Topics in Subtropics Newsletter

University of California Cooperative Extension

Fresno, Kern, Madera, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare, & Ventura Counties

News from the Subtropical Tree Crop Farm Advisors in California

Volume 5, No. 2
April-June 2007

Editor's Note:

Please let us know if your mailing address has changed, or you would like to add someone else to the mailing list. Call or e-mail the farm advisor in the county where you live. Phone numbers and e-mail addresses can be found in the right column.

Please also let us know if there are specific topics that you would like addressed in subtropical crop production. Copies of Topics in Subtropics may also be downloaded from the county Cooperative Extension websites of the Farm Advisors listed.

Gary Bender
Editor of this issue

Special Announcements

Final Farm Water Quality Planning Course for Orchards
Goleta, CA from August 8-10, 2007
Registration: http://ucanr.org/registration or
contact Julie Fallon at (805) 788-2321

Avocado Growers Tour in Ventura County. All avocado growers in California are invited! No Charge and no R.S.V.P. required....just be there on time! We'll gather at Faulkner Farm (14292 W Telegraph Rd., Santa Paula) at 1:00 pm and then head out to 4 or 5 stops – pruning, organic, high density, pollinizers, and new varieties. Ben Faber thinks we will break people into 4 groups and they would go to different stops and then rotate around to all of the stops.

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causes may vary from site to site since there are many factors that can potentially limit lychee flowering and fruit set.

We have noted that some trees of some cultivars are particularly productive and more consistent from year to year. The cultivars of lychee and longan are all a result of vegetative propagation and it is not unreasonable that they may not be completely uniform genetically. There is the possibility that over time there has been inadvertent selection by nurseries for plants that propagate readily rather than more productive plants. In areas of China and other countries where lychee and longan are extensively grown, emphasis is on the most productive trees for propagation. Commercial nurseries on the other hand often emphasize the more vigorous vegetative trees for propagation and this may affect the flowering and fruit by those trees.

Experience from Hawaii over the 20-25 years that they have attempted lychee fruit production indicates:

1) they needed to develop their own cultivar – in this case, Kaimana, - that produced best in Hawaiian condition;
2) they are still limited in some areas because of lack of chill hours; and
3) consistent fruit production even by Kaimana requires a regime of specific cultural practices to promote consistent fruit production.

Dr Francis Zee, of the USDA Clonal Germplasm Lab at eh Pacific Basin Agricultural Center in Hilo, HI reviewed some of the critical cultural practices for lychee production in Hawaii at the annual meeting of the Hawaiian Tropical Fruit Growers in October, 2006. Francis emphasized the need to synchronize vegetative "flushing" growth to condition the tree for flowering. This conditioning comes from pruning, controlling nutrients, and a period of water stress by restricted irrigation. Francis stated that only a "mature" leaf flush is receptive to the cold induction necessary for flowering. It is also important to severely restrict soil nitrogen to restrict excessive vegetative flushing during the winter cold induction period. He emphasized using foliar nutrient application to keep leaves healthy but limit overall nutrient uptake.

Francis knows California and feels that similar cultural practices should work also in California. He feels our cooler winter night temperatures should improve lychee production once the other conditions are also satisfied. It is important to remember that lychees are native to an area in China that is characterized by warm, humid summers and cold, dry winters. These are markedly different from those in California where our dry summers and wet winters confound flowering and fruit production. We need to isolate the critical factors for lychee fruiting and manipulate cultural practices to provide those conditions.

Dr. Zees's recommendations for lychee management are the following:

- Selecting the best variety for the climate is an important first step.
- Only mature shoots respond to cold induction. Flower induction occurs during cool dry weather on buds from mature leaf flushes with low nitrogen content. The order of importance is: low temp > N > water stress.
- Shoots need to be a healthy size for good flowering and fruiting-about 8-10 inches long with a minimum girth of 3/8 in. Smaller shoots are not productive.
- Low nitrogen is important for flowering. High potassium is beneficial.
- Using foliar fertilizer avoids the problem of residual N in soil that may be released at the wrong time.

The idea is to induce a synchronized vegetative flush after harvest which will mature in time for cold induction and result in terminal shoots with optimal characteristics for flower and fruit production. This is achieved through pruning along with nutrient and water management.

