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Tracing Water Quality Back to the Source

The quality of the water used for irrigation and pesticide application can impact crop quality, pesticide efficacy and the effectiveness of some PGRs. Factors such as site characteristics, climate zone, and geological features near water sources play a role in determining how often water quality should be monitored.

Many growers conduct one comprehensive irrigation water test annually, but in some areas of the country water quality can vary significantly over the course of the year, so more frequent testing is needed. Some examples from Pennsylvania illustrate how more frequent monitoring can improve product quality.

Road Salts Can Raise ECs in Irrigation Water

Water quality can be dramatically affected by deicing agents used in cold weather. One Pennsylvania greenhouse operation is located next to a residential area and a shopping mall. From January through April, run-off from snow melt containing deicing compounds applied to the roads and parking lots drain into a large storm water management pond. The karst geology of the area and the location of a small sink hole in the bottom of the storm water management pond cause the sodium chloride level and the EC of the irrigation water to increase enough to cause crop damage.

Photo 1: *Alternanthera* (Joseph's coat) grown under high EC irrigation exhibiting leaf rolling symptoms.

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The grower copes with this by testing the EC of his water daily and uses fertilizers with a low salt index through his fertilization system. If the EC of the irrigation water is high, rainwater is used to dilute the irrigation water. The grower is adjusting fertility rates based on the EC of the water and not the needs of his crops.

So Can Naturally Occurring Salt Deposits

On a farm south of this operation lies the convergence of two large limestone aquifers. The farm also has a pond and multiple springs on site. All of these water resources contain sodium chloride levels four to five times the upper limit for horticultural crops. It does not matter when the water sample is taken, the sodium chloride levels remain too high for the safe use in greenhouse crops. A hydrogeologist was brought into review the geology of the area and he concluded that the grower would not find a better source of water and should connect to the public water supply for irrigation and sprayer water.

Photo 2: Calibrachoa grown under high pH/high alkalinity conditions show interveinal chlorosis and slow growth.

Water Quality and the Spray Tank

Growers may become proficient at managing alkaline and high pH water supplies from a production standpoint, but water quality can also impact the efficacy of the pesticides and PGRs that they are using on their horticultural crops.

Most pesticides used by growers work best within defined pH ranges. If the pH is too high the pesticide in the spray tank may undergo alkaline hydrolysis which results in the degradation of the product in the spray tank. Some products are stable only at a relatively narrow pH range of 4-6 while others are stable irrespective of the pH of the water in the spray tank. For example, the label for the insecticide Azatin states that sprayer tank water should be in the pH range of 3-7 before the product is added. At a pH of 9, the common fungicide Captan will degrade by 50% in two minutes.

Water quality can also impact the efficacy of the plant growth regulator (PGR), Florel. Florel suppresses floral bud development in garden mums and encourages lateral branching in geraniums. Reports from growers about the ineffectiveness of Florel on their crops spurred me to review the practices that these growers employed when using this product. Most growers were not monitoring spray tank pH so when the Florel was added to high pH water in the spray tank, it released too quickly resulting in a loss of product efficacy. The pH in the spray tank after adding Florel is supposed to be in the 4.0 to 4.5 pH range. If the solution pH is below 3.0 Florel may become phytotoxic and injure the plants. If the solution pH is above 4.5 both activity and effectiveness may be compromised. Growers in the limestone belt in Pennsylvania have seen an increase in effectiveness by paying attention to the solution pH when using Florel.

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