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Mature Leaf Chlorosis and Necrosis

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Deficiencies of the nutrients nitrogen, phosphorus, potassium, and magnesium result in chlorosis (yellowing) and eventual necrosis (death) of older mature leaves. These nutrients are mobile elements that can be translocated from older to new leaves if their supply from the soil becomes limited and the young leaves become deficient in them. This translocation depletes the older leaves of these essential nutrients, leading to chlorosis and necrosis.

Diagnosing these nutrient deficiencies can be difficult because many other problems can cause similar symptoms. The practical approach to mature leaf chlorosis is to be certain of the cause of the problem before attempting to solve it.

Anything that causes damage to the roots can cause chlorosis in older leaves. Damage to the roots can be caused by nematodes, insects, diseases, herbicides such as Roundup® (Fig. 1), excess salinity (Fig. 2), drought, and flooding. The symptom can also occur naturally as the top-growth outgrows the root system, or competition occurs between plants for soil nutrients. When tip cuttings lacking roots are planted, similar symptoms may occur (Fig. 3).

Trees such as the rainbow shower tree commonly outgrow their root system (Fig. 4). Their leaves turn dull green, then chlorotic, and fall, resulting in a straggly look that is not aesthetically pleasing. This balance between the top-growth and the root system is a very important concept in landscaping, where aesthetics are important.

Many groundcovers that multiply by division often multiply to a point that each plant no longer has sufficient space to develop an adequate root system. Common examples are lauae fern (Fig. 5), psittacorum heliconia, and kupukupu fern. Many hedge plants such as privet, natal plum, bougainvillea (Fig. 6), and hibiscus are planted close together to provide instant landscaping. That is okay if the excess plants are removed later, but that is rarely done. The result, again, is an imbalance between the top growth and the root system.

Advanced symptoms of salinity damage often occur because the early symptoms of salinity are not detected. The fertilizer formulations used are often too concentrated (too high in their elemental analysis), and calibration of application equipment is rarely done. In some nursery greenhouses, almost every species grown shows various stages of salinity damage. Many landscape nurseries often have plants suffering from salinity.

Plants grown in a nursery under lower light conditions than occur at the eventual landscape site may show leaf damage after being outplanted. Mature leaves cannot adapt to a change of light conditions. New leaves will adapt to whatever the light conditions are. Leaves grown under high-light conditions are thicker and capable of utilizing greater amounts of nutrients applied as fertilizer than leaves grown under shade conditions, which will be thinner and not able to utilize much fertilizer. Generally, indoor plant companies thoroughly leach the medium of plants bought at nurseries. The rule of thumb is that plants to be maintained indoors need one-tenth the amount of fertilizer as plants grown in a nursery.

Ethylene gas, generated from air pollution or naturally from plants under stress, can cause chlorosis and leaf, flower, or bud abscission (drop). Ethylene also causes exudation of gum from lemon-scented eucalyp-

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tus (Fig. 7, 8) and *Ficus elastica*. When lemon-scented eucalyptus is grown under restricted root-space conditions, ethylene is released, and the gum exudation from the trunk becomes an eyesore. Landscape architects that do not know this often make the mistake of designing the spacing of lemon-scented eucalyptus too close to sidewalks, streets, buildings, or other trees.

During the lower temperatures of the winter season it is common to see water-soaked, chlorotic, lower leaves on *Aglaonema commutatum* 'Silver Queen' (Fig. 9).

Many insects, nematodes, and diseases damage the root system. This damage will cause the lower leaves to turn chlorotic or necrotic and eventually fall off. Leaf drop may also be caused by release of ethylene as the plant responds to stress. Some examples are

- *Pythium splendens* damage to mondo grass (Fig. 10)
- root mealybugs on potted palms (and other potted plants) (Fig. 11)
- *Rhizoctonia* rot of hottentot fig (ice plant) (Fig. 12)
- *Calonectria spathiphylli* rot of spathiphyllum (Fig. 13)
- *Erwinia* rot of *Dieffenbachia* 'Tropic Snow' (Fig. 14)
- *Erwinia* rot of *Aglaonema commutatum* (Fig. 15)
- black leaf streak damage to banana (Fig. 16)
- Steven's leafhopper damage to plumeria (Fig. 17).

When insect, nematode, or disease damage is suspected, samples can be submitted for analysis, for a fee, to the CTAHR Agricultural Diagnostic Service Center via Cooperative Extension Service offices statewide.

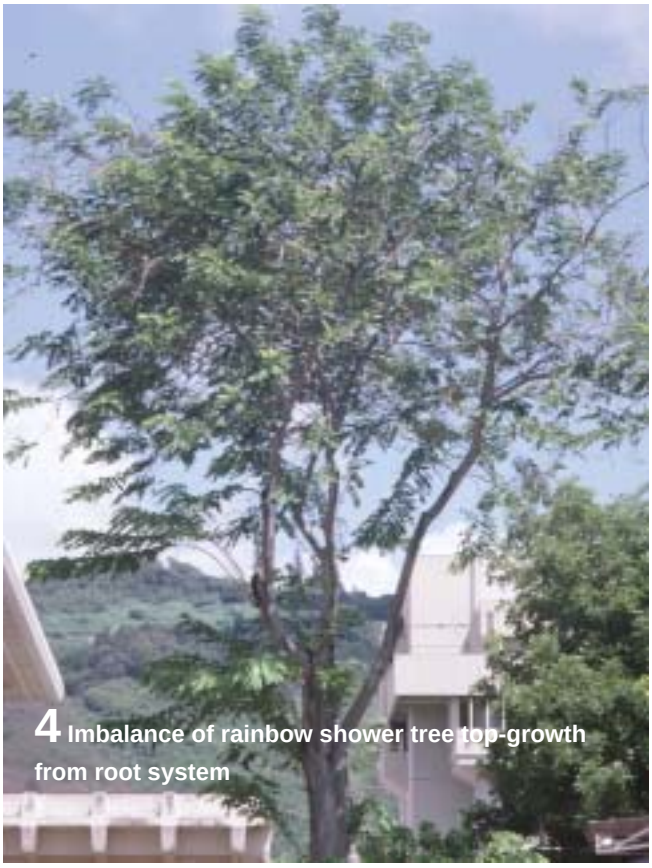
Literature cited

Chase, A. R. 1987. Compendium of ornamental foliage plant diseases. American Phytopathological Society, 3340 Knob Road, St. Paul, Minnesota 55121, USA.

1 Roundup® damage to ti plants

2 High salinity damage to hibiscus

3 Damage to ti plant after planting of ti tip cutting



4 Imbalance of rainbow shower tree top-growth from root system

5 Crowding of lauae fern

6 Close planting of bougainvillea hedge

7 Excess gum on lemon-scented eucalyptus

8 Excess gum on eucalyptus bark (close-up)

9 Low temperature winter damage to 'Silver Queen' aglaonema

10 *Pythium splendens* damage to mondo grass

11 Root mealybugs on potted plant

12 *Rhizoctonia* on ice plant

13 *Calonectria spathiphylli* root rot of spathiphyllum

14 *Erwinia* rot of *Dieffenbachia* 'Tropic Snow'

15 ***Erwinia*** **rot of** ***Aglaonema commutatum***

16 **Black leaf streak damage to banana**

17 **Steven's leafhopper damage to plumeria**