UC Citrus Entomology Program **Citrus E-Newsletter**

June 2007 No. 3

University of California Kearney Agricultural Research Center Cooperative Extension

California Red Scale – Second Flight

	1st male flight (observed)	1st gen. crawlers (observed)	2nd male flight (observed)	2nd gen. crawlers (predicted)	3rd male flight	3rd gen. crawlers	4th male flight	4th gen. crawlers	5th male flight
Estimated Degree Days	Biofix	550 DD	1100 DD	1650 DD	2200 DD	2750 DD	3300 DD	3850 DD	4400 DD
Kern	March 12	April 30	May 28	June 25					
Tulare	March 12	April 30	June 4	June 25					
Fresno	March 17	May 7	June 11	July 2					

Red Scale Lower Developmental Threshold: 53°F
Current DD (as of June 18) - Kern: 1403 DD, Tulare: 1350 DD, Fresno: 1240 DD

The second flight of California red scale males has started in Kern and Tulare counties, and is expected to start in Fresno and Madera counties shortly. We are predicting a second crawler emergence to begin the last week of June if daily high temperatures remain in the upper 90s (normal for this season). Currently, degree-days for Kern and Tulare Counties are accumulating at a rate of about 25 DD per day plus or minus five DD through the month of June. Degree-day calculations for CRS as well as weather summaries for selected weather stations are maintained on our website: http://citrusent.uckac.edu/DegreeDay.htm.

Citricola Scale – Eggs hatching into crawlers

This is the time of year when citricola scales have moved down to the ends of the twigs, molted into the female stage, produced their eggs and the females are dying. Whenever we have a cool and wet spring, female survival is highest and they produce the most eggs. The eggs have begun hatching and if you look closely you will find tiny, translucent, 1st instar nymphs on the leaves. It may be tempting to start treating the citricola scale now. However, some of the eggs are still not hatched and some of the crawlers are hidden under the female bodies. Treatments (oils, Lorsban, Assail, Applaud) will be more effective if you wait a few more weeks for all of the eggs to hatch and the crawlers to move out onto the leaves and settle down. In the past, Lorsban has provided the best chemical control of citricola scale, lasting more than one season if applied at a fairly high rate (6-12 pints/acre). However, last season we found that some populations of citricola scale have developed resistance to Lorsban. This reduces the effectiveness of the Lorsban and forces the grower to treat nearly every year. When resistance is a problem, the somewhat less effective insecticides (Assail, Applaud, oils) are at least similar and possibly better than the Lorsban in terms of efficacy.

Citrus Peelminer – Third Flight

	1st male flight	2nd male flight	3rd male flight	4th male flight	5th male flight	6th male flight	7th male flight	8th male flight
Estimated Degree Days	biofix	580 DD	1160 DD	1740 DD	2420 DD	3000 DD	3580 DD	4160 DD
Host Plant	Stems	Stems	Pummelo grapefruit	Pummelo grapefruit	Susceptible oranges	Susceptible oranges	Susceptible oranges	Susceptible oranges
Tulare	March 12	May 10	June 18 (predicted)					

Citrus Peelminer Lower Developmental Threshold: 55°F
Current DD (as of June 4) – Tulare: 1199 DD

The peelminer flight that will attack pummelos and grapefruit is predicted to begin the week of the 18th of June. However, we are hearing from PCAs that they are starting to see larvae and so this week is the time to start treating. Eggs from this flight of moths should start hatching 50 degree-days (or about 3 days) after being deposited on stems and fruit. Usually it is the fourth or fifth flight (1740 and 2420 from March 12) that attacks susceptible navel varieties (Fukumoto, TI, Atwood, Barnfield), so wait to treat those varieties. Jocelyn Millar is continuing to study the pheromone and is researching the synthesis of a more effective compound so that we will have better flight information. As peelminer degree day information accumulates, we will be posting it to our website: http://citrusent.uckac.edu/PeelminerDD07.htm

An updated version of our on-line peelminer moth trap count and fruit damage reporting system is now available for use at http://arcims.gis.uckac.edu/CitrusMiner/ Growers that have used the system already will find a streamlined interface and faster response time. One-on-one demonstrations of the system will be offered for both experienced users and growers that are using it for the first time. Please contact Greg Montez at (559) 646-6597 or mailto://gregm@uckac.edu for further information.

Once a peelminer infestation starts, it is best to treat two to three flights in a row (at 3-4 week intervals) with a mixture of a low rate of Micromite for the eggs and a low rate of a broad spectrum pyrethroid or organophosphate for the adults and larvae. The maximum label rate for Micromite is 6.25 oz during a 90 day period.

Is there potential for biological control of citrus peelminer? Cirrospilus coachellae is found in the Coachella valley and assists with biological control of citrus peelminer in that region. This parasite also attacks citrus leafminer. David Headrick (Cal Poly SLO) and Beth Grafton-Cardwell released *Cirrospilus* in the San Joaquin Valley during 2001-2004, however, it never overwintered. At that time, the parasite was reared from peelminer infesting grapefruit and the parasite release numbers were low. Researchers Bob Luck and Joseph Morse have developed a method of rearing *Cirrospilus* on citrus leafminer. David Headrick and Beth Grafton-Cardwell intend to do releases of *Cirrospilus* in the San Joaquin Valley this year and with the new rearing method plus the alternative host of citrus leafminer being present in the field, we may be much more successful in establishing this natural enemy.

