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Why Do My Trees Have Yellow Leaves?

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The leaves of most trees should be green, but sometimes in the Great Plains, tree leaves turn from green to yellow. It's a problem called chlorosis. Chlorosis is an abiotic (not caused by a living organism such as a fungus or virus) disease. It's characterized by the greenish-yellow to yellow leaves.

Much of the chlorosis seen in our area on trees is actually iron chlorosis or chlorosis caused by a lack of iron in the plant tissues. Iron is needed for the formation of chlorophyll, the green pigment in leaves. Without the green pigment that allows a plant to utilize sunlight for production of food and energy, the plant will die.

Plants with iron chlorosis first turn yellow-green to yellow between the veins, with the veins remaining a darker green. With more severe chlorosis the leaves become pale yellow and develop brown spots between the main veins. Leaf margins may also turn brown with the leaves later drying up and falling off. Tree growth slows to a stop and dieback of branches can occur when iron chlorosis is extremely severe.

Iron chlorosis is quite common in our area because we tend to have alkaline soil; those are soils with a high pH, often over 7.5. While our soils actually contain adequate amounts of mineral iron, it's in a chemical form unavailable to the plants due to the high pH of the soil. The yellowing or chlorosis can involve the entire tree, or may be restricted to one side or even just one branch. Within the same yard, there may also be perfectly healthy green trees growing right next to ones with iron chlorosis.

Certain types of trees and shrubs are more prone to iron chlorosis than others because they are more sensitive to high pH soils. Those trees most likely to show symptoms of iron chlorosis include pin oak, flowering dogwood, sweet gum, silver maple, tulip tree, and magnolia. Acid-loving shrubs, like azalea, blueberry and rhododendron, are also prone to iron chlorosis. These types of trees and shrubs should be avoided when planting in soils where pH is extremely high.

While it's common to encounter highly alkaline, calcareous soils in our region, a high pH is not the only cause of iron chlorosis. First of all, it may not even be iron chlorosis. Chlorosis can be confused with similar symptoms expressed by mineral deficiencies such as magnesium, manganese or boron.

Cultural factors can also lead to symptoms of chlorosis. Overwatering is probably the most common cause of chlorosis, in fact iron chlorosis can be induced if soils are kept excessively wet as a result of over watering, compacted soils, or poor drainage.

Chlorosis can also be the result of root damage, girdling roots, or trunk damage from mowers and cord trimmers. This is because root restriction, root injury and trunk injury all impair the plant's ability to take up and transport soil nutrients. Chlorosis can also develop in extremely dry soil situations because mineral nutrients must be in solution for a tree to be able to absorb them from the soil. In dry soils they can't absorb the nutrients. One common example is chlorosis on

silver maple trees in situations where half of the root zone or more is located in an area that isn't irrigated regularly, such as a dry lot, a gravel driveway, or a ditch bank area.

What can the landowner do about chlorosis? If the cause is excessively wet soils, adjust the watering so the soil doesn't remain saturated for any length of time. You will still need to water the tree adequately so it doesn't undergo drought stress. Watering should be done slowly enough to moisten the soil to a depth of at least 18 to 24 inches without saturating the soil. If the soil is compacted, aeration may help the water penetrate the soil more quickly. If the soil is too dry, the remedy is simple... water regularly to maintain moist soil to a depth of 18 to 24 inches in the entire root zone of the tree.

If watering or compacted soils doesn't seem to be the problem, check for trunk or root problems. Look for trunk injury from physical wounds to the base of the tree from mowers or cord trimmers. See if the bark on the southwest side of the tree has been damaged from winter injury. Check for girdling roots, constricted roots, or damage to the root system. When possible, these problems should be corrected. In some cases the tissue damage may not be able to be corrected and the tree may eventually succumb to its injuries.

Finally, correcting iron chlorosis in alkaline soils isn't an easy task. Before doing anything, it's a good idea to have a soil test performed to find out the alkalinity of the soil. This can be done at home with soil test kits available at most garden centers or through your cooperative extension service. Once you have determined that the soil truly is alkaline, there are several approaches to attempt to correct iron chlorosis.

One of the simplest approaches is to acidify the soil. This is most easily achieved by adding sulfur to the soil prior to planting, but acidification is a slow process and pH change will be slow. To acidify the soil, add sulfur to the soil prior to planting. The easiest sulfur to use is prilled sulfur. This should be applied at the rate of 25 pounds per 1000 square feet of landscape bed and mixed well with the soil to a depth of 18 to 24 inches. If trees and shrubs are already established use an acidifying fertilizer, such as ammonium sulfate.

Another method of correcting iron chlorosis is the application of iron chelates to the soil. Chelated iron is less affected by soil pH and more readily available to plants. Iron chelates must be placed in the root zone by drilling holes in the soil or working it into the soil.

Iron chelates in soluble form or iron sulfate can also be applied to plants through a spray to the leaves. These foliar sprays often result in a quick "greening" of the leaves, but these effects are generally temporary. New growth that develops after application will still be chlorotic.

There are also methods available for injecting iron right into trunk tissues with implants or injections, but these cause wounds to the tree trunk it's not advisable to use them in most situations.

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For additional information on this topic or for any of your forest and tree related questions please contact Oklahoma Forestry Services at 405-288-2385 or 800-517-3673.