# Presentations

## A Pump Monitoring Approach to Irrigation Pumping Plant Testing

Mr. Merritt McDougall [1A]-a

This presentation will discuss research that has been conducted using pump monitors and telemetry to evaluate irrigation pumping plant efficiencies in Arkansas. Traditionally, pump tests have been performed at only one given point in time. The monitoring approach used in this study made it possible to continuously evaluate the performance of approximately 50 diesel and electric pumping plants throughout the state across entire irrigation seasons. This presentation highlights the challenges and advantages of using this approach to pumping plant testing.

## Using Information from your Water Table

Mr. Brad Williams [1A]-b

Irrigation pumping is as much about what's happening underground as about what's being delivered to your pipelines above ground. Farmers should regularly test things like static and pumping water levels and flow rate. This is especially true when irrigation water is high in iron and there's elevated potential for biofouling. This paper will discuss water level monitoring and treatment of irrigation wells.

## Variable Frequency Drives – a Primer: Tool for Fluctuating Water Tables

Chris Henry, *PhD*, *PE* [1-A]-c

Flood/furrow systems watered out of the northern stretches of the Mississippi Alluvial aquifer pull lots of water from shallow depths; these pumps are classified as High Flow/Low Head (HF/LH). Total dynamic head (TDH), which includes pumping water lift, friction loss in column pipe, and outlet pressure is only about 40-50 feet. When water tables drop a mere 5 feet, TDH increases by 10-15% thereby dropping flow rate by at least that much. Modeled and on-farm test results showed that such a 5-foot drop in water table resulted in a 25% drop in flow. Pumps driven by normal electric motors are subject to these losses. However, diesel- and propane-powered pumps skirt this problem when the operator increases engine RPM. Electric motors equipped with variable frequency drives (VFD), can likewise skirt the problems associated with a fluctuating water table. Additionally, VFDs have other advantages, such as possibly being able to use single-phase electricity.

## What are IWMs and How they are Assisting Mississippi Rice Farmers

Joe Massey, *PhD* & Mr. Earl Kline [1B]-a

Earl and Joe having been working together for the past seven years to extend the water and energy savings of multiple-inlet rice irrigation (MIRI). The primary way they do this is by managing flood depth to maximize rainfall capture and reduce over-pumping. In both dry and wet years, water use has been well below average for comparable MIRI-only fields while grain yields have been maintained. In this talk they will discuss their recently published work as well as weed and disease control issues in intermittent flood areas. They will also provide a brief overview of the MIRI module in Pipe Planner and an outline of the California-based rice greenhouse gas emissions reduction program.

## Aerial Robots (aka Drones)

AJ Foster, *PhD* [1B]-b

Agriculture is the industry poised to reap the greatest benefits from unmanned aerial vehicle (UAV) technology. These high tech tool are a great addition to the farmer's tool kit to maximize profitability and minimize environmental impact. This presentation will discuss UAVs and their potential impact on decision-making in agriculture. Key issue include regulations, permits, the value of a bird's eye view, various available sensors and some of the many potential applications.

## Sub-Irrigation: Drains when Wet, Irrigates when Dry

Mark Nussbaum, *PE* & John Hester, *PE* [1B]-c

This study used computer modeling to compare the benefits of installing drainage/subirrigation systems in various layout patterns in ten corn producing soils commonly found in Missouri. The DRAINMOD 6.0 computer program was used to analyze soil moisture and plant conditions using 35 years of weather data. Projected corn yield increases were weighed against total system costs to determine optimum drainage and subirrigation system layout.

## What We've Learned about Wireless Monitoring: AR perspective

Chris Henry, *PhD*, *PE* [2A]-a

Wireless soil moisture monitoring has recently received much interest in Arkansas. Several master level research projects are being done on this topic.

## What We’ve Learned about Wireless Monitoring: TN perspective

Brian Leib, *PhD* [2A]-b

There are four basic approaches to obtaining soil water readings for irrigation scheduling: 1) in-field data collection, 2) edge of field logging, 3) computer/smartphone access and 4) portable sensors/data loggers. This talk will explore these approaches with the aim of helping producers and Ag professionals determine which method is best for their farm or business. Soybean irrigation trials from 2013 and 2014 will also be examined to investigate whether irrigation scheduling tools lead to maximum yield with minimum irrigation.

