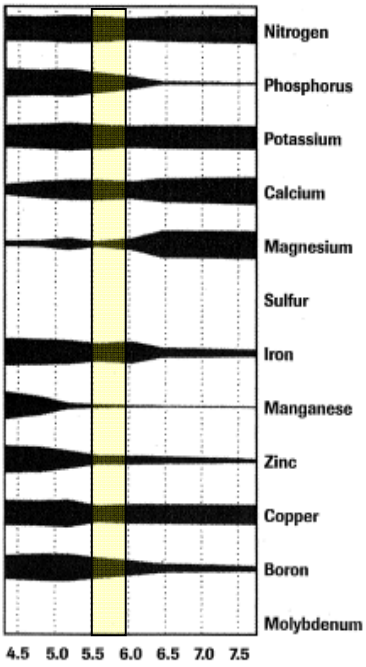
PREVENTING NUTRIENT DISORDERS WITH pH MANAGEMENT

Managing the pH of container growing-media can be a challenge. A pH too high can cause certain micronutrients to be less available to plants that can lead to deficiencies. If pH is too low, certain micronutrients can become more soluble, which can lead to toxicities for plants. Maintaining proper pH is important to be sure that all plant nutrients are at their optimum availability.

Let's first understand pH. When pH is measured with a meter, the value is the concentration of hydrogen ions found in a solution and is expressed on a logarithmic scale. Each pH unit corresponds to a multiplying factor of 10. Therefore, a pH of 6 has 10 times more hydrogen ions than a pH of 7.

Nutrient availability according to growing medium pH

As seen in this chart, nutrient availability is affected by pH. The thickest portion of the bar represents the nutrient's highest availability compared to the thinner portion of the bar express the lowest. As pH increases, some nutrients become less soluble and availability decreases. Conversely, other nutrients become more available as pH decreases. Changes in pH affect nutrient availability which in turn can cause plant uptake problems. For example, iron deficiency will cause yellowing of the newly formed leaves and can appear if the growing medium pH is higher than the target of 6.2 (see picture below). If the pH is not corrected, an entire crop can be severely delayed and become vulnerable to diseases and other stresses.



Nutrients most affected by pH

At a pH above 6, the elements Phosphorus, Iron, Boron, Manganese and Zinc become less available to the plants. The element Manganese is almost unavailable at a pH above 5. Magnesium is the opposite and will be more available to plants at a higher pH. Some elements like Nitrogen and Potassium are affected very little by the pH of the growing media. Remember that plants need a proper balance of all nutrients, therefore it is important to maintain an optimum pH of 5.5-6.0 so that plants can access all of these elements. (light yellow shaded area)

Plant Species and Optimum Growing pH

Even though growing media pH may be adequate to provide best nutrient availability, certain plant species perform best at a slightly different pH range. Different plant groups vary in their ability to absorb nutrients and pH is a strong determinant in their capacity to use fertilizers provided.

Plants can be divided in 3 groups:

- Geranium plant group: this plant group prefers a growing pH of 6.0 to 6.6. This group becomes sensitive to Iron-Manganese toxicity if the pH drops below 5.8. This means that these plants take up excessive plant nutrients that could affect plant growth.
- Petunia plant group: This plant group is prone to iron deficiency, which means they prefer a growing medium pH that is more acidic, in the range of 5.4 to 6.0. Higher pH can cause iron deficiency symptoms.

- General plant group: Plants in this group grow best at a pH of 5.8 to 6.2 and are less prone to toxicity or deficiency to iron. This covers a wide range of plants like impatiens, tomato, poinsettia, mum, etc.


Iron deficiency caused by high pH of growing media

With regular pH monitoring, various techniques can be used to correct growing medium pH and maintain it in the correct range. Some corrective measures include:

- Use potentially acid or basic fertilizers to adjust the growing medium pH, depending on the crop.
- Acidify irrigation water if the water alkalinity is too high. (high alkalinity causes pH of growing media to climb)

More information is available on this subject in a publication by William R. Argo and Paul Fisher. Understanding PH Management for Container–Grown Crops. Meister publication.

GS Tips No 3-5