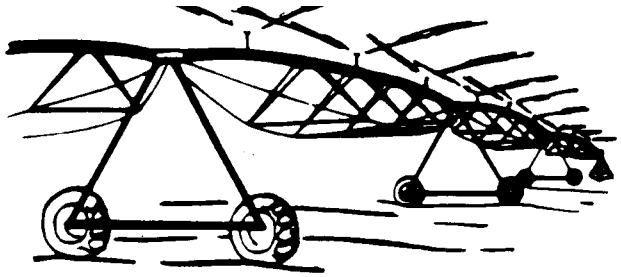
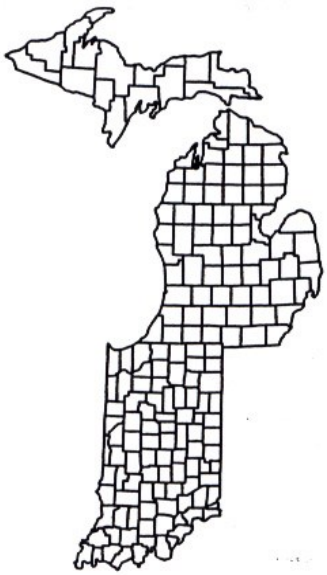
MICHIANA IRRIGATION ASSOCIATION



MICHIGAN-INDIANA IRRIGATION NEWSLETTER

October 2022

52540 Lawrence Rd
Leonidas, MI 49066



MIA Board Members

Jeremy Walker, President

Mike Morehouse, Vice-President

Ben Russell, Secretary/Treasurer

Trustees:

Joel Annable

Todd Feenstra

Tom Frank

Justin Gentz

Brian McKenzie

Doug Pedler

Greetings,

If you received this letter, you are somehow involved with irrigation. Since you have read this far it shows you are interested in irrigation. That is why we would like your involvement, membership, and input with the Michiana Irrigation Association (MIA).

The MIA was formed in 1980 as a nonprofit professional organization. The primary objectives:

A. To promote:
   1. The development, proper use, management and acceptance of irrigation equipment practices.
   2. Educational activities and materials related to efficient irrigation.
   3. Water and soil conservation and more economical crop production through the use of irrigation.

B. To acquaint public and private sectors with developments in the irrigation industry, as well as the part the industry occupies in both the economy and the development of the nation.

C. To counsel with industry leaders and others on desirable legislative changes which affect the irrigation industry and irrigators.

D. To advise government regarding irrigation-related areas that affect, either directly or indirectly, the public and the irrigation industry.

If you have questions about what Michigan Irrigation Association does, don't hesitate to reach out to one of the current members. Following is list of current board members with their e-mail address:

- Joel Annable joel.annable@peerlessmidwest.com
- Todd Feenstra todd@tritiuminc.net
- Tom Frank tfrank70@comcast.net
- Justin Gentz gbframs@live.com
- Brian McKenzie mckenziehighlander@msn.com
- Mike Morehouse mmore@maplenet.net
- Doug Pedler dpedler@maisco.net
- Ben Russell ben@pmcafarms.com
- Jeremy Walker walkerprecisionag@gmail.com

.

Benefits of Improving Irrigation System Uniformity

Dr. Younsuk Dong and Lyndon Kelley

As center pivot irrigation systems age, several issues can be found such as leaking joints, clogged sprinklers, missing sprinkler heads, and etc.. These can cause areas of non-uniformity that can make locations under- or over-irrigated and increase the potential for nitrogen leaching into groundwater. Poor uniformity in irrigation can lead to excess energy use and cost and potentially affect yield due to poor soil aeration. To improve the uniformity of an irrigation system, an evaluation must be conducted. The catch can method is simple and effective in evaluating the uniformity of the irrigation system. The procedure includes placing 32 oz disposable soda cups at 10 ft distance apart in a straight line outward from the pivot elbow. Once the catch cans are installed in the field, start the irrigation, then measure the water level in each of the cans using a graduated cylinder and recorded. Figure 1 shows a demonstration of the catch can test in Three Rivers, MI.

