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Texas Agricultural Extension Service

Texas Citrus Nutrition and Fertilization

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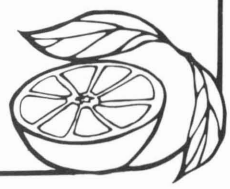

There are 16 nutrient elements essential to plant growth and development. A deficiency of any essential element will limit growth. Most Rio Grande Valley soils are quite fertile and contain ample levels of most elements to sustain optimum citrus growth and development.

Nitrogen is the only major nutrient which routinely must be applied to Valley citrus orchards to supplement existing soil nutrient levels. Long-term fertility studies in Texas citrus have not shown a meaningful response to supplemental applications of either phosphorous or potassium fertilizers.

Iron deficiency sometimes occurs in the early spring in Valley citrus orchards. The deficiency is usually transient, disappearing as soil temperatures increase in the spring. In severe cases, soil applications of iron chelates should correct the deficiency. Foliar sprays of iron are not recommended because of limited effectiveness and fruit spotting. Swingle citrumelo rootstock in heavier soils will exhibit persistent iron chlorosis severe enough to cause die-back. For that reason, Swingle citrumelo is recommended only for very sandy soils.

Deficiencies of other micronutrients have been reported rarely in Texas citrus. A documented deficiency should be corrected by soil application of chelates or by appropriate foliar sprays. Routine foliar sprays containing various micronutrients are not necessary for fruit set or general orchard condition. Moreover, repeated application of some micronutrients can result in potentially toxic levels in citrus.

Nitrogen Fertilization

There are a number of dry and liquid formulations of nitrogen available to growers, each containing a different percentage of actual nitrogen. The grower's choice commonly is based on the cost per unit of nitrogen and the method and ease of application. No yield differences have been correlated with the different sources of nitrogen. Some urea fertilizers may contain biuret impurities that can cause toxicity symptoms in citrus.

The rate of nitrogen application depends upon tree age, tree size or yield. The table below lists nitrogen rates for different tree ages. Tree size becomes the determining factor following severe rehabilitative pruning and nitrogen application rates should be reduced to levels corresponding to the age category which best matches existing tree size. Growers who use yield as the key to fertilization rate should apply 5 pounds of nitrogen per ton of fruit produced the previous season, unless the previous season's yields were reduced due to natural causes.

Nitrogen rates for bearing citrus

Tree Age	Pounds of actual nitrogen per acre per year
4	50
5	75
6	100
7	100
8	125
9	125
10+	150

Neither time of application nor the number of applications of nitrogen appear to matter. However, consistency in both timing and number of applications from year to year is important. A single application should be made pre-bloom. In split applications, two-thirds of the total nitrogen is applied pre-bloom and the balance in either May or August. A three-way split application of one-third of the total nitrogen each during pre-

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bloom, May and August is also acceptable, particularly on sandy soils. Dry fertilizers should be applied uniformly to the orchard soil surface. All fertilizer applications should be followed within a few days by irrigation or rainfall to move the fertilizer into the soil moisture system for use by the trees.

Nitrogen fertilization through a low-volume irrigation system is applied in equal rates at monthly intervals from February to November. Injection into the irrigation stream should be done near the end of the irrigation cycle to avoid leaching the nitrogen through the root zone. The total rate of nitrogen per year should not exceed 100 pounds per acre because of increased nitrogen use efficiency of such systems.

Soil Amendments

Soil amendments have not proven beneficial to Texas citrus production. Attempts to correct soil structural problems and increased salinity can be risky and may not be effective unless underground drain lines are operational. Application of soil amendments should be gradual and accompanied by heavy leaching to flush accumulated salts out of the root zone.

Gypsum application should be limited to 300 to 500 pounds per acre. Elemental sulfur applications should not exceed 100 pounds per acre, with no more than 200 pounds per acre in 1 year. Ammonium sulfate fertilizer should not be used when elemental sulfur is applied, as excessive sulfur in both soil and plant tissues could result.

Soil and Leaf Analysis

Soil and leaf analysis are not essential for a citrus fertilization program. The general recommendations for nitrogen fertilization and close observation of visual deficiency symptoms are adequate for the average orchard. However, analyses of soil and leaf samples, properly taken over several seasons, can lead to a more precise and economical nutritional program and optimum citrus production. Long-term trends in nutrient levels and soil salinity allow the grower to alter production practices before a nutritional or salinity problem can become limiting to citrus production.

Composite soil samples should be taken annually for each soil type and each variety in each orchard. The composite sample is comprised of 10 to 20 individual soil cores taken across the orchard. The individual cores should be thoroughly mixed in a plastic bucket, from which a 1-pint sample is taken for analysis. The sample should be air-dried overnight before delivery to the analytical laboratory.

The depth of sampling is 1 foot for routine analysis, but occasional subsurface samples to 3 or 4 feet in 1-foot increments can be useful. Sampling time is not so critical as is consistency in sampling time from year to year. It is recommended, however, that soil samples be taken in late July or August to coincide with leaf sampling time.

Soil analysis indicates the levels of various nutrients in the soil, but it does not indicate availability of those nutrients to plants. Because some nutrients may be unavailable in the soil, leaf analysis is useful to determine nutritional status based upon what the plant can extract from the soil.

Leaf analysis assumes that there is a given range of concentrations of each nutrient element which correlates well with optimum production—even under different soil types, climatic conditions and rootstock/scion combinations. The ranges which have been developed for Florida citrus are presented in the table below.

Satisfactory ranges in concentration of nutrient elements in Florida citrus leaf samples.

Nutrient	Symbol	Range
Nitrogen	N	2.30-2.90%
Phosphorous	P	0.09-0.15%
Potassium	K	1.20-1.70%
Calcium	Ca	2.50-5.00%
Magnesium	Mg	0.30-0.50%
Manganese	Mn	20-50 ppm
Copper	Cu	4-10 ppm
Zinc	Zn	20-50 ppm
Boron	B	40-100 ppm
Iron	Fe	40-60 ppm

The standard citrus leaf sample consists of 100 leaves from 20 trees across the orchard. Leaves should be 4 to 5 months old, taken from non-fruiting twigs of the spring growth flush. Thus, leaf samples should be collected in late July or August. Each sample should represent only one soil type, one variety and one orchard. Leaves should be air-dried prior to delivery to the analytical laboratory.

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