ADVANTAGES OF CENTER PIVOT IRRIGATION VERSUS DRIP IRRIGATION

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The goal of drip irrigation is to use minimal resources through extremely efficient water application. However, drip systems have a number of disadvantages that should be considered before deciding if they are right for a specific field.

In commercial agriculture, driplines are usually installed underground. This is known as subsurface drip irrigation (SDI). Water flows out from small holes in the lines called emitters.

To fulfill the goal of efficient water application, a drip irrigation system must be installed and managed correctly. This requires a high initial investment and often requires additional maintenance fees to fix broken lines.

One study cites that average initial and net investment costs of SDI systems were more than double of those for a center pivot system (Payero et al., 2005). This is not surprising considering the installation involves significant time and labor. Because the maximum dripline length is limited to a half mile, or 2,640 feet, additional main lines and submains add to the cost for larger fields. Additionally, the lifetimes of drip systems vary widely, so predicting how long one will last is difficult.

Drip systems are not right for every field or farming operation. They are difficult to install correctly in rocky soils. Lack of soil surface moisture with SDI can make seed germination challenging, and early growth may be limited by water stress. A backup irrigation system may be needed in arid areas for seed germination (Payero et al., 2005).

Additionally, the inflexible design of drip irrigation systems limits farming operations. Once a system is installed, features that effect the distribution of water such as dripline depth, spacing and length, as well as emitter diameter and spacing, cannot be changed. The types of crops that can be grown, as well as tillage practices, are limited by these initial choices.

Because chemicals may be needed to properly maintain driplines, a drip system may not be right for organic farming operations. A common drip system maintenance practice is to flush lines with acid to lower the pH inside. When pH is too high, a calcium carbonate deposit can form inside the lines. If a biological contaminant such as algae or slime forms inside the lines, a chlorine injection may be required. An herbicide injection may be used to correct root intrusion when crop roots grow around driplines and clog emitters (Payero et al., 2005).

Other problems can also occur with driplines. Rodents, such as gophers and field mice, can chew on driplines and cause leaks. Chemicals may be required to repel these rodents. If a leak does occur, it can be difficult to find and fix. If dripline systems are not installed correctly, surfacing, also known as "the chimney effect," can occur. When water is applied at a rate greater than the soil's infiltration rate, water comes up to the soil surface. This can cause soil erosion around the hose. A filtration system to prevent soil particles from clogging emitters should be a key component of any drip irrigation system. Vacuum release valves to prevent negative pressure in the lines after irrigation also are a good idea (Payero et al., 2005).

For growers who want an efficient irrigation method and would like a lower-cost, less labor intensive option, pivot irrigation is a good choice. Center pivots are highly customizable. If efficiency is a top priority, ask for low energy precision application (LEPA) sprinkler heads. Drop hoses are a good choice for short crops. They conserve water by applying it closer to the ground. Because sprinkler packages are customizable, center pivots actually go beyond uniformity to provide exactly the right amount of water for field conditions and specific crops. Water is controlled through various sprinkler plates, operating pressures, mounting heights and sprinkler spacing.

Center pivots provide flexibility that is not available with a drip irrigation system. If a grower decides to try a different crop 10 years after a pivot installation, sprinklers can be changed without replacing the entire system.

While driplines are difficult to install in rocky fields and around obstacles, customizable design features of center pivots allow them to fit nearly any field, no matter how large, small, or unusually shaped. Wrap spans bend up to 180 degrees around objects or tree lines and drop spans are easily disconnected for irrigation around obstacles. Swing arm corners (SACs) irrigate in the corners of fields, so growers can make the most of every acre. The Reinke Electrogator® is powered by a high-efficiency gear motor that propels the system over rough terrain and difficult soil conditions. The flex joint hook and receiver, another Electrogator feature, is a pipe joint that allows the system to traverse hilly terrain with minimal impact on water flow.

Like any irrigation method, a center pivot requires an initial investment. However, the per-acre installation cost is less than half the cost of an SDI system (Payero et al., 2005). Center pivots have stood the test of time with proven reliability and durability. An irrigation system's durability is an important consideration when calculating its economic value. The longer a system's lifetime, the more the initial investment pays off over time.

Precision ag technology, which is available with center pivots, may also help conserve water by helping the irrigator make wise decisions about when and how much to irrigate. Center pivots can run variable rate irrigation (VRI) prescriptions for fields with diverse soil conditions. Remote management, combined with soil sensors, is available with center pivots to help growers make informed decisions and apply water wisely.

Basic center pivot packages can be easily upgraded, so the initial investment not only meets today's irrigation needs, it's also a step toward advancing farming operations into the future.

References:

Payero, J.O., Yonts, D.C., Irmak, S., & Tarkalson, D.D. (2005). Advantages and disadvantages of subsurface drip irrigation. University of Nebraska-Lincoln Extension