June 2002

UPCOMING MEETINGS

The Citrus Research Board in cooperation with UC Cooperative Extension has scheduled their 2002 series of seminars to provide opportunities for growers to hear directly from researchers on a few select topics. Discussions are in laymen's language with plenty of time for questions available after each session. Registration cost is $15/person, which includes lunch and course materials. Call the Citrus Research Board for reservations at (559) 738-0246 for more details.

Dates, locations and subject matter are as follows:

Tulare, Friday, July 12 - 9:00 A.M. - 1:15 P.M. - Edison Ag TAC, 4175 Laspina, Tulare
Peelminer update/Leafminer briefing
Food safety/food biosecurity
Rootstock selection considerations; new frontiers in root rot management
Seedlessness in mandarins

Santa Paula, Friday, July 19, 9:00 a.m. - 1:15 p.m.- Santa Paula Community Center, 530 W. Main Street
Rootstock selection considerations
Food safety/food biosecurity
Comprehensive view of pest management
Citrus leafminer: what to expect (what to do, what not to do)

High Tonnage Of Fruit Expected From Citrus Trees This Season

For the past two seasons, fruit yields of mature citrus trees as measured by fruit numbers and weight have been below average in many Kern County groves. Relatively sudden changes in temperatures in May from cool to hot triggered excessive fruit drop in 2000 and 2001. The reduced tonnage, however, in many instances was economically advantageous in that although tonnage was down fruit size was up, and the combination of less fruit on the market and bigger fruit sizes resulted in higher prices in the marketplace. As a result of the smaller crop loads the previous two years and the more normal May temperatures this season, it looks like Kern County trees are set to produce a high tonnage crop this season. Although, at this writing, fruit is falling from the tree as is expected in May and June, it does not appear that enough is falling to prevent a big crop of small-sized fruit.

False Chinch Bug Suspected of Damaging Citrus Fruit

The adult false chinch bug, *Nysius raphanus,* is a grayish-brown plant bug, about1/8 inch or 3 mm long. The bugs have the triangular 'shield' on the back of their thorax that typifies the hemipteran. The legs and antennae of chinch bugs are relatively long and are darker than their bodies. The adults, unlike the immatures, have wings and are slightly larger than the nymphs. The nymph is somewhat lighter-colored than the adults and its abdomen has more of a reddish tinge. The eggs are laid randomly on the soil or within soil cracks. They overwinter as nymphs. During spring, summer and fall, the nymphs and adults can be so numerous that it appears the ground is moving in infested areas. The adults when disturbed can produce clouds of insects so thick that they may make breathing difficult.

The ability of false chinch bugs to damage young citrus, pistachio and other fruit trees is fairly well documented. Their feeding can cause young trees to wilt and die. The decline of young trees is often so rapid that the presence of a toxin in false chinch bugs has been hypothesized. Observational evidence strongly suggests that false chinch bugs can seriously damage mature citrus fruit as well. The damage occurs in progression. Typically, in the presence of high populations of false chinch bugs, the green fruit on the skirts of the trees turn prematurely yellow, in blotches. These yellow areas are slightly sunken and the oil glands tend to stick out. Darker discolored brown patches appear within the yellowed areas of the fruit rind. Light stippling may be visible in these brown areas. The damage at this stage appears similar to that which might be done by sunburn, herbicide, or by leafhoppers.

Under light feeding pressure from false chinch bugs, the areas of the fruit rind where the oil glands appear to be damaged may not be visible in the green fruit picked during the early navel orange harvest, but appear as green-spotting after the fruit is treated with ethylene gas. Under conditions of high pest-feeding pressure, the fruit on the tree may become more brightly colored with brighter hues of yellow and reddish orange. At this stage the fruit falls easily from the branches. Leaves adjacent to the fruit, generally, do not show much damage. False chinch bugs were commonly seen in the southern San Joaquin Valley last season, with the first damaged fruit usually appearing in July. Often affected fruit is not discovered until harvest, when chinch bugs are no longer in the orchard.

