

Why drip system uniformity matters

For decades, using drip irrigation (including drip tape, drip emitters or microsprays) has helped many farmers increase crop yield and quality while at the same time improve water and resource use efficiency. However, no matter how beneficial a drip system is expected to be, factors such as aging equipment, lack of maintenance or improper design can have a significant impact on the system's ability to deliver irrigation water and nutrients efficiently and effectively.

This ability is known as the system's distribution uniformity (DU) and is an

excellent indicator of how well it is operating. It's a measure of how evenly water is applied across a field during irrigation. For example, if one area of a field is receiving 10 gallons of water per hour from an irrigation system, but another area of the field in the same irrigation set is receiving six gallons per hour, this is considered poor DU. This creates a problem because areas that are receiving less water need to be watered for longer, which means other areas of the field are receiving more water than needed. Ideally, DU audits measure above 90 percent

and are conducted yearly by mobile labs, consultants or trained on-farm personnel.

Recent on-farm irrigation system DU analyses conducted by mobile labs were reviewed in a report by AG H2O and the Center for Irrigation Technology. The report reveals that a significant percentage of existing drip systems have poor distribution uniformity. A drip system with poor DU has a ripple effect, translating into a waste of water, fertilizer and energy, lost profits and possible degradation to the environment (see table below).

Impact of poor DU performance | 80-acre system

Increased quantity of inputs per acre per year due to DU degradation (based upon a new system DU of 90%)

	Distribution uniformity (DU)					
Inputs	85%	80%	75%	70%	65%	60%
Fertilizer (lbs/acre)	17	35	60	80	110	140
Water in acre feet (surface water supply)	17	33	53	77	103	133
Energy cost/acre @\$0.18	\$5.00	\$15	\$25	\$35	\$45	\$55

How to use this chart: If a grower wants to apply 3 acre feet of irrigation to all parts of the field, then depending on the degradation of uniformity, the grower must compensate by overapplying in some of the field. This chart calculates the wasted water, energy and fertilizers based on the overapplication.
Prepared by AG H2O, Sept. 2017

Percent of farms measured DU and impacts of poor DU performance excerpted from AG H2O presentation to CAIA on "Management of Agricultural Energy and Water Use With Access to Improved Data"

Determine if your system is delivering water and nutrients uniformly — and correct it if it isn't.

By Inge Bisconer, CID, CLIA

Out of
458
drip systems
evaluated,
48%
had a DU of
75%
or less.

Source: Management of Agricultural Energy and Water Use with Access to Improved Data, CIT and AG H2O Report

In addition, Western Growers evaluated the performance of four of its member companies that were considered to be leaders in irrigation efficiency and found that average DU was just over 81 percent, more than nine points below the DU expected of a new system. In the study summary, Western Grower Senior Vice President of Strategic Planning, Science and Technology Hank Giclas noted that the water, energy and fertilizer needed to produce a crop increases dramatically with the degradation of uniformity.

Improving a poor performing system

Systems with poor performance may often be improved with nominal time, money and effort. Remedies for poorly performing systems usually fall into two categories: equipment and behavior.

Common steps to troubleshoot equipment include checking and adjusting pressures. A good practice is to regularly inspect equipment and replace aged tapes, driplines, microsprinklers and sprinklers. Installing drip tape fittings can reduce leaking. Trimming the impellers of pumps and increasing the size of submains can also improve performance, along with the addition of pressure regulating and/or sustaining valves.

Creating a maintenance routine is another best practice. Your routine should include checking pressures and flows, flushing at adequate velocities of at least 1 foot per second, lowering the water pH to dissolve precipitated chemicals, and applying chlorine to check organic growth. A number of commercially available line cleaners are also available.

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The future of water management

A good question to consider is — Why are irrigation systems allowed to fall into disrepair? One possible reason is that, historically, water, labor and energy were inexpensive, and growers could focus on higher ticket farm management issues such as fertilizer, pesticides and seeds.

However, this is no longer the case. In fact, the cost of not managing water and fertilizer properly not only hurts yields but risks degradation to the environment and noncompliance with regulations.

Just as farm managers routinely hire experts to help them with soil health,

fertilizers, seed, pesticides, equipment, finances, legal advice and marketing, in the future they will also hire experts to help them with water management.

Although the obvious targets for improved irrigation are equipment repairs and upgrades, farm owners, managers, supervisors and irrigators can also take advantage of professional services, education and training provided in the irrigation community. Resources are available through area ag extension services; universities; the Irrigation Association; and irrigation manufacturers, system designers, consultants and dealers.

Despite significant progress toward modernizing ag irrigation systems, many existing systems are in disrepair,

translating into lost profits and increased risk to the environment. Through troubleshooting and maintenance practices, growers can work to solve these problems and ensure their systems are performing at a peak level. 🌱

Additional studies related to the evaluation of uniformity on drip systems are available. For more information, contact Inge Bisconer at info@surfnearth.com.

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Photo credit: Inge Bilsen

Top 5

How to be a better drip irrigator

1. Audit pressures and flows and remedy poor DUs.
2. Create a system maintenance program.
3. Schedule irrigations according to need.
4. Get education and training.
5. Find an expert and don't go it alone!