

Diagnosing environmental stress

General plant stress symptoms

- 🌿 Wilting
- 🌿 Chlorosis
- 🌿 Necrosis and dieback
- 🌿 Epicormic shoots
- 🌿 Unseasonal leaf reddening

Most environmental stress is related to water (too much or too little)

- 🌿 Leaf water stress
 - 🌿 Wilting, especially in young tissues
 - 🌿 Tip and marginal reddening
 - 🌿 Tip and marginal necrosis
 - 🌿 Decrease in mature leaf size
 - 🌿 Increase in premature senescence
- 🌿 Salinity
 - 🌿 Wilting
 - 🌿 Marginal and tip necrosis
 - 🌿 Premature leaf drop
 - 🌿 White crusts of salt
- 🌿 Hypoxia (Includes flooding, compaction and improper soil amendment)
 - 🌿 Indirect water stress - leaf wilt, necrosis, and abscission
 - 🌿 Leaf dieback or reduced leaf size
 - 🌿 Adventitious roots
 - 🌿 Root tip dieback

Using anthocyanins to diagnose water stress

- 🌿 Young tissues
 - 🌿 Relative lack of cuticle
 - 🌿 Need for high turgor
- 🌿 Deciduous tropical trees
- 🌿 Temperate evergreens

Management-induced water stress

- 🌿 Poor soil preparation
- 🌿 Poor installation
- 🌿 Poor soil management

Accurate diagnosis of landscape plant problems

Information needed for diagnosing landscape failure

1. Plant and landscape details

- A. Be sure to have a current soil test prior to any diagnosis or treatment.
- B. Correctly identify the plant, then do a little homework. What does it normally look like? What type of conditions does it need to thrive?
- C. Examine the entire plant and its surrounding environment.
- D. What's been done to the soil in the last several years? Include significant excavations, soil amendments, and fertilizer/pesticide usage.
- E. How was the plant installed? Were all materials removed from the roots? Were poorly structured roots pruned?
- F. What unusual weather events occurred in the last year?

2. Damage details

- A. Write down the damage you observe on the plant.
- B. Did the damage appear suddenly (acute damage)?
- C. Did the damage appear slowly (chronic damage)? Chronic damage is usually due to nonliving factors, especially if it recurs yearly.
- D. Nonliving causes MAY be indicated if:
 - a. damage is uniform and on more than one plant
 - b. damage does not continue to spread throughout the plant or to other plants
- E. Living causes MAY be indicated if:
 - a. damage is irregular or random.
 - b. damage progressively spreads through the plant or to adjacent plants.

The leading cause of death of cultivated trees and shrubs is poor management

Cultural reasons for plant stress and death

1. Newer plants (<10 years old)

- A. Poor quality roots (circling, girdling or kinked roots)
- B. Improper soil amendment
- C. Improper installation (foreign materials not removed from root balls, planted too deeply, etc.)
- D. Improper staking

2. Existing plants (>10 years old) - all of the above reasons PLUS

- A. Significant soil disruption
- B. Poor soil health
 - i. Compacted
 - ii. Use of landscape fabrics, sheet mulches
 - iii. No organic mulch
 - iv. Overuse of fertilizers/pesticides

Stressed plants may not be dead; wait for a year to see if growth resumes

- 🌱 Especially true of drought-related stress, where leaves fall prematurely.
- 🌱 Other tissues are more resistant to water loss and may, with proper care, survive until the following year.
- 🌱 Many trees and shrubs can be dug up and replanted if they were installed incorrectly, or they are in the wrong location.

Alternative methods for selecting, installing, and managing landscape plants

- 🌱 Keep soil texture uniform to optimize water and air movement
- 🌱 Select nursery plants with healthy root systems
- 🌱 Remove all materials from the roots to improve root establishment
- 🌱 Correct root flaws to stimulate new root growth
- 🌱 Plant the root crown at grade
- 🌱 Do not incorporate anything into the backfill soil
- 🌱 Apply an arborist wood chip mulch to protect root zone; maintain at 4-6"
- 🌱 Do not use any sheet mulches
- 🌱 Stake plants only if necessary
- 🌱 Irrigate well the first season
- 🌱 Have your soils professionally tested before adding any nutrients
- 🌱 Avoid pesticide use unless a professional diagnosis recommends doing so
- 🌱 Protect root zones whenever landscape soils are disturbed

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