UCCE Kern County
Subtropical Crops Newsletters

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UPCOMING MEETINGS AND EVENTS

March 12, 1998 California Citrus Expo at the Visalia Convention Center from 7:30 a.m. to 4:45 p.m. Beside the displays, workshops/presentations will be offered on combating California red scale options for 1998, beneficials in citrus, the future of ag- where are we going?, new regulations for preemergent herbicides, and the ants go marching on. Reservations are currently being accepted for the marketing, panel discussion and luncheon being held at noon. Contact California Citrus Mutua at 209-592-3790

March 25, 1 to 4:30 p.m. Kern County Spring Citrus Meeting, Cooperative Extension Office, 1031 S. Mt. Vernon Ave., Bakersfield. Clementine mandarins, windbreaks, California red scale, a nitrogen trial, cover crops, preemergent herbicide runoff, tristeza and more are on the agenda. No charge. PCA/PCO credit, refreshments and, as always, come as you are.

Does Applying All Of The Season's Nitrogen Early In The Season Promote Earlier Fruit Maturity?

Kern County has approximately 50,000 acres of citrus, most of which are navel oranges. The production of early navels is a competitive endeavor because orange growers receive a price premium in the market place for producing the first legally marketable orange of the season. How nitrogen (N) might be managed to encourage earlier development of color and an earlier acceptable solid/acid ratio is a question of interest to the grower.

Previous research by Dr. Embleton and others has shown that N may influence fruit quality characteristics of navel oranges and that leaf-N is indicative of the N-status of mature citrus trees. Total leaf -N in the range of 2.4 to 2.6 percent by weight on a dry matter basis is generally considered optimum and in this range should provide adequate yield, fruit size and quality. Generally, higher concentrations of leaf N are associated with higher yields, higher fruit numbers, a longer time to color break, lower solid/acid ratios and smaller fruit size. Thus the grower must balance applying enough N to the tree for

adequate yield, tree health and vigor, with the adverse quality effects and smaller average fruit size associated with higher N application rates.

An experiment was established near Arvin in March of 1996, and continued through the 1997 fall harvest. The soil of the site is a deep and gently sloping sandy loam which was planted to >Fisher= navel oranges on Carrizo rootstock in 1985. The trees are on a 22 ft between row and 19 ft between tree spacing. Each tree is irrigated by five 1 gal/h drip emitters spaced at intervals along a single hose.

The objective of the experiment was to determine, for equal seasonal N applications, if the timing of the last seasonal N fertigation promotes early fruit maturity or affects fruit size. The study consisted of four treatments, each consisting of one of four dates, approximately May 1, June 1, July 1, and August 1, by which time the total and equal seasonal allocation of N fertilizer had been applied to random plots in a commercial orchard. The number of fertigations used to apply the N were two for the May 1 termination date, three for June 1, four for July 1 and five for August 1. Again, however, the total seasonal application of N was the same for all treatments but the N applied during each fertigation was reduced accordingly as the number of fertigations increased.

The source of N was a liquid calcium ammonium nitrate (CAN-17) injected through the irrigation system. A total of 119 lbs/acre of actual N was applied in 1996 and 85 lbs/acre in 1997.

The percent total N in the leaf was approximately 2.6 in September of 1996 and 1997, and not significantly different among treatments. No differences were found among the four N-application termination dates and the following fruit characteristics sampled in October: soluble solid concentration, titratable acidity, the ratio of soluble solid concentration to titratable acidity, percent juice, fruit color (as measured with a Minolta colorimeter) or fruit diameter.

This study does <u>not</u> support the hypothesis that applying the total seasonal application of nitrogen early in the season results in earlier orange maturity or larger fruit size, at least for trees that have leaf-N in the optimum range.

I would like to express my appreciation to Mr. Ron Cosart and the Paramount mobile fruit testing laboratory and to Dr. Mary Lu Arpaia, UC Citrus Specialist, and her Fruit Quality Testing Lab at the Kearney Ag Center for analyzing fruit quality characteristics. I would, also, like to thank Mr. Cliff Trotter for his patience, work and advice and for making his orange grove available for the experiment and Mr. Rick Ramirez, UC Cooperative Extension, for his valuable help in operating and designing the injection equipment.

Fukumoto Bloods?

One grower of Fukumoto navels reports seeing red flesh inside some fruit. This variety never ceases to amaze and surprise.

Hang Onto Your Hat!

I was going to give the annual Kern County Defoliation Award to California red scale this year until a series of wind storms hit the southern part of the Valley. The worst hit trees were those suffering from *Colletotrichum*, a weak fungal pathogen of citrus which causes substantial defoliation and tip dieback. The wet weather appears to have flared this fungus, and the wind storms knocked the infected leaves to the ground in a hurry. Some trees in blocks south of Bakersfield, especially on the borders, are denuded. Even trees not affected by *Colletotrichum* have missing or shredded canopies. These blocks join those previously and effectively defoliated by red scale last season.

