"We have only one person to blame, and that's each other."

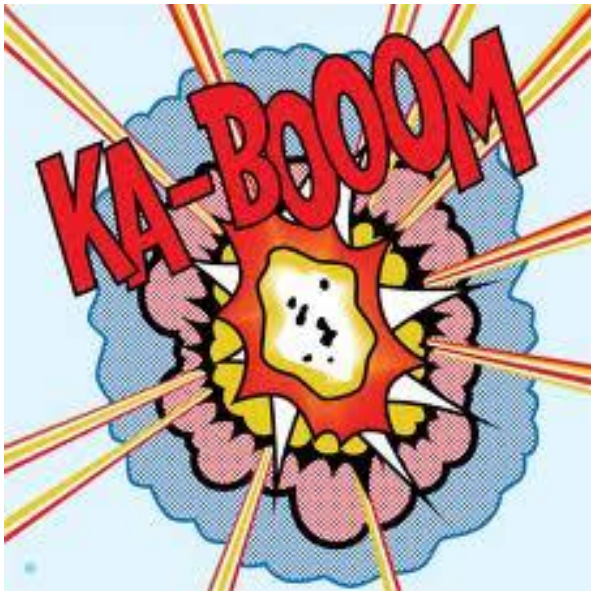
— Barry Beck

It wasn't long ago that I felt I could keep Varroa mites under control fairly easily. I would apply an effective, legally-approved miticide (e.g. Apiguard or MiteAway Quick Strips/Formic Pro) in August so that I would have healthy mite-free nurse bees to raise my mite-free overwintering bees. The next spring my colonies were reasonably clear of mites and wouldn't require treatment until the following August. Maybe some of this was wishful thinking but regardless, the reality I face now is markedly different, and I hear the same lament from other beekeepers in our region.

In recent years I've become more diligent in conducting Varroa mite assessments. Partly this is because as a beekeeping instructor, I feel a bit hypocritical when I insist that my students monitor their mite levels if I don't do it myself. I admit that I am often like Papa Berenstain Bear: "Do as I say and not as I do."

What I have found lately are two related and alarming issues. First, my early-spring mite counts are often unacceptably high, sometimes well over the 2% threshold proposed by the Honey Bee Health Coalition. Second, after treating in August, my mite counts in late September/October are often high again. Obviously this leads to the high spring counts that I've witnessed. As a result, for the past few years I've had no choice but to apply mite treatments in early spring (MiteAway Quick Strips/Formic Pro are excellent choices at that time of year), in August (Apiguard is a great option) and even in October.

What has happened? One knee-jerk reaction is to assume that the mite treatments just aren't good anymore. However the evidence in academic literature and reports from other beekeepers just don't support that theory.[1] Another possibility is that I've



What happens when Varroa mite and virus levels reach the point where a colony cannot survive any longer? The colony is robbed out and any survivors drift to other colonies in the area. The result can be an explosion in the mite population of neighboring hives.

forgotten how to use the products correctly. Since I faithfully refer to and follow the manufacturer's instructions, that explanation doesn't seem likely.

So what can cause a "clean" colony in August to be seriously infested again in October? As it turns out, this phenomenon has been studied by Gloria DeGrandi-Hoffman (USDA-ARS)[2] and others. Research has shown that when Varroa mite loads increase in a colony and that colony weakens, it becomes more receptive to drifting foragers. The colony's mites hitch rides on these drifting bees. (Did you think that mites only ride on nurse bees? That simply isn't true.) Furthermore, when the

[1] For example, see Gracia MJ, Moreno C, Ferrer M, Sanz A, Peribáñez MÁ, Estrada R (2017) "Field efficacy of acaricides against *Varroa destructor*" PLoS ONE 12(2): e0171633. https://doi.org/10.1371/journal.pone.0171633

[2] DeGrandi-Hoffman, G., Ahumada, F., Zazueta, V., Chambers, M., Hidalgo, G., & deJong, E. W. (2016). "Population growth of Varroa destructor (Acari: Varroidae) in honey bee colonies is affected by the number of foragers with mites" Experimental & Applied Acarology, 69, 21–34. http://doi.org/10.1007/s10493-016-0022-9

infested colony weakens to the point it cannot properly defend itself, it is often robbed out. The mites eagerly attach to the robbers and, like little Trojan horses, the robbers carry them back to their own hives.[3] Then when the colony inevitably collapses, the survivors scatter across the countryside and, with their mites, find new homes in receptive colonies.