False chinch bugs breed on weeds. Weeds that serve as host plants for these insects include wild mustards, wild radish, shepherds purse, London rocket and, especially, spurge. This pest may also be present in neighboring rangeland, and move into bordering crops once the summer dry season commences and range plants dry out. As weeds dry up in late spring, or are cultivated or killed by herbicides, false chinch bugs may move to adjacent tree crops such as citrus. Citrus fruit along Highway 166 in the Maricopa area appears to be particularly vulnerable to this pest. When large numbers of false chinch bugs are present on orchard weeds, and the weeds are scheduled for treatment, it may be advisable to include a properly labeled insecticide with the herbicide to prevent a migration to citrus or other tree crops. False chinch bugs, like many of their Hemipteran relatives, often appear suddenly and may disappear just as quickly, leaving growers, pest control advisors and packinghouse managers wondering just what caused the damage to oranges crossing the packline.

Applying Insecticidal Narrow-Range Oils Maybe Hazardous During First Spring High Temperatures

Every season, several reports usually come to this office of excessive leaf drop following applications of oil or tank mixes of oil and insecticides. These reports usually coincide with the first hot temperatures of the year. Our first hot daytime temperatures in May and early June are usually associated with cool nights and thus, relatively cool daytime soil temperatures. The ability of roots to absorb water is related to soil temperature. The increased evaporative demand of the atmosphere, tender and poorly acclimated new leaves, and cooler soil temperatures that limited the flow of water from the soil to the canopy, all conspired to produce a water-stressed tree. Applying oil to a stressed tree may cause excessive leaf drop and, eventually, sheep nosed, sunburned fruit with reduced yield. The hot temperatures also appeared to increase leaf drop in trees suffering from other forms of stress, like excessive citrus red mite feeding and late-stage bud union incompatibility caused by overgrowth of the scion by the rootstock.

Southern Fire Ants and European Earwig Damage New Citrus Plantings

Southern fire ant must be controlled in new citrus plantings. These ants damage leaves and bark. Typically, the damage occurs under the frost-protection wraps, so looking for ants should include opening and looking into wraps. The trunk of an ant-damaged tree has a honeycombed appearance with sap and dirt present. A yellowing tree with dropping leaves is a tip off that ants may have been present in the orchard for some time. As is the case with dry root rot, hot temperatures will cause the rapid collapse of tree girdled or partially girdled by ants earlier in the year. Often, many trees are damaged before the grower knows there is a problem. Ants can attack trees randomly throughout the orchard or only in one corner so any ant monitoring protocol should be thorough. Avoid looking for ants midday when temperatures are extremely hot during the summer. Ants are inactive in the heat, but are usually present earlier in the morning.

Chlorpyrophos (Lorsban ®) provides a fast acting knockdown of badly infested trees and ant baits containing abamectin (Clinch ®) or the recently citrus-registered pyroproxifen (Esteem Ant Bait ®) are effective in controlling southern fire ant populations.

European earwig is also capable of damaging young citrus. Again, as with ants, the insects live in the wraps. Earwigs can defoliate young trees and make circular gouges in the fruit.

Fukumoto Bark Rot Appears in Hot Weather

Fukumoto bark rot becomes apparent in a grove with the first hot temperatures of spring or summer. The problem is most commonly seen in the Fukumoto navel orange variety, hence its name, in trees that are one to two years old, although older trees may show symptoms as well. The usual tip-off to the disease is dying branches. Closer inspection of the dying branches reveals cankers with prolific gumming. In hot weather, apparently, a species of yeast uses the gum as a food source, and a light, frothy sudsing is produced, that smells somewhat like brewing beer. The problem was very widespread in Kern County last year. While copper is commonly low in leaf tissue samples in Fukumoto navels, copper deficiency does not appear to be the cause of Fukumoto bark rot. Heavy applications of copper did not alleviate the condition in several experimental applications last season.

