Topics in Subtropics Newsletter

University of California Cooperative Extension

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News from the Subtropical Tree Crop Farm Advisors in California

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Mary Bianchi is the editor for
this issue of the newsletter.

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http://cesanluisobispo.ucdavis.edu
or any of the CE office websites listed on page 9

Please let us know if there are specific topics that you would like us to address in subtropical crop production. If you would like to change information on your mailing label please call or send an email message to the farm advisor in the county where you live. In some counties this newsletter is sent electronically. Phone numbers and email addresses can be found at the end of this newsletter.

IN THIS ISSUE:

UPCOMING MEETINGS - 2005

<u>CAC/CAS/UCCE Grower Seminars</u>
Pest Control Strategies and Price Fluctuations in Avocados,

February 8
8a.m.- 10 a.m.
UCCE Auditorium, 2156 Sierra Way, San Luis Obispo.
Contact: *Mary Bianchi, 805-781-5949*

1p.m.- 3p.m.,
UCCE Office, 669 County Square Dr., Ventura.
Contact: *Ben Faber, 805-645-1462*

February 10
1p.m. – 3 p.m,
Castle Creek Country Club, Escondido
Contact: *Gary Bender, 858- 694-2856*

February 24 – Wells & Pumps*, 9a.m.- noon,*
UCCE Office, 669 County Square Dr., Ventura.
Contact: *Ben Faber, 805-645-1462*

February 25 – Wells & Pumps*, 9a.m.- noon,*
Edwards Community Center, 909 N. Fremont St., Santa Maria.
Contact: *Mark Gaskell, 805- 934-6240*

April 25 and 26 – National Citrus Institute
NOS Events Center, San Bernadino, CA
Contact*: 1-909-888-6788;*
http://www.nosevents.com/citrus_institute.htm

Avocado Lace Bug

Gary S. Bender[1] and Guy W. Witney[2]
[1]Farm Advisor, U.C. Cooperative Extension, San Diego County
[2]Director of Industry Affairs, California Avocado Commission

Avocado Lace Bug, *Pseudacysta perseae* (Heidemann) was identified on backyard avocado trees in the Chula Vista and National City areas south of the City of San Diego in September 2004. This pest was first described in Florida in 1908 and has since been reported in Puerto Rico, the Dominican Republic and Mexico. Avocado lace bug is a true bug with sucking mouth parts in the insect order Hemiptera; family Tingidae. In recent years avocado lace bugs have become an economic problem in Florida and the Dominican Republic, with occasional severe infestations causing tree defoliation.

Description and Life Cycle. Adult avocado lace bugs are small winged insects about 2 mm in length (slightly longer than 1/16 in) with black bodies, yellow legs and antennae, and are visible to the naked eye. The insects live in colonies on the lower surfaces of leaves, often with adults, eggs and nymphs together (Fig. 1). Eggs are laid in an irregular pattern, sometimes in loose rows, stuck to the lower leaf surface and are covered with irregular globules of a black, sticky tar-like substance excreted by adults. To the naked eye, eggs will appear like grains of black pepper. The eggs hatch into wingless young called nymphs. There are no distinct nymphal stages. Rather the nymphs go through a gradual metamorphosis shedding their exoskeleton several times as they grow in size, finally developing wings and becoming flying adults. The nymphs are dark red-brown to black and covered with spines. They feed for approximately two to three weeks before maturing into the winged adults that lay eggs, starting the cycle over.

Feeding Injury. Lace bugs feed on the undersides of leaves, inserting their needle-like mouthparts into leaf tissue cells to extract cell contents. Feeding initially causes small white or yellow spots on the surface of the leaves as individual cells dry out. As colonies grow, brown necrotic (dead) areas develop where there has been heavy feeding damage. These necrotic areas look like tip-burn caused by excessive salts, but in this case the necrotic areas are islands of dead tissue in the interior of the leaf surrounded by living tissue. Heavy feeding can cause striking leaf discoloration and early leaf drop. Other signs of lace bugs are dark, varnish-like excrement and shed nymphal skins on the undersides of leaves. They do not appear to feed on fruit, but will likely have a detrimental effect on yield resulting from the loss of photosynthetic capacity in damaged leaves.

