

# Sugar Dusting for Varroa Mite Control

Following is a posting that was made by Jim Fischer to BEE-L regarding the application of powdered sugar to honeybee colonies to mitigate the infestation of varroa mites. Jim is elaborating on the original concept as developed by Dr. Kamran Fakhimzadeh (<http://tinyurl.com/3t8vfqn>) of the University of Helsinki, Finland, and detailed by him in the June 2000 issue of the American Bee Journal.

## 1) What The Heck IS "Sugar-Dusting", Anyway?

It is a technique that Dr. Fakhimzadeh proposed as a part of his Doctoral work. He published it in the journals listed above. I tried it. It works for me. Your mileage may vary, but as a card-carrying scientist (sorry, physics, not entomology), I can state that I have done my best to "reproduce" his results, and I feel that I can confirm and endorse his findings. (Heck, I'd nominate him for an award if the beekeeping community had any serious awards - the results are that good.)

The idea is simple. When varroa fall down below a varroa screen, they don't crawl back up into the hive. Varroa have little "suction-cup" feet. Sugar particles that are around 5 microns in diameter clog up their little suction cups, and they can't hang onto things. They fall. They die. They don't live to reproduce. Therefore, dusting the backs of the bees will knock off some significant percentage of the mites, keeping the population "under the economic threshold". (Beg, borrow, or Xerox the ABJ article. Read the details for yourself.)

Given time, we may find that sugar dusting allows one to stop using (or at least skip a year of using) Apistan strips and other toxic stuff. I have nothing against the makers of chemicals, but one wants to have more than one weapon when one deals with a beastie like varroa, and this is both a cheap and effective non-toxic treatment.

## 2) Which Powdered Sugar To Use?

I do not think that 2% - 5% corn starch (found in Domino 10X and most other store brands) matters one bit. My reasoning is that one does not sugar-dust a hive until the warmer days, and there should be none of the problems that one might have with impurities in winter feed (dysentery). If the bees can fly, they can certainly avoid dysentery. But, just in case, try to find the *lowest* percentage of corn starch you can.

There are rumors of "pure" powdered sugar with zero corn starch (added to keep it from clumping up). I have yet to find any, but I have not looked further than my wife's pantry. (Yes, yet *another* opportunity to drive your long suffering spouse completely insane, this time by stealing her/his powdered sugar!)

## 3) How To Prep The Sugar?

If you read the articles, you find that VERY tiny sugar particles are what clog up the "suction cups" on the legs of the varroa mites. But how to insure that you "dust" a minimal amount of useless larger particles, when the optimal particle size is on the order of 5 microns?



This is what I do. It is far from "perfect", but it works, and requires no special equipment or skills:

- First, all sugar is sifted with a good-quality baking flour sifter. This removes the big lumps. One can simply dump the lumpy stuff back into the supply of sugar to be used in baking.
- Sift the sugar AGAIN, this time letting the sugar fall into a container that you can seal tightly against moisture.
- Do your sifting on a dry day. How dry? The driest possible. Mid-winter is a good time to do this, as heating systems tend to dry out the inside air. A day when you can get a shock from a doorknob is likely about the driest you can have.
- Add some rice to your sugar container to absorb humidity, and keep the sugar dry (Grandpa did it with his salt shaker...)
- Seal the container tightly (I use canning jars).
- Note that you are likely sifting sugar in a kitchen. Both the sifter and the kitchen may be "community property" under the law, but a wise beekeeper would do the sifting over the sink, and be sure to clean up after the sifting. I had one unfortunate accident involving a sifter, a bowl of sugar on a coffee table, a large dog, and an unexpected visit from the Fed-X delivery man, so *stay* in the kitchen. Listen to the game on the radio.

#### 4) How To Apply The Sugar To The Colony?

Since application of the sugar is the only "technique" one must master, I have messed with several different "varroa pistols", ranging from a bagpipe-like contraption to a foot-pump-driven monstrosity.

The lowest-cost (and perhaps overall best) approach would be to use a well-washed and dried baby-powder container, one with a cap that twists to reveal tiny holes. You open the twist-cap so that the holes are partly open, squeeze the plastic bottle sharply, and the result (with a little practice) should be a satisfying cloud of fine sugar particles.

With a little practice, you can perfect your "range" accuracy, and dust the bees without getting too much on the comb or frames.

If the tiny holes get plugged up, give the bottle a sharp thump to dislodge the clogs.

Now, you can remove frames, one at a time, give each side a few "poofs" of sugar, and replace them in the super or hive body. One hand holds the frame, and the other holds the baby-power container. Need two hands to pull that frame? Wear a carpenter's tool belt, and you have a "holster" for your varroa pistol and your hive tool.

There are some who have mentioned simply dusting the top bars rather than removing the frames, but the idea here is to do one's best to knock down all the adult varroa in the hive, so I have dusted every side of every frame (except those with open cells, on the grounds that the queen looks for "clean" cells [watch a queen sometime, she "inspects" every single cell before laying], and those cells that contain unsealed brood.)

Dr. Fakhimzadeh says that one need not be so careful, and that sugar *does not* have a negative effect on open brood or eggs. (Allen Dick recently pointed out that OTC dusted with sugar was claimed to be fatal to brood, and Dr. Fakhimzadeh stated that it is the OTC itself that can kill the brood, not the sugar.)

Regardless, I'd still try to avoid open cells ready for laying, since one does not want to slow down one's queen.