Some plantings of Fukumoto navel in Kern and Tulare Counties are experiencing excessive tree decline and death, with symptoms that may or may not be related to bark rot. In some of the

worst orchards the symptoms appear similar to those seen in incompatibility between rootstock and scion. Other plantings of the same age and older, appear to have few problems. University of California researchers are initiating research into possible reasons for the inconsistent performance of this variety.

New Finds of Glassy-Winged Sharpshooter (GWSS) in Delano Area

Glassy-winged sharpshooters were found recently outside the quarantine areas that were established along Highway 65 last year. This probably means that more citrus growers will be shipping fruit north with yellow tags this fall and winter. A good way to determine if GWSS is in your orchard is to string up a few hundred feet of sticky, yellow 'hopper tape'. If your citrus grove borders grapes, set up the hopper tape along your border with the vines. The greater the area of tape the more likely you will be to find a light infestation. Glassy-winged sharpshooters are big, and just driving by the tape on the quad will probably be adequate to spot any trapped insects.

Citrus Thrips Apparently Tougher to Control This Season

Citrus growers and pest control advisors report greater numbers of citrus thrips pesticide treatments this spring. Citrus thrips development this season coincided with the stage of fruit development most susceptible to thrips damage. A large range of fruit sizes existed in many orchards as a result of an extended bloom period and a tardy and lackluster 'June fruit drop', which all conspired to increase the time that the fruit crop was at risk of scarring. Careful monitoring and withholding treatments until 5 to 10% of the fruit is infested with new instars of citrus thrips (not flower thrips) can greatly increase the efficacy of treating for this pest. Often, in hilly ground, the timing for the pesticide treatment may be different for the high ground versus the low ground. Some years it may not be necessary to treat with pesticides at all; in most years one treatment will do the job, in bad years two treatments may be necessary. Rather than spray a third time, it probably just better to admit that you've been beat fair and square and vow to come off better next year. Once the fruit is greater than an inch and a half in diameter, the risk from thrips scarring is minimal.

Citrus Red Mite: To Treat Or Not To Treat

Citrus red mite (*Panonychus citri*) is, generally, a spring or late fall pest of citrus that feeds primarily on the outer canopy leaves and fruit of citrus. Citrus red mite (CRM) is a deep red in color and slightly smaller than the head of a pin. They are eight-legged and oval to rectangular in shape. The male is smaller than the female and has a more tapered abdomen. The females lay round, reddish, translucent eggs on both sides of the citrus leaf at the rate of two to three a day. This pest punctures leaf and fruit cells removing chlorophyll and other nutrients. The feeding damage is referred to as "stippling", which leaves the fruit or leaf surface with a characteristic finely pixilated pattern of dark green and light green or silvery tissue. Usually, severely attacked fruit falls from the tree while that which remains, even that blanched to white or light green earlier in the season, colors normally. Citrus red mite populations generally increase with initiation of bloom in late March in Kern County and peak sometime in May, before the onset of hot temperatures. Historically, a dry winter and early spring in the San Joaquin Valley, similar to

what occurred this season, results in higher than normal populations of CRM in citrus trees. Infestations of CRM appear worse in trees under stress, such as water stress. In dry years, rainfall typically does not meet the evapotranspirational requirement of the trees during winter or early spring as it does in wetter years, so growers should monitor soil-water status carefully at this time. Hot temperatures in late May or early June usually reduce CRM populations below economic thresholds. However, in some orchards CRM populations may continue to increase into June and early July.

The approach to treating or not treating CRM infestations varies considerably. Many of those relying on integrated pest management (IPM), especially those who release beneficial insects in the grove, do not treat CRM, no matter how severely the trees are infested. Other growers, using the traditional long-residual, broad-spectrum pesticides will treat with a mitacide like propargite or oxythioquinox when red mites first appear in the grove in appreciable numbers. So what does previous research tell us about when and how to control CRM?

