Leaflets News and Information for the Arborists of Michigan

The Plant Doctor's LANDSCAPE TIPS

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Photo 1: Iron Chlorosis on Pin Oak is very common in landscapes. All of these trees were planted in soil with the pH ranging from 7.5 to 8.0.

Photo 2 A severe case of iron chlorosis as evidenced by necrotic spots between the leaf veins. Also note that with iron chlorosis, leaf veins often remain green.

Photo 3: Even though these symptoms on red maple appear similar to iron chlorosis, this is likely a manganese deficiency, also induced by a too high soil pH.

Photo 4: Pachysandra may be affected by iron chlorosis. A soil test would help to determine whether these symptoms are caused by a lack of iron, nitrogen, some other nutrient, or perhaps caused by some other problem.

IRON CHLOROSIS

INTRODUCTION:

Iron is an element or nutrient that is needed in very small amounts by plants; hence, it is considered a micronutrient. Iron, absorbed in various forms by plant roots from soil, is utilized in the formation of chlorophyll and other organic chemicals; plant organelles use chlorophyll and sunlight to manufacture carbohydrates (i.e. sugar) from carbon dioxide and water, a process known as photosynthesis.

Iron Chlorosis is a term that describes a chlorosis or yellowing of plants induced by iron deficiencies. In many cases, the iron deficiency is not induced by an actual lack of iron in soils but rather by the fact that this micronutrient is unavailable to the plant. Unavailability of iron and some other micronutrients is usually due to a non-ideal soil pH for a particular plant. In the case of iron, the higher the soil pH above 7.0, the more unavailable it becomes to plants. Plants which suffer from iron chlorosis not only exhibit yellowing foliage but also suffer with low vigor, slow, stunted growth and less seed/fruit production.

In Michigan landscapes, pin oak (*Quercus palustris*) is one of the most common plants susceptible to iron chlorosis (Photo 1). Other highly susceptible species include silver, red and amur maples; crab apple; sweet gum; dawn redwood; white pine; river birch; grapes and many berries. Some species of plants that exhibit tolerance to high soil pH and induced iron chlorosis include many oaks, catalpa, many pines, poplar/cottonwood, many elms, ginkgo, hackberry, hawthorn, honey locust, linden/basswood, Norway maple and various grasses.

DIAGNOSIS AND SYMPTONS:

The primary symptom of iron chlorosis is yellowing of the foliage. Often the veins of the leaves remain somewhat green (Photo 2). In severe cases, trees exhibit poor growth and possibly even branch dieback. To confirm iron chlorosis on plants, perform a soil test to determine if the pH is high, above 7.0. Make sure that the particular plant species is susceptible to iron chlorosis and eliminate other potential causes, discussed below.

Iron chlorosis may be confused with some other plant problems. Other nutrient deficiencies such as nitrogen, manganese, boron and zinc may induce yellow foliage. Drought conditions may also exacerbate nutritional disorders. Herbicide injury and some diseases and pest issues may also cause yellow foliage on plants.

MANAGING IRON CHLOROSIS:

Iron chlorosis can be a perplexing and difficult problem to correct. In some cases, one solution may work best in one area and not so well in another. Trial and error may lead to an effective result.

Avoidance: Before installing plants in landscapes, perform a soil pH to determine if a particular species is prone to iron chlorosis. If the pH is conducive to iron chlorosis, susceptible plants will perform poorly and the battle with iron chlorosis can be expensive and difficult. If the pH is high, install plants less apt to contract iron chlorosis.

Soil Alteration: If iron chlorosis is a problem, attempts can be made at lowering the soil pH through the use of sulfur, iron sulfate and other pH lowering chemicals. Soil is highly buffered (resistant to change) so, this method has met with various degrees of success, usually disappointment, because the soil is extremely difficult to change to any measurable depth. Another method is to vertical mulch in the root zones of trees and back-fill with sulfur, iron sulfate, iron chelates, and other pH lowering amendments to improve aeration and water penetration.

Plant Treatment: Foliar sprays containing iron and other nutrients can provide temporary relief from iron chlorosis. Also available are trunk implants and iron delivered in various forms by injection equipment. Perhaps one of the most effective treatments is trunk injection with ferric ammonium citrate.

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