University of California Cooperative Extension

Kern Citrus and Subtropical Fruit

Kern County • 1031 S. Mt. Vernon Avenue • Bakersfield, CA 93307 • Telephone 661-868-6218

September 2003

Upcoming Meetings

- **1. Feedback for USDA's Risk Management Agency Insurance Program.** October 9 in the Large Conference Room, U.C. Cooperative Extension Office, 1031 S. Mt. Vernon Avenue, Bakersfield. (See announcement at the end of this newsletter).

- **2. GWSS research update, update on control efforts and new harvesting regulations.** Sponsored by UC Cooperative Extension, Citrus Research Board, Kern County Ag Commissioners Office and others. Sept. 29, 2003 in Large Conference Room, U.C. Cooperative Extension Office, 1031 S. Mt. Vernon Avenue, Bakersfield. (See announcement at the end of this newsletter).

Kern County Citrus Trees Looking Good!

I do not remember Kern County citrus trees every looking as good after a long, hot summer as they do now. The trees appear to put on one new leaf flush after another. Temperatures have been as hot as ever, but humidity has been higher, perhaps more closely matching the subtropical areas where citrus originated. I've also made a fewer farm calls related to tree health this summer. Hopefully, some of this beauty and healthiness will translate into higher profits at harvest.

Fruit set in Kern County is better than I would have predicted after the hot temperatures we experienced last May, especially on trees less than 15 years old although some older orchards dropped most of their fruit. In general, fruit numbers and distributions on the tree point to a good marketing year for many growers. Whether the delay in maturity that occurred for most fruit and nut crops in the San Joaquin Valley this year will hold true for the early navel and lemon harvests in October is yet to be seen.

How Good is Our Refrigerator?

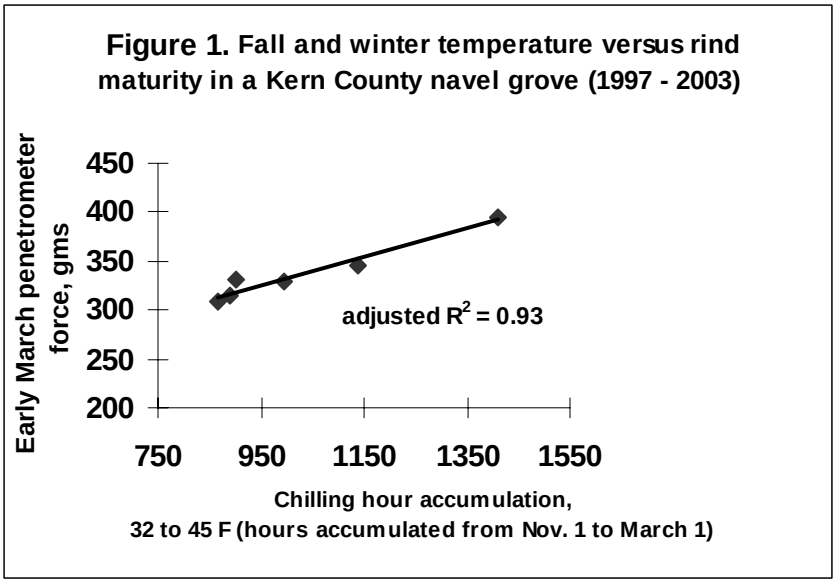
If fruit rinds mature more rapidly than anticipated or if the fruit falls from the tree prematurely, it is usually the application of growth regulators or the fertilization program that is blamed. In my March 1996 newsletter, in an article entitled, "How Good is Our Refrigerator?" I briefly discussed another factor that

allows citrus growers in the San Joaquin Valley to provide fresh fruit to the marketplace over an extended period of time. This factor, of course, is our cool (sometimes too cool) winter climate. The winter fog in the Central Valley is the great moderator of our fall and winter temperatures, which protects the fruit from freezing (assuming adequate cold drainage exists) and yet maintains temperatures at a sufficiently low level so as to reduce the rate of orange maturation. For those of you who did not keep this 1996 article for later referral, the gist of the article was that chilling hour accumulations vary widely from year to year, and this variability probably accounts for the differences we see from year to year in our ability to store or hold fruit on the tree.

