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# Scouting and Managing Greenhouse Nutrient Problems

Checking your plants weekly is the key to managing greenhouse nutrient problems. Check the color and vigor of the foliage and the health of the roots. Even though the foliage is showing nutrient deficiency symptoms, the root problem may be pest, disease, or water-management problems rather than fertilizer type or concentration. Checking the roots is important because the plant may have a compromised root system due to *Pythium*, fungus gnat infestation, or water-logged or poorly drained media.

Conducting regular testing of media pH and EC is vital. pH affects the availability of nutrients and EC gives you the overall concentration of fertilizer salts in the media. For plugs, test 2-3 times per week because their smaller media volumes are more susceptible to changes than bigger volumes. For flats and 4-inch pots, test once a week, and for containers 6-inches or larger, every 2 weeks.

These 2 testing methods are easy to do in the greenhouse:

- **Pour-through:** Irrigate the crop 1 hour before testing. Then select 5 pots and place plastic saucers under them. Pour distilled water on the surface of the media. The amount of distilled water depends on the size of the pot: For cell packs and 4-inch pots, pour 50 ml (1.7 oz), for 6-inch pots, 75 ml (2.5 oz), and for 6 1/2 - 8 inch pots, pour 100 ml (3.3oz). Collect the leachate and test pH and EC as soon as possible. For plugs, place containers under the plugs, then press on top of the plugs' media to collect leachate.
- **1:2 method:** Randomly select 5 pots and collect a small amount of root media from the lower 2/3 of the pot. Mix thoroughly and remove any slow-release fertilizer capsules to avoid inaccurate EC values. Add distilled water twice the volume of soil. Mix thoroughly and allow to sit for 30 minutes before testing EC and pH of the slurry.

Select one method and stick to it. Establish a target range depending on your crop.

For iron-inefficient crops (also referred to as the petunia group) which include petunia, calibrachoa, pansy, nemesia, bacopa, dianthus, snapdragon, verbena, and vinca, the acceptable pH range is 5.4 – 6.2.

For iron-efficient crops (geranium group) which include seed and zonal geranium, marigolds, New Guinea impatiens and lisianthus; the acceptable pH range is 6.0 – 6.6

For other crops such as impatiens, ivy geraniums, poinsettia, chrysanthemums the acceptable pH range is 6.0 – 6.4. Therefore a range of 6.0 – 6.2 would be acceptable to most crops.

The acceptable EC ranges depend on the testing method:

<b>EC (mS/cm)</b>	<b>Pour-through method</b>	<b>1: 2 method</b>
Acceptable range	1.0 – 6.0	0.30 – 1.50
Low	1.0 – 2.5	0.25 – 0.75
Normal	2.6 – 4.5	0.76 – 1.25
High fertility range	4.6 – 6.5	1.26 – 1.75
Can cause root damage	> 8.0	>2.5

## Troubleshooting nutritional problems in the greenhouse

Symptoms may be caused by other problems such as root rot diseases, insects or poor drainage in the root media. To confirm that the symptoms are nutritional you have to rule out all other causes. You also need a soil test to confirm the nutrient element causing deficiency or toxicity symptoms.

<b>Symptom</b>	<b>Possible problem</b>	<b>Solution</b>
Color of entire plant is light green to yellow.	Sulfur deficiency.	Use MgSO <sub>4</sub> (Epson salt) at 0.25-0.5 lb/100 gal of water in the water- soluble fertilizer. (Don't mix in the same tank with fertilizers containing CaNO <sub>4</sub> ).
Growing tip is lost, many growing tips develop, young leaves elongate and are brittle.	Boron deficiency.	Lower humidity levels in the greenhouse to increase boron uptake. Use a one-time drench with borax at 21.3 g/100 gal water, or Solubor at 12.2 g/100 gallons of water. Or use a regular drench with borax at 0.85 g/100 gal water or Solubor at .48 g/100 gal water.
Growing tip alive, but young leaves are distorted. Leaf edges may become necrotic.	Calcium deficiency.	Lower humidity levels in the greenhouse to improve calcium uptake. If this doesn't work use foliar sprays with calcium chloride at 1 lb/100 gal of water weekly.
Youngest leaves start to show interveinal chlorosis progressing to yellow to white.	Iron deficiency.	Check media pH, adjust pH by adding acid fertilizer (NH <sub>4</sub> ). Use supplemental iron chelate drenches (sprint 330 or sprint 139 at 5oz/100 gallons of water).
Older leaves show bronzing coloration with necrotic spots (especially in iron efficient crops like geranium or marigolds).	Iron/Manganese toxicity.	Check media pH. Switch to nitrate-based fertilizers (e.g. 13-2-13 or 15-0-15). If pH has not risen within a week, drench with potassium bicarbonate at 2 lbs./100 gal or flowable (liquid) lime at 2-4 qts/100 gal water.
Older leaves become chlorotic over the entire leaf.	Nitrogen deficiency.	Check EC of fertilizer solution. Check to see if your injector is working properly. Reduce leaching.
Older leaves turn purple, top of the plant may be dark green.	Phosphorus deficiency.	Check if P was incorporated in root media before planting. Check P levels in your fertilizer. Drench with fertilizer containing P at 50-100 ppm.
Older leaves have interveinal chlorosis or gray-green coloration.	Magnesium deficiency.	Check for Mg levels in root media. Single drench with MgSO <sub>4</sub> at 0.5lb./100 gal will solve problem. Include dolomitic lime in the media.
Older leaves show edge burn which may progress towards the center.	Potassium deficiency.	Check K levels in fertilizer. Check if injector is working properly. Increase K levels in fertilizer by adding KNO <sub>3</sub> . Reduce leaching.

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