WATER MANAGEMENT

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Irrigation scheduling is applying the right amount of water at the right time and can improve crop yields and reduce pumping costs. How many times have we seen or heard this same comment? Managing irrigation has been researched, discussed and demonstrated for a number of years. More recently, the application and control of chemicals through irrigation systems have given water management a renewed importance. Important not only for efficient and profitable crop production but for the protection of a natural resource that is needed and used by every individual, water.

Wise use of water in agriculture can mean a number of different things to the producer, all with varying degrees of importance. It can mean an efficient pump, or applying the water uniformly across the field. In other situations it might mean knowing how much water is applied or how much water the crop is using. However as the non-agriculture sector of our society views agriculture and the wise use of water their question relates to how much water is being used and what is the quality of the water when agriculture is finished. This means that as we make improvements in our ability to manage water through improved practices or equipment the results will be evaluated by many, both in and out of agriculture.

The question is, what is agricultures response to water management issues. The answer should be found in that worn out phrase, apply the right amount of water at the right time. Following that simple, yet sometimes hard to achieve water management goal, will ultimately provide the solution for agriculture on the wise use of water.

Soil, Water and Plant Relationship

To apply the right amount of water we must first understand the relationship between soil, water and the plant. The soil is not a bucket that is filled with water but more like a sponge that will hold water when it is applied. We commonly think the soil absorbs the water when in fact the water is held around each individual soil particle or held in pockets created by soil particles close together. Different soils will hold different amounts of water. Coarse textured soils like sand have large soil particle size and as a result holds less water than a fine textured soil. Applying more water than what the soil particles can hold means water will be lost to excess drainage. Applying too little water means the crop may be stressed.

The plant views the soil as a structure to support the plants growth and a medium for holding nutrients. Water in the soil sees the plant as a small vacuum. The strength of this vacuum or plant is driven by atmospheric conditions. The temperature, wind and humidity are some of the factors that influence how much strength the plant has to pull water from the soil and transpire it through the leaves. This process is called transpiration and is the amount of water used by the plant. Evaporation from the soil surface is also important because the amount of water evaporated is also determined by atmospheric conditions. The term evapotranspiration or ET combines transpiration from the plant and evaporation from the soil surface. ET is the total amount of water that must be replaced to meet the water needs of a growing

Plant Influences on Water Use

There are several things that will influence crop water use in addition to the climate. Different crops will use different amounts of water during a growing season due to plant characteristics such as rate of maturity and planting date. Stage of growth also influences crop water use as plants just beginning to grow will use less water than a more mature plant even though each experiences the same climatic conditions. Another factor which influences crop water use is the cover on the soil surface. Because evaporation is a component of crop water use, residue on the soil surface that reduces evaporation also reduces crop water use values.

Irrigation System

Applying the right amount of water also means knowing the performance of the irrigation system as well as the relationship between the irrigation system and the soil. The uniformity of application and system efficiency are two factors that are often discussed when evaluating the performance of an irrigation system. But applying the right amount of water means knowing how much water is being applied through the irrigation system. Is it enough to meet crop water needs or is it too much for the soil to hold? The answer to this question is critical in knowing that the right amount of water has been applied.

Underestimating the amount of water being applied will gradually lead to crop water stress and ultimately yield loss. The concern for crop water stress often leads us to applying more water than the crop needs. The result is drainage below the root zone or runoff from the field. Either way is not wise use of water.

Determining the amount of water your crop has used, ET, can be found through various sources such as newspaper, radio and circulars. The information may relate to average water use values or specific water use values for the current growing season. By combining this information with your irrigation information a schedule can be developed by which irrigations, both

timing and amount, can be predicted based upon your field conditions. The process of irrigation scheduling has been available for years, and for good reason. Irrigation scheduling holds the key to water management by allowing us to apply the right amount of water at the right time.

The following guide is one example of how to put information about your crop and irrigation system together for the wise use of our water.

CHEMIGATION BENEFITS THROUGH EQUIPMENT CHOICES

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Both growers and regulatory agencies are becoming more and more concerned about the use and misuse of agricultural chemicals and fertilizers. Equipment decisions today are influenced by economic, environmental and safety considerations. With the increased technology and dependability of today's irrigation systems, chemigation is recognized as an application method which effectively addresses all of these concerns. The intent of this paper is to describe the proper (and moreover recommended) equipment that most thoroughly ascribes to the safety, economic, environmental, and efficiency concerns of the application method. Discussion will first focus on different types of irrigation systems and injection systems as well. The paper will then move into the necessary components of a well designed chemigation system and also provide a listing of the specifications of each major component of the injection system. Finally, the selection process and decision making parameters will be examined.

IRRIGATION SYSTEMS

The first component of a successful chemigation endeavor is the irrigation system. Many types of irrigation systems exist. Systems can be generally categorized into sprinkler, surface, and trickle. Sprinkler types include center pivot, lateral move, traveling gun, linear move, wheel move, tow line, and solid set. Trickle systems are primarily drip applications. Surface systems include gated pipe, siphon tube, and open flood.

Researchers have concluded that sprinkler systems are best suited for chemigation practices. With today's chemical formulations and application rates, along with the precise management practices followed by the modern grower, the irrigation system must provide high performance levels to match the user's exact application expectations. Another consideration is the ease with which the chemigation equipment is integrated and connected to the sprinkler systems (in terms of power and plumbing requirements).

Of the irrigation systems, self propelled linear and center pivot systems seem best for chemigation applications. They have advanced control features and their water application/distribution uniformity are most precise. Drip systems have also been used for chemical applications and can apply products in a very precise area (root zone, plant base, etc.). However, the size of orifice in the emitter sometime presents a clogging problem, given