## What We’ve Learned about Wireless Monitoring: MS Perspective

H. C. (Lyle) Pringle, III, *MS* [2A]-c

This presentation will discuss experiences installing, operating, and choosing the location of electronic soil moisture sensors and associated wireless communication systems that we have worked with to date in Mississippi.

## What We’ve Learned about Wireless Monitoring: MO Perspective

Joe Henggeler, *PhD* [2A]-d

Wireless rainfall sensors have proven to help increase yields, and growers have appreciated the ability to receive the resulting data on their computers and cell phones. Wireless sensors are especially beneficial to pivot users because they provide an accurate reading of how much water is put down with each pass. (Many farmers found they were putting down less water than they had believed.) It is probably adequate to place a single soil monitor per pivot, especially if manual sensors had already been placed at this location and two or three other locations. If the manual stations produce similar results for a few weeks, the single wireless location will suffice. A third party should be involved to train customers, install sensors, and retrieve them before harvest to ensure the sustainability of this technology.

## A New Generation of Propane Engines

Mr. Gordon Cunningham [2B]-a

Propane-powered irrigation engines are becoming increasingly popular, as propane is cleaner-burning than diesel and not as easily stolen in remote locations, and it is easier and cheaper to deal with than natural gas, with more BTUs. Furthermore, the Propane Education & Research Council’s (PERC) Propane Farm Incentive Program lowers the initial cost of purchasing a new Environmental Protection Agency (EPA)-certified propane irrigation unit by offering participating growers a $400 incentive based on a per-liter engine displacement of up to 10.3 liters, for a total of $4,120. Eligible farmers report propane's performance details to PERC for at least one season, which aids in future product development. Diesel engines will also have to meet new EPA Tier 4 emissions standards in 2014, which will make propane engines even more cost-effective by comparison.

## Diesel Engines and the Tier System

Mr. Gary Buenemann [2B]-b

There is no such thing as a "simple guide" to the EPA's new diesel exhaust emission standards. Today the Clean Air Nonroad Diesel Rules are a Tier 4 rule, and the standards for (nonroad diesel) irrigation are at their most stringent. Irrigation famers must become proficient in a host of factors including horsepower, fuel and exhaust chemicals, maintenance schedules, and initial and repair costs. Luckily the new emission standards will only impact new equipment (though American farms may start to look like downtown Havana, where '57 Chevys are jury-rigged to keep running because new ones aren't practical). This talk will clarify the ins and outs of the EPA's Tier system for diesel irrigation engines.

## Experience in Using Written Pole Motors – True Single-Phase Motors

Mr. Steve Jackson [2B]-c

Steve will discuss the use of Written-Pole electric motors on his irrigated farm near Cardwell, MO. Since the W-P motor is a true single-phase machine, it allowed Steve to avoid the cost of also bringing in three-phase power when he "took the plunge" six years ago. Because of its innovative design, W-P technology can be run on single-phase for pump sizes up to 100 horsepower; it also means no phase-converter is required (which makes his coop happy). After irrigating a 160-acre field using it, he doubles its usefulness by moving it to a 28,000-bushel grain bin to provide a source of drying. Steve will discuss W-P efficiency, maintenance, service, and the choices available to him when he pioneered this method of pumping water in the SEMO area.

## Surface Irrigation Facts in Missouri

Joe Henggeler, *PhD* [3A]-a

"Typical" fields have out times of 19.5 hours and a length of 1,224 feet, while "problem fields" have out times of 35.5 hours and a length of 1,446 feet. Packed rows reach the end of their fields six hours before non-packed rolls. Users of Poly-pipe report a cost of $6.35 per acre. Ninety-four percent of irrigators run water down every other row (EOR). The rest are split evenly between running every row (ER) and a combination of EOR and ER. Twenty-eight percent of furrow irrigators use PHAUCET, the hole-size design software, when laying out Poly-pipe, and they employ it on 65% of their fields. Fifty-six percent of furrow irrigators use a full length of Poly-pipe plus another half-length so they can water half their fields at a time, and they employ it on 38% of their fields. More than twenty percent of furrow irrigated fields in the Bootheel make use of surge flow.

