ADVANTAGES OF CENTER PIVOT IRRIGATION VERSUS FLOOD IRRIGATION

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Early civilizations used flood irrigation, also known as furrow irrigation, to grow crops. Despite the many advantages of mechanized irrigation, this method is still used in the United States and in less developed countries. To irrigate with the flood method, furrows are dug between crop rows and water is pumped into the fields. The water travels down the furrows, which reach the end of field, soaking into the soil and hydrating the crop root zone.

This irrigation method will produce better yields than dryland crops, but it comes with a number of disadvantages. Environmental concerns are not the least of these. Overwatering is a common problem with flood irrigation (Yonts et al., 2007). Overwatering can cause nitrogen and other farming chemicals to leach into groundwater. Additionally, overwatering can lead to yield loss.

According to a 2014 study, both hand-harvested and combine-harvested grain crops that were slightly overwatered, at 125% of evapotranspiration (ET), produced less yields than the same crops that were slightly underwatered at 75% of ET (Irmak, 2014).

As might be expected with an older method, flood irrigation is labor-intensive. The land must be prepared by leveling, then digging furrows. A slight downward slope helps the process; but if the slope is too steep, water will pool at the downstream end of the field and upstream crops will not receive adequate water. Any slight hill or terrain variation can prevent water from reaching the end of the field and cause pooling. Fields must be rectangular shaped and not too large for water to disperse evenly. It is generally recommended that irrigation furrows not exceed 600 feet in length on coarse-textured, or sandy soils, and 1,300 feet on medium-textured soils (Yonts et al., 2007).

When it comes to harvesting the highest possible crop yield, flood irrigation is at a disadvantage because of poor uniformity in water distribution. With flood irrigation, soil toward the upstream end tends to experience deep percolation, or excess water, and soil downstream may not receive enough water. This problem is exacerbated in soil with a high infiltration rate, like coarse-textured soils, because the soil absorbs water more quickly (Yonts et al., 2007).

For growers who want to avoid over- and under-watering, and thus increase their yields, center pivot irrigation is a good choice. Additionally center pivots are more efficient and less labor intensive than flood irrigation.

Unlike flood irrigation, center pivots provide an even distribution of water with good uniformity throughout the field. This helps crops reach their full yield potential no matter their field position. Because sprinkler packages are customizable, center pivots can 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.

Not only do center pivots apply water more uniformly than flood irrigation, they also use less water per application. Some options, like low energy precision application (LEPA) sprinkler heads, increase pivots' efficiency. Drop hoses are a good choice for shorter crops. They conserve water by applying it closer to the ground. Precision ag technology, which is available with center pivots, may also help conserve water by providing information that helps the irrigator make wise decisions about when and how much to irrigate.

In addition, center pivots are a low-labor irrigation option. All functions are automated through a central control panel. If the irrigator chooses, the systems can be monitored and controlled with a smartphone or computer.

Flood irrigation works best in small, rectangular fields. 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. With many types of pivots, no field leveling is required. 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.

The irrigation system's durability is an important consideration when calculating its economic value. The longer the system's lifetime, the more that the initial investment pays off over time. Although they require an initial investment, center pivots have stood the test of time with proven reliability and durability.

To minimize initial investment, a basic pivot is a good choice when converting from flood irrigation to center pivot irrigation. Once the initial investment pays off, many upgrades are available, including precision irrigation options. Center pivots can run variable rate irrigation (VRI) prescriptions for fields with diverse soil conditions. Remote management, combined with soil sensors, is also available to help growers make informed decisions and apply water wisely. The initial investment in a basic center pivot not only meets today's irrigation needs, it's also a step toward advancing farming operations into the future.

References:

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