

TECH TRAINING:**PLANT HEALTH DIAGNOSTICS PART I: IDENTIFYING SYMPTOMS**

There are many important considerations when trying to diagnose a plant health issue, and it can be difficult to know where to start. Remember the 3 Ds of Diagnostics: DESCRIBE the symptoms, DETERMINE the affected plant parts and consider the symptom DISTRIBUTION. The following tips pose some key questions to consider when starting the diagnostic process.

Tip 1: Describe the Symptoms

- Is the plant displaying unusual color?
 - Yellowing (chlorosis), browning (necrosis) and purpling are common changes in color.
- Is the plant displaying unusual growth?
 - Stunting, distortion, wilting, galls and rots can occur.
- Are signs of pests or pathogens present?
 - For example: fungal sporulation, cast aphid skins or spider-mite webbing.



Symptoms of interveinal chlorosis on gerbera.

Tip 2: Determine the Affected Plant Parts

- Are symptoms on older (lower) leaves or younger (upper) leaves?
 - Is the growing point (tip or meristem) intact, distorted or aborted?
- Do symptoms follow a pattern on the leaf?
 - For example: between the veins (interveinal), along leaf margins (marginal), spots, mosaic or streaking.
- Remember to check the roots.
 - Are roots well developed or thin and weak?
 - Are roots white and healthy or discolored?



Lower leaf necrosis may be a symptom of a nutrient toxicity.

Tip 3: Consider Symptom Distribution

- Is most of the crop showing symptoms or are symptoms sporadic?
 - Are symptoms on one variety or multiple varieties?
 - Are symptoms only on one species?
- Do symptoms follow a pattern?
 - If symptoms are along a wall, under a heater or in a low spot, it could be a sign that the issue is environmental.
 - Randomly distributed symptoms are indicative of pests or disease issues.
- How quickly have symptoms developed?
 - Rapid, uniform symptom onset may indicate an environmental issue.



Random symptom distribution is an indication of biotic disorders.

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Describing Signs and Symptoms. Being able to properly describe symptoms is essential for making the correct diagnosis. Following a process, like a dichotomous key can help narrow down the potential issues and point to clear corrective actions. In general, it is best to consider symptoms based on factors including their color, pattern, effect on growth, location on the plant and distribution across a crop. In some instances, signs of specific pests or pathogens may be present such as fungal sporulation.

Unusual Color. There are numerous descriptive terms used to describe symptoms of unusual coloration. For instance, yellowing or chlorosis is often associated with nutrient deficiencies, while necrosis may be due to nutrient toxicities or spray damage. Symptoms of reddening or purpling may be due to phosphorus (P) deficiency or cold temperatures. It is also important to look at the roots—as brown or black roots are often indicators of root disease.

Symptom Pattern. While symptoms sometimes occur uniformly across the surface of a leaf, they often develop in a pattern that can be used to help identify the problem. For instance, magnesium (Mg) and iron (Fe) deficiencies often lead to yellowing between the veins (interveinal chlorosis), while potassium (K) deficiency causes yellowing along the leaf margins (marginal chlorosis). Concentric rings or mosaic patterns are often due to viral infections, while dead (necrotic) or water-soaked spotting or streaking occurs with many bacterial infections.

Unusual Growth. Besides color, irregularities in growth habit can also help point to several different causes. Stunting is a common result of many issues including low fertility, poor root health, excessive insect feeding or poor environmental conditions. Other symptoms such as distortion are often more specific. Thick, distorted leaves near the growing point are often the result of calcium (Ca) or boron (B) deficiencies, or due to broad mite damage. Twisting and curling can occur with insect feeding or herbicide drift.

Symptom Distribution. How symptoms are distributed throughout the greenhouse can tell you a lot about the potential problem. If symptoms are occurring on all plants uniformly, it is likely due to an abiotic issue such as a nutrient deficiency, chemical injury or temperature extremes because these effects happen over a broad area. If the distribution is random, or if there are “hot spots” of symptomatic plants, it is more likely due to a biotic issue such as insects, mites, bacteria, fungi or viruses—because of how pests move and reproduce.

Symptom Onset. Another important consideration is how quickly symptoms develop. The sudden appearance of symptoms throughout a greenhouse could be a sign of an abiotic or environmental issue. For instance, the sudden appearance of necrotic spotting throughout a crop may be due to phytotoxicity from a pesticide application the previous day.

In Summary. The ability to sufficiently identify and describe symptoms is the first step to plant health diagnostics. Whether or not the specific problem can be identified in-house, understanding the diagnostic process can help when working with professional diagnosticians. *Part II of this series on plant health diagnostics will focus on diagnosing nutrient disorders.*

For more information, check out these additional resources:

Michigan State University. [The basics of diagnosing greenhouse floriculture problems](#)