Chlorosis in Ornamentals

control of lime-induced chlorosis by soil applications of chelated iron can be effective

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Thousands of chlorotic trees and shrubs—on lime soil in southern California—can be made to become green by soil applications of iron-containing chelates.

An iron chelating agent, such as EDTA —ethylene-diaminetetraacetic acid—has the ability to form complex compounds with iron ions and hold the iron in a soluble form available to a plant.

Four iron chelating agents have been used successfully as soil applications to control chlorosis of a number of plant species on several different lime soils. These compounds are EDTA—ethylenediaminetetraacetic acid—DTPA—diethylenetriaminepentaacetic acid—HEEDTA —N-hydroxyethylethylenediamintriacetic acid, and an unknown compound. The last three have given exceptionally good results on lime soil. They give longer and more satisfactory results than does EDTA. Five months after soil applications of DTPA and three months after HEEDTA, there was no evidence that more iron was needed. Just how long they will remain effective is as yet unknown.

Application Rates

Soil treatment with iron chelating agents is very economical for ornamental plants but no statistics are available for the cost of their use with commercial fruit trees.

The chelates should be thoroughly watered into the soil and then the normal irrigating procedure should be followed. Some tentative application rates of the dry chelated complexes to woody plants are given below:

Plant height (feet)	Rate
up to 2	1 to 2 oz.
2–4	2–4 oz.
4–6	4–8 oz.
6–10	8–16 oz.
10–15	1–2 lb.
large trees	2–5 lb.

Plant height is used here as a measure of tree size, but this can be misleading. Individual judgment must be used in translating the above rates to actual practice. Excessive applications can result in leaf burning similar to that caused by excessive applications of other fertilizers, although, soil applications are much less apt to cause leaf burn than are foliage applications.

All the chelating agents studied—that are available as dry iron complexes—fit into the above rate list. The larger amounts should be used for EDTA. The rates are larger than those used on citrus trees in nonlime soil in Florida. Perhaps smaller amounts will be found just as effective. Chlorotic potted plants should not receive more than one gram—about ¼ level teaspoon—of dry chelate complex per gallon of soil.

The list of woody plants observed to respond to soil applications of iron chelates includes *Acacia, Abelia, Azalea,* avocado, *Bauhinia,* citrus, *Erythrina, Gardenia, Hydrangea, Liquidambar, Leptospermum, Macadamia, Magnolia, Ochna, Pyracantha,* and rose. Response of any plant appears to be directly related to the condition of, and extent of, the root system.

Time of Application

Evergreen plants, apparently, can be treated successfully at any time of the year. Treatment during the active growing season will possibly give best results, but precise studies on this point have not yet been made.

The season for treatment of deciduous plants is more limited and may be confined to the early part of the growing season, although *Liquidambar* trees responded as late as August. How late in

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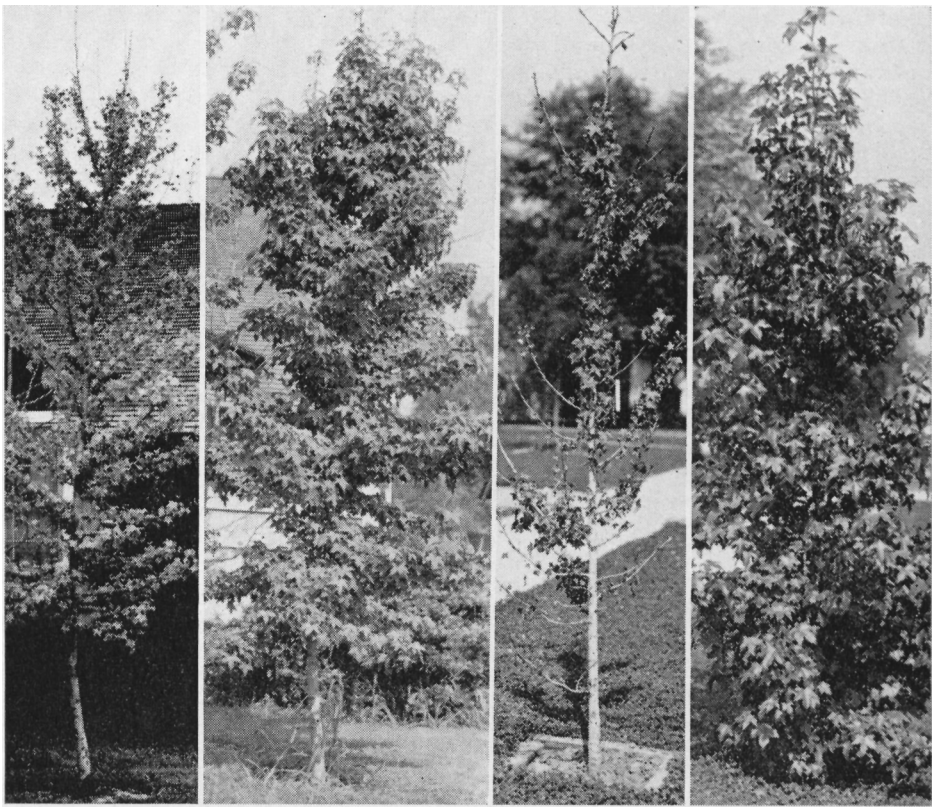
***Liquidambar* trees in the San Fernando Valley, reading from left to right: 1. Chlorotic tree. 2. Same tree 12 weeks after treatment with ½ pound iron-EDTA—13% iron. 3. Chlorotic tree. 4. Tree adjacent to and very similar to the No. 3 tree until treated with ¼ pound iron-HEEDTA—6% iron. Owner applied complete fertilizer following response to iron. Picture is 12 weeks following iron treatment. The soil contains 4% calcium carbonate.**