Figure 1: Catch Can Test Demonstration

In 2022, Michigan State University (MSU) Irrigation group collaborated with two irrigators to evaluate the uniformity before and after replacing sprinkler packages. We used the catch can test data to calculate Scheduling Coefficient (SC), which is run time multiplier that shows the amount of extra water that needs to be applied to get the dry areas of the field wet. After the sprinkler package was replaced, we found SC was reduced from 1.3 to 1.2 in Field A and from 1.6 to 1.2 in Field B. In these two fields, replacing sprinkler packages helped to improve system uniformity efficiency. Below is an example of the potential economic impact of improved uniformity.

A. Water savings for each inch applied due to improved uniformity: 0.2 inches.
B. Annual average irrigation applications in corn and soybean production: 6 inches.
C. Total irrigation saving per year: B x C = 1.2 inches.
D. Range of irrigation power costs in Michigan: $3.16 - $7.50 /acre/inch.
E. Annual total energy saved (100-acre size field, energy cost $5.33/acre/inch): $5.33/acre/inch x 100 acres x 1.2 inches = $640.
F. Total sprinkler package cost (part only): $3,000.
G. Payback period: 4.7 years.

Some previous studies have discussed that improved uniformity increased the corn yield by 11%. **Therefore, improved uniformity should provide better yields with less energy and water, and less potential nutrient leaching below the root zone.**

Currently, MSU Irrigation group has ongoing irrigation research studies, supported and funded by USDA NRCS, Michigan Soybean Committee, Michigan Potato Industry Committee, and Michigan Blueberry Commission. These activities mainly focus on improving irrigation water use efficiency using irrigation scheduling methods. In addition, MSU Irrigation group has given a presentation to Michigan Water Use Advisory Council about the current efforts to improve agricultural irrigation efficiency.

Create the Irrigation Repair List as You End the Season

Before you put your irrigation system away for the season, create a list of needed repairs and potential improvements.

A good, end-of-season list of needed irrigation maintenance and repairs can help irrigators prevent in-season system breakdowns and delays in watering during next summer. Michigan State University Extension advises creating a plan for tackling repairs, and ideally making the repairs, before winter sets in. Often, there are special fall pricing and incentives for parts, service and repair work that is booked during fall and winter months. Using a smart phone to take photos and jotting down notes can help create a detailed repair list and makes it easy to send to others.

Put the center pivot system in motion and listen - Listen to each center pivot tower drive system to detect a damaged gear box or worn bearings. Identify gear box leaks and note or mark with a crayon for later repair. Drain water that condenses in gear boxes and refill with manufacture suggested gear lubricant. If there are signs of gear box leaks but the drive system still looks serviceable , consider using corn head grease or a grease product designed for gear box drive to extend the usable life of the system.

Check wheels and tires - Inspect wheels for loose lug bolts and tires for cracks and wear. If you add air to tires in the fall and they are not still full in the spring, they need to be replaced or at least patched.

Listen to your traveler - Drive system noise can help you identify needed off-season repairs. Take time to listen to the traveler drive system at the point of greatest stress—beginning of the run for hard hose traveler, or end of the run or pull for soft hose systems. Note squeals and knocks that can indicate bearing or equipment wear.

Inspect the distribution system - Turn the water on and walk the length of the system or coverage area and list all the needed repairs. Leaks, bad seals and worn out sprinklers can be marked with a crayon or photographed and will eliminate the need to run water as you make repairs over fall and winter. Watch big guns and endguns for a few cycles. Hesitations in advancing around the semi-circle or in reversing are indications of a needed tune-up or bearing and seal replacement.

Check out the pressure gauge - First, make sure your pressure gauge works. A good gauge should return to zero when system pressure is relieved and should show the fluctuation in system pressure as the endgun or addition sprinklers are turned on and off. Pressure gauges provide very important information on the performance of your system.

If you question the accuracy of your gauge, replace it with a good quality liquid filled one. Mounting gauges on an isolator or upright section of pipe 4 to 5 inches in length allows the gauge to read the compressed air in the pipe rather than being constantly exposed to water, thus reducing rust accumulation and fouling.

