

Varroa Management Without the Use of Chemicals

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Alternative methods to mite control

🐝 “One fist of iron the other of steel if the right one don't get you the left one will”

🍯 Powdered sugar dusting

🍯 Drone traps

🐝 Oxalic acid

🍯 Dripplle

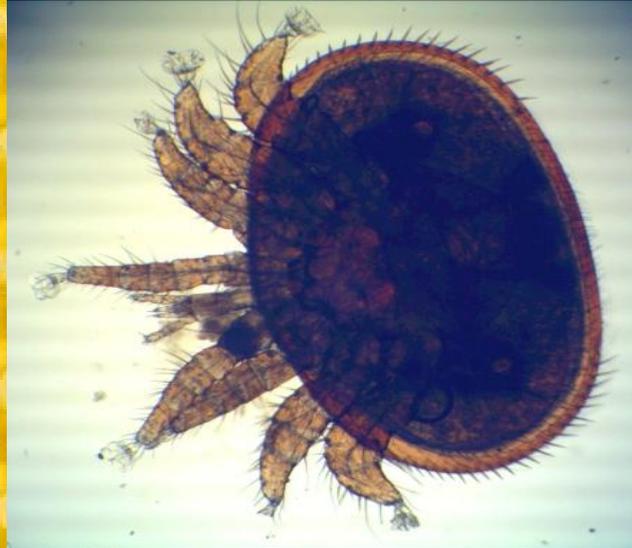
🍯 Vaporizing

🌸 Passive

🌸 Active



What is the Varroa Mite and what does it look like?

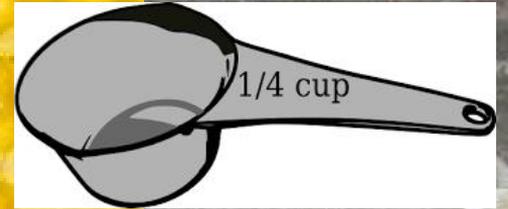


What is the Varroa Mite and what does it look like?



Do a sugar roll test to determine mite population

- 🐝 Take bees from 3-5 frames
- 🐝 You want 100-200 bees [x]
- 🐝 1 fluid oz = about 100 bees
- 🐝 $\frac{1}{4}$ cup = about 200 bees
- 🐝 Shake or brush bees into a container
- 🐝 Transfer in a jar with $\frac{1}{8}$ " hardware cloth lid
- 🐝 Add 2 Tablespoons of powdered sugar
- 🐝 Roll bees in jar until they are all coated
- 🐝 Let them rest for about a minute
- 🐝 Tip over jar and shake into white bucket.



Do a sugar roll test to determine mite population

- 🐝 Shake for 1 min.
- 🐝 Return the bees and sugar back to hive
- 🐝 Count the number of mites in the bucket
- 🐝 If there is brood in the colony double your number
- 🍯 For example if you count 5 mites/100 that would equal 10 mites/100
- 🐝 If there is 10 or more mites/100 you should consider treating !



Powdered Sugar Dusting

- One cup of very dry powdered sugar works well for a single or a double deep
- Sift the sugar over the frames to evenly cover bees
- Use a $\frac{3}{4}$ " wood frame affixed with some window screen
- The Scirocco sugar duster from Italy
- The powder sugar works by clogging up the mites sticky tarsal pad
- The powdered sugar does not kill the mites.



How effective is the powdered sugar method?

