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Feast or Famine: Managing Iron Deficiency and Toxicity

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Horticulturists have agreed that 16 different elements are crucial to good plant nutrition. Seven of these essential plant nutrients are defined as micronutrients. Iron is one of them. Although required by plants in only small amounts, iron plays a key role in the manufacturing process of chlorophyll. Its involvement in chlorophyll production is the reason for the chlorosis (yellowing) associated with iron deficiency and the bronzing that occurs with iron toxicity.

Reports of iron deficiency in greenhouse crops continue to rise, due in part to the popularity of vegetatively propagated crops with lower soil pH requirements. Iron deficiency usually results from high media pH, though it can also result from insufficient fertilizer or diseased root systems. Iron is an immobile element, meaning that the lower leaves cannot give up iron to supply the newer growth. Therefore, iron deficiency symptoms will first appear as an interveinal chlorosis of the youngest foliage.

Pictured: A geranium with iron and manganese toxicity.

Some plants are less efficient at taking up iron and are more susceptible to deficiency, including bacopa, basil, brachycome, calibrachoa, diascia, nemesia, pansy, petunia, scaevola, snapdragon and vinca. This group of plants will quickly show iron deficiency if media pH rises above 6.0 and should be closely monitored as part of a normal scouting routine. The first priority in avoiding iron deficiency in susceptible crops is to inspect the roots. If roots aren't functioning effectively, they can't supply adequate nutrients to the foliage. Poor root growth often leads to stunting. Overwatering follows, resulting in Pythium root rot.

Keeping the media pH in a range that maximizes long-term iron availability—pH 5.3 to 5.8—is also important. The use of iron chelates, like Sprint 138 and 330, are valuable tools in helping to quickly restore iron to plants for good green color and full vigor. Sprint 330, a 10 % chelated DTPA iron, performs best when the media pH is under 6.5. Sprint 138, a 6% fully chelated EDDHA iron, is preferred when the symptoms are more severe or media pH is over 7.0. Media drenches of 3 to 5 oz. per 100 gal. are the safest way to apply the Sprint products. Rinse the foliage with clear water immediately after the application to reduce the risk of phytotoxicity from concentrated iron remaining on the foliage. Damage would show as brown or black spots. Correcting underlying high media pH is helpful to keep the problem from recurring.

On the other end of the spectrum, growers must be aware not only of micronutrient deficiencies, but toxicities as well. Excess iron can produce symptoms of stunted growth and discolored bronzing foliage. Some plants that are prone to iron toxicity include seed and zonal geraniums, lisianthus, African marigolds, pentas, New Guinea impatiens and lilies.

Many geranium growers have experienced iron/manganese toxicity at low media pH (below 6.0). The remedy for iron toxicity is to adjust fertilizer programs to keep media pH between 6.0 and 6.5. Despite using pH-adjusted growing media, there are times when media pH falls below optimum levels during crop production, especially when growing a wide range of crops on the same irrigation system. Irrigation water quality, fertilizer selection and even the crop itself can cause significant changes to the pH.

Fortunately, there are tools available to help us raise media pH, if needed levels drop below ideal levels. Limestone-F and potassium bicarbonate have both been used successfully for this purpose. CalOx from BioSafe is a new product showing promise for raising soil pH as well. Your production practices may make one or another of these products more practical for you.

To prevent either iron deficiency or iron toxicity, it's best to monitor your crop closely for symptoms. Administer routine soil tests and establish ideal media pH parameters to institute effective measures to prevent and provide quality results.

Always read and follow all label directions. Not all products are registered for use in all states or for all crops. Products other than those mentioned here may also be safe and effective. **GT**

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