

## **NUTRIENT DEFICIENCY SYMPTOMS**

**ZINC:** This is the most widespread and damaging micronutrient deficiency of citrus in California. It is commonly called "mottle leaf" because of the distinctive leaf pattern it produces on most citrus species.

Excessive phosphate or nitrogen has been shown to bring on or increase zinc deficiency. Reduced vigor, lower production, smaller fruit size, and lower fruit quality all result from insufficient zinc in the tree. Symptoms indicating mild deficiency may have little effect on yield in oranges.

Zinc does not move to successive new growth flushes. Applications of zinc sprays may be necessary on each major flush of growth to keep the tree free of deficiency symptoms.

Mottling becomes more pronounced with more severe deficiency. Leaves are smaller and pale in color, and more growth terminals are affected. In cases of severe deficiency, twig dieback is apparent, resulting in bushy, stunted trees. Symptoms of zinc deficiency are usually more noticeable on the south side of the tree.

**MANGANESE:** Manganese deficiency is common in most citrus areas of California, and is particularly evident in the spring after a cold winter. Because it frequently occurs in combination with deficiencies of zinc or iron or both, its symptoms may be overshadowed.

A slight reduction of tree vigor and yield is associated with mild manganese deficiency. If visual symptoms persist in leaves over 5 months old, yield is probably adversely affected. Defoliation, loss of vigor, and lower yields are the result of severe deficiencies. The area between the veins in the leaf becomes increasingly lighter in color as the deficiency becomes more severe. In extreme cases the area takes on a whitish-green cast, and the symptom is accompanied by premature leaf drop. Symptoms of manganese deficiency are usually more noticeable on the north side of the tree, and are more pronounced in the spring growth flush.

**POTASSIUM:** Symptoms of potassium deficiency are yellow to yellow-bronze chlorotic patterns on older leaves. On orange, the chlorosis develops primarily on leaves behind fruit, and may not be easily recognized even when the deficiency is severe. Visual diagnosis should be confirmed by leaf analysis.

**NITROGEN:** Nitrogen deficiency is sure to occur if orchard fertilization is not practiced. For mature trees, 1 to 1 1/2 pounds of actual nitrogen per year applied in February are usually sufficient. Excessive amounts of

nitrogen will reduce fruit size and quality and may delay maturity. Symptoms of nitrogen deficiency include an overall yellowing of the tree canopy and lack of vigorous new growth.

## **LEAF ANALYSIS**

Leaf analysis in citrus is best performed in September-October when nutrient levels in leaf tissues are stabilized. Excellent critical values to help guide you in your fertilization practice have been established for citrus by U.C. researchers.

Analysis can reveal specific nutrient deficiencies or can alert you to potential problems that might be coming up.

Collect 5 to 7 month-old, terminal, spring-cycle leaves from non-fruiting and non-flushing shoots. Leaves selected for analysis should be free of obvious tip burn, insect or disease injury, mechanical damage, etc., and should be from normal, healthy trees. If you have a weak area and you'd like to diagnose the problem, sample that area and compare the results with those of a sample from your best area.

## **Critical Nutrient Levels for Citrus**

	Deficient Below	Optimum
Nitrogen (N)	2.2%	2.4-2.6%
Phosphorus (P)	0.09%	0.12-0.16%
Potassium (K)	0.40%	0.70-1.09%
Zinc (Zn)	16 ppm	25-100 ppm
Manganese (Mn)	16 ppm	25-200 ppm
Boron (B)	21 ppm	31-100 ppm

Not all elements need be run each time you have an analysis made. I'd spend money checking only those elements where you suspect a possible deficiency or are interested in the leaf levels for a specific element. Using the shotgun approach where all elements are routinely checked is unnecessary.

Deficiencies that are most common in this area are Nitrogen (N), Potassium (K), Zinc (Zn), and Manganese (Mn). Boron (B) and Phosphorus (P) are sometimes deficient in the Oroville foothills.

Citrus trees in the Sacramento Valley need zinc regularly, and many need manganese. Zinc and manganese are normally applied as a foliage spray. The best time to apply them is in the spring when the new growth is about half expanded.

Remember, leaf analysis is a helpful guide in orchard management. Leaf levels should be considered along with orchard appearance and growth before corrective action is taken. Make sure that a deficient element is really the problem before you seek fertilizer applications as a solution.