CHLOROSIS

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the year they will respond is not known.

Lime-induced chlorosis can be avoided in many situations by not overirrigating. Careful irrigation will often prevent or minimize the need for chelates.

The use of chelating agents may make it possible to grow certain plants in soil in which they could not survive otherwise. Also, chelating agents may permit the use of irrigation water which previously was too alkaline. However it is more logical to grow in lime soil only those species resistant to lime-induced chlorosis. Certain plants, including grapes and possibly avocados, can be grafted to resistant rootstocks.

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Rooting Bed Test

soil conditioner in nursing bed eased chrysanthemum transplanting

Edward J. Bowles

A synthetic soil conditioner, CRD-186—Krilium—was tested in rooting beds of commercially grown chrysanthemums for its influence on total root growth and the transplant operation.

Customarily, cuttings are taken in the spring and rooted in beds of sand, after which they are moved to open ground beds for additional growth before being finally transplanted into the cloth house flowering beds.

One such rooting, or nurse, bed was treated with CRD-186 when the soil—a Yolo clay loam—was in ideal condition, and rototilled. At the treatment rate of 10 pounds per 500 square feet there was a remarkable improvement in the aggregation of the soil.

The improved soil aggregation permitted good plant growth, and there was much less damage to roots when the plants were dug for transplanting to the flowering beds. The digging operation was easier and faster. When the soil was loosened with a fork the plants could be pulled from the bed in groups of five or six. A few shakes removed the soil from the roots with little or no loss of feeder roots.

In untreated soil the plants had to be dug out, and the soil removed by hand from each plant, with a rather heavy loss of roots.

A better root development—by those varieties usually slow to root and develop in the nurse bed—was noted on plants in the treated soil.

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QUOTAS

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that grain, alfalfa and idle or fallow land will absorb 523,000 acres, or 76% of the land diverted from cotton.

Specialty crops, oil seeds and sugar beets are expected to account for another 82,000 acres—12%. The remainder will be divided among miscellaneous uses.

If these preliminary estimates are borne out by farmer action, California feed grain and hay acreage in 1954 will be at record levels. Alfalfa would occupy about 1,100,000 acres as compared with 1,058,000 in 1950—the last previous cotton allotment year. Barley, too, at 2,200,000 acres would exceed its previous high of 2,162,000 acres, also in 1950. Grain sorghum acreage, about 170,000, would be the highest since 1941 when it occupied 204,000 acres.

Among specialty crops, sugar beets—at about 220,000 acres—may exceed their previous high of 219,000 acres in 1950. Oil seeds would be well down from earlier highs because it is not expected that flaxseed will regain its wartime prominence in southern California.

Such acreage shifts as these—with normal yields—must be accompanied by *price reactions as well as farm adjustment problems.* Least price impact will be felt by producers of specialty crops that can be contracted.

Alfalfa and grain producers may sell at lower prices than for recent years. Alfalfa is more vulnerable to price drops due to oversupply than is grain because there is a close production-consumption balance in California.

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The third article in this four-part report, to be published next month, will consider the geographic differences in alternative crops, effect of size and changes in net income.

Estimated Utilization of Diverted Cotton Acreage, 1953 to 1954, Basis July 1 Estimates (Thousands of Acres)

County	Acres to be diverted	Small grains	Alfalfa	Grain sorghum	Sugar beets	Corn	Oil crops	Potatoes	Irrig. pasture	Idle	Misc. crops
Merced	24	9	8	2	1	2	..	..	2	..	..
Madera	19	6	6	3	2	..	..	..	2	..	..
Fresno	188	100	18	7	6	3	14	..	4	31	5
Kings	74	37	9	3	1	..	4	..	1	15	4
Tulare	103	30	25	8	5	5	8	2	2	5	13
Kern	149	65	16	6	12	3	5	4	3	27	8
Total San Joaquin Valley	557	247	82	29	27	13	31	6	14	78	30
Imperial	91	20	17	12	5	..	17	..	1	8	11
Riverside	37	15	10	1	..	..	2	..	1	2	6
Total Southern California	128	35	27	13	5	..	19	..	2	10	17
Total 8 Counties	685	282	109	42	32	13	50	6	16	88	47
Others	2	1	1	..	..	..	..	..	..	..	..
Total California	687	283	110	42	32	13	50	6	16	88	47