

September/October 1997

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*Efficacy Hearing  
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USDA Varroa Samples*

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Efficacy Hearing

In July, the California Department of Pesticide Regulation announced its intent to change regulations concerning the requirement for efficacy data for pesticide products used in production agriculture. Instead, it was argued, the market place would provide adequate controls on performance. If a new product worked, it would sell. If not, it wouldn't. This is a form of "Let the buyer beware." It is also similar to a lot of our unregistered mite control alternatives.

Both USEPA and DPR expect applicants to have data assuring themselves that the pesticide works. This data is to be made available upon demand, but not included with the application package.

A request was made for a public hearing on the issue (the request was subsequently withdrawn). But DPR decided to hold a hearing on the topic at 1:00 pm, on Thursday, October 30th, in Room 215, Legislative Office Building, 1020 "N" Street, Sacramento.

If you feel strongly about this issue, please plan to attend the hearing. Arrive early enough to sign the speaker's list. If you can't attend the hearing but wish to have input. You can e-mail your opinions to: [dpr97008@cdpr.ca.gov](mailto:dpr97008@cdpr.ca.gov) or mail them to Ms. Ann Prichard, Senior Environmental Research Scientist, Pesticide Registration Branch, 1020 "N" Street, Room 332, Sacramento, CA 95814-5624.

Avoiding Resistance

Dr. Karen Robb, Floriculture and Nursery Crops Farm Advisor in San Diego County, developed this information for greenhouse growers, but the fundamentals hold for orchards, row crops, and bee hives.

"In the past five years or so, growers have experienced a paucity of effective materials. Insecticide resistance has had a significant impact on this situation. Increasing public concern regarding worker and environmental safety have played a role. The re-registration process has affected availability and use, as has the increasing reluctance of chemical companies to obtain registrations

for ornamental use due to their high value and high liability.

As a result, pesticide use in greenhouses has changed dramatically in the last 20 years. Twenty years ago growers had a large arsenal of effective compounds, which were generally applied on a calendar basis for worry-free (and pretty much thought-free) pest control. These pesticides were primarily broad spectrum materials with long residual activity.

Long residual, broad spectrum pesticides are no longer considered acceptable.

Pesticides in the future will need to be 'reduced' risk pesticides and will have the following characteristics:

- low toxicity to mammals and fish
- short residual
- minimal risk to worker health and safety
- safety to non-target organisms
- environmental compatibility (no ground or surface water contamination)
- disposable/recyclable packaging

The exciting news is that many new products have been brought to development in the last two years, exceeding the total number of new products considered for development over the last ten years!

What are some of these 'softer' or new materials that will and are being used?

### Insect Growth Regulators

These materials interrupt development and so are only lethal to immature insects. It is important to know which type of IGR is being used in order to evaluate its effectiveness, since these materials do not all work

in the same way. Certain IGRs are Juvenile Hormone Mimics, such as Precision and Logic, and do not kill the insect until the final molt. This can lead to the erroneous perception that the material is not working. Chitin Synthesis Inhibitors, such as Dimilin and Applaud, do not exert their influence until the target insect is ready to molt, whereas Ecdysone Inhibitors, such as Confirm and Mimic, lead to a premature molt.

### Botanical Insecticides

Botanical insecticides have been extracted from plants. Botanicals may have either broad-spectrum activity or activity against a few specific pests. Some of the best known botanicals include pyrethrum (extracted from chrysanthemum), nicotine (extracted from tobacco), and Azadirachtin (extracted from the seed of the neem tree). Another botanical which is being evaluated for use is the sugar ester of Nicotiana gossei. Botanical insecticides tend to have short residuals and tend to be compatible with natural enemies and IPM.

### Biological Insecticides

Biological insecticides are insect pathogens/natural enemies that have been formulated for application via conventional insecticide methods. The bacterium, Bacillus thuringiensis, has been registered for use in greenhouses for several years and is effective on worm pests. Nematodes are another example of a natural enemy that is commercially available.

The toxic component of micro-bials is often a toxin produced by the microbial and not the microbial itself. Avermectins

are a novel class of insecticides which are a mixture of natural products produced by a soil fungus, Streptomyces avermitillis.

Abamectin, a material in this class, has been widely used in greenhouses for control of mites, leafminers and thrips.

There are several fungi and viruses currently being researched for possible use in greenhouses, some of which are already registered for use on other crops. Insect-pathogenic fungi might be the most promising group of micro-bials. Two of these fungi include Beauvaria bassiana and Paecilomyces fumosorensis. Both of these fungi bore into the cuticle and develop in the host; both are effective on whiteflies and have potential against other pests.

