

IRON AND MANGANESE TOXICITY

Iron (Fe) and manganese (Mn) toxicity doesn't only impact geraniums, it can also show up on crops like New Guinea impatiens, marigolds, pentas and others. But geraniums make up the bulk of the calls I get from growers each spring that result in consultations about toxicity issues. Here's what to look for and some actions you can take to avoid or correct the problem.



What Fe/Mn toxicity looks like:

This disorder is caused by an accumulation of Fe and/or Mn in plant tissue.

- Symptoms vary slightly across classes of geraniums (*Pelargonium x hortorum*, *P. peltatum*, *P. domesticum* and interspecific hybrids) and even among cultivars within a series, but they always appear on the oldest leaves first.
- Symptoms often start as chlorosis (yellowing) along the leaf margin or chlorotic speckles from the centers out to the edges of leaves. Chlorosis advances across affected leaves over time.
- As symptom severity increases, the yellowed leaf margin and/or speckles in the middle of leaves will start to look burned (necrotic) and dark-colored splotches will appear in the affected areas.
- If the disorder advances further, entire leaves will become necrotic and crispy. As lower leaves die off, symptoms will start to appear higher up in the canopy (on newer growth).

BMPs to avoid and correct Fe/Mn toxicity:

The best way to avoid this disorder in your geraniums is to regularly monitor the pH of your growing media.

- A pour-thru (see my quick how-to video [HERE](#)) on a few pots or hanging baskets each week is a quick way to make sure soil pH is in an appropriate range for geraniums.
- Target soil pH of 5.8 or higher for ivy and interspecific geraniums to keep out of trouble.

- Target soil pH closer to 6.0 for zonal geraniums, as they are less tolerant of lower pH.

If you start to see early indicators of Fe/Mn toxicity, act quickly. Once damage is done, affected leaves will not recover. Corrective measures often take a few days to affect symptom progression, so the longer you wait, the worse the problem will get. To start, check soil pH ASAP and figure out how strongly you need to react:

- If soil pH is about 5.6 to 5.7, symptoms are mild, and only one or two cultivars are showing symptoms, you can often correct soil pH with a simple switch to a nitrate-based fertilizer like a Cal-Mag (like 15-5-15).
- If you already use a nitrate-based fertilizer but you inject acid to your irrigation water, reduce your acid injection concentration slightly.
- If you don't inject acid into your irrigation water and already use a nitrate-based fertilizer, apply a periodic drench of potassium bicarbonate to your geraniums. These types of products are water-soluble and easy to apply through an injector, but only aid in minor/temporary minor pH correction.

Unless you accidentally used a highly acidic fertilizer once or twice, it is likely that all or most of your media's lime buffer is gone. Apply a flowable lime agent (such as CalOx pH) that contains multiple forms of lime (fast-acting and long-lasting) to correct soil pH and help keep it stable over a longer period. Continue to monitor soil pH and reapply as needed.