Citrus Leafminer

Citrus leafminer is now infesting backyard citrus trees and commercial citrus in Imperial, Riverside, Orange, Los Angeles, San Diego, San Bernardino, Ventura, Santa Barbara, San Luis Obispo, Fresno, Tulare and Kings counties. The pheromone traps are highly effect in collecting moths. In Kern, Tulare and Fresno counties we are catching moths, yet not seeing damage in the flush leaves. If you see any leaf damage the San Joaquin Valley, please let us know about it. Because leafminer is a small moth, we recommend triangular traps to limit other insects from accidentally being stuck in the traps – it makes it easier to find and count the moths. The exact size and color of the trap are not important.

If you would like to trap citrus leafminer, two sources of lures and traps are:
APTIV, Inc.2828 SW Corbett Ave., Suite 114, Portland OR 97201,
(877) 244-9610, www.aptivinc.com
ISCA Technologies, Inc., 2060 Chicago Avenue #C2, Riverside, CA 92507,
(951) 686-5008, www.iscatech.com

A moth trap catch reporting system similar to the one we are using for citrus peelminer has been developed for citrus leafminer and is now active on our website at http://arcims.gis.uckac.edu/CitrusMiner/ . Growers who wish to use this system may request a one-on-one demonstration from Greg Montez (contact information above).

While the damage that the leafminer causes to flush of mature citrus trees is ugly, insecticides are not very effective and leafminer will not affect yield (except perhaps for lemons on the coast that are continuously flushing and producing multiple crops). Therefore, we recommend that you ignore this pest in mature citrus. For information on identification see our web site: http://citrusent.uckac.edu/leafminer.htm. Citrus leafminer will heavily damage flush of nursery citrus and newly planted citrus and could affect growth and development of young plants. Therefore treatments may be necessary in these situations. In foreign countries, such as Israel, growers apply Admire for the first three years to newly planted trees to reduce leafminer infestations and maximize growth of the trees. We have both SLN and IR4 requests to gain registration of the insecticide Intrepid (methoxyfenozide) for nonbearing citrus and are testing new insecticides for their efficacy against this pest. Additional management guidelines are posted on the UC IPM web site: http://www.ipm.ucdavis.edu/PMG/r107303211.html.

Dr. David Headrick (Cal Poly San Luis Obispo) is collecting parasitized leafminer larvae and pupae to determine which parasites are attacking the leafminer in coastal and central California. If you would like to assist with this project, instructions for collecting and shipping parasitized larvae are located on our web site: http://citrusent.uckac.edu/Collect_leafminer_parasites.htm. This pest should eventually be controlled by natural enemies. Some of the same parasites that attack leafminer also attack peelminer (for example *(Cirrospilus*) and so having both pests present should improve biological control.

Citrus Tristeza Virus Update

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 susceptible sour orange rootstock or pitting of the branches and trunks if the scion is it is grafted on tolerant rootstock. 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. The University of California Lindcove Research and Extension Center (LREC) is located in the northeastern corner of the Tulare Pest Control District, where removal of citrus tristeza virus (CTV) infected trees has not taken place since the mid-1990s. At LREC, immediate removal of CTV-infected trees occurs upon detection in an effort to suppress CTV disease at the research center. Trees in the research plots are tested on a yearly basis. Trees in the Citrus Clonal Protection Program (CCPP) foundation area at LREC, that provides disease-free budwood to the citrus nursery industry, are tested multiple times per year for CTV.

During the period of 1992-2005 there were no CTV-infected trees detected in the foundation block and the number of CTV-infected trees averaged 3 trees per year for the entire research center. During 2006, two 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 2006 period 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.

This epidemic has two consequences. First, the detection of CTV in the CCPP foundation area prevents budwood from being released from these trees to the nursery industry until the known infected trees are removed and the remainder of the trees are 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 http://www.ccpp.ucr.edu/news/index.html). The commercially important varieties of citrus are also grown within a screenhouse at LREC that protects them from aphid transmission of disease, however, only small amounts of budwood are produced by these trees because they are young and shaded. Thus, the nursery industry will receive much less than the expected number of buds this year. The second consequence of this epidemic is that research programs are being heavily affected by the high incidence of CTV infection. If a research block loses a tree now and again, research is not heavily impacted. However three of the blocks had significant numbers of infected trees: 5, 9, and 21 trees. The trend appears to be a high number of infected trees in young orchards, and this makes sense, because young trees with lots of flush are very attractive to aphids. When 5 to 21 trees are removed from a 200 tree research plot, research is affected because replicates of the experiments are eliminated. Thus, the research program at LREC is at risk due to the heavy CTV infection. 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. Through funding from the Tulare County Pest Control, the commercial orchards surrounding LREC had 25% of their trees tested during early June to assess the distribution and severity of of the virus. While the percentage of trees with CTV has increased since tree removal ended in 1998, the virus is still controllable through a concerted effort of testing and tree removal over a period of several years. Various organizations within the citrus industry are working to develop a long-range plan to develop the funding needed for tree removal and compensation to the growers surrounding LREC. The citrus industry agrees that the foundation block and research plots at Lindcove Research and Extension Center are a precious resource whose integrity must be preserved.

The Citrus IPM Newsletter is published by the University of California Citrus Entomology Laboratory at the Kearney Agricultural Research Center.
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