Studies have demonstrated that CRM is capable of reducing photosynthesis and total yield of navel oranges. At the McKellar Experimental Plot and at the UC Lindcove Agricultural Research Center in the late 1980's and early 90's, many of the integrated pest management (IPM) practices now in common use were developed. At McKellar, Dr. Hare at UC/Riverside, and others, investigated the damage done by CRM. Citrus red mite infestations were examined over a period of four years to determine the long-term effect of feeding on citrus yield and the grower's profit. Dr. Hare's study shows that, over the long-term, heavy infestations of CRM can reduce the total yield of the tree. Over the last two years of the project, in untreated controls where mitacides were not used, mean peak average densities of adult female CRM reached 7.1 and 2.2 at one site, and 9.6 at a second site. These populations caused total yield to be reduced by 9, 6.6 and 11.4% respectively. However, the reduction in total yield was compensated for by an increase in fruit size of 2.3 and 2.1%, respectively at the first site, with no compensation of increased size at the second site. Trees in the "deficient" nitrogen fertilization plot suffered greater yield losses from mites than did those in the plots with "adequate" or "excessive'' nitrogen.

In many crops, and in the experience of those who manage pests in citrus, the use of long-residual, broad-spectrum insecticides for other common insect pests can cause CRM populations to explode as a result of reductions in beneficial insects. Those using IPM, which includes the release of *Aphytis* wasps for control of California red scale, avoid using pesticide in their groves as much as possible. In groves like these, the recommendation for control of CRM, based on Dr. Hare's research, is not to treat until populations in the grove are higher than an economic threshold of eight mature female CRM per leaf by 2 to 4 weeks after petal fall. Frequently, in bad infestations, CRM populations climb much higher than 8 per leaf, out of the range of economic studies. However, in an IPM situation, the possible disruption in the control of other pests in the program may result in greater reductions in fruit quality and yield than will damage from CRM. Predacious mites, *Stethorus picipes* (a small, black lady beetle), six-spotted thrips, dustywings, lacewings, minute pirate bugs, and especially a virus disease specific to CRM which commonly occurs with the onset of warmer temperatures may all reduce an infestation significantly. Many, using IPM, especially those that have reduced pesticide use to a minimum with short-residual, and very selective materials, report that CRM, although certainly not unknown, is less of a problem in groves under IPM management. Additionally, by not spraying CRM the cost of the spray treatments is saved.

When treatment of CRM is necessary, some growers find applications of narrow-range 415 oil sprays at 2 to 5 gallons of oil in a 100 gallon per acre spray solution to give adequate control when the mite populations are over the economic threshold. This oil treatment is a less disruptive option for those using IPM. For more information on CRM and the use of oil and other chemicals to control CRM in citrus obtain a copy of the UC IPM Pest Management Guidelines - Citrus at your county UC Cooperative Extension Office or download it at www.ipm.ucdavis.edu. Always read and follow label directions and all applicable state and federal regulations closely when handling pesticides.

On the negative side, heavy mite feeding in the same grove, year after year, probably results in increased cost of fertilizers, to maintain leaf-tissue nutrient levels at recommended levels. Obviously, watching this pest reduce tree vigor, drop leaves, and remove nutrients from fruit and leaves that were applied as expensive fertilizers is not easy for the grower. More scientific investigation is required, no matter what the pest management strategy, to determine economic thresholds for this pest before a grower or PCA can be told, confidently, whether to treat or not to treat when CRM infestation is severe.

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Disclaimer: Discussion of research findings necessitates using trade names. This does not constitute product endorsement, nor does it suggest products not listed would not be suitable for use. Some research results included involve use of chemicals which are currently registered for use, or may involve use which would be considered out of label. These results are reported but are not a recommendation from the University of California for use. Consult the label and use it as the basis of all recommendations.