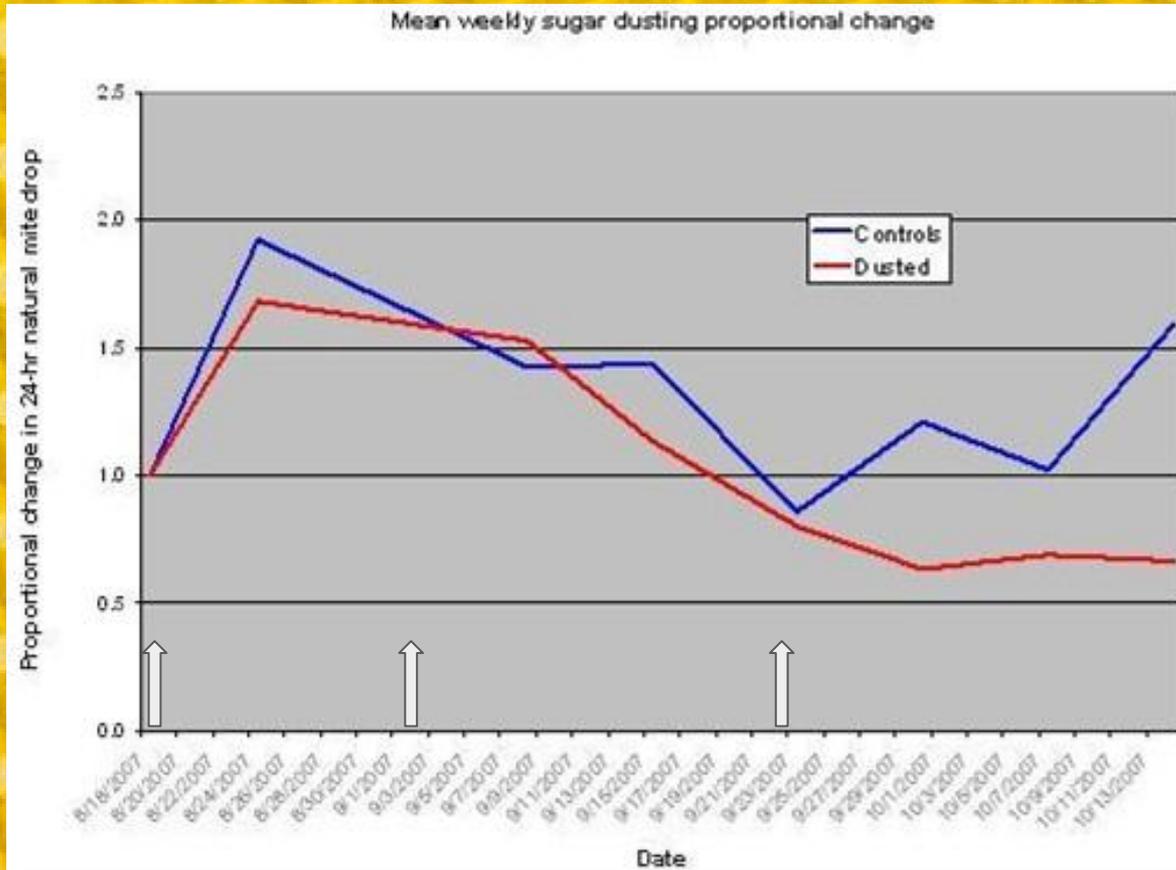
- 🐝 Estimated 50% of phoretic mites fall off per treatment
- 🐝 Reduces the population in broodless hives
- 🐝 Good on packages, nucs, and swarms
- 🐝 Get an idea of mite counts
- 🐝 Works good with bees that already demonstrate a Varroa sensitive hygiene like the Russian Honeybee.



How effective is the powdered sugar method?

-  By removing about $\frac{1}{2}$ the phoretic mites you decrease the competition of the remaining mites.
-  With higher mite counts multiple mites may infest a drone cell
-  Mite reproduction is lower in multiply cells
-  So one might argue that this may help mites reproduce more efficiently
-  Even weekly treatments would only keep mites at or slightly below initial levels
-  But it is most effective when used with drone traps.