The specific recommendations for Hawaii are:

1. Prune all shoots 8-12 inches from the tip at harvest.
2. Apply foliar fertilizer immediately after pruning. (See the recommended composition below.)
3. Let leaves mature. They need to mature in time for cold weather.
4. Withhold fertilizer until young fruit is pea size, then apply a high K fertilizer such as Banana Super (10-5-40). This can be applied to the soil.
5. Maintain even moisture through fruit sizing.

The recommended foliar fertilizer in 100 gallons of water is the following:

- 3 lbs 20-20-20 plus micros
- 1 quart soluble B, Ca solution
- ½ quart liquid iron

Apply this mix thoroughly to the tree canopy approximately 3 gallons per tree.

Lychees overall are slow growing and more difficult to establish compared to longan (and many other subtropical fruits). Six to eight years are required for lychee to reach the first production. Thus far, most lychees are propagated by air layers (marcots) in California and this creates special root architecture with primarily a weak, fibrous root system concentrated at the surface. Lychee plants should be pruned aggressively to keep the height below about 12 ft. (4m) to facilitate harvest.

Trials are currently underway to evaluate these cultural practices on lychee flowering and fruit set in California.

Longan Status

Longans overall are easier to establish, more vigorous, and more resilient than lychees. Longans flower more vigorously and consistently than lychees but still suffer from problems with fruit retention. They also tend to be alternate bearing. Some of the alternate bearing characteristic is likely tied to their longer fruiting cycle in cool California coastal conditions. The fruit matures relatively late and there is limited time for pruning and synchronizing the flush.

Longans have produced commercial quantities and quality of fruit on multiple sites but thus far the fruiting has been in alternate years. Much of the field trial work needed with longans is related to how to manipulate cultural practices to improve flowering and especially fruit retention. It would also be valuable to determine if there is a pruning or other cultural practices to advance flowering following harvest late in the year. This would allow time for the plant to flower and fruit again the following season. There are fruit retention spray materials and other hormonal materials that are being evaluated with longans and these may offer some promise also.

Loopers in Avocados-A Note from San Diego County

Gary Bender

Is this the Year for Loopers in Avocados?
Those of us who remember the looper problems in the avocado groves in the late 1980's also recall the freezes that occurred in late 1987, 1988 and 1990. What's the connection? It's the spiders of course!! (Well, at least that's my theory). Freezes seem to kill the spider populations in our groves, and spiders are one of our main biological control systems for catching looper moths and larvae. We learned to appreciate the contribution of spiders one year when we were shaking out branches to catch and count looper worms on large cardboard trays. We could often shake out a spider onto the tray and the spider would run around and eat our data before we could get a count. (We finally gave up counting, but we realized that, as the weather was warming and spiders were re-appearing, spiders were contributing significantly to natural control of loopers). This year we had quite a freeze, and sure enough, heavy looper damage is showing up in some groves in San Diego County.

Do you have loopers?
Yes, every grove has loopers. They eat holes in the leaves and you can always find a few leaves with holes. As noted, they are normally kept under biological control, not only by spiders but also by tiny wasps that lay their eggs into the looper eggs. You can purchase these wasps (*Trichogramma platneri)* as eggs glued to strips of cardboard. These can be cut up and hung in trees, but they need to be protected from ants. Trials have shown that releases of *T. platneri* at 100,000 parasites/acre/season during spring and early summer (after peak moth flights) will help to control loopers. If you see a lot of damage and the looper eggs have already hatched, but the looper worms are small, you may want to spray the grove with a microbial insecticide known as B.T. Do not spray malathion as this will kill beneficials for all of the other pests.

Finding parasites and traps.
Simply do a search on the internet for "Trichogramma platneri" and "omnivorous looper traps" and you will find several places to purchase your materials.

More questions?
The website http://www.ipm.ucdavis.edu (go to agriculture, go to avocado, go to omnivorous looper) will give you more details.
Finding loopers?
Do what I do….go into an area with a lot of holes in the leaves, shake branches and leaves out onto a large piece of cardboard. If 5-10 loopers fall out, consider treatment. Be careful! They will also fall out into your hair, down your shirt and I've even had one crawl into my ear. Yikes!