Colletotrichum can be controlled by fall sprays of copper sulfate and neutral coppers or with the recently registered benomyl. Check the latest edition of the Citrus Pest Management Guidelines for copper rates and/or the benomyl (Benlate7) supplemental label for details. If the leaves are healthy, the wind will have to blow harder to knock them off. Early navel growers may not need to control brown rot since the fruit is harvested early, but they may need to control *Colletotrichum* if it has been severe. With all of this rain a second copper treatment may have been advisable, assuming a course the ground was not too wet to spray. Even without treatment, with the advent of drier Kern County weather in the spring, the twig dieback and loss of leaves will stop. Fortunately, even if defoliation and tip dieback have been prevalent, trees will usually push new leaves, bloom, and produce fruit with no adverse effects in the spring. Interior pruning should be considered to remove the dead twigs and branches which provide an innoculum source for the disease. An early spring nitrogen application can replace some of the nitrogen normally stored in the leaves but lost as a result of excessive leaf loss.

Earlier this winter, and much more serious than the leaf loss, acres of the navel and valencia orange crop suffered substantial wind damage along Highway 166 in the Mettler-Maricopa area and along General Beale Rd. Some growers are planting wind breaks to slow the wind, and as more of the area is planted to perennial crops, the amount of sand and dirt in the wind is decreasing. However, the winter Santa Ana - like winds will remain a feature of this early orange growing area and a risk factor the grower will have to reckon with.

Metallized Reflective Mulch Did Not Apear To Promote Earlier Color

Metallized plastic reflective mulches have promoted increased coloring of apples and earlier maturity of a number of fruits, including grapes, plums and berries. In an effort to determine if these reflective mulches could move up color break of Fisher navels, a randomized complete-block experiment was established in a commercial grove southeast of Bakersfield. A strip of mulch 5-feet wide was run down the middles adjacent and under the skirts on both sides of four trees in the row. This procedure was repeated in two additional rows. Each of these treatments was separated by trees without mulch that acted as controls. The mulch was laid out October 7 and removed November 11. The

reflectivity of the mulch was decreased by the runoff from a Bordeaux spray which occurred about October 17. However, the reflectivity of the lime itself was high, and substantially more light was reflected upward from the lime and metallized mulch than in the bare ground plots. The weather in October was, generally, sunny. The Fishers were harvested in November. **No visual difference in time to color break or in general color development was observed between the plots with the reflective mulch and those without**.

California Red Scale Update

The California Citrus Quality Council (CCQC) submitted Emergency Exemption (Section 18) request to use Knack and/or Applaud for control of California red scale and yellow scale on citrus is undergoing California Department of Pesticide Regulation (CDPR) review. If accepted, the application package will be forwarded to U.S. EPA. The application package stressed that the California and U.S. EPA reviews must take place by April 15. Knack and Applaud in past tests in Kern County have resulted in more scale-free fruit if applied with the first push of crawlers in the spring. In Kern County, this push has occurred during the last week of April, for the past two years. In addition to CCQC, Sunkist and California Citrus Mutual representatives are monitoring the progress of this request through the process.

Citrus Thrips Damage Predictor

Dr. Heinrich Schweizer and Dr. Joe Morse, post-doctoral student and professor at UC Riverside have done some work correlating heat and chill units to the degree of thrips scarring at the Lindcove Experiment Station. In short, and statistically speaking, a cool early March in conjunction with a warm April means more thrips scarring.

Decollate Snails - Good Brown Snail Controller But Do They Eat Citrus Thrips Pupae?

Drs. Morse and Schweizer continue to report that the jury is still out on whether decollate scales eat enough citrus thrips pupae to make them a useful or adjunct thrips controller. Even if these snails are proven to eat a lot of pupae as they scavenge under the tree, migration of thrips from outside the grove may dilute their efforts. Decollate scales, however, have been proven controllers of the brown garden snail. For as yet unknown reasons, the establishment of decollate snails in a given orchard can be extremely fast or slow. The presence of large number of brown garden snails hastens establishment as does higher levels of organic matter under the trees, low skirts, an orchard that stays wet and by scattering a lot of decollates throughout the orchard in the initial establishment phase. However, the factors that influence rapid establishment of decollates, may not necessarily be the same as those that promote tree health and yield. Unfortunately, trying to establish

decollates while poisoning brown garden snails is not recommended because the baits are as attractive to the decollates as they are to the brown garden snail.

Boron Is High In Some Northern Kern County Citrus Trees

Many citrus trees in northern Kern County have high levels of boron in the leaf tissue. Citrus is sensitive to boron. Excessive levels of boron produce a yellowing of the tip of leaves with death of the tissue along the margins. Defoliation may become severe. Leaf symptoms are somewhat similar to those caused by excessive salt, or deficient potassium, so a leaf tissue analysis is important for delineating causes. Often excessive boron and sodium appear together.

