Contents

where frequent irrigation is being applied, or in container media. It is relatively uncommon in palms growing in clay soils.

Look-Alike Disorders

Early symptoms of potassium deficiency are often confused with leaf spot diseases or the yellow and brown spots caused by sucking insects. Certain preemergence herbicides cause marginal and interveinal chlorosis followed by necrosis. Preemergence systemic herbicide symptoms occur in older leaves first, as with potassium deficiency.

Diagnosis

Potassium deficiency is diagnosed primarily from visual symptoms. Leaf analysis may be unreliable, as potassium is mobile in plants and may be leached from leaves with rain or sprinkler irrigation.

- Has the soil been graded? The highest concentration of potassium in soil usually occurs near the surface. Young or shallow-rooted plants may become potassium deficient where topsoil has been removed.
- If the deficiency is suspected in a palm, examine the soil. Sandy, rapidly drained soils are most susceptible to potassium deficiency.

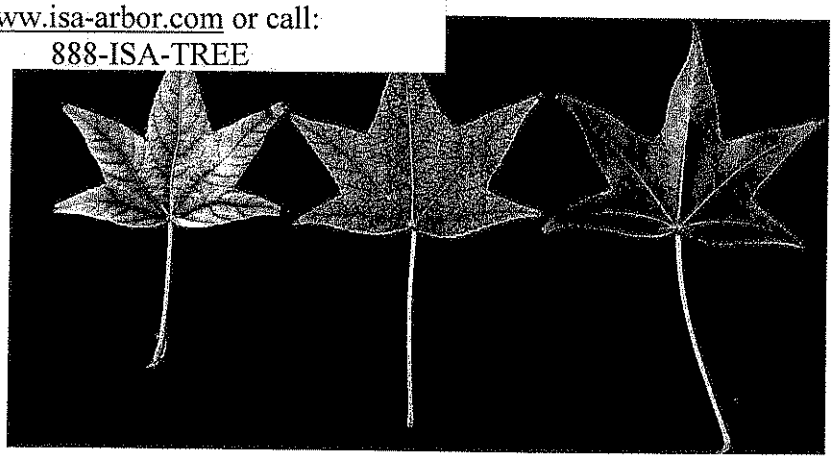

Figure 5.40. Iron deficiency symptoms in sweetgum *(Liquidambar styraciflua)*; non-deficient leaf on right. Because iron is immobile in plants, older basal leaves remain green as young leaves become chlorotic between veins. Various soil conditions are usually responsible for making iron unavailable to plants, including a soil pH above 7.0 and cold, wet, or poorly drained soils.

Sensitive Species

Many palm species are sensitive to potassium deficiency, including royal (*Roystonea* spp.), queen (*Arecastrum romanzoffianum*), coconut (*Cocos nucifera*), date (*Phoenix* spp.), and areca (*Areca* spp.) palms.

Remedies

Confirmed potassium deficiency in palms may be corrected with soil applications of potassium-containing fertilizers. On very sandy soils, slow-release forms of potassium fertilizers should be applied to prevent rapid loss due to leaching. Use organic mulch to cover soil around plants, as potassium leaches readily from organic matter. In palm trees, symptomatic leaves do not recover and must be replaced by new growth. However, do not remove symptomatic leaves, as this may cause the deficiency to worsen.

Iron Deficiency

Symptoms

Iron deficiency, or iron chlorosis, is the yellowing of leaves due to a lack of iron. In iron-deficient broadleaf plants, the areas between the veins of young leaves are chlorotic, with distinct narrow green veins (fig. 5.40). Because iron is immobile in plants, the older basal leaves remain green as young leaves become chlorotic. With extreme iron deficiency, young leaves are small, almost white, and may have necrotic margins and tips. Shoots are normal in length but small in diameter. Twigs die back and defoliate as the deficiency increases in severity (fig. 5.41).

In iron-deficient conifers the older needles and the lower crown remain green, while new needles are stunted and chlorotic. The new leaves of iron-deficient palm trees are uniformly chlorotic, especially in poorly aerated soil or when the tree has been planted too deep.