Powdered Sugar Vs. Control



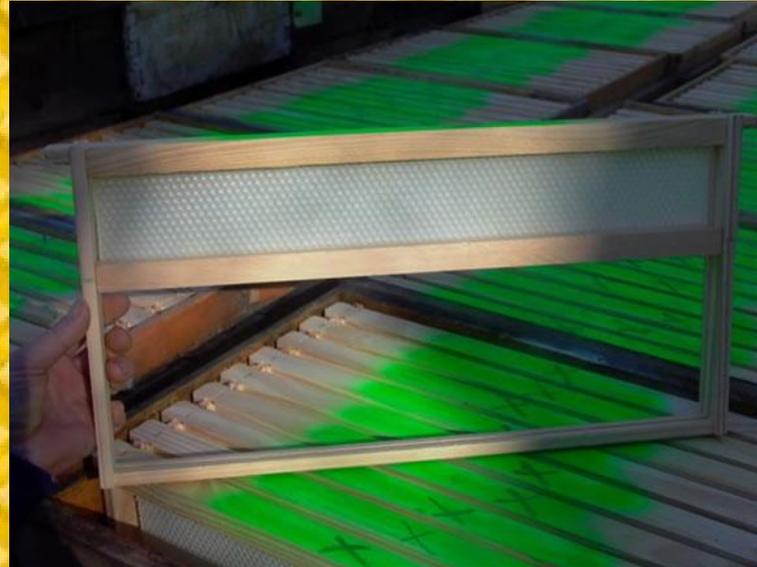
Drone Trapping

- 🐝 Drone trapping is the process of using drone comb to trap mites
- 🐝 The more popular drone trap is a plastic frame with drone size comb imprinted on the foundation ^[x]
- 🐝 Timing is everything
- 🐝 Fewer volunteer cells
- 🐝 One deep frame a month.



The Oliver Drone Trap

- 🐝 2" of foundation on top for honey stores
- 🐝 Forces the bees to build new foundation
- 🐝 Mites typically enter drone cells on the 8th or 9th day giving a 2 day trapping window
- 🐝 Remember remove in 4 weeks
- 🐝 Can stay in hive all year.



Why is drone trapping effective?

- 🐝 Mites prefer drone cell 10:1
- 🍯 Reproduce poorly in worker cells
- 🍯 Same amount of mites from 50-60 drone cell as you do from 1000 worker cells
- 🐝 Mites reproduce on a 10 day cycle
- 🐝 Drone emerge in 24 days
- 🐝 Workers 21 days
- 🐝 Drones capped after 11 days
- 🐝 Workers are capped after 9 days
- 🐝 Nurse bees frequent drone cells more often.



Cull your drone cells

- 🐝 Generally you only want about 4% drone comb_[x]
- 🐝 Just by reducing drone brood from 4% to 3% you would reduce mite population by 25%
- 🐝 Even bees with Varroa sensitive hygiene usually only remove infested worker pupae.

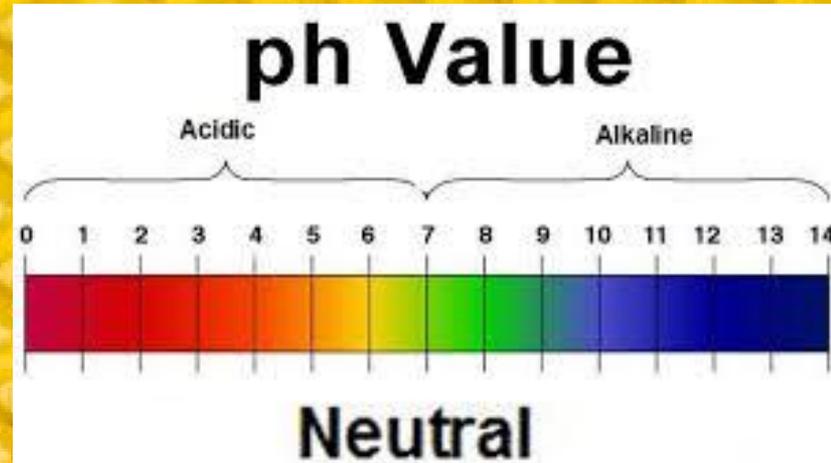


Oxalic Acid what is it ?

- 🐝 Oxalic is strange for an organic acid
- 🐝 Acts more like a mineral acid like sulfuric or hydrochloric
- 🐝 Other carboxylic acid, like acetic or citric are weak acids
- 🐝 Oxalic is about 10,000 times “stronger” than the acetic acid in vinegar

🐝 Ph of organic acids

🐝	Oxalic acid	3.00
🐝	Formic acid	3.47
🐝	Lactic acid	3.51
🐝	Ascorbic acid	3.59
🐝	Acetic acid	3.91



Oxalic Acid where does it come from?