Hosts. Avocado lace bugs have only been reported on avocado, red bay and camphor, all members of the Lauraceae family.

Biological Control. The most important biological agents reported in Florida are two egg parasitoids including *Oligosita sp.* (a Trichogrammatid wasp) and an unidentified mymarid wasp. Green lace wings and other generalist predators are also thought to be important natural enemies. A predatory thrips is reported to be the most important natural enemy of the avocado lace bug in the Dominican Republic.

Chemical Control. Insecticides treatments for other sucking pests currently registered for use on avocado in California will likely provide control of avocado lace bugs. In a trial reported in 1998, J. E. Peña, University of Florida, showed that citrus oil, M-Pede (soap), and Mycotrol (a *Beauveria* fungal species) all controlled lace bug, but it was not indicated how long the effect lasted.

Photo: Guy Witney

Figure 1. Adult avocado lace bugs laying eggs on the underside of an avocado leaf to start a new colony adjacent to damage caused by previous feeding (brown leaf area on the left of the photograph). Adult avocado lace bugs seldom fly from the surface of the leaf even when disturbed.

The First Rule of Growing Citrus in the San Joaquin Valley:
Location, Location, Location

Craig Kallsen
Farm Advisor, U.C. Cooperative Extension, Kern County

Citrus is a subtropical crop and frost hazard is normally the most limiting factor for production in the Southern San Joaquin Valley of California. Generally, citrus is planted in a zone or "belt" approximately 500 to 950 feet above sea level in the low foothills on the eastern side of the San Joaquin Valley. During the winter, on windless frosty nights, an inversion layer forms several hundred feet above the valley floor. An inversion layer is a sandwich of warm air trapped between layers of cold air. At the higher elevations of the citrus belt, citrus trees may actually be within the warm inversion layer. On a frosty night, trees in the inversion layer may be in air that is above freezing, while air in the coldest regions of the Valley may be close to 20º F. Relative topography is important, too, even if the orchard is or will be located in the area generally known as the citrus belt. Cold air runs downhill and any prospective orchard site should have good cold air drainage. Citrus should not be grown in low areas where cold air is trapped by natural topography, vegetation, or by manufactured obstacles like aqueduct walls, raised roads, or dams. For a general overview of the physics of freeze events see Dr. R. Snyder's (Dept. of Land, Air and Water Resources, University of California) website at http://biomet.ucdavis.edu.

Winters have been relatively warm in the Southern San Joaquin Valley since the last significant freeze event, which occurred during the winter of 1998/1999. That event was mild compared to the previous tree-killing big freeze of 1990/1991. Anyone who has suffered the economic consequences of a severe freeze is very conscious of the freeze hazard associated with planting citrus, but many new to the citrus industry are not. In the time intervals between severe freezes, such as the interval we are currently in, citrus plantings tend to appear in areas down hill from the true citrus belt. As a general rule of thumb in the San Joaquin Valley, a new citrus planting located to the west of the current most westerly citrus grove in a given area is probably in harms way. This is especially so if this next nearest grove is out of sight.

Insurance companies that provide frost insurance to growers have actuarial tables based on maps and information developed by the United States Department of Agriculture Risk Management Agency that divide counties into areas of relative frost hazard. New growers are well advised to consult with insurance companies to help assess the relative frost hazard of any new prospective planting. Severe freezes (when fruit is not only frozen, but the trees are killed as well) usually move the citrus belt back to the east toward higher ground. The eastern edge and center of the citrus belt remains stable. It is the western edge that ebbs uphill under the onslaught of the freezing storms that occasionally explode out of Alaska. The western edge flows downhill with the consecutive warm winters that our Mediterranean climate often provides. The observation that homeowners in Delano, Arvin or southwest Bakersfield have orange trees does not mean that these areas are suitable for citrus production. Replanting a single orange tree is much less expensive than replanting acres of trees in a grove.