#### Novel Pesticides

Many chemical companies have placed emphasis on developing novel pesticide chemistries with low mammalian toxicity, safety to the environment and compatibility with natural enemies. Three new types of materials are nitromethylene, pyrazole and pyridazinone pesticides. Marathon is a nitromethylene insecticide. This material is primarily a systemic and it is active on sucking insects. Pyrazole insecticides are active on mites, sucking insects and other insects, including the beet armyworm. Pyrazoles exhibit translaminar, not systemic movement and affect electron transport in the pest. Pyridazinone insecticides are active against mites and sucking insects. These insecticides provide a rapid knock-down and long residual

activity and work best at moderate temperatures.

Now that so many new materials are on the horizon, it may be tempting to give a sigh of relief and return to pesticide use patterns of 20 years ago, i.e. calendar sprays of a material until it is no longer effective. Wrong! Resistance to Marathon, as a result of improper use, has already been documented in Europe. It is imperative that growers utilize good IPM and resistance management strategies to prolong the effective life of all pesticides.

Greenhouse growers have little control over some of the factors affecting resistance development, such as short generation time of pest insects, continuous source of suitable plant material and the ideal environmental conditions for pest breeding found in greenhouses. However, factors such as chemical choice, rate and rotation, application frequency and method, the use of pesticide alternatives, can be controlled.

One strategy which has been suggested is called the 'low dose strategy'. The basic premise of the strategy is that a lower dose may provide adequate pest control but still allow some susceptible individuals to survive the application. The first resistant individuals in a pest population are often not as fit as susceptible insects and the susceptible insects are able to outcompete the resistant individuals. The surviving susceptible insects may also breed with resistant individuals and thus delay resistance development. Several tests have shown that pesticide applications can be reduced 1/2 or 2/3 and still pro-

vide the same level of control.  
Thus, using the low dose strategy  
reduces insecticide costs and may  
retard resistance development.  
(continued on page 7)





Insecticide rotation is probably the most commonly used resistance management strategy currently utilized. To be effective, pesticides used in rotation should have different modes of action. The number of individuals resistant to the first material will then become rare when a second material is used.

The interval before switching may vary for each pest, but a class of chemical should be used for at least as long as the time required for development of one generation of the target pest; many researchers feel that growers should wait for the time required for two generations to develop before switching chemical classes.

Different application methods, targeted toward different life stages, may also help to retard resistance development. For example, fogs are directed primarily against adult insects while systemic and foliar applied insecticides are usually aimed at immature insects.

A commonly overlooked strategy in insecticide resistance management is the use of non-chemical pest control strategies. These do not contribute to the development of resistance and insects cannot become resistant to these control measures. Non-chemical control strategies include the use of screening to exclude insects, soil sterilization between crops, weed control in and around greenhouses and the use of natural enemies for pest control.

In summary, general guidelines which growers can use to help retard insecticide resistance development include:

- Avoid unnecessary pesticide applications.

- Use the lowest pesticide rate which still provides adequate control.
- Rotate insecticides from classes with different modes of action. Use an insecticide class for at least the time required for one generation of the target pest.
- Alternate application methods whenever possible.
- Practice good integrated pest management strategies, emphasizing the use of **non-chemical control strategies.**"

#### Wear your Veil!

Long time beekeeper and bee-keeping instructor Randy Oliver wrote this reminder in the July, 1997, issue of the Nevada County Beekeeper's Association newsletter, Local Buzz.

"I had an unusual stinging incident the other day. I was setting up cell builders and not wearing a veil (remember, do as I say, not as I do). A bee kamikazied right into my eye and zapped me good in the eyelid. I couldn't tell if I had scraped out the sting, so I ran over to the truck rear view mirror (this is a good idea any time you get a painful facial or ear sting that you can't see). Sure enough, there was a stinger buried to the hilt smack dab in the middle of the eyelid. I quickly scraped it out, but immediately afterward felt an intense burning on my eyeball. The dang stinger had penetrated all the way through the lid, and squirted poison out the other side right onto my eyeball. It burned like a sonofagun! I made for the house for some saline to wash it out, but actually got dizzy and had to sit down for a minute. By the

time I got to the house, my eyeball looked like a marachino cherry. I'm glad I wear contact lenses--it probably saved me from a scratched cornea. After washing out the venom, I was able to return to bee work, but I did put on my veil. Luckily I don't swell much anymore, and my eye returned almost to normal in a few hours **OUCH!!!!**

Side note: my three year old, Connor, got a little sting below the eye the same day, but the whole side of his face swelled up in a normal reaction and made him into a temporary cyclops the next day. Connor, like most

beekeepers, was back with the bees in a few hours begging for a taste of honey from the comb."

Sincerely,

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