



# B-PLUS

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## RESISTANCE VS. RESISTANCE

Or to put it another way, the genetic race is on. What I am alluding to is the fact that varroa has shown some resistance to the chemical fluvalenate (Apistan®) in some areas of Italy. Sandoz, the chemical company that makes Apistan strips, has investigated the problem. The resistance is real and appears to be somewhat localized at the moment. They also found that the areas where the resistance was found, beekeepers often used fluvalenate by spraying the bees directly. This is not a label use even in Italy. The consequence of this use was a very powerful selection force that resulted in the quick buildup of resistance.

Other species of mites have had a long history of rapid buildup of resistance to pesticides. There are some types of mites that are resistant to several classes of chemicals and dozens of specific miticides. In many agricultural crops almost every generation of the mites is pressured by a pesticide. The mites also have many generations per year so it may be only three or four years before the chemicals no longer do the job. An early solution to partial resistance is to increase the dose level. This increase is the amount of chemical only delays the final collapse of the pesticide, and may lead to a higher level of resistance.

In our treatment of varroa with Apistan® strips we do not generally treat every generation. The factor of not treating every generation may be a good reason to remove the strips in the fall after treatment. (The other more compelling reason is the buildup of poisons in the beeswax.)

The buildup of chemical resistance is a result of “un-natural” selection. I say un-natural only because it is provided by humans. It is very powerful selection none the less. Once the genes for this resistance are fixed in the population they often do not change very easily. Even if you remove the chemical from use for a period the loss of these genes is very slow. For example, years ago I tested some house flies for resistance to DDT. The population of flies had not been exposed to DDT for about 20 years. Yet they were almost as resistant as they were when we stopped using the insecticide on flies. If the genes responsible for resistance are more detrimental

if the chemical is not being used, then reversion to susceptible may occur. Often once the mites become resistant to one chemical they develop resistance to another even more rapidly. This is because they often use the same method of attack on the pesticide (enzymes, etc.) for the new chemical.

This brings us to the other type of genetic resistance. That is, the ability of the honey bee to eliminate, reduce, co-exist, or otherwise live with the pest. This type of resistance will happen! It is just a matter of time and the selection pressure. *Varroa jacobsoni* and the European honey bee, *Apis mellifera* have only lived together for about 50 years. Thus, the host-parasite relationship is not very well established. You could say that varroa is not a very good parasite since it kills its host (the colony). If it kills its host then it also dies, unless when the colony collapses bees with varroa attached move to another colony. However, in time, honey bees and varroa will come into a better equilibrium.

What we want to do is speed up this selection process. Such that bees can survive with a small number of mites, still produce honey, and live through a winter. We now know that there are four or five mechanisms that some bees and/or colonies use to eliminate or reduce the effect of the mites. We just need to push this selection pressure so that it happens in our lifetime.

If you want to wager on the selection battle, I suggest you take the side of chemical resistance will come first. I would like to think that would not be true, but I also think I am a realist with past history. Thus anything you can do to slow down the development of chemical resistance by varroa so much the better. First, use the chemicals as directed by the label. If we get a second miticide registered (formic acid?) it would be best if these would be alternated from one year to the next. Then if you have any colonies that seem to have survived without any treatments, use these colonies to raise queens to re-queen all of your other colonies.