The 2007 Citrus Tristeza Virus Situation at the University of California Lindcove Research and Extension Center

Beth Grafton-Cardwell

What is citrus tristeza virus and how is it moved between trees?

Worldwide, citrus tristeza virus (CTV), is the most destructive virus disease of citrus. Some strains of CTV cause very mild symptoms that are not visible to the grower. Other strains cause decline and death of the tree if it is grafted on to susceptible sour orange rootstock, or pitting of the branches and trunks if the scion is grafted on to tolerant rootstock. The infected tree can not be cured of the disease and the only method available to stop the disease is tree removal. The disease can be spread through grafting of infected plant tissue or it can be acquired during feeding by aphids and transmitted (vectored) to new trees. Several species of aphids are known to transmit the virus in California, these include the cotton/melon aphid (*Aphis gossypii*), the spirea aphid (*Aphis spirea*), and the black citrus aphid (*Toxoptera aurantii*). The virus is nonpersistent, which means that the aphid carries it in its system for only a short period of time. Aphid success in transmitting the virus is affected by the level (titer) of virus in the tree that they acquire the virus from, the number of aphids picking up the virus and flying to neighboring trees, the receptivity of the tree they land on (availability of tender flush) and the type (isolate) of the virus. The species of aphids currently found in California are not very efficient in moving the virus. In other regions of the US and around the world, the brown citrus aphid (*Toxoptera citricida*) is the primary vector. Brown citrus aphid is a more efficient vector of the disease (transmits it at a higher rate) than the other aphids. Even more importantly, when brown citrus aphid arrives in a new region, it causes the virus to become more severe. Prior to 1995, Florida did not have stem pitting strains of CTV or the brown citrus aphid. Now that the brown citrus aphid has established, Florida growers are finding severe strains of CTV that affect tree growth, fruit size, and yield. While brown citrus aphid is not currently found in California, it is found in Hawaii, Mexico, and Florida and so it is likely to arrive in the future. If California citrus growers can suppress the disease to very low levels, then when the brown citrus aphid arrives, it will have less effect on the industry.

CTV in the San Joaquin Valley

The citrus growing region of the San Joaquin Valley of California is divided into 5 pest control districts. These districts were originally formed to eradicate California red scale, but activities shifted to CTV detection and tree removal during the 1960s. The growers in these districts pay a per 100 tree assessment to support the activities of the Central California Tristeza Eradication Agency (CCTEA) who collect leaves from the orchards, conducts the CTV testing using a laboratory test called ELISA and removes the CTV-infected trees. In the mid 1990s, citrus growers in two of the five pest control districts (W. Fresno and Tulare) voted to halt tree removal activities. For W. Fresno, the decision was based on very low incidence of virus and the growers have elected to have the CCTEA test only new citrus plantings. For the Tulare County Pest Control District, the incidence of the virus was high (1.7% district-wide with some orchards exceeding 10% infection rates). Growers felt that the symptoms caused by the mild strain of the virus did not warrant tree removal and voted to end detection and tree removal activities in their district. The remaining pest control districts (Kern, S. Tulare and Central Valley) continue to remove trees and have suppressed the disease to $\leq$ 0.1% of trees per orchard.

Lindcove Research and Extension Center (LREC)

The University of California Lindcove Research and Extension Center (LREC) is the location of the foundation block of the Citrus Clonal Protection Program (CCPP) that provides disease-free budwood to nurserymen throughout the state of California. The nurserymen use CCPP budwood to produce registered ‘mother’ trees and/or increase trees that provide the buds to create the field trees sold to growers. The scion material (fruiting portion) of all trees in California are required to come from registered trees that are periodically tested to ensure that they are disease-free. The rootstocks are grown from seed that is also disease free. In this way, Californian growers have minimized diseases and maximized yield and fruit quality. LREC is also the location of more than 30 research projects on 125 acres conducted by researchers from UC Riverside, UC Davis, the USDA and farm advisors from the Extension offices. A number of the projects study how well new varieties of navel, Valencia and mandarin strains perform on various rootstocks under San Joaquin Valley weather conditions. Other projects study the effects of preharvest pesticides on nematodes, insects, mites and post harvest treatments for diseases. All of the research projects require protection from diseases that may influence the results of the tests. These studies are supported in large part by grant funds from the California Citrus Research Board.