Occurrence

In many areas, iron chlorosis is the most common nutrient deficiency seen in landscape plants. The concentration of iron in

soil is usually adequate for plant growth, but various soil conditions can make the element unavailable to plants. For example, the availability of soil iron decreases as soil pH rises above 7.0, and it decreases in cold, wet, or poorly drained soils. Symptoms of iron deficiency are variable within trees, between adjacent trees, and between species. Iron deficiency in palm trees is uncommon; it can appear in palms growing in poorly aerated soils or those that have been planted too deeply. In soils above pH 7.0, species adapted to acidic soils ("acid-loving" plants) are usually affected by iron deficiency symptoms.

Look-Alike Disorders

Symptoms of iron deficiency closely resemble those of manganese deficiency or damage by soil-applied preemergence systemic herbicides. However, iron deficiency occurs on new leaves, and preemergence herbicide injury occurs primarily on old leaves. Soil compaction, root injury caused by construction, and poor drainage can aggravate iron deficiency symptoms or cause symptoms similar to iron chlorosis.

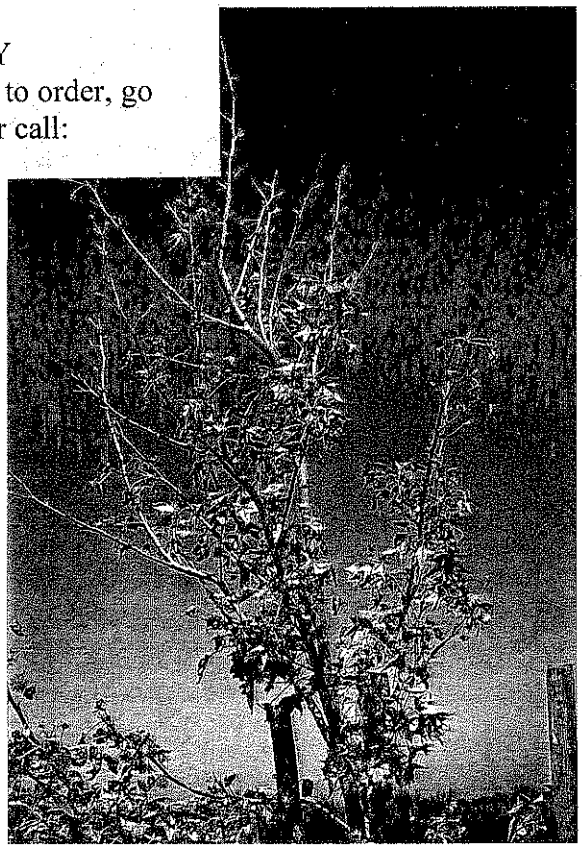

Figure 5.41. Advanced iron deficiency symptoms in sweetgum *(Liquidambar styraciflua)*. The twigs of this tree are dying and defoliating as the deficiency increases in severity.

Diagnosis

Iron deficiency may be diagnosed by a combination of visual symptoms and soil analysis.

Plant Factors

- Identify the species. Certain acid-loving species are susceptible to iron deficiency in alkaline soils.
- Examine leaf symptoms carefully. Do symptoms appear on old or young leaves? Because iron is not mobile in the plant, iron deficiency symptoms appear first on the youngest leaves.
- The rapid growth of vigorous young trees is often temporarily iron deficient in spring.
- Iron deficiency symptoms may occur on few plants within a group of the same species in the same landscape. Or, individual branches within a tree or shrub may be affected.

Soil Factors

- Analyze the soil for pH. As soil pH increases above 7.0, iron availability decreases.
- Evaluate the soil. Is it wet and poorly drained? Plants growing in soils low in oxygen are prone to iron deficiency symptoms, especially in spring when soil temperatures are low.

Sensitive Species

Plants adapted to acidic soils (see table 5.15, p. 122) are often iron deficient in alkaline soils.

Remedies

Confirmed iron deficiency may be corrected with soil applications of iron-containing fertilizers. For a more rapid correction, iron chelates may be applied to the soil or foliage, but the effect of iron chelates is relatively short-lived. Trunk injections of iron