I hesitate to discuss specific levels of boron that would be considered excessive in September-sampled spring-flush leaf tissue, because how the leaves are sampled can greatly influence the results. If leaves with severe symptoms are sampled, such as leaves that are mostly yellow with dead margins, concentrations of boron can reach into the thousands of parts per million. A truer picture of the boron status of the grove can be gained by avoiding pulling leaves with the worst symptoms. If orange leaves with slight yellowing or no symptoms are sampled, a leaf-tissue boron concentration greater than 350 ppm is probably cause for concern. Using this sampling technique, the highest levels of boron seen in this office from orange leaves is about 600 ppm from a particular calcareous piece of ground near Edison. High boron leaf tissue in northern Kern County routinely show levels of 300 plus ppm. Excessive defoliation does not usually begin until concentrations of approximately 400 ppm are reached. Trees at 400 ppm or higher will, generally, exhibit a thin-canopied, unthrifty appearance. The yield of the tree does not appear to be affected nearly as rapidly as the appearance of the canopy.

Recently, some extremely stunted young Chandler pummelos with obvious leaf symptoms and leaf loss were sampled and had levels of 400 ppm, while some neighboring Melogolds had levels of 350 ppm and showed only minor leaf symptoms. The cause of the severe stunting has not been determined, but the boron may be the culprit. Chandler pummelos may be more sensitive to boron than oranges. Chandler pummelos of roughly the same age, in a neighboring block had levels of 250 ppm and where growing well.

The frustrating thing about these high boron levels seen in this part of Kern County is that it is not clear where all the boron is coming from.

Soil sampling down to 5 feet, in foot increments, has not shown excessive boron in the soil in the groves tested, even when the leaf-tissue levels were very high. The possibility exists that a thin layer of clay, may harbor much higher concentrations of boron that are being diluted by sampling the soil one foot at time.

Generally, most of the growers are using surface water, which when tested, is low in boron. Most growers in the area, do have access to well water which can have moderate

levels of boron, and although it is not much used currently, was depended on during the drought years. The boron in the trees might date back to the irrigation water used during the drought. However, boron is not that easily leached in calcareous ground, and if it is in the trees, it should still be in the soil, and should show up in the soil analysis.

Pit gypsum can have varying quantities of boron in it. In making calculations based on some analyses of some of these materials laying around the office, my figures show that a ton of this gypsum may contain as much as 20 pounds of boron.

Most of the trees in northern Kern County are on Troyer or Carrizo rootstocks. It may be that these similar rootstocks tend to accumulate boron and promote a high boron level in the scion, even though the soil and water levels are relatively low.

There are actions the grower can take to reduce the amount of boron in the tree. First the source of the boron should be determined if possible. Soil testing should be done in small increments of depth, especially if the soils is highly layered, to determine if the soil is the source of the boron. If boron does test high in the soil, it may be leached by acidifying the soil with sulfur, phosacid, or other acidifying materials, in combination with sufficient water to leach the soil. Acidifying the soil and not supplying sufficient water to leach the boron from the root zone can compound the problem by making more boron readily available to the tree.

If boron levels are increasing in the leaf tissue, analyze the ditch water and the well water. Avoid using water with greater than 0.5 ppm boron for irrigation of citrus. Ditch water comes from diverse sources in Kern County and a lot of surface or ditch water may well have started out as well water. If boron is in the water even at slightly elevated levels, avoid spraying it directly on the trees when treating for insect pests or when applying foliar fertilizers. We apply fertilizers foliarly because of the quick uptake of dissolved minerals through the leaves. If boron is in the water, it will be absorbed quickly by the tree along with the potassium, zinc, manganese, nitrogen and whatever else.

If leaf-tissue boron is high and the water is not, check the foliar fertilizer blends being used. Often boron, is included in many micronutrient mixes because boron can be deficient in acid soils.

Actively growing, vigorous trees, may dilute the concentration of boron in the leaf tissue through the production of a thick canopy. Increasing the nitrogen fertilization rate can encourage vegetative production and enhance this effect, but too much nitrogen may be associated with adverse fruit quality characteristics like regreening of valencias, later maturity of early navels or higher yields of smaller fruit.

Citrus Peel Miner Update

In an earlier newsletter, I discussed the citrus peel miner's appearance in Kern County. At the time I did not realize that Dr. John Heraty, entomologist at UC/Riverside, has been investigating the peel miner in the Coachella Valley, through a grant from the Citrus Research Board. Whether the peel miner we have in Kern County is the same as the one down south is not clear, since we have not yet obtained a moth in good enough condition for a postive I.D.. In the Coachella Valley, the peel miner appears to prefer grapefruit among the citrus, while in Kern County it has been found only on oranges so far. Dr. Heraty explained to me that this pest has additional hosts other than oleander, such as cotton and tree tobacco, so removing oleanders adjacent to the affected grove may not be that effective. There is a good native wasp parasite (in the *Eulophid* family) in California of the citrus peel miner, which, by the way, has been shown to be effective against the citrus leaf miner, should this destructive pest ever reach this state.

So far, three PCA's, Bob Gaddy, Robert Walther, and David Blakslee, have brought in fruit or water sprouts showing the convulted mines. All of the material, I believe, has come from south of Highway 178 on the east side of the San Joaquin Valley.

Craig Kallsen
Citrus, Subtropical Horticulture, Pistachios