CTV incidence at LREC

The University of California Lindcove Research and Extension Center (LREC) is located in the northeastern corner of the Tulare Pest Control District, where tree removal has not taken place since the mid-1990s. Trees in the LREC research plots have been tested on a yearly basis and trees in the CCPP foundation area have been tested multiple times per year for CTV. Immediate tree removal of CTV-infected trees occurs upon detection in an effort to eliminate the disease at LREC. During the period of 1992-2005 there were no CTV-infected trees detected in the foundation block and the number of CTV-infected trees in research plots averaged 3 trees for the entire research center per year. During 2006, 2 infected trees were found in the CCPP foundation area signifying a breakdown of protection of that area. Budwood was not released from the foundation trees during the June period following those detections to ensure that nurserymen did not receive CTV-infected budwood. During May 2007, testing of the LREC trees indicated that the incidence of CTV-infected trees had climbed steeply: 46 infected trees were found in the research plots and 4 infected trees in the foundation area. Thus, more total CTV-infected trees were found at LREC during 2007 (50 infected trees) than in all the previous years that testing had been completed (43 infected trees removed during 1990-2006). In 2007, it became clear that the lack of CTV-infected tree removal in the commercial orchards surrounding the research center had resulted in an epidemic at the center.

How CTV has affected budwood release and research programs at LREC

This epidemic has two consequences. First, the detection of CTV in the foundation area prevents budwood from being released from these trees to the nursery industry until the trees can be retested over a period of time (one or two high virus titer periods) and shown to be free of disease (see the CCPP website for updates). The important varieties of citrus are also grown within a screenhouse at LREC that protects them from aphids, however, only small amounts of budwood are produced by these trees because they are young and shaded. Thus, nurserymen will be receiving fewer buds than they typically get from the CCPP program. In addition, trees grown in the screenhouse rarely produce fruit and so it is difficult to determine if the trees are true-to-type or have fruit quality typical of that variety. Secondly, research programs are being heavily affected by the high incidence of CTV infection. If a research block loses a tree now and then, research is not heavily impacted. However three of the blocks had significant numbers of infected trees: 5, 9, and 21 trees. When 5 to 21 trees are removed from a 200 tree research plot, research is affected because replicates of the experiments are eliminated. The trend appears to be a higher number of infected trees in young blocks, and this makes sense, because young trees with lots of flush are very attractive to aphids. It is highly likely that there are CTV-infected trees nearby tree removals that do not have sufficient virus titer this year to be detected. We can expect to find additional infected trees next year in the research blocks. Thus, the research program at LREC is compromised due to heavy CTV infection.

How can LREC be protected from CTV?

The only long-term solution to protect the research plots and the CCPP foundation plant material from CTV infection is to lower the incidence of CTV in the neighboring orchards. Because the Tulare County Pest Control District growers voted against tree removal, clean up of CTV infection is completely voluntary at this time. An initial survey of 25% of the trees (in groups of 4 trees per test) in the commercial orchards in a 0.5 mile radius around LREC was completed in late May-early June of 2007. Based on the survey results, 1.2% of trees are estimated to be infected with CTV. While the incidence of CTV in these groves bordering LREC has increased compared to the last survey in 1998 (0.14% infection rate), it is still at a level that is manageable with a concerted effort of tree removal. Data from this survey will be used to estimate resources needed to do a more intensive survey (single trees) followed by tree removal later this year or next year and to provide growers with tree removal compensation. Resolution of the problem will require funding from a number of sources and the area will need to be surveyed and trees removed for a number of years. The citrus growers, citrus pest control districts, nursery industry, Citrus Research Board, CCPP program, and state and local authorities are working together to solve the problem. These organizations unanimously agree that Lindcove Research and Extension Center is a precious resource for the California citrus industry whose integrity must be preserved.

Dr. Beth Grafton-Cardwell

Errata

We wish to thank reader (and grower) John Feyk for helping us to correct some math errors in the original article published in the January –March (2007) issue of "Topics in Subtropics". Here is a corrected version of that article with the corrected sentences in bold font. (G.S. Bender editor).