I began making measurements in 1997 in an effort to quantify the relationship between chilling hour accumulations and aging of the navel orange rind. I would like to thank both Paramount Farming Company and Badger Farming Company for annually donating fruit from several blocks for this project. Chilling hours were accumulated from November 1 through March 1 as follows: the number of hours where the temperature stood between 32 º and 45 º F. were summed on daily basis to give a daily chilling hour accumulation, and the daily accumulations were summed over the period from November 1 through March 1. These blocks had a history of holding fruit well and all of the fruit in these blocks were treated annually with gibberellic acid and the isopropyl ester of 2,4-D. The fruit was sampled in early March and the rind was tested for the pressure required to penetrate it with a 1 mm diameter probe. The more force required to penetrate the rind, the more immature or younger the rind, and the longer the grower can hold it on the tree or the farther the packing house can ship it.

Since Kern County tends to produce early fruit, sometimes there was no fruit on the tree to sample in early March in some of the project orchards. Whether all of the data was there or not for every year, all of the blocks in the study showed a significant positive correlation between chilling hour accumulation and the force required to penetrate the rind, although the coefficients of the various equations varied depending upon the ability (and all of the unknown variables that entails) of a particular block to hold fruit. There was one exceptional block in northern Kern County where the trees held fruit very well and where the fruit was always held past March 1 (except in the freeze year, of course). In Figure 1, the highly significant functional relationship between chilling hours and the force required to penetrate the rind is displayed for this block. Generally, if only 225 grams/mm of force or less are required to penetrate the rind, the fruit is overly mature and will pack and ship poorly. As Figure 1 demonstrates, even in the year with the lowest chilling hour accumulations (about 850), the force required to penetrate the rind remained above 300 grams/mm. In a year with as many as 1400 chilling hours, the force required was 400 grams/mm, demonstrating a very immature rind, and an orange that has many more days of potential storage on the tree. It would appear, that for blocks of oranges that have historically held well that the chilling hour accumulation can be used as an additional source of information in determining the potential for late navel harvests. The more chilling hours accumulated between November 1 and March 1, the more likely that fruit can be stored on the tree into April and May.

Although the correlation between chilling hours and rind maturity was excellent, no correlation was found between chilling hour accumulation and the appearance of what I term “hard-rind puff and crease”. Unlike the inevitable soft-rind puff and crease that occurs in overly mature navels if you keep them on the tree long enough, puff and crease can occur early in the season in navels when the rind is still relatively hard and immature. In some years this early season puff and crease can occur across the industry in the San Joaquin Valley and the reason for its appearance is still largely unknown, but appears to be related to differences in the growth rate of the inner and outer rind at some stage of the young fruit’s development.



Notes on Applying Gibberellic Acid to Navels

Note 1

Dr. Coggins, emeritus professor and long-time citrus researcher at UC Riverside, reconfirmed in the late 1990's that the late September to mid- October application window, is the best time to apply gibberellic acid to navels in the San Joaquin Valley for reducing puff and crease, rind staining, and, generally, for maintaining a more juvenile rind longer. Applying the gibberellic acid two-weeks before color break still remains a handy rule-of-thumb. Color break in mid-season navels (like Washington, Frost Nucellar, Atwood and others) usually occurs about two weeks after color break in the early navels (like Beck and Fukumoto). Dr. Coggins' work showed the gibberellic acid was significantly more effective when a nonionic silicon-based surfactant was included with the spray as an adjuvant. Note that the addition of an effective surfactant can increase the chance and/or severity of significant leaf drop. Always follow the surfactant's label carefully and make note of any cautionary statements regarding phytotoxicity.

Note 2

Uptake of gibberellic acid by the peel is improved if the spray solution is acidic. A pH of the spray solution of about 4 to 5 is recommended and several acidifying agents and products are available to accomplish this. In general, tank mixing other pesticides or nutrient solutions with gibberellic acid should be avoided.

Note 3

Growers achieve good results using the label recommended rates of gibberellic acid per acre using concentrated or dilute sprays. Which ever route the grower goes, good coverage is essential and good coverage is most likely to occur with higher gallonage. Most of the beneficial results of gibberellic acid are probably obtained with about 25 grams of gibberellic acid per acre.

Note 4

Every year at least one navel grower in Kern County reports a significant drop of fruit and leaves as a result of a gibberellic acid spray. Usually the gibberellic acid was sprayed within a week of two of a narrow-range oil spray. There appears to be a connection here, but gibberellic acid and oil have been sprayed a few days apart or even from the same tank with no ill effects. If possible, avoid spraying petroleum oils and gibberellic acid within a few days of each other. Make sure when applying either gibberellic acid or oil that the trees are not under water stress and that gibberellic acid or oil are not applied to trees that show

phytotoxic affects from either a previous oil or gibberellic acid spray. The addition of an effective spreader may increase the risk of leaf drop with gibberellic acid. Monitor soil-water carefully in the fall before gibberellic acid or oil is applied. The temptation is to reduce irrigation too much in response to the first light rains of fall. Often these rains, especially in Kern County, will not meet the water requirements of the citrus, especially on the hilltops leaving the trees susceptible to damage from chemical spray applications.

