IPNI Plant Nutrition TODAY
Better Crops, Better Environment...through Science

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WATCH EMERGING POTASSIUM DEFICIENCY WITH DRIP IRRIGATION

The use of drip irrigation continues to expand to cover more acres and more crops. This conversion may be driven by labor costs, a need for improved water management, fertilizer efficiency considerations, or a quest for higher yields. Whatever the reason, there are important differences to consider with your nutrient management program when making this change.

Yields have soared for many crops as the transition continues from surface irrigation to drip irrigation. For example, average yields for California processing tomatoes have climbed from 30 tons/A to over 40 tons/A in the past 10 years … with yields well over 50 tons/A becoming common. Table grape vineyards that previously produced 400 boxes/A now produce more than 1,000 boxes/A with drip irrigation, while using less water.

When plants are irrigated with drip irrigation, root growth is concentrated in the soil zone where frequent wetting occurs. This limited zone contains most of the water and nutrients that the plant will extract for growth and development. When the drip emitters are buried 6 to 12 in., much of what is happening is hidden from view.

A recent study conducted by the University of California measured the nutrient demand of drip-irrigated processing tomatoes. In eight high-yielding fields, they measured an uptake of 80 lb P_2O_5/A in the entire plant and a removal of 60 lb P_2O_5/A in the 57 tons of harvested fruit. In these same fields, the plants accumulated a total of 350 lb K_2O/A, and the harvested fruit removed 290 lb K_2O/A. The average application rate on these fields was only 9 lb K_2O/A!

Plants require a large amount of K to support high yields. In these trials, it is clearly not sustainable to remove 290 lb K_2O/A in the fruit while returning only 9 lb K_2O/A, but similar examples of nutrient mining are common with many crops. Processing tomatoes are particularly sensitive to potassium shortages since they can cause undesirable fruit disorders such as yellow shoulder and internal white tissue. Potential nutrient deficiency problems are compounded with drip irrigation since the root system is extracting nutrients from a small zone of soil.

Soil sampling is the best way to estimate the need for supplemental K fertilization, but remember to sample in the zone where the roots are most active, which may be 10 to 20 in. deep with a buried drip irrigation system. If soil samples are taken only from areas without many roots, misleading results may indicate the presence of sufficient nutrients, while the nutrient concentration is actually quite low in the zone of active uptake.

There are a number of excellent K fertilizer sources that can be added to water and applied through a drip irrigation system. Depending on what additional nutrients are needed, growers successfully use products such as potassium chloride, potassium sulfate, potassium nitrate, potassium thiosulfate, and mono-potassium phosphate through drip irrigation systems. Whatever source is used, pay attention to the soil zone where the roots are actually growing and remember that high-yielding crops must have an adequate nutrient supply to support their growth.

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Abbreviations: K = potassium.