# Furrow Irrigated Rice in Missouri

Michael T. Aide, *PhD*, *CPSS* [3A]-a

Furrow irrigated rice (Oryza sativa L. 'indica') is gaining attention in Missouri and Arkansas because of (i) accelerated groundwater depletion, (ii) pumping costs related to water table depth, (iii) graded land already existing as a landscape feature, (iv) cost of levee construction and removal, (v) more rapid field drying, and (vi) less dependence on Areal application. The advantages of delayed flood irrigation remain formidable and include: (i) an already understood practice in terms of water management, (ii) current higher yield potential, (iii) standardized nitrogen management, (iv) crop insurance availability, and (v) known appropriate weed management strategies. This presentation stresses recent investigations into soil and plant tissue nitrogen assessment, where the likelihood of nitrification-denitrification processes are problematic for furrow irrigated rice and new nitrogen strategies are proposed.

# LASER- versus GPS-controlled Land Leveling

Mr. Preston Marthey [3A]-c

Preston Marthey of OptiSurface (Jonesboro, AR) will demonstrate how farmers, agricultural consultants, and earthmoving contractors can improve farm profitability through optimized water management. The machine control systems used in precision leveling are of two types. The first, and the one we are most familiar with, uses a rotating LASER beam that emanates from equipment mounted on a tripod or stand in the field (similar to the rotating beacon in an airport light tower). The system can be set to have the beam rotate with both a dialed-in main slope and side slope. The rotation forms (ugh, geometry) a single plane. The earthmoving equipment has a vertical one- to three-foot-wide array of receiver sensors that can detect the LASER beam. If the beam strikes a receiver at the bottom of the array, the scraper is too high and hydraulics are used to lower the blade and increase the depth of cut. If the beam strikes the receiver at the top of the array, the scraper is too low and hydraulics are used to raise the blade to finished elevation. When the beam strikes the sensor in the middle, the scraper is at the correct depth. In the end, the plane of the land surface will be perfectly parallel to the rotating plane of the LASER. But such fixed position planar (2-D) systems cannot easily be used to form anomalies on the land surface, such as raised berms for roads, etc. The second method uses very accurate GPS (3-D) signals coming from orbiting satellites. In this case, anomalies to the normal land surface can be dialed in. Also, cuts can be made to the existing land surface at different slopes instead of one constant slope. As long as the downstream slope is either level with or lower than the upstream slope, water will move in the downstream direction. This can lead to great decreases in cuts. OptiSurface, one of several software packages that work with GPS signals, can predict the amount of standing water in the field after a rain or irrigation, with and without furrows and beds. This feature allows an estimate of crop loss due to water logging (ponding).

## Benefits from PHAUCET / Pipe Planner, Wireless Soil Sensors, and other Irrigation BMPs

Jason Krutz, *PhD* [3B]-a

The Row-crop Irrigation Science Extension and Research (RISER) Program focuses on means to improve furrow irrigation efficiency and timing for various Mid-South production systems. In this break-out session, we will discuss environmental, agronomic and economic advantages associated with the proper implementation and utilization of computerized hole selection, surge valves, and soil moisture sensor technology.

## Designing Poly-Pipe Manifolds: PHAUCET / Pipe Planner

Mr. Chris DeClerk [3B]-b

Methods of low-cost irrigation have been sustainable for generations, but current pumping rates are rapidly increasing, and sustainable recharge cannot keep up. If we don’t become better managers of our resources, the cost of irrigating crops will only rise in the future. Adopting Pipe Planner, a web-based computer application, is one of the cheapest and most effective methods of conserving water on the farm. Every field, whether square or highly irregular, can benefit from the use of Pipe Planner. It helps keep polytubing tight, furrows water out more evenly, and ultimately saves water and money for your farm. On average, users see as much as a 25% savings in fuel costs.

## In-Canopy Sprinkler Irrigation: Ensuring Equal Opportunity

Freddie Lamm, *PhD* [4A]-a

Each plant should have an equal opportunity to receive the water applied by sprinkler irrigation. Unfortunately, this can be undermined by improper marketing, design, and installation of equipment, as well as through inappropriate farming operations and irrigation mismanagement. Key issues include irrigation application symmetry, spatial orientation of sprinkler travel with respect to crop rows, and the seasonal longevity of the sprinkler pattern distortion caused by crop canopy interference (especially when the irrigation is applied within or near the crop canopy). These issues must be carefully considered by crop producers, irrigation consultants, and the industry that supplies the irrigation equipment.