Note the end-of-season operating pressure - With a good gauge, note the date and operating pressure. A log of operating pressures taken periodically throughout the season should highlight performance of the pump/screen and the static water level the pump pulls from. Expect that normal seasonal fluctuation will create a lower pressure reading in late summer/early fall than a spring reading when water levels are at seasonal highs.

Measure water flow - Many irrigators just have an educated guess at the flow their system puts out. A flow meter can give you a simple, quick look at your system's output. Late summer/early fall is the low point in the annual cycle for surface water and ground water static water level. Compare the sprinkler package criteria to your measured flow and make adjustments as needed. Many dealers have the capacity to measure irrigation flow for their clients. Several well drillers and maintenance companies offer well testing programs. Be cautious of in-line impeller style flow meters. Most impeller style flow meters require annual calibration to be accurate—misinformation can be worse than a guess.

A good indication the water supply flow is not what the system was designed for is when the pressure at the pivot

point is greater than 10 percent different than your sprinkler package specification when all of the sprinklers and the end gun on. If you utilize sprinkler pressure regulators, your pressure should be at least 5-10 pounds greater with the end gun on than the regulator operating pressure at the pivot point and just above the regulator operating pressure at the last sprinkler. See the explanation in the sprinkler chart design for details.

Compare actual application to the application chart - One of the surprising things we found doing uniformity can tests and flow testing is about two-thirds of systems evaluated applied less water than they were designed for. Accurate applications are dependent upon measurements of water flow to the distribution system and control of the pivot or traveler's speed.

By timing a complete run of a circle and comparing to the system application chart, you can identify problems. The center pivot percent timer tends to be less accurate at low settings (below 10 percent). With larger systems being installed, and the switch to high-speed pivot drives, many irrigation applications are at these lower settings.

Check irrigation controls - Test the function of all the major control and interlock systems. Check center pivot end gun switches, stop-in slot or park, cornering arm valve controls and pump interlock systems.

Stop barricades - Pivots that make partial circles often use stop barricades at the edge of the water area. Check stops for integrity, making sure the height is still appropriate for the machine's turnoff mechanism. Newer style stop barricades are designed to catch and spin the tire against the barricade, allowing the last tower safety timer to shut the pivot down as a backup safety system. Tire skid marks on the barricade indicates the primary stop switch has failed and needs replacing.

Make the most of irrigated fields yield maps - GPS yield mapping has tremendous potential for improving irrigation design, maintenance and management. If you had a period of drought this summer, the yield data and map will have even greater importance. Normal rainfall will mask many of the irrigation issues in most years.

Make a special effort to calibrate your yield sensor before harvesting irrigated fields and save the data back to a safe place before shutting the yield monitoring system down at the end of the day. Note areas in the field that have significant low or highs yields at harvesting and look for any obvious explanation while still in the field.

After harvest, find the GPS locations of center points of pivots, wheel paths or traveler lanes and double-watered areas. Most mapping programs will allow you to draw in the pivot point and pivot wheel rings allowing you to compare yield under each span.

If you do not enjoy the computer part of yield mapping, consider paying one of many services or consultants to help you. Finding irrigation equipment design or malfunctions can have a long-lasting benefit. A beginning step is to compare an aerial photo where you can identify the irrigation system with the yield map and see what jumps out at you.

Check your irrigated and non-irrigated yields - Now is the time to lay out the plan for future irrigation investments. Due to higher input costs, it is harder to survive a drought year without irrigation. Gather the data needed to decide where future irrigation investments are warranted.

Review the repair and needed improvement list and consider buying new - In most situations, the cost of needed repairs and improvements are small compared to the price of a new system. For systems covering large acreage or on crops of great importance, it may be better to replace them before a mid-summer catastrophe. Often, the old equipment is recycled into a few small field or dry corner machines if they still have useable life left.

Mark your calendars: The Annual Meeting of the Michiana Irrigation Association is planned for Friday, December 16, 2022 at Das Dutchman Essenhaus in Middlebury, IN.