Honey Bees in California

By Eric C. Mussen
Extension Apiculturist, UC Davis

Honey bees (*Apis mellifera*) were imported into what is now the United States in 1622. Beekeepers were able to transport colonies of honey bees into San Jose in 1853 and moved them to some of the best honey producing locations in the country, in southern California, about 16 years later. As the acreage of citrus expanded in California, following their introduction in 1873, beekeepers located apiaries near citrus groves to provide sustenance for the bees and, on a good year, obtain a crop of premium "orange blossom" honey.

Recorded numbers of colonies kept by US beekeepers eventually reached a peak of about 5 million during WWII, then steadily declined to the current USDA figure of about 2.4 million honey producing colonies, of which 500,000 (21%) are resident in California. Not all commercial colonies are used for honey production, so the number is an underestimate. Also, there are many feral colonies, living on their own, throughout the country.

During the period from October to early or mid-May, an additional 800,000 or so colonies are brought to California (total 1.3 million) from at least 35 other states to meet the almond industry's demand for pollinators. As demand for additional honey bee colonies increases with the expanding almond acreage, many more colonies will be placed near citrus. This will occur because the conditions at the point of origin of many imported colonies are inappropriate for immediate return.

The diet of bees consists of water, nectar and pollen. While gathering pollen, bees pollinate flowers. Worker honey bees forage for those foods over distances exceeding four miles from the hive location. If food is abundant, most honey bees will forage within three-quarters of a mile from the hive. From early spring to early fall, each honey bee colony requires an acre equivalent of blossoms to meet the daily needs of the colony. If more blossoms are available, extra nectar is collected, processed, and stored as honey.

The two most critical times of the year for brood rearing are in the spring and late summer/fall. In the spring, colonies have to build back to full sized populations from their smallest seasonal size during the preceding winter. The colonies require access to large amounts of pollens and nectar to provide food to the queen that may be laying up to 2,000 eggs every day. Three days later, those eggs hatch into a similar number of larvae that require continuous feeding for the next six days, before they pupate in capped cells. This is a daily routine, so nearly 12,000 larvae are demanding feed generated from pollens, every day. Locations providing abundant early bee food sources for 1.3 million colonies are not plentiful in California.

For decades California beekeepers have relocated between 250,000 and 350,000 colonies within flight range of citrus plantings to ensure the development of their colonies to a strength that will allow the bees to survive and build up to be available for pollinating more than 50 additional crops during the rest of the summer season, survive the winter, and provide almond pollination the next spring. The colonies not located near citrus are moved to limited, non-agricultural areas where wildflowers may be abundant enough to support the growth of colony populations, if adequate rains and permissible flight conditions occur. Beekeepers have to be careful not to choose apiary locations where plants poisonous to honey bees are in bloom: California buckeye (*Aesculus californica*), cornlily (*Ixia campanulata*), death camas (*Zigadenus elegans*) and locoweeds (*Astragalus* spp.). The current 500,000 colonies are at the carrying capacity of California for commercial beekeeping. All readily accessible, not too distant, apiary locations are inhabited by honey bee colonies, each year. The influx of extra honey bees for almond pollination simply reduces the food for each colony through competition, if beekeepers locate extra colonies near historic apiary locations of resident beekeepers.

With a four mile foraging radius around each hive, honey bees from a single colony may be foraging anywhere in a 50 square mile area. California has a land mass of 156,537 square miles. If each of California's 500,000 commercial colonies were separated by eight miles, with no foraging overlap, they would require 25.13 million square miles of space, which is 160 times greater than the land mass of California. The United States has only 3.48 million square miles of land mass.

Obviously, commercial beekeepers cannot own enough land, containing honey bee attractive plants, to feed their colonies adequately. Beekeepers rely on private land owners and supervisors of various public agencies to allow them to place apiaries, usually 40-100 colonies each, on their properties. Beekeepers try to select locations that will at least meet the minimum nutritional requirements of the bees. In years when honey plants are abundant, beekeepers can harvest a honey crop.

