holder can create their own application record form as long as the minimum information is recorded as on the approved MDA record form.

A copy of an Inspection and Maintenance Record Form provided by the MDA commissioner can be found on the MDA's website at: <http://www.mda.state.mn.us/Global/MDADocs/licensing/chemicals/ag01077chemi.aspx>

Additional information regarding the MDA Chemigation Program can be found on the MDA's website at <http://www.mda.state.mn.us/chemicals/fertilizers/chemigation.aspx>.

The MDA inspects chemigation systems to determine compliance with the chemigation requirements, including those listed in this article.

If you have any questions related to chemigation please contact the following MDA chemigation program staff: Jim Freiling 320-243-7382, Jeff Lorentz 320-223-6547 or Matthew Parins 651-201-6587

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Water Management Tips from Nebraska

Irrigation and water management information is housed on the Nebraska Extension website <http://water.unl.edu/> in the Agricultural Production section. Sub-sections include:

- *Managing Water for Crop Production*
- *Agricultural Irrigation*

Also checkout the Agricultural Water Management Guide, a Nebraska Extension publication on irrigation management — both why it is used and more importantly, strategies to improve irrigation efficiency. Also included are definitions of basic irrigation terminology and a brief history of irrigation.

http://cropwatch.unl.edu/Agricultural_Water_Management_Guide/index.html

This publication is targeted to farmers, crop consultants, agriculture educators, science instructors, students, and anyone interested in increasing their knowledge of irrigation management.





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