Lemons and a new crop of Valencia oranges may begin to freeze at temperatures as high as 28 or 27 º F Frozen fruit are difficult to separate from unfrozen, so even partial freezing of the outer fruit on a tree canopy can seriously downgrade the whole harvest. Some growers plant early-maturing citrus varieties in more marginal areas with the knowledge that the fruit will be harvested before the coldest periods of the year. Navel oranges such as Fukumoto, Beck, Newhall, TI, Fisher and some mandarin varieties like the Satsuma and Clementine are picked in October, November and early December and are not usually in danger from the coldest frosts that normally occur in late December and January. Wood of even baby trees can usually withstand a short duration of temperatures to 22 ° F and much colder if the wood is older.

Wind machines are not heaters. They work by mixing the warm air in the inversion layer with colder air in lower areas. Therefore, groves located on the valley floor are less protected by the use of wind machines. If the inversion layer is too high, stirring up the air with a rapidly rotating propeller is not going to bring much warm air down to freezing fruit. Orchard heaters, such as those burning propane, are almost prohibitively expensive to operate during an extended freeze period, and those burning some other fuels can run afoul of air pollution regulations.

The San Joaquin Valley climate is such that hundreds of different crops are grown successfully here. A site that is only marginally suited to citrus will likely be far better suited for one or more of these many alternate and potentially profitable crop choices. Planting a frost tolerant crop on a cold piece of land will avoid the discomfort of having to bring in the New Year by firing up wind machines instead of fireworks or having to wake up worrying about how cold the oranges got last night.

The Inland Empire Small Farm Initiative: Promoting Small Farm and Hispanic Economic Development in Riverside and San Bernardino Counties

Eta Takele, UCCE Area Advisor, Farm Management/Agricultural Economics, Southern California Counties, Peggy Mauk, UCCE County Director and Subtropical Horticulture Advisor, Riverside County, Jose Aguiar, UCCE Small Farms and Vegetable Crops Advisor, Riverside County, Joe Elizondo, Director, Inland Empire Center for Entrepreneurship, CSUSB

The declining small farm ownership and under representation of Hispanics in Southern California has been the basis for the University of California Cooperative Extension (UCCE) risk management education program since 2000. In 2003, in partnership, UCCE and California State University San Bernardino (CSUSB) formed the Inland Empire Small Farm Initiative (IESFI): A Catalyst for Small Farm and Hispanic Development in Riverside and San Bernardino Counties.

The purpose of the Inland Empire Small Farm Initiative (IESFI) is to enhance the feasibility and sustainability of small farm and Hispanic owners through risk management education of production and entrepreneurship. The UCCE contributes research-based seminars in agricultural production, economics, and marketing. The Inland Empire Center for Entrepreneurship (IECE) provides continuous consulting support to small businesses, using IECE program staff, faculty, and student intern teams.

We approached this project using the following methodologies: We conducted program needs assessment of farmers and potential farmers via mail survey. We also established an advisory board to help in the identification of critical issues and program design. The board consists of 15 members including UCCE Farm Advisors, farmer's representatives, community leaders, and businesses from the local area.

Survey results (220 responses (>5%); 13% Hispanic) indicated the need for programs in the following areas:

- Production and marketing of organic crops, crop selection and new crop varieties
- Specialized marketing channels/marketing niches
- Ownership succession plan, estate planning, business transfer, etc.
- Labor management, laws and regulations
- Economics costs, financial and business management

The survey results along with the SFI Advisory Board recommendation led us to focus on the first set of educational programs on direct marketing to hotels, schools and other organizations. These seminars beginning June 2004 in Riverside, San Bernardino and Indio/Coachella Valley, attracted over 90 participants. Lessons included:

- Selling to direct buyers
- Developing cooperative marketing
- Food safety in marketing and production
- New and specialty crop production

Coachella Valley grower (left) discusses his date palms production and marketing with UCCE farm advisors Eta Takele (middle) and Jose Aguiar.