## Growing Rice with Center Pivots

Earl Vories, *PhD*, *PE* [4A]-b

Continuous-flood irrigation is the most common method for U.S. rice production, but it requires more than twice the irrigation water of methods used for other Mid-South crops. Center pivot irrigation can reduce water use in some cases and allow rice into the crop rotation when flooding is not practical. This talk will discuss research at the University of Missouri Fisher Delta Research Center, which has explored the development of an experimental crop coefficient and optimal irrigation management, and has compared center pivot yield, water use, and economics to flooded production.

## Costs to Water Corners / Irrigation and the Farm Program

David Reinbott, *MS* [4A]-c

On a per acre basis, the area under the pivot and that reached by end guns are the cheapest to water. However, this can leave 22% of the field from being watered; for a typical quarter-mile pivot this is about 34 acres, and this can be problematic, especially on sandy soils. Pivot manufacturers make arms that can reach out and apply water to a significant portions of the "dry corners." The per-acre investment cost to water these 30 odd acres is much higher than investment paid to water the first 125 acres. Although the per-acre investment cost is higher, it may be a wise investment—especially with the increased reliability of these arm systems.

The new farm program may incentivize the employment of irrigation.

## Irrigation Management Demonstrations in Northern Arkansas

Ray Benson, *MS* [4B]-a

Much of Ray's work has involved irrigation timing and termination, and recently he has also begun demonstrating irrigation tools that help improve efficiency. This presentation will highlight some of the on-farm demonstrations he has conducted over the past three years. A portion of the talk will be devoted to addressing potential pitfalls of irrigation tools such as surge valves, ET gages, and computerized hole selection programs. Ray will also discuss what the majority of producers have found to be most helpful.

## What Farmers' Surveys Tell us about Irrigated Soybean Production

Joe Henggeler, *PhD* [4B]-b

Since 1987, Bootheel Irrigators have provided important information on irrigation practices in the region. When they first began, irrigated soybeans yields were only about 10 bu/acre greater than dryland yields. By 2012, the yield differential was nearly 30 bu/acre, indicating that area farmers are becoming more skilled at irrigation. Other important data include: Each inch of irrigation water applied produces 4.3 bu/acre. Irrigators who use scientific irrigation scheduling out-yield those who do not by 6.5 bu/acre. Furrow-irrigated soybeans consistently out-yield pivot-irrigated ones (5.3 and 4.3 bu/acre for double-crop and full-season, respectively) due to furrow beds allowing surface drainage to occur. Survey data also indicated the superiority of beds over flat-planting in increasing yield. This was shared with growers ten years before the first published research in the mid-South on this topic. Soybean yields on furrows increase by 2.0 bu/acre when surge flow is used. And for each week of delay of planting after the last week of April, yields decrease by 1.75 bu/acre.

## Drilling a Quality, Affordable Irrigation Well

Jim Cook [4B]-c

There is a good deal of difference in what a farmer might pay for a well then what a municipality might pay for a high-end well in the Bootheel area. The largest factor by far for irrigators on the cost of water for flood/furrow systems, is the pumping water level (PWL). Thus the well driller needs to use practices that will make the well efficient so that deep PWLs are avoided. Such things as the type of gravel pack and the correct combination of gravel pack/screen size are important. However, at some point the additional costs involved in making "the perfect well" can become too much. Therefore, the owner and the well driller must seek to have a quality well that is also affordable.

## Five Key Points about Irrigating from the Mississippi Alluvial Aquifer

Joe Henggeler, *PhD* [5A]-a

Pumping plant performance of units drawing water from the Mississippi Alluvial aquifer (MSA) has been evaluated since the late nineteenth century. But it was only several years ago that the first systematic characterization of pumping plants was developed by the University of Missouri. Prior to this, there was no clear pattern of best management practices (BMPs) for pumping out of the MSA. The new analyses found that pivots, whether diesel/propane (d/p) or electric, did not have low efficiencies, and that pumping water level (PWL) had the largest effect on water costs for furrow/flood with d/p. Because of this, it is imperative that efficient wells be drilled and, since PWL increases with flow rate, that farmers avoid inordinately high flow rates (more than three or four thousand GPM) unless absolutely necessary. Also, d/p systems being pumped into cascading basins and duck lakes should be tested to determine what level of RPM produces the cheapest water.

