Mites at hull split continued.....

PCAs should also take into account additional information such as drought stress to the trees and mite history within the block. At hull split it is also wise to adapt the thresholds a little to consider that hull split may be the last opportunity to get into the field and spray before harvest begins.

Choosing a miticide

There are several miticides to choose from at hull split. The most commonly used include Envidor, Fujimite, Acramite, Zeal, and Omite. Each of these products can do well at hull split, depending on what you want to accomplish. It is also important to remember that 415 Oil is, by itself, a miticide. Use rates of 1% by volume with other miticides or insecticides will assist in mite control. Use rates of 2% can be very effective at suppressing mite populations while maintaining biological control organisms.

In three years of UC trials in Kern County, Fujimite and Envidor provided the best overall control at hull split (Table 1). Plots treated with these products either did not, or rarely had mite populations return to pretreatment levels for the duration of the trial. Pros and cons are that Fujimite acts very quickly and has long residual, but is highly toxic to predatory mites. Envidor has long residual and is safer on predatory mites, but takes longer to work. Acramite and Zeal also provided excellent knockdown of mites for a period of three to four weeks. Both products work quickly and are safe to predatory insects, though Zeal is highly toxic to predatory mites. Omite also continues to be an option, though its use decreases each year due to the availability of the reduced-risk miticides that were previously described.

Table 1. Affects of hull-split sprays on residual control of spider mites in large scale field trials in Kern County, 2006-2008.

Treatment[1]	Days after treatment to return to an average of 1 mite per leaf			Days after treatment to return to an average of 2 mites per leaf		
	2006	2007	2008	2006	2007	2008
Fujimite	28	30+	58+	34+	30+	58+
Envidor	29	30+	58	32	30+	58+
Acramite	15	30+	35	19	30+	45
Zeal	22	21	36	25	30	42
Kanemite	10	NT[2]	22	17	NT[2]	35
2% Oil	NT[2]	11	38	NT[2]	17	45

[1]Most treatments were made with the addition of 1% 415 oil at a water volume of 200 GPA.
[2]Not evaluated in that year.

A Comparison of Several Methods for Controlling Pocket Gophers

Roger A. Baldwin, UC Wildlife Pest Management Advisor, Kearney Agricultural Center

Pocket gophers (*Thomomys* spp.) cause extensive damage to many crops throughout California. Many tools are available for controlling gophers including trapping, fumigation with aluminum phosphide, poison baits, and the use of a gas explosive device. Trapping gophers has been a common method for controlling gophers for many years. However, a new trap called the Gophinator (Trapline Products, Menlo Park, CA) is now available that may increase efficiency of trapping. Additionally, combining aluminum phosphide fumigation with trapping may increase effectiveness, as gophers will occasionally spring traps without getting captured. In these situations, gophers often become trap shy and are much more difficult to capture. Treating these tunnel systems with aluminum phosphide shortly after trapping could remove these individuals from the population thereby increasing gopher control in vineyards. Poison baiting with strychnine, zinc phosphide, and anticoagulant baits (e.g., chlorophacinone and diphacinone) has often been used to control gophers. Efficacy of these treatments has varied widely, although strychnine baits reportedly are most effective. Gas explosive devices have been used to control a number of burrowing animals, although no scientific

Pocket gophers continued.....

studies on gophers have been reported. These devices combust a mixture of propane and oxygen within tunnel systems, thereby killing gophers through concussive force while also destroying the burrow system. All of these methods are currently allowable techniques for controlling gophers in California, although the efficacy and efficiency of these approaches, particularly in comparison to one another, remain unclear.

To better address these issues, I established a replicated trial at Laguna Ranch, Sebastopol, CA, from 6 April – 8 May, 2009, to estimate the efficacy and efficiency of these approaches. Three study blocks were established ranging from 21–31 acres in size. Plots of all three treatment types (trapping + aluminum phosphide, baiting with strychnine, gas explosive device [Rodenator®]) and a control were established within each block. Based on absolute indices (number of sites with any gopher sign after treatment/number of sites with any gopher sign before treatment), Rodenator® control ranged from 0–55%, baiting control ranged from 30–56%, and trapping + fumigation ranged from 74–90%. Relative index values (number of gopher mounds and feeder holes after treatment/number of gopher mounds and feeder holes before treatment) mirrored absolute indices, with substantial reductions in gopher sign for all trapping + fumigation plots (range = 91–96%); only 2 of 3 baiting (range = 22–81%) and Rodenator® (range = 0–86%) plots indicated substantially reduced gopher sign. Index values did not differ for control plots for either absolute or relative indices. Therefore, observed differences within and across treatments did not appear to be an artifact of natural variation in gopher populations over the sampling period.

The time required to apply each treatment was relatively similar between baiting, trapping, and Rodenator® treatments (90–106 seconds); fumigation treatments were substantially longer (260 seconds). Approximate costs per acre for each treatment were $420 for baiting, $396 for the Rodenator®, and $252 for trapping + fumigation. Please note these values are higher than what would typically be observed as densities were at the highest levels recorded for gophers (>60 gophers/acre).

To be effective, control measures need to result in a minimum of a 70% reduction in plots with gopher activity; values of 80–90% are preferable. Trapping + fumigation met this minimum criterion in all three plots, and met the more rigorous criterion in 2 of 3 plots. Even the one plot that fell short of an 80% reduction in plots with gopher activity yielded a 92% reduction in overall gopher activity. In addition to being more efficacious, trapping + fumigation was also more cost effective. Therefore, trapping + fumigation appears to be an effective method for controlling gophers. Baiting and Rodenator® treatments did somewhat reduce gopher activity in most plots, but these levels of control fell well below the minimum threshold for effectiveness (70%). As such, growers may realize short-term benefits from control, but will have to apply equal effort for control the following year. More effective control measures (80–90%) should reduce the cost of control in subsequent years.

Although absolute values were lower than desired for baiting and Rodenator® treatments, relative index values indicated a substantial reduction in gopher activity for 2 of 3 plots for both baiting and Rodenator® treatments. Therefore, an additional round of treatments could have resulted in greater absolute control values, although additional treatments would add additional costs to control efforts. This is of note, as baiting, and in particular, Rodenator®, treatments have the potential for slowing reinvasion rates due to the destruction of gopher burrow systems by the Rodenator®, and due to residual bait remaining in vacated gopher tunnel systems. However, given that these treatment types were already more costly than trapping + fumigation, a relatively high reduction in reinvasion rates would be required to offset these costs. These reinvasion rates are being assessed, although presently trapping + fumigation appears to be the most effective and efficient method for gopher control.

Pocket gopher