# INCREASING IRRIGATION EFFICIENCY

As global populations increase, water is becoming a much more important natural resource. As with any limited resource, efficient use is a key component. Because of increased demand for food and water, Irrigation Efficiency in agricultural systems is becoming a growing concern. According to the University of Nebraska, "Irrigation efficiency is generally defined from three points of view: (1) the irrigation system performance (2) the uniformity of water application, and (3) the response of the crop to irrigation." Irrigation system manufacturers have found ways to enhance performance and increase the uniformity of application through the use of technology. A few of these technologies include soil moisture sensors, automated control boxes, variable rate systems and subsurface drip irrigation.

Agronomics and an understanding of individual cropping systems play a role in influencing the response of a particular crop to irrigation. A good first step is to know your soils. Differences in soil characteristics determine the Water Holding Capacity. For example, the water holding capacity of a sandy soil will be about one inch of water per foot whereas a silty clay loam will be near two inches per foot. These same soil characteristics also influence the infiltration rate of a particular soil which aids in understanding how much and how fast water can be applied before surface runoff will occur. Probing the soil to determine how much water is currently being held in the soil will help in deciding when to start irrigation and how much should be applied. The over-application of irrigation water to soils already saturated will reduce efficiency by percolating water to depths past the root zone and increasing the potential for runoff. Not only does the crop not respond to the added water but this can also have a negative influence on the environment.

Another important step to increasing efficiency is to understand the water needs of the crop being grown. Consumptive water use is normally measured by Evapotranspiration (ET). ET is the sum of plant transpiration and the evaporation from the soil surface of the field. ET is influenced by many factors including average daily temperatures, wind, crop growth stage, rooting depth, amount of canopy and soil residue cover. All of these help to determine the amount of irrigation water to be applied at different stages throughout the growing season. The goal is to apply the correct amount at the correct time to increase the crop's response to irrigation. Consumptive water use charts have been made for most crops that will give an idea of how much water a crop is using for a particular growth stage but to really understand the amount of ET you must monitor the soil.

Fertility also plays a part in increasing crop response to Irrigation water, helping to increase efficiency. Starter fertilizer applications in conjunction with a base soil fertility program will increase root growth allowing crops to extract more stored water in the soil profile from each irrigation.

Starter applications also enhance early season growth, which increases leaf area and leads to quicker canopy closure creating a decrease in evaporation. Efficient and timely applications of both nutrients and water will increase the crop's response to both and help to increase overall Irrigation Efficiency. This can be achieved thru the utilization of foliar fertilizer applications as well as delivering nutrients thru the irrigation system, known as fertigation. Efficient nutrient management using in-furrow starter, foliar fertilizer and fertigation applications along with efficient irrigation techniques can have a positive impact on the environment and profitability.

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