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Better Crops, Better Environment...through Science

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GET THE MOST FROM FERTIGATION

Fertigation continues to grow in popularity as the advantages of applying nutrients with the irrigation water become clear. One advantage of fertigation through microirrigation systems is the ease with which nutrients can be added to water and directed to the soil where root density is greatest. However, fertilizing through microirrigation systems requires that the operation be carefully managed in order to deliver the nutrients in the right place, the right rate, the right time, and in the right form.

Uniformity: One critical aspect for effective fertigation is achieving uniform application of water and nutrition across the field. Attention should be given to variation in emitter discharge rates, constant nutrient injection into the system, and knowing the travel time required for the dissolved nutrients to move to the furthest point in the irrigation system. The travel time is commonly measured by injecting a fairly high rate of fertilizer and then measuring the electrical conductivity in the water coming from the last emitter in the line furthest from the pump. Alternatively, liquid chlorine (bleach) can also be added to the irrigation system and then detected at the end point with a chlorine test kit used to measure swimming pool water.

Nitrogen: There are many excellent N fertilizers used for fertigation...liquids or dissolved solid materials containing urea, ammonium, or nitrate alone or in some combination. Urea and nitrate are very mobile and move with the irrigation water in the soil. Ammonium is held by soil on cation exchange sites and therefore far less mobile than urea and nitrate. Ammonium initially accumulates near the dripper or microsprinkler as it leaves the irrigation system. Of course, all of these N forms are subject to a variety of biological transformations that will influence their behavior and availability for plant uptake.

Phosphorus: Phosphorus fertilization through microirrigation systems can be a very effective way to deliver nutrients during critical times of plant demand. Since P has very limited mobility in most soils, the fertilizer needs to be delivered in close proximity to the roots. A variety of soluble P fertilizers can be used for fertigation. However, when P fertilizer is added to an irrigation water that contains elevated concentrations of calcium or magnesium, the pH must be maintained low enough (generally below pH 5) to prevent precipitation of insoluble salts. A fertilizer compatibility test with the irrigation water should be conducted before injecting any soluble P fertilizer into an irrigation system. Failure to do this properly can result in severe plugging problems.

Potassium: A number of K fertilizers are well suited for fertigation. Dry K fertilizers can be dissolved or a liquid source can be successfully used. Potassium has limited mobility in soil, but moves more readily than P. Since fertigation directs nutrients to a relatively small area of the soil, avoid high single doses of nutrients to prevent salinity problems for sensitive crops.

Nutrients are commonly added to the irrigation water during the middle third or middle half of the irrigation cycle. This allows the added nutrients to be distributed through the wetted soil and then provides for clean rinse water to follow the fertilizer. It is important to flush the irrigation system with clean water after the nutrients have passed through the system to minimize the growth of microorganisms and prevent chemical precipitation. Avoid flushing the system with excessive amounts of water that can move the added N fertilizer out of the rootzone.

As the urgency grows for getting the maximum production from the minimum inputs of water and nutrients, the increased use of fertigation will likely continue. Since successful fertigation requires knowledge of fertilizer chemistry, soil science, and engineering, it is recommended to have an experienced professional help to get you started.

—RLM—

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Abbreviations in this article: N = nitrogen; P = phosphorus; K = potassium.

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