

Chlorosis of red and silver maple

by Elton M. Smith and Cynthia D. Mitchell

Chlorosis or yellowing of foliage is a common symptom of a number of landscape trees due to one or a number of factors. In areas where the soil pH is above 6.5 many plants, including numerous Oak species, become deficient in iron as the iron is in a form unavailable to plants. The symptoms of iron deficiency are, typically, yellow foliage with green veins.

The symptoms of iron deficiency closely resemble the symptoms of manganese deficiency which occurs under the same high soil pH conditions. Manganese deficiency is common in Maples especially in Red (Table 2) and Silver in Ohio. In Michigan, manganese deficiency has also been observed in Sugar and Norway Maple (Table 1).

In advanced cases, the tissue between the veins turns brown particularly along the leaf margins. The

symptoms are most likely to occur in the youngest or most recently developed foliage since manganese is relatively immobile within the foliage. New growth of Red Maple is likely to be stunted especially late spring or summer growth.

To properly diagnose chlorosis problems of trees and shrubs a soil test and leaf analysis are recommended. The soil test is important, in the case of manganese deficiency, to determine the soil pH while the leaf or tissue analysis accurately reveals the level of most major and minor mineral elements necessary for plant growth. The proper diagnosis must be stressed, prior to treatment, because Maples treated with iron, rather than manganese, will cause the symptoms to become more severe, since iron suppresses manganese uptake due to an iron-manganese antagonism.

Studies during 1975-1976 at Ohio State University have shown that with both Red and Silver Maple manganese will aid in preventing foliage chlorosis. The data in Tables 1 and 2 reveal that trunk implantations of capsules containing manganese sulfate will improve foliage color and increase both total chlorophyll and manganese levels.

Manganese sulfate capsules are in the marketing channels as Mn medicaps containing 28% manganese. As a result of these and other studies during the past several years, several related points should be made.

Treatments to be effective the season of application should be made prior to leaf growth in spring. In other words, implant during the winter months or early spring although implants can be made year round. Complete wound healing generally occurs if treatments are completed early in the season, while

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Table 1 — The effect of limb implantation of manganese sulfate on Red Maple (*Acer rubrum*) 5 months from treatment April 29, 1975.

	Check	Manganese
Foliage color (1-10) ¹	5.0	9.0
Total chlorophyll (mg/g) ²	170	226
Manganese content (ppm) ³	193	499

1—Figures expressed on a 1-10 scale with 10 the darkest green.

2—Figures expressed as mg. total chlorophyll per g. of leaf tissue.

3—Figures expressed as elemental manganese in parts per million.

Table 2 — The effect of limb implantation of manganese sulfate on Silver Maple (*Acer saccharinum*) 6 months from treatment March 25, 1976.

	Check	Manganese
Foliage color (1-10) ¹	3.0	8.0
Total chlorophyll (mg/g) ²	163	209
Manganese content (ppm)	69	153

1—Figures expressed on a 1-10 scale with 10 the darkest green.

2—Figures expressed as mg. total chlorophyll per g. of leaf tissue.

3—Figures expressed as elemental manganese in parts per million.

Silver maple

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mid-summer treatments may require 12-18 months to close.

Implants of the ½" capsules should be made in a spiral pattern around the base of the tree trunk. Effective control will not be possible unless the head of the capsules are inserted beneath the cambium to allow for proper cambium growth and healing.

Manganese deficiency of Maples can be corrected with other methods of treatment. However, capsule implantation is longer lasting than foliar spraying and more effective than soil treatments particularly in soils with highly alkaline pH readings.

In summary, if chlorosis of Red and Silver Maple is noted with the typical yellowish leaves with green veins the reason is quite likely manganese deficiency. A soil test

and leaf analysis to confirm the suspected diagnosis is recommended. Treating for all deficient elements is suggested along with a pH adjustment to 6.0 for Maples is advised. Finally, manganese deficiency can be prevented with implantations of manganese sulfate capsules. □

Literature Cited

1. Kielbaso, J. James and Kenneth Ottman. 1976. *Manganese Deficiency — Contributing To Maple Decline?* *Journal of Arboriculture*, Vol. 2 No. 2. pg. 27-32.
2. Smith, Elton M. and Cynthia D. Mitchell. 1977. *Manganese Deficiency Of Red Maple.* *Journal of Arboriculture*, Vol. 3 No. 5. pg. 87-88.

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Silver maple. Leaf on left treated with MnSO₄ capsules in March. Leaf on right untreated. Photo taken in September.