🐝 Oxalic acid is derived from plants and vegetables

🐝 Contents of Oxalic acid in vegetables

🐝 Other foods containing Oxalic acid

☕ Coffee and tea

🥜 Nuts and seeds

🍫 Chocolate and berries

🍠 Sweet potatoes

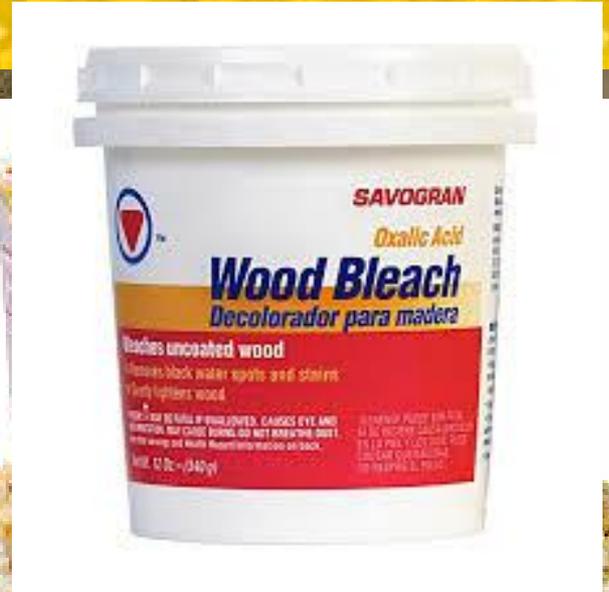
🍿 Popcorn.

🐝 We can get it at the hardware store

Oxalic acid content in selected vegetables

Vegetable	Oxalic acid (mg/100g)
Asparagus	0.13
Broccoli	0.19
Lettuce	0.59
Brussels sprouts	0.36
Collards	0.45
Beet leaves	0.61
Spinach	0.97 (0.32-1.26)
Purslane	1.31
Parsley	1.70

Rhubarb leaf	0.3-1.5 0.59-0.72
stalk	0.39 - 0.54



How safe is Oxalic Acid ?

- 🐝 Oxalic acids are 70 times more toxic to mite than they are to bees
- 🐝 Its part of our diet so we have a metabolism to deal with it
- 🐝 It's already in our honey so bees know how to deal with it as well
- 🐝 It is not lipid soluble
- 🐝 Treatments will not increase the concentration of it in the honey
- 🐝 Rhubarb leaves are poisonous.



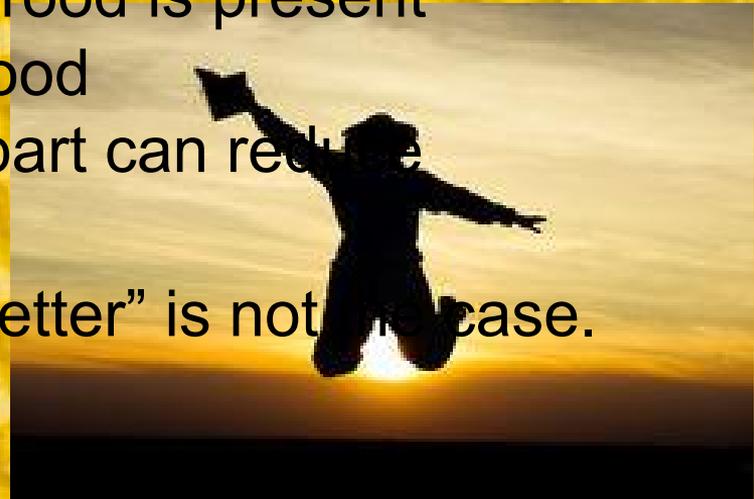
Treating with Oxalic Acid: Dribble method

- 🐝 Concentration of the Oxalic acid rather than the amount
- 🐝 35g of Oxalic acid into 1 liter of 50:50 syrup
- 🐝 Weigh the Oxalic acid instead of measuring by volume
- 🐝 Do not use hard water
- 🐝 Use hot water 150'
- 🐝 Apply 5ml per bee space or 50ml p
- 🐝 Using a 60ml syringe for accuracy
- 🐝 Using a garden sprayer.