## Water Usage Studies of Major MS Delta Crops

Joe Massey, *PhD* [5A]-b

Although intermittent flooding of rice (Oryza sativa L.) has been shown to significantly reduce irrigation demand, continuous flooding remains standard practice in the United States due in part to scalability and agronomic concerns. This study used replicated trials in farmer-managed fields to determine if intermittent flooding could be successfully adapted to commercial-scale rice production in Mississippi. When intermittent flooding was coupled with multiple-inlet rice irrigation (MIRI), the quantity and quality of yields were maintained or increased for five commercial rice varieties and one hybrid, relative to continuously-flooded controls, and water use over three years averaged 32% less. Only CL151 exhibited a decrease in total head rice when milled (after being subjected to five or more wetting and drying cycles over ≈80 day flood periods). These results demonstrate that intermittent flooding can be successfully adapted to commercial-scale production when combined with effective pest management. Even partial adoption of intermittent rice flooding can increase rainfall capture and help alleviate overdraft of the Mississippi River Valley Alluvial aquifer.

## Flood Tolerance of Soybeans

Matt Rhine, *MS* [5A]-c

Soybeans, in general, are sensitive to water-logging damage, especially during earlier stages. Bedding up helps reduce the susceptibility of the soybean, but in a rice-soybean rotation, this practice is impractical. One option is to use soybean varieties that have higher degrees of flood tolerance. Dr. Grover Shannon was the key investigator in this research, and Matt wrote his master's thesis on it. This research has had large amounts of grower interest and support.

## Irrigation Scheduling – Smartphone App

Gene Stevens, *PhD* [5B]-a

The University of Missouri developed an online mobile program (app) called Crop Water Use Calculator (CWU) to help farmers manage irrigation for optimum crop yields and water use. The application estimates water use by analyzing weather station data such as temperature, humidity, wind, and solar radiation. Daily soil water deficits are reported using a "checkbook" system that tallies rainfall and irrigation as deposits and water use, etc., as withdrawals. For each field, users specify latitude and longitude, dominant soil texture, crop planted, planting date, rooting depth, irrigation method, inches of water per irrigation and maximum allowable field water depletion. CWU provides daily balance summaries with dryness index forecasts for the following two days. As soil water deficits worsen, the app alerts the user of the need to irrigate before yield loss occurs. Field validation work for the program was conducted in 2013 and 2014. The program will be available to farmers for free.

## Irrigation Scheduling – Using Various Moisture Sensors

H. C. (Lyle) Pringle, III, *MS* [5B]-b

This presentation will discuss the basics of soil water characteristics and electronic soil moisture sensors and the use of these sensors in scheduling irrigation in the Mississippi Delta.

## Irrigation Scheduling – Woodruff Charts

Andrea Phillips-Jones, *MS* [5B]-c

A recent study found cotton to cutout prematurely if farmed dryland or if irrigation is started too late. Using the full growing season maximizes yield and improves fiber quality. Genetics controls much of the fiber length, but if cotton is stressed during its first fifteen to twenty-one days, fiber length will shorten in the boll. Good irrigation helps prevent this. If you don't have time to employ computer-based irrigation scheduling, there is a quick, easy, and effective method called a Woodruff Irrigation Chart that uses historic weather data and modern crop coefficients to determine when to irrigate. This stop on the blue tour will give you "hands-on" experience with the Woodruff method. You will create a chart and pencil in the weather data to determine proper irrigation dates.

# Workshops

## Workshop: Center Pivot Irrigation: Technology and Management Tips

Dana Porter, *PhD*

Workshop Overview

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|---|---|
| Time: | Thursday, Dec 18, 2014 (1:40 PM - 4:30 PM) |
| CCAs: | 2 ¼ hours (Soil and Water) |
| Instructors: | Dana Porter, *PhD* (Texas A&M AgriLife, Lubbock, TX) |
| Target Audience: | Farmers using center pivots |
| | Agency personnel working with pivot owners |
| | Pivot dealers |

Center pivot irrigation encompasses a wide range of technologies that are excellent tools, promising great results with good management. This session will provide an overview of center pivot irrigation, including advantages, limitations, and site-specific and operation-specific considerations. It will also offer management recommendations to help irrigators take full advantage of the technologies available today. Topics will include selecting application-appropriate nozzle packages and types, pressure regulators (when needed), and general maintenance options. Best management practice tips will address crop water requirements, soil moisture management, chemigation and safety.