Note 5

Gibberellic acid works best on blocks of fruit that normally hold well on the tree. The best strategy is to harvest blocks that are prone to early rind breakdown early and to treat only blocks where the fruit holds longer with gibberellic acid. Applying gibberellic acid to a block with poor fruit-holding qualities may extend the life of the fruit a few weeks, while gibbing the fruit of a good-holding block may give the grower an additional six to eight weeks of tree storage. Treating with an auxin (an isopropyl ester of 2,4-D is registered for this purpose) in November or early December is necessary if fruit is treated with gibberellic acid. The auxin prevents the fruit from dropping. There is no point in delaying the maturation of the rind with gibberellic acid into May if the navel is going to drop from the tree in February.

Note 6.

Sometime fruit does not grow as quickly as a grower would like, and a block that was scheduled for an early or mid-season harvest may be rescheduled for a late season harvest. Gibberellic acid applications can still delay harvest (although not for as long a period of time) if treated later than October. Do not apply gibberellic acid to fruit that is in the process of changing color. A two-tone fruit may result. Wait until the fruit has turned completely orange and then apply the gibb. Check the label for application timing. Gibberellic acid can negatively affect next year's crop if applied too late.

Note 7.

Gibberellic acid and an isopropyl ester of 2,4-D can also be applied to some other citrus fruit in Kern County with good results. Read and follow the labels carefully when applying the commercially available plant growth regulators for crop registrations, uses, timings, rates, cautions and other necessary information that will vary with citrus variety. Puff and crease and rind staining of Minneola tangelo, lemons, and some mandarins is reduced and fruit storage on the tree is extended by the use of these growth regulators. The timing of application is similar to that of navels in most cases.

Fall Sampling of Leaves

Leaf tissue samples should be taken in September or October from non-terminal leaves that developed during the spring flush on non-bearing branches. Make sure the leaves that are samples are spring flush leaves. In nitrogen deficient blocks, the spring flush leaves may no longer be present as a result of resorption of the nitrogen from the leaf prior to an early drop. Sampling younger leaves will yield results overestimating the amount of nitrogen storage in the tree.

The sample should include the average-looking leaves from all quadrants of the trees. The temptation, in blocks that do not look good, is to take the worst looking leaves. However, the tree has resorbed most of the nutrients from these worst looking leaves in preparation for dropping them, and information derived from these leaves is usually meaningless for deficiency situations. If a nutritional deficiency or excess is present, it will show up in the average leaf of the orchard. Growers of early navels that are not normally treated with copper as a fungicide should include this element as one of the nutrients to be included in the leaf analysis. Copper deficiency is a real possibility on trees of early maturing fruit that are not treated with fungicides and growing in some of the sandy soils in Kern County.

Fukumoto Navels and Alkaline Soils

An increasing amount of observational evidence suggests that Fukumoto navels on Carrizo, C35 and Trifoliate rootstocks are less tolerant of high pH soils than are Washington navels and many other citrus varieties on these same rootstocks. In several locations where soil pH was tested, Fukumoto trees on trifoliate or citrange rootstocks were dying in areas of high pH (values in the top two feet at 7.8 or higher) where Washington navel trees looked good. Lowering soil pH is advisable anyway for all citrus when pH levels rise to 8.0 or greater. For Fukumoto navel on Carrizo, lowering soil pH to 7.5 or below can reduce yellowing and improve tree growth. For Fukumoto on C35 and trifoliate rootstocks, soil pH should be 7.0 or lower. Alkalinity can be reduced with applications of soil sulfur, sulfuric acid, phosphoric acid, acid-forming fertilizers and by other means. The effectiveness of methods of lowering pH can vary widely with the acidifying agent, soil chemistry and conditions and application procedures. Injection of acidic materials can result in personal injury; crop damage; and damage to equipment, valves, pumps and irrigation pipe. For best results consult with someone with expertise and experience in lowering soil pH.