Treating with Oxalic Acid: Dribble method

- 🐝 Fall/winter and Spring/Summer applications
- 🐝 Oxalic acid works best in broodless colonies
- 🍯 Treat only one time or you could harm the colony
- 🍯 You could expect a mite kill of 90%
- 🐝 Less effective in summer when brood is present
- 🐝 It does not kill the mites in the brood
- 🐝 3 multiple treatments 7-9 days apart can reduce mites 40-60%
- 🐝 “If a little is good more must be better” is not the case.



Dripple Method

Pros:

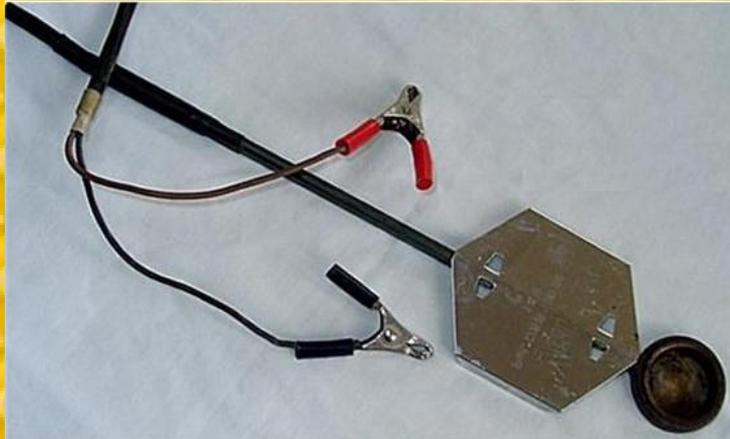
- 🌸 Good mite kill
- 🌸 No residues in honey
- 🌸 Inexpensive
- 🌸 Relatively safe to mix
- 🌸 Quick and easy to apply.

Cons:

- 🌸 Requires broodless colony
- 🌸 Applied accurately
- 🌸 Shouldn't be used more than once in fall/winter
- 🌸 You have to open the hive
- 🌸 May be some adult bee mortality due to ingestion
- 🌸 May cause suppression of brood development.

Treating with Oxalic Acid: Vaporization method

- 🐝 Oxalic acid is vaporized by heating it
- 🐝 There are 2 types of vaporizers
 - 🐝 Passive
 - 🐝 Active
- 🐝 Once vaporized it can be circulated throughout the colony
- 🐝 It then recrystallizes and attaches to all surfaces
- 🐝 Both units take the same dosage of 1-3 grams



Treating with Oxalic Acid: Vaporization method

- 🐝 To operate the passive unit
 - 🍯 Put measured amount into cooled vaporizer (1-3 g)(1/2t)
 - 🍯 Insert into hive entrance, and seal up openings
 - 🍯 Energizer unit with battery
 - 🍯 You'll notice vapor fog escaping
 - 🍯 After about 3 min you should be done.



Treating with Oxalic Acid: Vaporization method



To operate the active unit

- Put measured amount into cooled vaporizer (1-3 g)(1/2t)
- Energizer unit with battery
- Insert into hive entrance, and seal up openings
- Turn on heater switch and wait about 30sec
- Turn on fan switch
- You'll notice vapor fog escaping
- After about 3 min you should be done
- Don't forget to turn off both switches and let cool before the next hive.



Vaporization method

Pros:

- 🌸 Oxalic Acid Vaporization is over 96% effective
- 🌸 Organic treatment_[x]
- 🌸 Do not have to open
- 🌸 Can be done in winter
- 🌸 Less toxic to adult bees and brood
- 🌸 Can use multiple treatments.

Cons:

- 🌸 You have more chance to come in contact
- 🌸 The vapor is harmful
- 🌸 Risk of fire_[x]
- 🌸 Up front cost
- 🌸 Not effective against mites in brood.





HAPPY BEEKEEPING !