



CMG GardenNotes #112

Systemic Plant Evaluation

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Steps to Systematically Evaluate a Plant with Focus on Trees

It is important to systematically evaluate the entire plant as part of the diagnostic process. Refer to CMG GardenNotes #102 *Diagnosing Plant Disorders, Step 2 – Identify the Problem(s)*.

1. **Macro-Look** – Look for things that stand out. These may be clues for other steps. For example, decline from the top down is typical of root problems and/or drought. Give extra attention to the soil and roots in step 3.
2. **Macro-Look at Surroundings** – Insects and diseases (biotic problems) are often *host specific*. If symptoms are found on a variety of plants, it may suggest abiotic disorders, which are **not** host specific. Abiotic problems (like soil compaction) may also affect surrounding plants. For example, how is the lawn under a struggling tree performing? It will share the same soil problems.
3. **Soil and Rooting Area** – Soil issues contribute to a large part of the problems in the landscape. While we cannot see a root system, other clues will help evaluate it. Look for the following:
 - How is the lawn under the tree performing? It may share the same soil growth-limiting factors.
 - Push a screwdriver into the soil. How easy or hard it is to push into a moist soil provides an estimation of soil compaction.
 - With a soil probe, take some cores from the rooting area of trees or shrubs. It may indicate issues with soil texture changes and rooting.
 - Surface roots of trees or shrubs indicate soil compaction and/or wet soils, as the roots develop closer to the surface where oxygen is available.
 - The lack of a root flare on a tree suggests that it was planted too deeply or that soil was added over the rooting area (smothering the fine feeder roots). Planting too deep causes trunk girdling roots.
 - Trunk-girdling (circling) roots are a common cause of death in landscape trees. Trees often show a gradual decline from trunk girdling roots twelve to twenty years after planting. The girdling root is usually below the soil surface.

- Decline of a tree or shrub from the top down or a uniform decline of the entire tree suggests root/soil problems. For additional details on the diagnosis of soil and rooting problems of trees, refer to CMG GardenNotes #113, *Diagnosing Root and Soil Disorders*.
4. **Trunk (if a tree or shrub)** – Look for the following:
 - Cankers.
 - “Lawn mower decline” (bark damage at ground level from lawn mowers and weed trimmers) is common in many landscapes. If the bark is removed down to the wood on more than 50% of the tree’s circumference, the tree is considered to have no value.
 - Look for evidence of decay in large size pruning cuts. A drum-like hollow sound when the trunk is tapped with a wood mallet is a symptom of extensive internal decay.
 - Ridges and valleys along the trunk are symptoms of internal problems and decay.
 - Borer exit holes may indicate stress issues.
 5. **Major Branches** (scaffold branches or secondary trunks) – Look for the following:
 - Cankers.
 - Large pruning cuts and evidence of storm damage (suggests the possibility of internal decay).
 - Borer exit holes could indicate stress issues.
 6. **Minor Branches and Limbs** – An important part of the evaluation is to get an assessment of the plants’ growth and vigor by comparing the annual growth increments of the twigs. **[Figure 1]** Starting at the branch tip, follow the twig back to the first **annual growth ring** (*terminal bud scar*). This is where the growth ended the previous year. The annual growth ring looks like a small ring or crown going completely around the twig. On some trees, a slight change in bark color helps identify where the annual growth rings are located. **[Figure 1]**

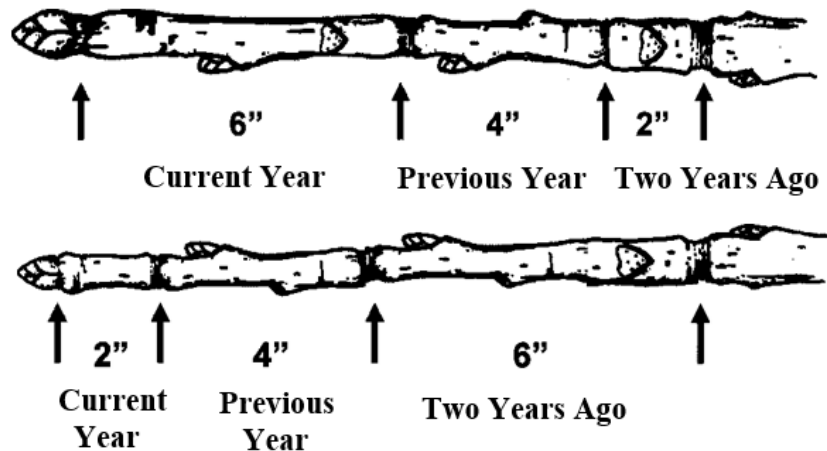


Figure 1. Comparison of Annual Growth

- Twig on top shows a decrease in stress levels as growth increases from two inches to four inches to six inches in current year.
- Twig on bottom shows an increase in stress levels as growth decreases from six inches to four inches to two inches in current year.

During your evaluation, look at several branches around the tree. Going back three to five years, determine what is typical for each year, not what is longest or shortest. Is the annual growth what would be expected for that species of tree? For example, a young honeylocust tree in an open lawn could readily put on eighteen to over twenty-four inches per year. The

same tree located where buildings and hardscape features limit root spread may put on only six to twelve inches per year. This reduced growth is in response to the restrictions in rooting. Another important comparison is the change from year to year. For example, if the length of annual growth is shortening each year, it indicates that the stress levels are increasing. On newly planted trees, twig growth will be minimal until the root system is established. A significant increase in annual twig growth indicates that the root system has established.

On mature trees, growth will naturally be reduced and must be evaluated by looking at the growth near the top rather than the bottom of the tree.

Evaluating annual growth helps interpret the effects of other problems (like soil/root issues) observed in previous steps.

Other things to look for include scale and other twig insects, borer exit holes (which may indicate stress issues), cankers, and galls.

7. **Foliage** – Look for the following:

- Leaf color and size.
- Leaf spots and other foliage diseases – Typically more serious on the lower inner foliage of any plant where humidity is higher.
- Leaf chewing insects, sucking insects, mites, and galls.
- Leaf scorch and dieback from the top down are general symptoms of root problems and/or drought.
- Leaf scorch on a specific side (suggests abiotic disorders originating on that side).
- Early fall color (a general symptom of stress).

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