

Insect Development is Based on Temperature

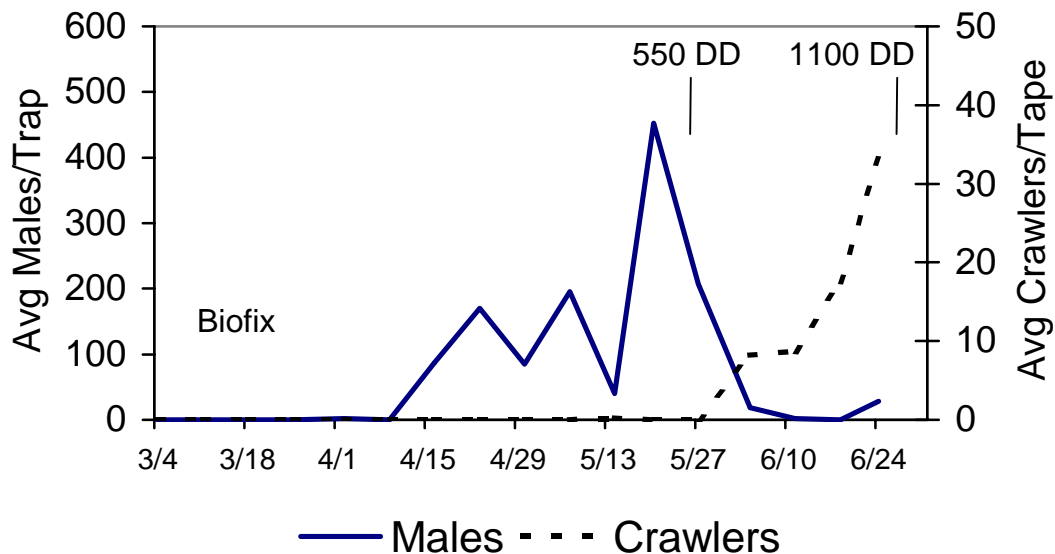
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California Red Scale

Now that temperatures have finally begun to warm up, we are seeing California red scale development speed up. The second flight of males was predicted (based on degree day units) to begin the week of June 29. Second generation male scale have been captured on trap cards in Kern County and the warmer areas of Tulare County. At the same time, 1st generation crawlers are continuing to emerge due to the very prolonged cold period in early June, when eggs were developing inside the mature females. In Kern County, Craig Kallsen (Kern County Cooperative Extension) is still catching 40 scale crawlers per tape and at Lindcove Research and Extension Center in Exeter scale crawlers have reached their highest numbers (Figure 1). What this means is that we will soon be seeing overlap of two generations with all stages of scale present on the twigs, leaves, and fruit. This overlap is good for biological control because parasites need to have 2nd and 3rd instar scale present at all times for parasitism. However, this overlap makes chemical control more difficult because the older instars are harder to kill with most of the insecticides. When the crawlers all emerge at once, it is easy to spray them all at once when they settle down and form white caps. When the crawlers emerge gradually over many weeks (as they are now) it is difficult to know when to spray them. For those of you who have sprayed Knack or Applaud, do not expect to see dead whitecaps immediately after the spray is applied. These insecticides kill the scale when they molt and so crawlers will continue to emerge and scale will continue to grow for a while before they die. You should wait 30 days before you try to decide if the insecticides killed the scale.

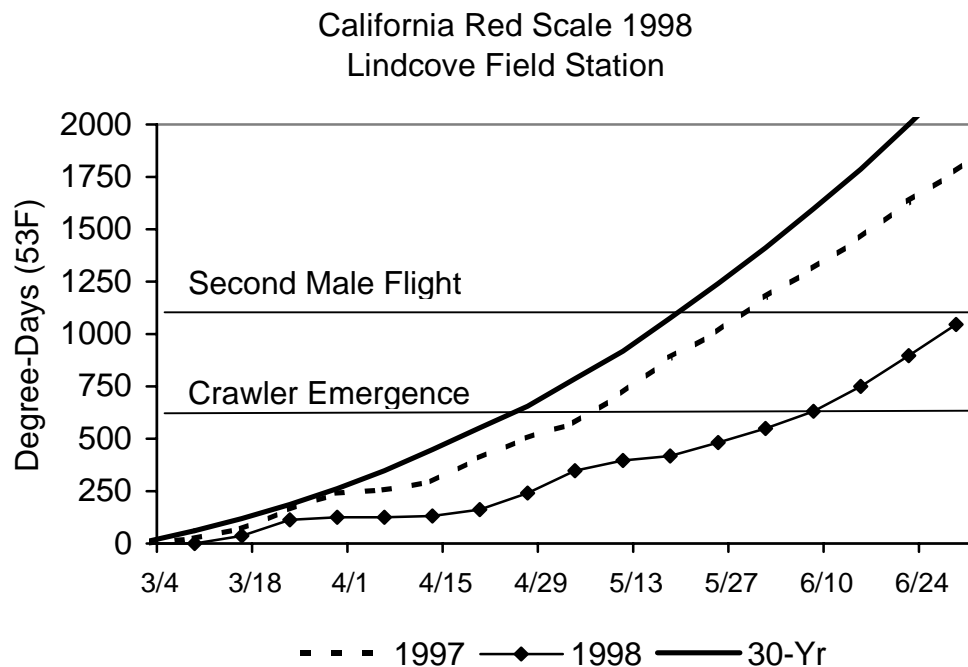
Fig. 1

California Red Scale 1998
Lindcove Field Station



Although the weather seems nice and warm, temperatures remain cooler than average and development of both insects and the trees continues to be severely affected. In 1997, we were well into the second generation of crawler emergence on this date, and in 1998 we are only just now seeing the second male flight begin. Figure 2 shows the difference between last year, this year and the thirty year average degree-day accumulations. Even with an extraordinarily hot summer, development of the trees and insects will most likely be three to four weeks behind last year.

Fig. 2



Cottony-Cushion Scale

Cottony Cushion scale is usually kept under control in San Joaquin Valley citrus orchards by a type of ladybug called the Vedalia beetle. This beetle is a voracious predator of cottony-cushion scale. There is no commercial source of Vedalia beetles, but they occur naturally and can be moved by hand between citrus orchards. They are easily seen with a hand lens and look like a small red larvae crawling over the white cottony-cushion scale, or like a black and red beetle. One of our concerns this year is that the Knack® and Applaud® treatments applied for California red scale are quite toxic to these predatory beetles. In other countries, cottony cushion scale outbreaks have been observed when these pesticides have been used for California red scale control. If your citrus orchard has a noticeable cottony cushion scale population, then the Applaud® or an organophosphate insecticide would be toxic to the beetles for a shorter period of time than the Knack®. If these pesticides cause an outbreak of cottony cushion scale, we do not have any good chemical alternatives for cottony cushion scale control. Thus, the best way to control cottony cushion scale is to avoid outbreaks. Outbreaks may result from removal of Vedalia beetle by single applications of Applaud® or Knack® or by multiple applications of organophosphate, carbamate, and pyrethroid insecticides used for citrus thrips and California red scale control.

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