Additional accomplishments include:

- The establishment of the Inland Empire Small Farm Initiative for providing education and advice to small scale and Hispanic growers in the Inland Empire.
- Recruitment and enrolment of over 50 entrepreneurs in consulting programs.
- Assisting farmers in applying for USDA programs and services.
- Networking with institutions and local community establishments for purposes of establishing local marketing such as school lunch programs, cooperative marketing and farmers market.
- Continuing risk management education by UCCE. This will help farmers get up to date information on crop selection, production and management practices.

Thus far, this project has identified several critical needs and conducted programs that enhance the viability and sustainability of small scale and minority growers in the Inland Empire. This project is an example of how a partnership program between academic institutions can enhance programs and outreach through the pooling of resources and expertise across institutions and organizations. Through our coordinated effort we have been able to conduct educational workshops as well as consult with several individuals regarding entrepreneurship. We have strengthened our network with local institutions and agencies for establishing direct and local marketing.

IMPORTANT GUIDELINES IN FARM DECISION MAKING

Planning Stage:
1. Identify the enterprise, production practices, marketing strategy, and capital sources
2. Estimate costs and returns using all available information
3. Evaluate and assess your risk bearing capacity

Implementation Stage:
1. Initiate and carry out production practices and market the product
2. Evaluate returns
3. Adjust plans based on new information about price, yields, or other factors as needed

Adapted from "Building a Risk Management Strategy", a USDA/Risk Management Agency Publication. August 1998.

Cellulase Production by Various Sources of Mulch

Ben Faber[1] and Michael Spiers[2]

1. University of California Cooperative Extension, Ventura, CA

HortResearch, Ruakura, New Zealand

Biological control of *Phytophthora cinnamomi* in avocado through the use of mulches was identified by an Australian grower and later described as the "Ashburner Method" by Broadbent and Baker. The technique uses large amounts of organic matter as a mulch along with a source of calcium. Control of avocado root rot in the Ashburner method was attributed to the presence of *Pseudomonas* bacteria and Actinomycetes. Multiple antagonists are more likely the cause of biological control, since no single organism has been found to be consistently associated with soils suppressive to *P. cinnamomi*.

The use of organic mulches has multiple effects, such as altered soil nutrient and water status and improved physical structure. Any improvements in plant status resulting from improvements in the growing environment can improve plant health. The effect of organic amendments on soil physical and chemical properties can vary considerably depending on soil texture and the environment. One of the most consistent effects of organic amendments is an increase in biological activity. Increases in organic substrate lead to increased fungal and bacterial populations. In numerous cases, this increase in biomass has been associated with disease suppression. This biological control can be ascribed to several mechanisms: competition, antibiosis, parasitism, predation and induced resistance in the plant.

The microbial biomass is responsible for release of enzyme products and polysaccharides in soils. The microbially-produced enzymes cellulase and glucanase have been demonstrated to have a significant effect on *Phytophthora* populations. This mechanism of antibiosis is possible because the microbes are releasing these enzymes to solubilize organic matter. Unlike other fungi, *Phytophthora* have cell walls that are comprised of cellulose and in the process of decomposing organic matter with enzymes, an environment is created that is also hostile to the pathogen.