Foliar fertilizer sprays containing iron, copper, magnesium, manganese and zinc can improve the appearance of Fukumoto trees on alkaline soil, but the negative effect on growth in alkaline soils appears to be more than just micronutrient deficiency.

California Red Scale and Citrus Peelminer

Widespread use of soil-applied water-injected imidacloprid (Admire®) for control of glassywinged sharpshooter over the past few years, has probably suppressed California red scale in southern Kern County orchards. However, there is no room for complacency with this pest, especially with regard to some blocks that have not been treated with imidacloprid, or other anti red scale chemicals or measures (such as *Aphytis* wasps) for one or more years. California red scale populations can build quickly, especially, when heat units accumulate as rapidly as they have in July, August and September of this year. Some pest control advisors reported large numbers of males in third flight traps and continued high catches. Male catches in fourth flight traps can predict the need for possible treatments in June and July of next year when the crawler populations can be more accurately targeted.

Citrus Peelminer activity appears low again in Kern County this season, but like California red scale, populations can build rapidly. September and October are prime months for this pest to damage significant quantities of fruit, especially grapefruit and pummelos, so growers are not home free yet. Fruit close to or touching the ground are frequently the first to become mined. Unfortunately, the best defense against this pest is to hope that it does not show up, because there appears to be little for the grower to use either chemically or culturally to gain control. Not having a suggestion for the control of this pest is bad enough, but it is particularly galling when it strikes in your own backyard. After two years of being citrus peelminer free, I find that a navel orange tree and several other plants in a corner of my own backyard have become infested in the past week. I am actively hoping that that the infestation will just away.

The following articles were contributed by David Haviland, Entomology Farm Advisor/ Kern County and Dr. Beth Grafton-Cardwell, Entomology Specialist/Kearney Ag Center and UC/Riverside.

Cottony cushion scale and application timing of Admire and Assail for Sharpshooter Control.

David Haviland, UCCE Entomology Advisor-Kern Co. (office phone 661-868-6215)
and Beth Grafton-Cardwell, UCCE Entomology Specialist- Kearney Ag. Center

Prior to the introduction of vedalia beetle into California in 1888, cottony cushion scale was a devastating pest of citrus. Now, serious problems with cottony cushion scale generally occur only when new

broad-spectrum insecticides, such as pyrethroids, insect growth regulators and neonicotinoids are used for one or more citrus pests, disrupting the highly effective vedalia beetle. The severity of the disruption depends on the timing of when they are used, the rate and application method, and the number of applications per season.

Laboratory and field studies have shown that neonicotinoid insecticides, including Admire®, Assail®, and Provado®, are toxic to vedalia beetles. Mortality occurs when foliar applications come in contact with the beetle, or when larvae or adults feed on cottony cushion scale that has ingested one of these insecticides from a systemically or foliarly treated tree. Since cottony cushion scale is not susceptible and vedalia beetles are highly susceptible to these insecticides, growers should not use these insecticides where they have a cottony cushion scale population.

The optimal application timing of Admire to control the glassy-winged sharpshooter in citrus is just prior to bloom (late March). The next best option is just after petal fall (late April, early May). Bloom-time applications would also be effective, but are restricted due to bee toxicity. Applications during this pre- and post-bloom period have consistently resulted in good uptake of the active ingredient (imidacloprid), resulting in lethal concentrations throughout the tree in 4-6 weeks. Applications applied more than a week or two before bloom are less effective because the roots are not active.

In areas where cottony cushion scale is a concern, Admire applications should be postponed until after petal fall. This application timing (late April or early May application plus 4-6 weeks for uptake) will allow time for vedalia beetle to grow and develop during the March to May period when it naturally cleans up scale. Mortality to vedalia after this period is less of a concern as their populations naturally disperse or decline in the summer heat.

Monitoring for cottony cushion scale in the spring is recommended prior to setting an application date for Admire. To monitor, check 20 trees per every 10 acres for the presence or absence of live cottony cushion scale. If more than 5% of the trees have live scale, delay Admire applications until after petal fall.

Assail, with its active ingredient acetamiprid, is also effective against glassy-winged sharpshooter. This treatment is the most effective option for growers on furrow or flood irrigation because it is difficult to get adequate uptake of Admire into trees in this type of irrigation system. As with Admire, applications of this material to fields with heavy populations of cottony cushion scale should be delayed until after vedalia beetle has finished feeding on cottony cushion scale (early June).