#### 5) I'm A Klutz - I'll Drop A Frame, Or Crush Bees!

Don't sweat it. Several of the bee suppliers sell a handy gizmo called a "frame hanger". It has two brackets that slide over the edge of a hive, and two arms that support several frames at a time, hanging them out where you can dust them. You can buy one, and use two hands to handle the frames at all times.

If you are a klutz, this will be a good way to get in the habit of developing skill, style, and panache in tearing down a hive, looking at comb, finding the queen, and other skills basic to "working with bees". Keep at it. You'll get better.

## 6) OK, I've Dusted My Hives - Now What?

I going to assume that you have a varroa screen, a slatted bottom board, or at least a sticky-board insert with a mesh cover. (If you don't, get one! Sugar dusting will not help if the mites can crawl onto another bee after their fall. Better yet, even when you are *not* sugar-dusting, quite a few mites will fall through a varroa screen.)

I use plain old "shelf paper", cut to the correct size, with the backing paper removed at the hive, and the shelf paper slid into the rear opening below the varroa screen *sticky side up*.

If you slide a fresh sheet in just before you do your dusting, you can get the most accurate "body count". There are many methods to count, and I am sure that some statistics expert will tear my head off, but I don't care how you count ("pick a few square inches", count all the varroa in a stripe across the sticky paper, whatever). But pick a method and *stick* with it, so your data is all based on the same "sampling technique".

When you sugar-dust, you should get more varroa on your sticky paper than you have *ever* seen before. More than you would see after 48 hours with varroa strips, more than with any chemical. From what I have seen, the only thing that would knock down more varroa would be a direct nuclear strike on the hive.

Remove that paper after a day or two, and replace it with a fresh sheet to count "falling survivors". You should see few on the second sheet, even after a week or two.

Why sticky paper at all? Well, if you are doing sugar rolls as a varroa detection method, you may choose to *not* use sticky paper, but I *like* seeing the actual results of the sugar dusting. Call me vindictive, but I laugh a maniacal laugh when I see a sticky sheet with lots of varroa. I laugh even more as I set the sticky paper on fire and drop it in a burn bucket. If you listen carefully, you can hear the little vampires scream.

Seriously, once a varroa falls down below the varroa screen, it will NOT crawl back up into the hive and onto a bee. They just are not that smart. The varroa will simply lie there and starve to death, waiting for a bee to come close enough to climb upon. One does not need the sticky paper. Several articles have addressed the effectiveness of varroa screens.

## 7) WHEN Do I Dust My Hives?

When you see "high enough" varroa counts as a result of a sugar roll or on a sticky paper placed under your varroa screen. (For instructions on how to do the sugar roll test, see <http://tinyurl.com/69gvrkq>, pointed out to the list by Mr. Aaron Morris).

But what's "high enough"? Well, you have to keep track, keep records, and develop a judgment about such things. I can't simply give you a number, since there is no single number that would work for all hives, and no two beekeepers are going to even "sugar shake" their bees the same way.

There is a trade-off here. One could sugar-dust a hive every week, but think of the impact on the productivity of the bees. Doing a complete tear-down of a hive is *very* disruptive. Better to tolerate a low varroa population for a while than to disrupt the hive so often. I would not dust more than once a month. (But one can do a sugar roll, or if you must, an ether roll as often as you wish.)

One is likely never going to see zero varroa during the summer, so if you see zero varroa, question your test methodology.

From what I have read, the varroa population, if left unchecked, starts to get out of hand in June, July, August, and September. Of course, if one sugar-dusts early, one could argue that one could stop the population growth before it starts. A military strategist would argue that one must do a second sugar-dusting just in time to get any mites that were sealed in brood cells when you did the first dusting. I dunno, I am just happy that I have an all-natural way to kill the majority of the mites that does not require removing the hive from the season's honey production.

### **8) I Have An Insecticide Duster - Can I Use It To Dust My Bees?**

You can use the same type of device, but I would buy a new one and mark it "Sugar Only", for obvious reasons.

### **9) I'm A Commercial Beekeeper, And Don't Have Time For This Nonsense Of Tearing Down Every Hive.**

OK, send me an e-mail (jfischer@supercollider.com), and I'll be happy to build and sell you the ultimate sugar dusting rig. I've got a Pratt and Whitney turbine engine from a Navy F-16 out in the barn that shows promise as a high capacity "whole hive" sugar duster. You could also use it to clean pollen if you had a football-field sized room in which to clean pollen.

### **10) Where Do We Pool Our Data?**

Good point. We should. Mites and diseases are forcing beekeeping to become much more of a "science" than an "art". "Science" means accurate records, archived in a central repository, and made available to all. I am open to suggestions on how we might standardize our "mite counts" to make such a data-collection effort worthwhile.

### **11) Where Do The Varroa Come From? How Do They Get In My Hives?**

I wish I knew. I wish I knew someone who knew. If you can find out where varroa come from, call me, so we can go napalm the place some Saturday night.

**Jim Fischer**  
Farmageddon  
May 25, 2001

### **Jim adds this post script on October 11, 2002**

If Bob Stevens (of Betterbee) and his team had gotten the quirks out of the "Formic Acid Gel Pack", I would have been using it rather than enduring all the extra work to use powdered sugar.

Given that the problems with the Formic Acid Gel Pack will not be solved this year or next, my eyes are now on Brushy Mountain Bee Farm, who will be offering a USA version of "Api-Life VAR". Alternating Api-Life with Apistan in alternate years should do the trick, and not result in "resistance".