Tech Shares

Listen to Your Plants

Listen to your plants; they have lots to tell you about fertilizer

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Plant nutrition should be a very easy issue to deal with. Plants need certain essential elements, at the right ratios, the correct amounts, and at the correct times. A systematic approach will consider the important factors: irrigation water, growing media, crops types, environment, and production objectives (Fig. 1). This will lead generally to a good general fertilizer program – one that is simple to implement, fits most crop nutritional needs; but also employs a one size fits all strategy that just might not satisfy every crop you grow. Typically you will have to provide certain picky crops some special treatment to maintain quality.

Typical things that can go wrong in fertilizer selection include: selection of the wrong fertilizers, adding too much fertilizer, adding too little fertilizer and pH issues. When developing your fertilizer program, analytical data can be very useful to help you prevent crop issues that impact quality and crop value:

- A comprehensive water test can account for the buffering of the water (Alkalinity or bicarbonate level), nutrient provided with the water such as calcium & magnesium and any problematic ions like sodium or chlorides.
- In-house testing of EC (electrical conductivity or soluble salts) can validate that the fertilizer recipe is correct and that the injector is functioning correctly.
- Conducting pH & EC tests on media can give you a general snapshot of the nutritional status of the root zone.
- Using a full service nutritional lab will can give you a more specific snapshot of the nutritional status of the root zone.

Invariably things will go awry even in the best designed fertilizer program. Part of this is due to the large diversity in crops types with diverse genetics and crop stages that growers typically grow concurrently. Part of this is due to environment variations that are out of our control. Part of this is due to variability in growing systems (e.g. injectors, irrigation systems, and growing media) that will impact the efficacy of fertilizers. Remember that most of the nutrients taken up by the plant are in ionic form in the soil solution and fertilizer efficacy is directly impacted by factors such as poor water availability or evapotranspiration, incorrect root zone pH's, poor root health, over leaching, extreme temperatures.
When things do go wrong, crops are the ones to alert us of problems in our nutritional systems by exhibiting symptoms of nutrient deficiencies/ toxicities. Unfortunately at this point it may too late to change the fertilizer program, reverse the condition or make the crop salable. Plants cannot talk; by this I mean they clearly can't shout out: "Hey Grower, calcium levels are down this week and my growing points are killing me, give me some 15-0-15…"

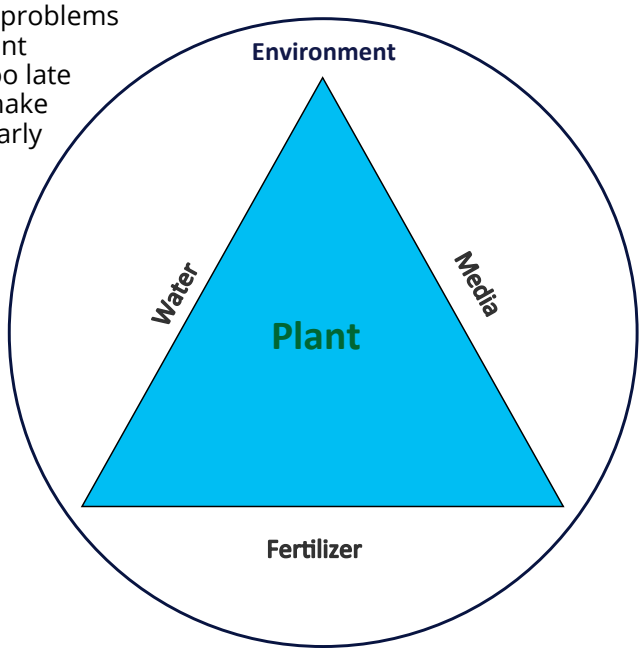

Figure 1. Fertilizer efficacy is impacted by water, growing media, crop & environmental interactions.

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However, if you "listen" to your plants through careful scouting and observation, you will find that plants are continuously providing feedback. Subtle crop appearance such as changes in foliar color, turgidity, wilting, and growth rates of both shoots and roots can help you address nutrient shortcomings before they become big problems. Most symptoms develop slowly and gradually and it is best to tackle these issues early on. Look for patterns of symptoms over time between benches/ houses; indicator crops or cultivars, crop turns to identify/ eliminate possible causes of the problem.

When trying to diagnose the cause of deficiency symptoms and come up with an effective mitigation program, it is best to think holistically and consider the entire production system. It is easy to fall into traps based on assumptions and truisms:

- Example: This past year I have seen numerous cases in nurseries with extremely low root zone pH's (3.5 – 4.0) where crop exhibit chlorotic newer leaves (see Pic 1.).
- Diagnosis: We are trained to think that low media pH's cause micronutrients like iron & manganese (Mn) to become more soluble and excessive to plants. However, in this case after media and tissue testing, the cause of the symptoms was actually determined to be iron deficiency. How could this be? Low pHs were resulting in very high Mn levels in the soil solution. The source of the Mn was likely from the bark used in the mix. This was flooding the system and preventing adequate iron uptake by the plant. By adding a Liquid Stem treatment, symptoms were reversed.

Finally, here are a few comments on diagnosis:

- In a problem situation, media and tissue testing can help identify and eliminate possible causes of a problem. But interpretation can be confusing and improper sampling can muddy the picture.
- Just because you have analytical data, doesn't mean the problem is nutritional in nature.
- Confer with your fertilizer company representative/ extension agent/ consultant to help assess data and work up possible solutions.
- Anything that will impact root or shoot health can impact fertilizer efficacy (e.g. Pythium, viruses, PGR's, viruses, heat stress, and planting depth).
- Listen to your plants. They know a lot about nutrition.

Random chlorosis at low media pH due to an Iron deficiency

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