Information, gleaned from 2005 county crop reports, relates that California beekeepers generated $39.8 million in honey production, nearly half (46.6%) of which came from Tulare County and was predominantly citrus honey. Honey production contributed 23% to the total beekeeping income of the state and is vitally important to the economic survival of beekeepers in the San Joaquin Valley and southern California. Pollination income was about four times greater than honey income ($122 million), but the colonies have to be healthy and strong to command a good price for pollination and to survive the stresses of inadequate food supplies and pesticide exposure when used for saturation density crop pollination later in the season.

In recent years, some citrus growers have been planting varieties (mandarins) that are most attractive to consumers when the fruits contain no seeds. While navel oranges do produce some pollen, growing a seedless variety near navels probably would not be problematic. However, planting two or more compatible varieties of mandarins near each other can be very problematic. The pollen from one variety will set seed in the other. Currently, varieties planted in the San Joaquin Valley produce crops that mature at different times of the year. But, they bloom simultaneously and are very compatible.

To avoid seeds in their mandarins, San Joaquin Valley growers are attempting to convince beekeepers not to place colonies within two miles of their 10,000 acres of mandarins that will be in bloom. Beekeepers are reluctant to abandon apiary locations that have provided sustenance, and sometimes a honey crop, to their colonies for many decades, if not generations within many beekeeping families. However, some growers became insistent. Lawsuits were threatened for loss of marketable mandarin crops to trespassing bees. Then, the approach shifted to a proposed effort by California Citrus Mutual (the organization that previously worked with the beekeepers to provide pesticide protection legislation for the bees during citrus bloom) to have new legislation introduced that would require all honey bee colonies to be moved two miles away from the boundaries of any planting of six acres or more of mandarins in Fresno, Kern, or Tulare Counties. **An area extending two miles around a six acre square plot covers 8,544 acres, which is 13.35 square miles. A similar area extending around a 640 acre (one square mile) plot covers 13,802 acres, which is 21.57 square miles."**

According to industry statistics, there are about 250,000 acres of citrus grown in California, of which about 25,000 acres are planted to mandarins and about 10,000 acres of mandarins currently are mature enough to produce a marketable crop**. If the 10,000 acres were planted in non-adjacent 640-acre blocks, there is the potential to eliminate honey bees from a maximum area of 215,656 acres, which is 337 square miles. If 10,000 acres were planted in a single, solid, square block (a 15.63 square mile area with 3.95 mile borders), the protected area would cover 38,282 acres, which is 59.8 square miles.**

A total of 189,577 acres are reported planted to citrus in the 2005 crop reports from Fresno, Kern and Tulare Counties **Thus, somewhere between a minimum of 20.2% (having all planted mandarin acres in a single, large block) and a maximum of 100% (for either individual 6 or 640 acre plantings with non-overlapping bee exclusion areas) of the three-county citrus acreage would be off limits.** The exact planting schemes are not available for more precise calculation. However, more and relatively smaller acreages are being planted every year.

Some citrus growers have tried to help beekeepers find substitute citrus locations, but often none were available. In other cases, long-standing citrus locations of one beekeeper were taken away from him or her and given to another beekeeper that had been forced out of a mandarin location. There are little or no unused citrus locations, due to the huge demand from so many colonies.

The beekeepers have serious reservations about how things are transpiring. First, does one agricultural industry, in the name of economically protecting its agricultural interest, have the right to inflict economic damage on another agricultural industry? What role will right-to-farm legislation have in protecting their right to move onto agricultural landowner's land with permission? How will new mandarin plantings affect growers of established crops requiring honey bee pollination plums, kiwi, mandarins, Minneola tangelos, pummelos and other seeded citrus, avocados, late cherries, and early summer squash, among others.

Second, beekeepers fear that laws or regulations prohibiting the placement of apiaries within two miles of anyone desiring the absence of honey bees on his or her property would set a dangerous precedent. Such prohibitions, across the country, could eliminate essential apiary locations for honey bee colonies that are recovering after use in crop pollination or are making a honey crop. Suitable apiary locations already are difficult to find, without distance regulations. The beekeepers hope that efforts to enact such legislation will be discontinued.

