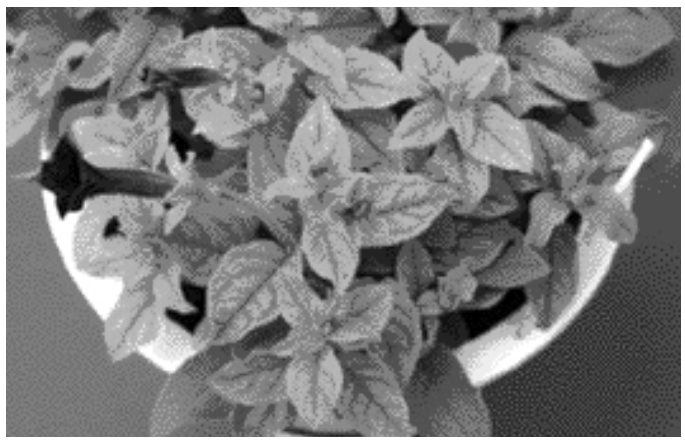

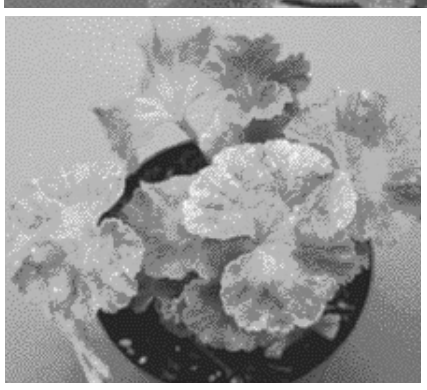

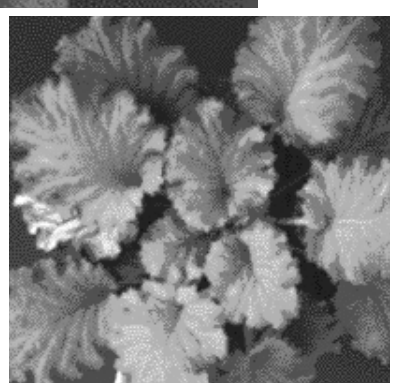

*Clockwise from top: Common petunia showing symptoms of Fe deficiency. The interveinal cholorosis could also be caused by a deficiency of magnesium or nitrogen, so a soil or tissue test should be done before corrective treatments are made; Fe deficiency on primula. Sometimes symptoms show up as a mild chlorosis affecting the entire plant. A soil test is needed to elimate nitrogen deficiency as a cause; Don't apply any Fe fertilizer to this plant! This is Fe toxicity on zonal geranium. This disorder is sometimes called "bronze speckle," and it generally occurs when growth medium pH is acid, making Fe more available for plant uptake. Too much manganese (Mn) may also be involved in this problem; Severe Fe deficiency on piggyback plant (*Tolmiea menziesii*). Note the development of white tissue on some of the leaves. (Photos this page courtesy of Douglas Cox.)*

How to Prevent Iron Deficiency

Many popular varieties are prone to iron deficiency, resulting in unsalable plants. However, with proper management, the condition is easily controlled.

By Douglas Cox

Iron deficiency problems are appearing more frequently than ever among bedding plants and other spring crops. Iron (Fe) deficiency symptoms generally show up as an interveinal chlorosis, normally starting at the shoot tips, but often they occur throughout the entire plant. The leaves of some plant species turn almost white in extreme cases. In all but the most extreme cases, Fe deficiency can be easily mistaken for nitrogen or magnesium deficiency, so a soil or tissue test is necessary to confirm a suspected case.

Since many of the varieties that are susceptible to Fe deficiency problems are widely grown and since the problem can easily be avoided, growers simply need to be adept at diagnosing the condition and aware of ways to prevent it.

SUSCEPTIBLE CROPS

The fact that growers are reporting more cases of Fe deficiency lately is explained in part by the growing popularity of some crops susceptible to the disorder. In particular, some of the plants in "The Flower Fields" and the "Proven Winners" series are known to be susceptible to Fe deficiency. These might be popular varieties that are highly recommended. The key to success ➧

Figure 1. Popular plants that are suceptible to iron deficiency.

