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Zinc Deficiency in Grapes

Why zinc (Zn) is important in plants: needed for auxin, elongation of internodes, formation of chloroplasts (chlorophyll-role in photosynthesis), and starch. In grapes, zinc is essential for normal leaf development, shoot elongation, pollen development and set of fully developed berries. *The most widespread micronutrient deficiency of grapes in CA.

Zn in soil: sandy soils have lowest levels. After weathering from minerals, Zn is adsorbed by clay particles and organic matter and held in exchangeable form. Less available at pH > 6.0 Calcareous soils (such as limestone) fix Zn so it is not available. Clay soils high in magnesium often have low Zn.

High N which stimulates vigorous growth, or vigorously growing young vines, often show Zn deficiency.

Rootstock effect: vigorous rootstocks, such as Dogridge, Salt Creek, Harmony, and Couderc 1613, are predisposed.

Petiole analysis:
Deficient at < 15 ppm
Questionable at 15-26 ppm
Adequate at > 26 ppm

Zn levels in tissue don't change much during the season.

Symptoms: little leaf, stunted laterals, mottling of leaves, deep petiolar sinus or, in severely affected leaves, sinus is shallow. New growth of leaves is smaller and distorted. Chlorotic pattern in leaves with veins darker green. Straggly clusters, underdeveloped or shot berries. Berries can remain green and hard.

Correcting Zn deficiency:
*Daub spurs, fresh pruning cuts with $ZnSO_4$ (36% Zn) at a concentration of 1 lb. $ZnSO_4$ in 1 gal. water. 2-4 gal. per acre usually sufficient, with one worker walking behind a group of pruners. Higher concentrations can cause injury. Some reports of growers spraying spur pruning cuts with $ZnSO_4$ at same concentration at less than 100 psi pressure (no research data on that). Not effective on cane pruned (not enough surface area).

*Foliar sprays: Apply 2-3 weeks prior to bloom. If petiole sampling at bloom, remember Zn levels will be artificially high on sprayed vines. Fall treatment, used to correct Zn deficiency in fruit trees, has not been found effective in grapes.

Use 4 lbs. $ZnSO_4$ (36% Zn) + 3 lbs. lime in 100 gal. water/acre. Higher volume is better than a concentrate spray: want to wet flower clusters and undersides of leaves. Lime is added as a softener to prevent burn.

"Basic" $ZnSO_4$ contains up to 50% Zn and is neutralized to prevent foliage burn. It is available under various trade names and should be used at label recommended rates. Basic $ZnSO_4$ is not fully soluble and requires good tank agitation. May need to flush your sprayer lines.

No advantage to using more expensive, chelated Zn products. They have been found less effective on a label recommended and cost per acre basis.

*Soil applications only for sandy soils. In dormant season, a band of concentrated $ZnSO_4$ (1 lb. per young vine or 2-3 lbs. per mature vine) can be shanked in furrows 8-10" deep, about 18" on either side of vine.