University of California Cooperative Extension • Tulare County

Citrus Notes

Volume 6, Issue 1 ***January 2009***

Spring Citrus Meeting

Thursday, March 12

9:00 A.M. - 12:00 P.M.
Tulare County Agricultural Building
4437 South Laspina Street, Tulare

9:00-9:30 A.M. **Irrigation in a Short Water Year**
Dr. David Goldhamer, Cooperative Extension Water Management Specialist University of California, Davis

9:30-10:15 **Citrus Peelminer, Citricola Scale, Movento for California Red Scale**
Dr. Beth Grafton-Cardwell, Director, Lindcove Research and Extension Center and Extension Specialist & Entomologist, Kearney Agricultural Research and Extension Center, Parlier

10:15-10:30 **Break**

10:30-11:15 **Rootstock and Varietal Development**
Dr. Mike Roose, Professor of Genetics, University of California, Riverside

11:15-11:45 **Grower Returns**
Jim Sebesta, Sunkist Growers, Inc.

Continuing education credit has been requested

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Nitrogen Demand

During the bloom and fruit setting period there is a strong demand for nitrogen by the tree, therefore an adequate level of nitrogen must be readily available. The time required for soil applications of nitrogen fertilizer to be available for assimilation by tree depends upon what form of nitrogen is in the fertilizer. First, of course the fertilizer must be moved into the soil by rainfall or irrigation. The nitrate form will move with the water and be available for immediate assimilation by the roots. This is desirable where the nitrogen level in the tree may be deficient. The urea form moves with the water and then is rapidly converted to the ammonium form; this form adsorbs to the soil particles and is then converted to the nitrate form. The ammonium form in a fertilizer is fixed to the soil particles at the soil surface and then is converted to the nitrate form before it can be taken up by the roots. The conversion to the nitrate form of urea and the ammonium forms requires time which is largely dependent upon soil temperature. Foliar application of lo-biuret urea is taken up by spring flush growth very rapidly (some studies suggest within hours). Although large quantities of nitrogen cannot be applied in this manner in a single spray, it is a method of quickly providing a source of nitrogen to the tree, as in cases where fall leaf analysis has suggested a below optimum level of nitrogen.

Spring Cultural Considerations

An efficient nitrogen management program should involve review of leaf analysis, production records, and fruit quality as well as fertilization records including applied material, rate, timing and method of application. To assist in management decisions regarding nitrogen use results from recent research in navel oranges in Tulare County, by Drs. Lund and Arpaia are included. In the study nitrogen was applied in increasing amounts and at various times by foliar application, introduced into the irrigation system or in a combination of foliar and fertigation applications. Foliar treatments were as follows: one time only in late May; two applications, one late winter and one late May; four times - late winter, prebloom, late May and 30 days following the late May application. Soil treatments (injected into the low volume irrigation system) were: one application in late winter; two applications - late winter and early summer; continuous application - applied in every irrigation from late winter through summer. Samples were taken of soil solution moving below the root zone. Fruit yield, size and quality were evaluated. Results of the trial demonstrated an increase in yield with increasing amounts of applied nitrogen up to 1 to 1 ½ lbs. of actual nitrogen per tree per year. This effect was demonstrated regardless of the method of application. The rates of actual nitrogen applied varied with the various treatments from 0-2.25 lbs. Soil applications (fertigation) resulted in the highest nitrate nitrogen leaving the root zone in the soil solution with foliar applications resulting in the least and combination treatments of foliar and soil resulting in intermediate levels of nitrate in the leachate.

A number of elements are required in trace amounts by citrus trees; these elements are referred to as micronutrients. Citrus has been found to need the following micronutrients: iron, manganese, zinc, copper, boron and molybdenum. A shortage of one or more of these micronutrients usually affects the appearance of the tree; severity of symptom is related to severity of the deficiency. Zinc and manganese are the micronutrients most frequently deficient.

Leaf analysis is based on the idea that the plant is the best nutrition indicator for the complex production system of climate, soil and plant. Results from last fall's leaf analysis can be compared to standards established for citrus. Leaf analysis provides the information for planning, evaluating and controlling the nutritional program, with the goal being high yields of good quality fruit with maximum returns at reasonable cost. Nitrogen has the greatest effect of the elements on fruit quality. High levels of nitrogen delay color development and result in a thicker and coarser texture of the peel. Adequate levels of potassium and phosphorous are required for high fruit quality. Interpret leaf analysis results from last fall by comparing to optimum levels established for each of the essential elements. Review production and fruit quality from packout records. Review fertilizer amount, timing and analysis applied last year. Was it

enough, too little or excessive? This review will suggest if the current program is adequate or if adjustments upwards or downward are called for.

Winter Tree Color

Winter temperatures frequently result in tree canopies taking on a yellow color often referred to as winter chlorosis. Low soil temperatures during the winter months result in reduced root activity. This may result in a reduced assimilation of iron. A reduction in the iron level affects the production of chlorophyll. Iron is a building block of chlorophyll, the pigment which gives the green color to the tissue. With warming soil temperature in the spring, uptake of iron increases and the normal green color generally returns to the canopy. A continuing yellow cast to the foliage may be the result of a saturated soil condition which has persisted, beyond just a brief condition following an irrigation. In this case, oxygen concentration in the soil is low which reduces iron uptake by the roots. Some soils in which citrus orchards have been established over the years have lime present in surface and subsoil. Some rootstocks are less efficient in extracting iron in the presence of lime in the soil resulting in a condition referred to as lime-induced chlorosis.

Among the commercial rootstocks, trifoliate rootstock is the most notable in this regard, followed by Troyer and Carrizo, which are related to trifoliate.

If the tree roots contact lime at some point, iron assimilation by the tree may be affected. The presence of the lime raises the pH of the soil which decreases the solubility of the iron, making the iron less available for assimilation by the roots. Carbon dioxide produced by roots during respiration lowers the pH, making the zone between root and soil particle more acid, increasing the solubility of iron present and more available for assimilation. Trifoliate rootstock is less efficient in this process. The amount and location of lime present varies with soil types. Correction of iron chlorosis in citrus has been studied for many years. Addition of iron in various forms to the soil has been studied, as well as direct injection into the tree and materials sprayed on the tree canopy, all with limited success. Chelated forms of iron applied to the soil have been more successful, however they are often more expensive. Application of acidifying materials which react with the line can be helpful. This would include materials such as soil sulfur or acids such as sulfuric. Sulfur applications are slow in influencing the lime condition because of the soil mass involved in the root zone. Acid treatments may react more rapidly with the lime but generally require additional safety precautions and equipment during application. Application of various foliar formulations have also been studied extensively, again with limited success. Some materials are taken in by the leaf tissue but re not translocated throughout the tree.

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