Provado is the foliar form of imidacloprid. It is effective against citricola scale and glassy-winged sharpshooter, but because it has been shown to cause flare-ups of red scale, it is not recommended for use in citrus.

Admire is the preferred treatment of glassy-winged sharpshooter in citrus because it is long lasting (5-6 months) and more selective, allowing most natural enemies to survive with the exception of vedalia beetle. An added benefit of Admire is that it can provide suppression of red scale and citricola scale. Assail is shorter lived (2 months) and may be more disruptive of natural enemies because it is applied to the foliage. It is somewhat more effective in controlling citricola scale than Admire. We are in the process of studying the impact of Assail on red scale and natural enemies in large field plots.

By following these recommendations, growers can successfully integrate Admire and Assail applications into their integrated pest management programs without severely disrupting the benefits of their biological control organisms.

Wooly Whitefly makes a showing in the lower SJV

By David Haviland

The wooly whitefly, *Aleurothrixus floccosus*, is a common pest of coastal citrus, but is rarely noticed in the lower San Joaquin Valley. It is considered to be under complete biological control throughout the state, except in desert regions where hot weather disrupts its natural enemies.

This year, multiple samples of this pest from Kern County were brought to the farm advisors for identification. Adults look similar to other whiteflies, but have no marks on their white wings. Immature stages are attached to the leaves and are covered with long, thin, curly white wax filaments, thus resulting in the term 'woolly' whitefly. Both larvae and adults can damage trees by sucking phloem juices and through the large amount of sticky 'honeydew' they secrete on leaves and fruit.

In most years, wooly whitefly is under good biological control in the Central Valley. The primary parasite, a tiny wasp called *Amitus spiniferus*, lays an egg into a small whitefly nymph. After hatching, the larval parasite develops by consuming the immature whitefly, leaving behind the black pupal skeleton of what was a developing whitefly.

Growers in the SJV should not be concerned about this pest, as biological control parasites should do their job. So far, populations have appeared to be isolated to leaves from the summer flush, and have not been sufficient to cause yellowing of the leaves. As long as the whiteflies are not well protected by ants, parasites should control them sufficiently until cool temperatures in the fall cause their populations to crash.

Meeting Announcements

Glassy-winged Sharpshooter Meeting.

Update, outlook, and general discussion for citrus growers and packers. Presentation of the Compliance Agreements and Area-Wide Management Program for the 2003-2004 season, and a facilitated open discussion on the impacts of treatments on citrus pest management practices.

Hosted by the Citrus Research Board
Co-sponsored by County Agricultural Commissioners, CDFA, USDA,
UC Cooperative Extension, and California Citrus Mutual

Agenda: 9:00 A.M. – 12:00 P.M. at all locations (PCA credit pending)

Regulatory Procedures for 2003-2004
Report from CDFA representatives and County Ag Commissioner

Area-Wide Treatment Programs
Report from USDA representatives

Discussion
Q&A and feedback from growers

Monday, September 29 – Bakersfield
Kern County Ag Commissioner/UCCE Conference Room
1031 S. Mt. Vernon Avenue
Bakersfield, CA

Tuesday, September 30 – Exeter
Exeter Veterans Memorial Building
324 N. Kaweah Avenue
Exeter, CA

Chance For Input On U.S.D.A. Ag Risk Management Agency

In an effort to obtain feedback from producers, insurance personnel and other interested parties regarding the current Citrus Dollar Plan Pilot Insurance Program, AgriLogic, Inc., on behalf of USDA's Risk Management Agency, will be holding listening sessions in Kern County. This pilot program has been offered to navel orange producers since 2001. The purpose of these meetings is to gain input that will result in a recommendation to (1) terminate the program, (2) modify the program, or (3) make the program permanent. The future of this risk management product depends heavily on the suggestions, complaints, and/or opinions voiced during the meetings; therefore, it is imperative that you attend.

The meeting for producers will be held from 8 a.m. – 10 a.m. A second meeting for the insurance industry (agents and adjusters), crop association representatives, University and Extension personnel, and all other interested parties will be held from 10 a.m. – 12 p.m.

The scheduled date and location for the meetings is listed below:

October 9, Bakersfield
Bakersfield Ag Extension Office, UCCE Large Conference Room, 1031 S. Mt. Vernon Ave.

Refreshments will be served. To R.S.V.P., please call toll-free **877-245-6442 ext. 8130** or respond by e-mail to npitts@agrilogic.com.

Craig Kallsen, Citrus, Subtropical Horticulture, Pistachios Advisor