University of Illinois Extension

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Hort Answers
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Environmental Damage
Chlorosis
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Frequency
4 (1 = rare 5 = annual)

Severity
3 (1 = very little damage 5 = plants killed)

Hosts

Herbaceous plant as well as woody plants are susceptible to chlorosis. Possible causes of chlorosis include poor drainage, damaged roots, compacted roots, high alkalinity, and nutrient deficiencies in the plant. Nutrient deficiencies may occur because there is an insufficient amount in the soil or because the nutrients are unavailable due to a high pH (alkaline soil). Or the nutrients may not be absorbed due to injured roots or poor root growth.

Plants Affected

Small Fruit

- Blueberry (*Vaccinium sp. Example: Highbush - V. corymbos*)

Tree

- Asian White Birch (*Betula platyphylla*)
- European White Birch (*Betula pendula*)
- Gray Birch (*Betula populifolia*)
- Paper Birch (*Betula papyrifera*)
- Pin Oak (*Quercus palustris*)
- Red Maple (*Acer rubrum*)
- River Birch (*Betula nigra*)
- Silver Maple (*Acer saccharinum*)

Symptoms

The lack of iron in a plant is one of the more common reason for chlorosis. Manganese or zinc deficiencies in the plant will also cause chlorosis. The way to separate an iron deficiency from a zinc or manganese deficiencyis as follows: Iron chlorosis starts on the younger or terminal leaves and later works inward to the older leaves. However, manganese and zinc deficiencies develop on the inner or the older leaves first and then progress outward.

Symptoms can vary depending on several factors. How alkaline is the soil? The higher the pH, the more chlorotic the plant. How long has the plant been chlorotic? In general, the longer the plant has been chlorotic, the more severe the chlorosis. Generally, mild chlorosis starts as a paling (lighter green to lime-green color) of interveinal (between veins) tissue, whereas a yellow color indicates a more serious condition. In some cases, only part of the plant is chlorotic. Affected areas (or the entire plant) may be stunted or fail to produce flowers and fruit. In addition, chlorotic leaves are more prone to scorching and leaf diseases. With severe chlorosis, the leaf veins will turn yellow, followed by the death of the leaf, the affected branch may die back, and death of the entire plant can occur.

Life Cycle

Plants need iron for the formation of chlorophyll. Chlorophyll gives leaves their green color and is necessary for the plant to produce the food it needs for its own growth. Iron is also necessary for many enzyme functions that manage plant metabolism and respiration. Iron becomes more insoluble as the soil pH climbs above 6.5 to 6.7 (7.0 is neutral;below 7.0,the pH is acidic; above 7.0, the pH is alkaline). With most plants, iron can only be absorbed as a free ion (Fe) when the pH is between 5.0 and 6.5. Other elements such as calcium, zinc, manganese, phosphorus, or copper in high amounts in the soil can tie up iron so that it is unavailable to the plant. However, a shortage of potassium in the plant will reduce the availability of iron to the plant. Insufficient iron in the soil may also be a problem. However, most Illinois soils have adequate iron. An exception may be sandy soils. In most cases, as previously described, the problem is the availability of the iron in soil to the plant.

Management

Treatment for chlorosis varies with the cause. If the chlorosis is due to soil compaction, poor drainage, poor

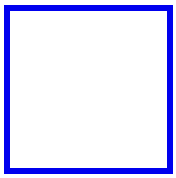
root growth or root injury, then core aerification, tiling, mulching or some other cultural practice may be needed.

Nutrient deficiencies can be treated in one of several ways. Foliar applications of nutrients in a water soluble or chelate form can correct the problem for awhile, but only affects the leaves that are present during application. Leaves that develop and grow after the treatment are not affected by the treatment. Therefore, several treatments per growing season may be necessary to keep the foliage green.

Another method is trunk application. Trunk application is quick and may last several years. However, you should allow up to thirty days for the tree to respond to trunk applications. There are a couple of ways to apply nutrients via the trunk. Both methods involve drilling holes in the trunk - the number of holes is based on trunk diameter. With the first type of application, containers with tubes are then attached to the holes. The tree's movement of moisture will help draw the nutrients into the trunk. After the containers are empty, they are removed and the holes are plugged. The other method requires plastic capsules to be hammered into the drilled holes. These capsules are designed to be left in the tree. In both cases, consider hiring a professional to do trunk applications.

Another method for treating chlorosis is via soil treatment. Soil tests should be taken to determine soil pH as well availability of nutrients that can cause chlorosis. Based on a soil test, the pH is corrected by using sulfur. To add sulfur, the following method is recommended: drill holes in the ground at a forty-five degree angle to a depth of twelve inches starting three to five feet from the trunk. Additional rings of holes are made every two feet out. Add rings as far out as the tree is tall or as far as property lines, foundation, streets, driveways, etc. will allow. Another soil treatment is to addsoluble/chelated forms of iron directly into the soil using the same pattern as previously described.

Related Resources
U of IL - Distance Diagnosis through Digital Imaging
U of IL - Plant Clinic



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