Greenhouse: What's Your Problem? Test Your Diagnostic Skills

Where: Grand Gallery (main level) Room D
MI Recertification credits: 1 (COMM CORE, PRIV CORE)
Moderator: Jeanne Himmelein, Masterpiece Flower Company, Byron Center, MI

10:00 am What's Your Problem? Test Your Diagnostic Skills
   • Jan Byrne, Integrated Plant Systems Center, MSU
   • Kristin Getter, Floriculture Outreach Specialist, MSU

10:50 am Session Ends
What’s Your Problem? Test Your Diagnostic Skills

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There is no one way to diagnose a greenhouse production problem, but having a well-defined method may help. One process that is useful is the following:

1. **Define the problem.** Describe the abnormality and confirm that it is indeed an abnormality. Perhaps the problem in question is a cultivar that is supposed to look abnormal!

2. **Look for patterns.** In the plant community itself, is there a pattern? Also look for patterns on the individual plant itself. Are the patterns of the problem distributed in a uniform or random fashion across the crop or plant?
   a. Random problems tend to be a biotic problem (caused by a living organism), such as insects or diseases.
   b. Uniform problems (either within a community of plants or on an individual plant) tend to be caused by an abiotic problem (caused by a non-living issue), such as nutrition, environmental, etc.

3. **Gather information.** Look for potential problems by scouting the crop. Go look for insects and/or disease issues. Stop and examine a few plants closely. This includes looking under the leaves, checking sticky cards (your using sticky cards, right?) and popping a few plants out of their pots to look at the roots. Also gather information about the crops’ history, such as:
   a. What recent chemicals were used?
   b. Have any environmental conditions changed?
   c. Have irrigation/fertilization problems occurred?
   d. Is there a possibility that a heater may have malfunctioned? Etc.

   A special note about nutrition: If the pattern is very uniform across a whole area, the cause may be nutritional. When nutritional issues are suspected, the first piece of information growers should gather is the substrate pH and EC measurements. If the pH is not in the desired range, we know that some essential nutrients may not be available (or be overly available) to the plant. If the EC is too high or too low, your injectors may not be working properly. Also, look for where the problems STARTED on the plant (lower leaves or upper leaves). We can narrow down the particular nutrient problem by looking at where the first symptoms started. See Figure 1 for a flow chart that may help.

4. **Firm up a diagnosis.** Consult published materials (or your own previous historical production notes) for guidance to develop a working diagnosis. Some good sources include:
   a. [http://extension.umass.edu/floriculture/services/plant-problem-diagnostics](http://extension.umass.edu/floriculture/services/plant-problem-diagnostics)
   b. [http://pestid.msu.edu/](http://pestid.msu.edu/)
   c. [http://edis.ifas.ufl.edu/ss530](http://edis.ifas.ufl.edu/ss530)
   d. Floriculture Principles and Species (Dole and Wilkins, 2005)
   e. Nutrient Deficiencies in Bedding Plants (Gibson et al., 2007)

   Consider all the possibilities from these sources or your own experience. Eliminate potential causes of the problem that aren’t very likely and then prove or disprove your diagnosis via testing. Some testing options include:
   a. Tissue analysis
   b. Water analysis
   c. Substrate nutrient analysis, etc.

5. **Take action.** With your final diagnosis in hand, fix the problem based on previous experience, extension recommendations, book recommendations, etc. And then record what you did to fix it, so that you can make sure it worked and for your own future reference if the problem should occur again.
Figure 1. Nutritional diagnosis tree to help rule out or narrow down potential nutritional issues. Modified from: Identifying nutrient deficiencies in ornamental plants. University of Florida extension. Available at: http://edis.ifas.ufl.edu/ss530.

Symptoms on new/upper leaves only

- Leaves distorted or brown/dying
  - Terminal bud dies
    - Boron
      - New leaves distorted, tips and edges brown/dead
  - Terminal bud does not die
    - Calcium
      - Plant stunted. Leaves bluish-green, small & distorted

Symptoms on entire plant

- Entire leaf yellow, spreading to entire plant
  - Sulfur
    - Stems shortened and rosetted
      - Zinc
        - Stems NOT shortened and rosetted
        - Leaves WITHOUT brown spots
          - Iron
            - Leaves develop brown spots
              - Manganese

Symptoms on older/lower leaves

- Symptoms on entire plant
  - Nutrient
    - Leaves distorted
      - Upper leaves may curl up or down. Older leaves may be excessively large, yellow at edges, edges turning brown.

- Symptoms on lower leaves only
  - Plant light green. Lower leaves yellow, drying to brown
    - Nitrogen
      - Plant dark green with red/purple color. Lower leaves yellow, drying to dark green
        - Phosphorous
          - Older leaves wilt/scorch. Edges brown with spots on leaves.
            - Potassium
              - Older leaves yellow at edges, but stay green in center.
                - Magnesium
                  - Older leaves may be excessively large, yellow at edges, edges turning brown. Upper leaves may curl up or down.

- Older leaves yellow at edges, but stay green in center.
  - Older leaves tip death, leaf may be reddish-brown in color.
    - Ammonium
      - Small yellow/brown spots and yellow/brown edges. Spots enlarge until whole leaf is brown.
        - Iron
          - Brown leaf tips and edges, turning into brown patches. May have bronze or reddish color.
            - Manganese
              - Older leaves tip death, leaf may be reddish-brown in color.
                - Boron

White Box = deficiency
Gray box = toxicity