# Workshop: Furrow Irrigation: Technology, Management Tips, and Leveling

Joe Henggeler, *PhD*

Workshop Overview

| | |
|---|---|
| Time: | Thursday, Dec 18, 2014 (1:40 PM - 4:30 PM) |
| CCAs: | 2 ¼ hours (Soil and Water) |
| Instructors: | Joe Henggeler, PhD (University of MO - Jake Fisher Delta Research Center)<br>Preston Marthey (OptiSurface - Jonesboro, AR) |
| Target Audience: | Farmers using surface irrigation<br>Farmers with their own land-leveling equipment<br>Custom land levelers<br>Consultants doing land-leveling design |

- Evaluating your surface irrigation system
- Surge flow
- Cutback irrigation
- Land-leveling with LASER systems vs. with GPS systems
- Matching guidance systems to your personal needs

## PART 1: FURROW IRRIGATION: TECHNOLOGY AND MANAGEMENT TIPS

*SYNOPSIS: Joe Henggeler will discuss how to analyze and improve the performance of flood irrigation system. Correct furrow length, the importance of discharge uniformity out of the polypipe, packed vs. non-packed rows, and surge and cutback flow will be discussed, as well as available government funding opportunities for furrow system improvements.*

In the former days of "dollar diesel," there wasn't much concern about improving furrow/flood efficiency, especially when water supplies were abundant. However, three things have come together to form "the perfect storm" affecting farmer attitudes about furrow efficiency: (1) the decline of water tables in the lower MS Valley Alluvium, (2) the steep increase of diesel costs starting in 2004, and (3) the widespread use of yield mapping.

The first step in improving efficiency is to analyze your system's current performance. This can be done by examining overall field uniformity (using, e.g., yield maps, aerial photos [drones?], and satellite images from Google Earth), studying furrow out-times, and checking for uniformity down the row. Methods of improving furrow irrigation efficiency to be discussed will include soil moisture sensors, correct flow stream, surge flow, and cutback flow.

**PART 2: THE IMPORTANCE IN GUIDANCE METHOD – LASER VERSUS GPS**

*SYNOPSIS: Preston Marthey will discuss how farmers, agricultural consultants, and earthmoving contractors can improve farm profitability through optimized water management using land-forming. Types of guidance systems will be discussed as well as choosing the correct guidance system for commercial earthmovers vs. farmers vs. consultants.*

**Guidance Systems**

The machine control systems used in precision leveling are of two types. The first, and the one we are most familiar with, uses a rotating LASER beam that emanates from equipment mounted on a tripod or stand in the field (similar to the rotating beacon in an airport light tower). The system can be set to have the beam rotate with both a dialed-in main slope and side slope. The rotation forms (ugh, geometry) a single plane. The earthmoving equipment has a vertical one- to three-foot-wide array of receiver sensors that can detect the LASER beam. If the beam strikes a receiver at the bottom of the array, the scraper is too high and hydraulics are used to lower the blade and increase the depth of cut. If the beam strikes the receiver at the top of the array, the scraper is too low and hydraulics are used to raise the blade to finished elevation. When the beam strikes the sensor in the middle, the scraper is at the correct depth. In the end, the plane of the land surface will be perfectly parallel to the rotating plane of the LASER. But such fixed position planar (2-D) systems cannot easily be used to form anomalies on the land surface, such as raised berms for roads, etc.

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**Commercial Systems Available and Business Plans**

Different commercial guidance packages will be discussed, including product interchangeability and different equipment requirements based on customers' business plans.

## Workshop: Variable Frequency Drives

Chris Henry, *PhD*, *PE*

Workshop Overview

| | |
|---|---|
| Time: | Thursday, Dec 18, 2014 (1:40 PM - 4:30 PM) |
| CCAs: | 2 ¼ hours (Soil and Water) |
| Instructors: | Chris Henry, *PhD* (University of Arkansas) |
| Target Audience: | Farmers |
| | Irrigation dealers & well drillers |
| | Electric utility managers & engineers |

Flood/furrow systems watered out of the northern stretches of the Mississippi Alluvial aquifer pull lots of water from shallow depths; these pumps are classified as High Flow/Low Head (HF/LH). Total dynamic head (TDH), which includes pumping water lift, friction loss in column pipe, and outlet pressure is only about 40-50 feet. When water tables drop a mere 5 feet, TDH increases by 10-15% thereby dropping flow rate by at least that much. Modeled and on-farm test results showed that such a 5-foot drop in water table resulted in a 25% drop in flow. Pumps driven by normal electric motors are subject to these losses. However, diesel- and propane-powered pumps skirt this problem when the operator increases engine RPM. Electric motors equipped with variable frequency drives (VFD), can likewise skirt the problems associated with a fluctuating water table. Additionally, VFDs have other advantages, such as possibly being able to use single-phase electricity.