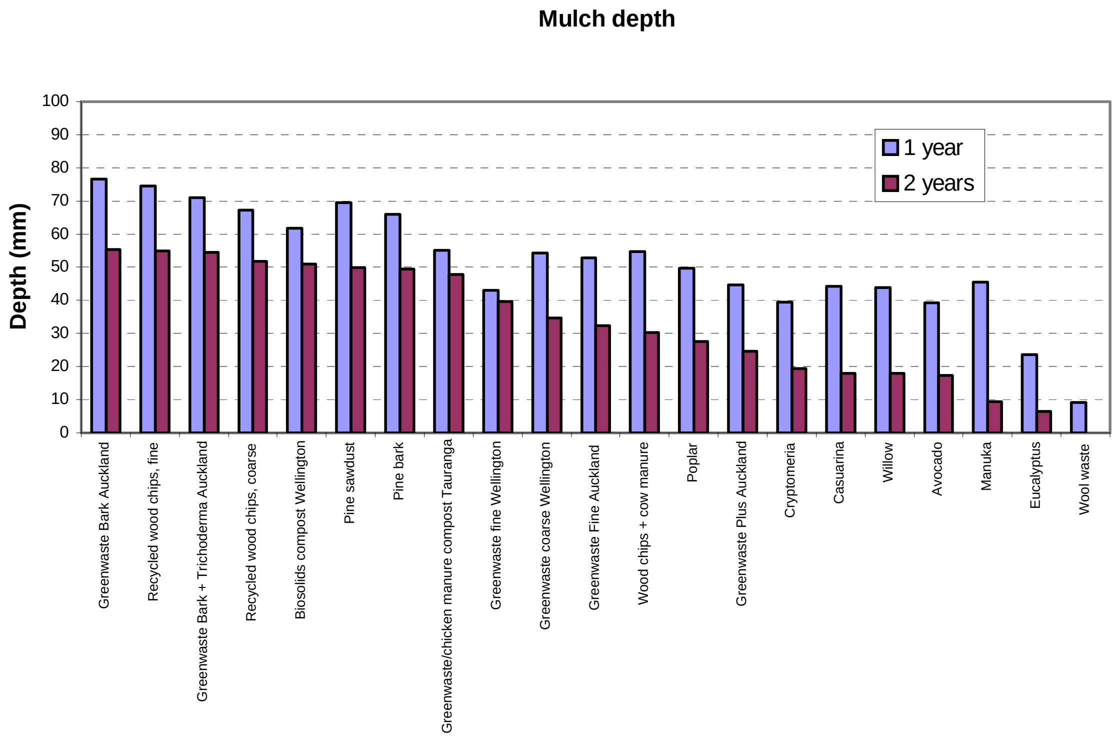
In order to see if there might be potential differences in organic materials being better at combating avocado root rot, a little field trial was established with 23 different types of materials (see types on Graphs 1 and 2). The mulch materials were obtained from nearby hedges and chipped or obtained from commercial sources of mulch. Some of these materials would be difficult to get in large amounts, such as manuka (*Leptospermum* scoparium), but others are commercially available chipped greenwaste. The materials were then spread on the ground to a depth of five inches, in separate plots that were 36 X 36 inch squares. Decomposition was measured over a two year period and then cellulase was measured in the mulch, at the soil / mulch interface and at a two inch depth in the soil at the end of 2 years.

Since cellulase production is part of the decomposition process, the rate of decomposition should be a partial indicator of the amount of cellulase present. Graph 1 shows the depths of various materials at the site after one and two years of decomposition. After a mulch application there is generally settling due to rainfall-caused compaction, but much of the decline by the second year is due exclusively to decomposition. The more recalcitrant materials, such as bark, wood chips and sawdust have barely lost half their depth after two years, while others such as shredded eucalyptus, manuka, avocado and willow are less than 20% of their initial depth. Much of the shredded/chipped material, such as eucalyptus had a significant fraction of leaves in the mulch. The wool disappeared a little after one year. The greenwaste + chicken manure compost is nearly the same depth as the wood chips, since it is a material that had gone through a decomposition process prior to its application and much of the easily digestible materials had already been decomposed.