The financial considerations of maintaining healthy, well nourished honey bee colonies throughout the year in California can be demonstrated from the data collected annually by county agricultural commissioners and published in their annual crop reports. In 2005, the latest year for which data is published; honey bee pollination was an essential factor in the production of $6.15 billion of fruits, nuts, vegetables, and seed crops. Eliminating an extremely important nutrient source for bees, fairly early in the season, will damage the bees, reduce their value for income production for the beekeepers, and affect the ensuing almond pollination season as well as other commodities for the rest of the year. Other solutions for the seedy citrus problem, ones more acceptable for the beekeeping industry and other bee-reliant commodities, need to be identified.

YEAR-ROUND IPM PROGRAM FOR AVOCADO GROWERS

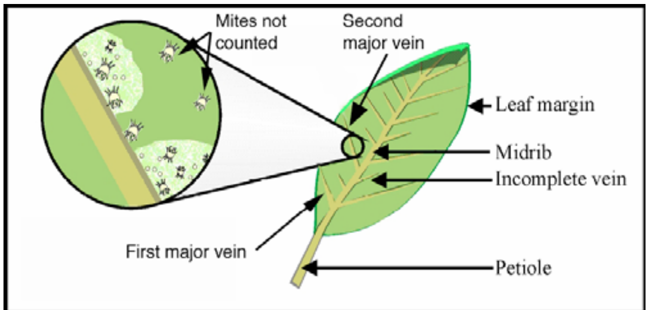
For more information please call Mary Bianchi at 805-781-5949 or email mlbianchi@ucdavis.edu

The University of California's Statewide Integrated Pest Management Program (UC IPM) has developed a new tool for avocado growers. The Year-Round IPM Program includes tools for a monitoring-based IPM program that reduces water quality problems related to pesticide use. Links take you to information on how to monitor, forms to use, and management practices. You can track your progress through the year with the annual checklist form.
Water quality becomes impaired when pesticides move off-site and into water. Each time a pesticide application is considered, information is available in the Pesticide Application Checklist on the UC IPM website to learn how to minimize water quality problems. This program covers the major pests of Avocado; information on additional pests is included in the Avocado Pest Management Guidelines.

The UC IPM website is http://www.ipm.ucdavis.edu.

Along with many other features, the site includes monitoring guidelines, along with forms that can be downloaded to keep records of pest population development through out the season. As we head into the summer months, the recommended monitoring program for persea mite as outlined in the year-round program is:

Directions: Monitor mites about every 7 to 10 days from about April through October:
1. Randomly pick current-season leaves of mixed age, one leaf from each of at least 10 trees.
2. Looking at the underside of each leaf, start at the petiole end. Locate the second major vein that goes strongly from the midrib to the left leaf edge. Ignore any partial, small, or weak veins. Examine the upper (towards the leaf tip)vein edge through a hand lens. (Do not count mite eggs; do not count any visible mites located away from the vein and outside webbed or necrotic patches.)
    - Count the persea mites adjacent to that upper edge of the second major vein.
    - Count mites in webbed nests or exposed necrotic feeding patches that touch the vein.
    - Count any other mites up against the vein.
3. Total the number of persea mites counted and divide the total by the number of leaves sampled (typically 10).
4. Multiply by 12 to derive the average mites per entire leaf.
5. Also count the predaceous mites (e.g., Galendromus spp.) in the persea mite feeding patches. Divide total predator mites by the number of leaves sampled. Multiply this predaceous mite average by 6.



Adapted from: Hoddle, M. S. 1998. University of California, Riverside. www.biocontrol.ucr.edu

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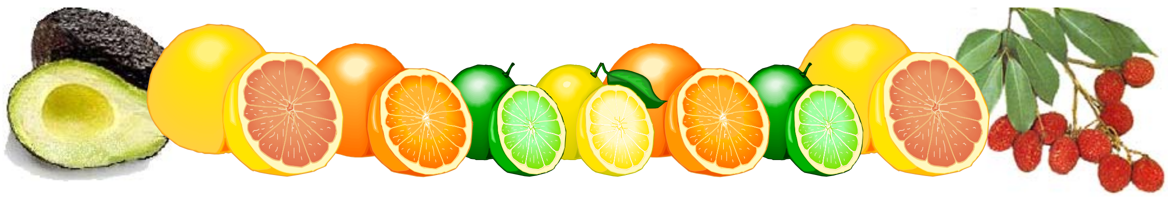

April - June 2007

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