## General Keynote Sessions

# What this USB Grant is All About

Jason Krutz, *PhD*

The USB/MSSB project will achieve this goal through these objectives:

1) Advance the science and usability of Computerize Hole Selection (CHS) for lay flat poly pipe, soil moisture monitoring, surge irrigation, and other proven irrigation efficiency practices;

2) Develop a more user friendly and easier to implement public domain computer program for evaluating and planning hole punch plans;

3) Validate proven irrigation water management practices mentioned in (1) on soybean grower farms and document sustainable water use and improved profitability.

4) Demonstrate irrigation pumping plant performance gains and how irrigation pumping plant performance can improve energy conservation, profitability and reduced greenhouse gas emissions.

5) Conduct a cost-benefit analysis of the implementation of the irrigation BMP’s in (3).

6) Disseminate results through field days, regular Extension outlets, and through a specialized regional irrigation conference for soybean growers.

Today, the Delta States Irrigation Conference is the first step in meeting the goals outlined in (6). Welcome!

## Experiences from the Central Plains Irrigation Conference

Freddie Lamm, *PhD*, *PE*

Since 1989, the Central Plains Irrigation Association has sponsored the annual Central Plains Irrigation Conference each February. The conference rotates between locations in Kansas, Nebraska and Colorado. Its intended audience includes producers, crop consultants, USDA-NRCS, water agency staff and other parties interested in irrigation. This presentation will discuss the history of the conference and its impact.

## Going forward: Delta States Irrigation Conferences in the Future

Lanny Ashlock*, PhD*

On behalf of the Mid-South Soybean Board (MSSB) and the United Soybean Board (USB), we hope you have benefitted from your attendance to the "Delta States Irrigation Conference and Trade Show – 2014". This activity has been made possible by the soybean producer check-off funds of the states of AR, LA, MO, MS and TX and by an intensive commitment of the USB. The USB and the MSSB have joined hands to fund a four-year research and technology transfer project entitled "Irrigation Water Management for Southern Region Soybean Growers" that was submitted by Dr. Jason Krutz, Extension Irrigation Specialist with the Mississippi Agriculture and Forestry Extension Service, and by Dr. Chris Henry, Water Management Engineer with University of Arkansas Division of Agriculture. This project encompasses much more than the conference we have just participated in. It will expand into multiple in-depth on-farm water management demonstrations in all of the Mid-South states that comprise the MSSB. These comprehensive on-farm demonstrations will focus on insuring that these cooperating soybean producers are exposed to the most effective and efficient water management programs for their individual farming operations. Additionally, the research and Extension personnel involved in this project will continue to evaluate ways to insure that water management programs are adapted to Mid-South soybean production systems and environments and that they are producer-friendly and scientifically sound. Current and new findings will be shared with all interested soybean producers in future conferences that are scheduled for Arkansas, Mississippi and Louisiana over the next three years as well as appropriate publications, podcasts and programs.

In closing, on behalf of the MSSB, the USB and all the speakers and attendees, it is my privilege to recognize and express our sincere and deepest appreciation to Dr. Joe Henggeler, Irrigation

Specialist for Commercial Agriculture with the University of Missouri Delta Center. Joe has worked tirelessly to make this conference a reality. “Events like this don’t just happen, they are caused,” and certainly the first of the four planned “Delta States Irrigation Conference and Trade Show – 2014” is one such event. Again we are all indebted to all of our conference speakers and participants and we sincerely thank our trade show partners for helping to make this conference and trade show a reality. But most of all we thank the soybean producers of not only the Mid-South but of the U.S. for your continued commitment to the nationwide soybean check-off program. Your support of educational activities such as this conference helps insure that U.S. soybean producers remain not only competitive but wise stewards of our nation’s natural resources, and it also helps ensure that the U.S. soybean industry remains viable and economically and environmentally sustainable for future generations.