The Flower Fields

- Vegetative petunias (Linicashowers, Caccadias, Doubloon, Marco Polo, Petitunia)
- Outback Plants (Brachyscome Daisies, Scaevola Fan Flowers and Paper Daisies)

Proven Winners

- Calibrachoa "Million Bells"
- Scaevola "New Wonder"
- 'Supertunia' and 'Surfinia' trailing petunias

Other plants

- Certain bedding plants including pansy, common petunia, snapdragon and vinca.
- Ivy geranium
- Primula
- Piggyback Plant (*Tolmiea menziesii*)

with these plants is preventing Fe deficiency. Figure 1 lists crops that are susceptible to Fe problems.

PREVENTING Fe DEFICIENCY

There are three ways to prevent Fe deficiency: maintain acid growth medium pH, use a low phosphorus fertilizer or use an iron fertilizer.

pH control. Acid pH favors the availability of Fe to plants; therefore, the target pH range for crops susceptible for Fe deficiency is fairly low, about 5.4 to 5.8. Many commercially available soilless media mixes have pHs that fall within this range, and in most cases, the use of an acid-forming fertilizer with a balance of ammonium and nitrate will help keep the pH in this range.

Commonly grown crops such as snapdragon (above), vinca (below) and pansies (right) are susceptible to iron deficiency.

A major exception would be if the irrigation water is alkaline. In this case, acid injection might be needed. If a grower mixes his/her own sphagnum peat-based growth medium, dolomitic limestone should be added at a rate of no more than 5 lbs/cu. yd. Too much limestone is an aggravating factor that actually contributes to Fe deficiency. For most growers growing plants susceptible to Fe deficiency, keeping pH in the 5.4 to 5.8 range will probably be enough to prevent Fe deficiency.

Low phosphorus fertilization. Under certain circumstances, phosphorus (P) and Fe can react together to form insoluble Fe phosphates. The Fe in Fe phosphate is not readily available to plants. The chemistry of this reaction is well understood in field soil but has not been studied in soilless media. So, to be on the safe side, excess P should be avoided for crops susceptible to Fe deficiency.

This means that little or no superphosphate should be mixed in the growth medium, acid other than phosphoric acid should be

used if acid injection is practiced; and if possible, a water-soluble fertilizer supplying no more than 10 percent P (I suggest 2-5 percent) should be the main fertilizer. Keeping P low will help prevent Fe deficiency, but the key is maintaining acid growth medium pH.

Iron fertilizers. Occasionally fertilizing crops susceptible to Fe deficiency with Fe is probably the least complicated way to prevent Fe deficiency. Iron sulfate is one possible fertilizer, but I recommend an Fe chelate. For example, one Fe chelate that many greenhouse supply companies carry is called Sprint 330, or perhaps an older naming is Sequestrene 330. Both products are 10 percent Fe chelates and are basically the same product (Sequestrene 330 is now marketed for orgronomic crops only).

Fe chelates can be applied as soil drenches or as foliar sprays at the same rate of 8 oz./100 gal. (1/2-3/4 tsp./gal.). The chelates are also soluble enough to make a concentrated solution for injection, but the solution must be mixed and injected by itself and not with other fertilizers. Soil drench is the safest method of application; foliar sprays should be tried experimentally first to check for injury or residues. Fe chelates at the recommended rate can be applied every 3-4 weeks, but one application may be enough for bedding plants. Other brands of Fe chelate that are just as effective as Sprint 330 may be available in your area. Always read the label carefully for rate application instructions.

Occasionally fertilizing crops susceptible to Fe deficiency with Fe is probably the least complicated way to prevent Fe deficiency.

AVOIDING Fe TOXICITY

It is important to use the information in this article to treat only those crops known to be susceptible to Fe deficiency. Over the past decade, we have learned that some spring crops are susceptible to Fe toxicity rather than deficiency. Iron toxicity, sometimes called "bronze ➧

speckle," is a problem for some important bedding plant species, including marigolds, zonal geraniums, seed geraniums and New Guinea impatiens.

Applying the Fe treatments I have described in this article to plants susceptible to Fe toxicity would be disastrous! Fertility programs for these plants are designed to prevent the occurrence of excess plant-available Fe. This is done by keeping the pH in a higher range (6.0-6.8) and by avoiding fertilization with too much Fe. Since "new" crops are introduced each year and we are always learning more about the "old" ones, it is very important to keep up with cultural information to see if plants have any special nutritional requirements. GPN

Editor's Note: The use of specific trade names in this publication does not constitute endorsement of these products in preference to others containing the same active ingredients. The use of trade names is solely for the purpose of providing specific information and does not signify that they are approved to the exclusion of others. Mention of a product does not constitute a guarantee or warranty of the product by the author or magazine.

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