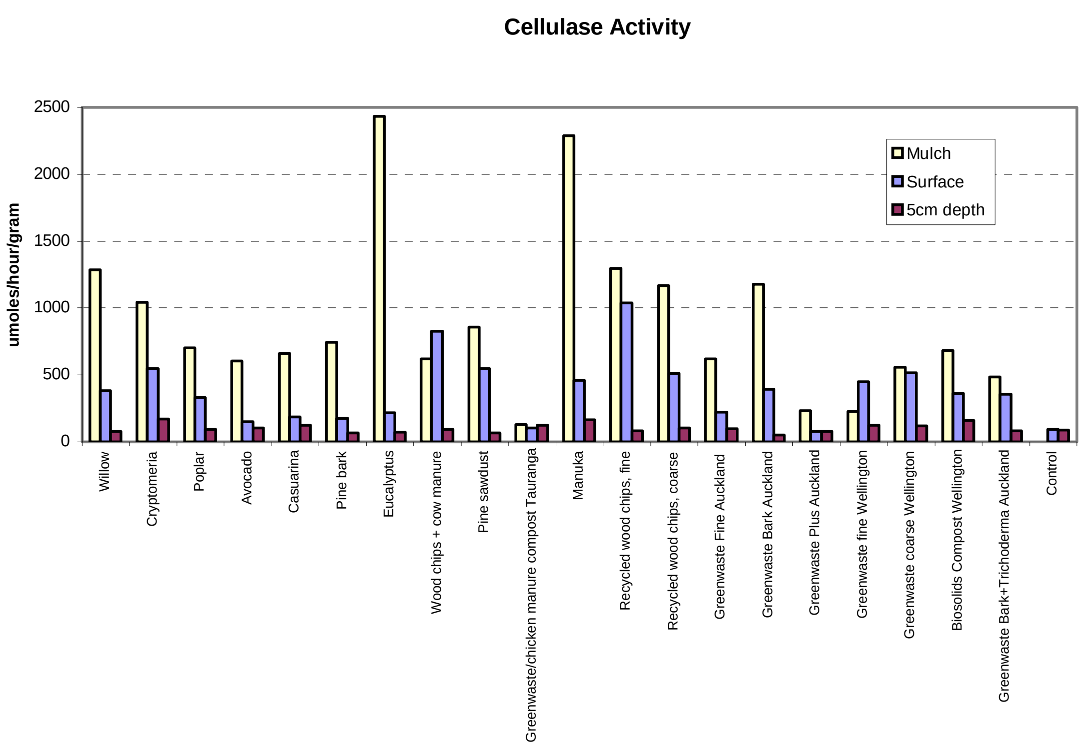
The rate of decomposition has some bearing on the rate of cellulase production (Graph 2). Eucalyptus and manuka had the two greatest rates of decomposition and show the highest levels of cellulase production. The cellulase levels were consistent with all the different mulch materials. Using decomposition rate alone is not a complete indicator of cellulase production since, poplar, willow and avocado had high rates of decomposition, but their cellulase rates were half those of manuka and eucalyptus

It is clear that the cellulase effect is limited to the layer of mulch and not to depth within the soil. There is some effect at the soil surface, but at 5 cm (2 inches) cellulase activity drops to background levels (Graph 2). There is earthworm activity at the test sites and one idea was that earthworm incorporation of organic matter would move the cellulase production into the soil. Maybe with further time this would occur. As it is, when mulches are applied to avocado, the roots tend to proliferate in the mulch, out of the soil where the cellulase activity is the least.

Something to keep in mind is that we do not know what levels of cellulase are necessary to control the root rot fungus. It may be that levels seen with pine bark are more than adequate. Also we have measured cellulase production at only one time in a two-year period and it is quite likely that this is not the best snapshot of what is happening before and after. A further reminder is that cellulase is only one of the many by-products associated with decomposition and many of the antagonistic properties that are associated with the microbial biomass are not being measured in this trial. Having developed this screening procedure what needs to be done next is to take high, medium and low cellulase producing mulches and challenge the fungus to verify that this is a good way to evaluate mulches.



Graph 1. Depths of applied mulches at Ruakura, one and two years after application. Initial depth was 100 mm (~4 inches).



Graph 2. Cellulase production within the mulch, at the soil/mulch interface and at a depth of 50mm (~2 inches) in the soil below the mulch.

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