

Abiotic Disorders: Bugs and Diseases Aren't Always Guilty of Killing Your Plants

Definition: Abiotic (adj.) — Of or characterized by the absence of life or living organisms.

STORY AND PHOTOGRAPHY BY DOUGLAS A. SPILKER



Excessive mulching and improper irrigation can cause decay of trees due to moisture retention on the trunk.

Plants are not only damaged by diseases and pests, but also by noninfectious factors. Symptoms of these “abiotic disorders” can often be confused with disease problems. For example, a plant with marginal leaf burn may be thought to have a fungal blight, but the true cause may be a nutrient deficiency: a misdiagnosis potentially leading to an unnecessary use of fungicides. Unfavorable soil properties, fertility imbalances, moisture fluctuations, chemical toxicity and other problems, such as root girdling, are examples of abiotic disorders that can reduce plant health and even kill plants.

Water woes

Both lack of water and excess moisture can cause injury to plants. Plants commonly recover from wilting, the symptom of a temporary lack of water. However, during prolonged drought conditions, plants grow more slowly and young leaves may not fully expand. In severe cases, “scorching” or marginal leaf burn can occur on deciduous trees and needle browning on conifers. During winter months, lack of precipitation and bright windy days can result in winter



Leaf scorch (here on a red maple) often occurs in late summer, especially on trees after transplanting or on trees planted in areas that restrict root spread, like in parking lots and along streets.

desiccation (especially of conifers). The foliage may turn “off color” or reddish brown, being most severe on the side facing the wind. The key to preventing winter desiccation is to maintain adequate soil moisture throughout the summer and into winter.

Oddly enough, plants suffering from excessive soil moisture have symptoms similar to those in drought — wilting and stunting — because of underdeveloped roots. Plants growing in waterlogged soils may also develop corky, blister-like swellings (edema) on the underside of leaves.

Nutrient deficiencies

All plants need a certain array of nutrients, some in very low amounts, for proper growth and development. Nutrient deficiencies might result from a lack of nutrients in the soil, but certain ones, such as calcium and iron, occur due to poor soil conditions for poor uptake by the plant. Because nitrogen is highly mobile in the plant, nitrogen deficiency is observed first in the older leaves that may senesce while younger shoots remain healthy. If the symptoms are a general over-all yellowing

(chlorosis), applying nitrogen fertilizer to the soil might solve the problem.

Many trees, shrubs and other landscape plants suffer from iron deficiency. This deficiency commonly occurs not because the nutrients are lacking in the soil, but because they are unavailable under alkaline soil conditions (pH 7.0 and above). Iron deficiency causes yellowing of the newest foliage. The leaf veins remain green while the tissue between the veins turns a pale yellow. If severe, the entire leaf may

become cream-colored, while the tips and margins of leaves turn brown. Plants severely affected will be stunted or have branch dieback and may eventually die. Pin oak, sweet gum, white oak, rhododendron and azalea frequently show symptoms of iron chlorosis.

Calcium deficiency can be a result of inadequate levels in the soil, but it is often the result of fluctuations in soil moisture levels. Blossom-end rot of tomatoes is a common symptom of calcium

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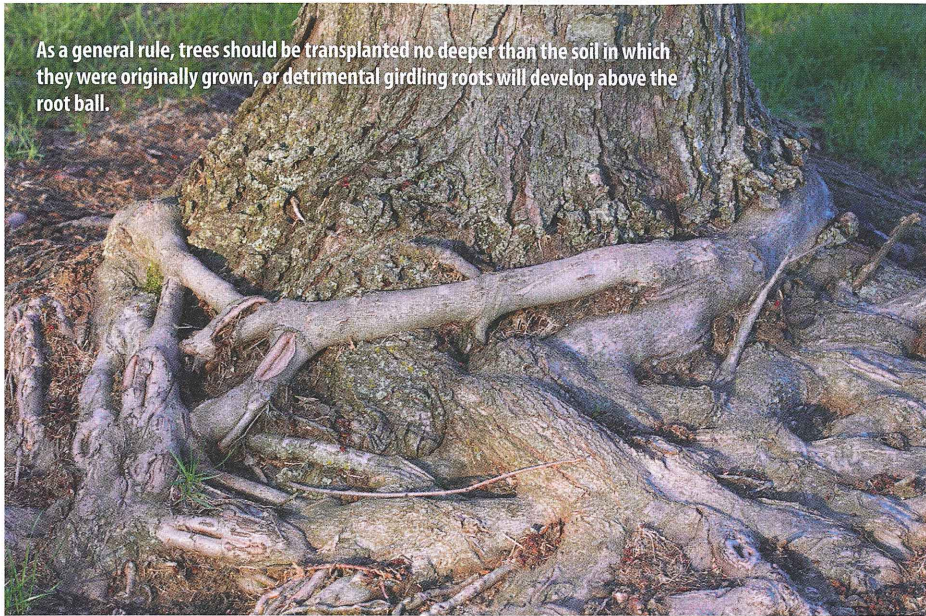
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As a general rule, trees should be transplanted no deeper than the soil in which they were originally grown, or detrimental girdling roots will develop above the root ball.



Interveinal chlorosis on azalea (*Rhododendron* spp.) is most likely due to iron deficiency.



deficiency, and can often lead to secondary colonization by fungi. It can be overcome by raising the pH of acid soils, watering regularly and applying calcium fertilizer.

In many cases, it may be more efficient to correct the cause for the deficiency (for example, improper soil pH) rather than trying to correct the deficiency by applying fertilizers. Consider having a soil test. Also consider your watering habits. Overwatering can leach nutrients (especially nitrogen) from the root zone, and underwatering does not make the nutrient-water solution available for root uptake.

Chemical toxicity

Herbicides are used to control weeds, but herbicide drift to desirable plants can be detrimental. Herbicides may be non-selective, affecting all plants, or selective, affecting certain plant groups (for example, broadleaf plants or grasses). Some herbicides, especially those for control of broadleaf weeds in lawns, cause leaf distortion that can be confused with viral disease. For example, the phenoxy herbicide 2,4-D, causes distortion in grapes, tomatoes and many other plants. Landscape and garden plants may outgrow exposure to low levels of selective herbicides, but exposure to non-selective

herbicides, like glyphosate, is usually lethal. Always be cautious when applying herbicides, and avoid applying them during windy days.

General diagnosis

These are just a few examples of abiotic disorders. The bottom line is that some requirement of the plant is not being met, and the health of the plant suffers. Determining exactly what attribute is amiss requires that you carefully examine both the symptoms and the plant site. First, rule out the possibility of pests and diseases, and then figure out the cause of the plant's stress so you can relieve it. Because abiotic disorders occur very frequently on plants in the landscape, it is important to be a good detective by developing the skills and experience needed to diagnose them. ✎

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Be a detective: Tips for diagnosing abiotic disorders

When an "abiotic disorder" is suspected, an accurate diagnosis is needed to develop an appropriate corrective action. Here are a few tips to help:

- Identify the plant. Be familiar with its normal growth pattern and ideal growing conditions. Remember the saying: "The right plant in the right place."
- Is there a pattern to the symptom? Abiotic issues often follow a regular pattern such as along roadways, in low areas, and such, whereas diseases tend to be random.
- Be suspicious of secondary invaders. Pest or disease invasion might occur after an abiotic disorder has weakened the plant. For example, drought stress can predispose trees to cankers.
- Consider that there might be more than one problem. Leaf yellowing could be the result of both nutrient deficiency and powdery mildew.