On top of all that, research has shown that Varroa mites easily transfer from bee to bee on flowers, so when a colony is so infested that mites are on lots of foragers, they can easily spread that way.[4] Given all of these Ninja tactics designed with the sole purpose of dispersing its species far and wide, it is no mystery that the Varroa mite was able to spread across the entire United States in literally just a few months.

Colonies that build up large bee and mite populations only to collapse and spread their mites to neighboring hives are called "mite bombs." They may look perfectly innocent, even thriving, as the mite pressure builds and builds. Then ka-boom! The colony collapses and the mites scatter to greener pastures attached to the refugee bees. This may sound farfetched but the effect has been scientifically quantified in the references I've cited. It also provides a well-fitting explanation to what many of us have observed in recent years.

What does it take to get bombed? First, there must be other hives within a couple of miles of your apiary. As I mentioned last month, with the explosive rise in popularity of beekeeping in the past decade, most of us probably have many more beekeepers within flight range than we are even aware of. Second, those hives must be poorly managed with regard to Varroa mites. Note that I said "managed"; they may be "treated" but if they aren't treated at the right time with a product appropriate for the situation then they aren't being adequately "managed". (See April 2018's "What's the Deal with Oxalic Acid, Part Two" for an example.)

What can we do to protect ourselves from mite bombs? They probably cannot be prevented since we have little to no control over honey bee colonies that aren't our own. However simply knowing that this is a problem in the fall is a start. We cannot be complacent; we must monitor mite levels, treat if needed, then monitor again and treat again if warranted. One strategy that appears to work well is to treat with an effective miticide such as Apiguard, MiteAway Quick Strips/Formic Pro or ApiVar at the "usual time" (August/September), then follow that with a "clean up" oxalic acid treatment in December when the colony is broodless. Not only is a broodless period the only time that an established colony can be effectively treated with oxalic acid, that is the only time that it is legal to do so.

Also remember that a reasonably effective treatment, properly applied, still doesn't get rid of 100.000% of mites. If, say, you have a 15% mite infestation and you kill 80% of them, that's not a bad kill ratio. But it still leaves a 3% infestation, which is dangerously high. This is another reason to abandon the notion that once we take action we are done. We must monitor periodically to determine where we stand at any given moment.

The last thing we can do, which should really be the first, is to educate and encourage other beekeepers in our area to be "mite aware" and genuinely control their mite problem. That's the only way that we can keep mite bombs from invading our hives – stop them at their source. September 2018's "Mentoring as a Defensive Strategy" talks more about this.

I'm sorry to say that I don't have much more advice than this for you. Stay vigilant, strive to be a part of the solution rather than a

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[3] Forfert N, Natsopoulou ME, Frey E, Rosenkranz P, Paxton RJ, Moritz RFA (2015) "Parasites and Pathogens of the Honeybee (Apis mellifera) and Their Influence on Inter-Colonial Transmission", PLoS ONE 10(10): e0140337. https://doi.org/10.1371/journal.pone.0140337

[4] Peck DT, Smith ML, Seeley TD (2016) "*Varroa destructor* Mites Can Nimbly Climb from Flowers onto Foraging Honey Bees", PLoS ONE 11(12): e0167798. https://doi.org/10.1371/journal.pone.0167798

part of the problem and hope for the best while planning for the worst. It's likely that the war may never be over but our bees can survive!

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Recommended treatment thresholds by colony phase (% of Varroa mites per 100 adult bees)

Colony Phase	Acceptable Further control not needed	Danger Control promptly
Dormant with brood	<1%	>2%
Dormant without brood	<1%	>3%
Population Increase	<1%	>2-3%
Peak Population	<2%	>3%
Population Decrease	<2%	>2-3%

***Acceptable**: Current mite populations are not an immediate threat.*

***Caution**: Mite population is reaching levels that may soon cause damage; non-chemical control might be employed while chemical control may be needed within a month; continue to sample and be prepared to intervene.*

***Danger**: Colony loss is likely unless the beekeeper controls Varroa immediately.*

Source: Honey Bee Health Coalition, Tools for Varroa Management, 7th Edition (2018)
https://honeybeehealthcoalition.org/varroa/