



4 • A • TREATMENT OF VARROA MITES ATTACHED ON ADULT BEES

Extra powdered sugar dusting

Sugar dusting is known more as a *Varroa* diagnostic method rather than as a treatment. It is considered as a complementary to other treatment methods.

Although sugar dusting can indeed cause a substantial proportion of the phoretic mites to drop off bees, in order to effectively manage *Varroa*, dusting requires more effort and weekly repetition. Based on the methodical experiments of Randy Oliver sugar dusting clearly causes a rapid drop of mites – most mites fall in the first hour, then the rate tapers off until it returns to baseline in about 24 hours. The method is much more efficient if applied in a single brood chamber than in doubles. During the brood rearing season, weekly sugar dusting would not be expected to substantially drop the mite population – at best it would hold it steady. However, at times when there is no brood present or in combination with heat treatment of capped brood frames, weekly dusting would be expected to accelerate the decline of the mite population.

It is a good way to quickly determine the level of mite infestation of a colony as it monitors virtually all bees in a colony, as opposed to just a sample of 300 bees. Removal of phoretic mites from the adult bees by using extra dry powdered sugar (*humidity can be avoided by adding about 20 % of rice flour and mix it with powdered sugar*) applied on the entire colony works well, but it is not “powerful” enough to remove enough mites. It has to be combined with the heat treatment of capped cells, in order to keep mites from eventually causing damage to the colonies. It is hard to image to apply this method for large scale apiaries due to frequency of its application, but for a small size apiaries, it is a method which can be well integrated into the whole concept of the annual plan.

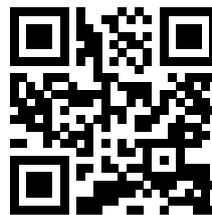


1ST STEP - POWDERING THROUGH THE MESH



2ND STEP - IT IS IMPORTANT TO GET THE SUGAR IN BETWEEN THE FRAMES

HOW TO APPLY POWDERED SUGAR DUSTING



Scan the QR code with your smartphone or enter the address in your browser.

<https://youtu.be/2lePAF54Zhk>

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4 · B · TREATMENT OF VARROA MITES ATTACHED ON ADULT BEES

Oxalic acid $C_2H_2O_4$

Although organic acids are permitted for use in the treatment of bees against *Varroa* mites, their negative effects on the honeybee colony may be similar to that of synthetic drugs.

Oxalic acid is absorbed through the skin, therefore the necessary precautions should be taken when handling it. The use of protective equipment is strongly recommended.

Oxalic acid remains in the colony for a relatively long time after its application and it has subliminal effects on honeybee colonies.

A variety of chemicals are used in treatments against *Varroa* mites, including organic acids and some fragrances such as thymol. The ultimate objective is to remove the mites attached on adult honeybees. In this section, we point out only a few negative effects that application of oxalic acid may have on honeybee colony.

The use of oxalic acid is used for more than 20 years. It is most commonly applied in control of *Varroa* mites between November and January, when there is no brood in the colony. Since oxalic acid is slowly transformed, it remains in the colony for a relatively long time, sometimes until spring. Therefore, several researches focus on both the lethal and sublethal effects of oxalic acid on honeybee colony, particularly on honeybees' longevity, their ability to learn, or the pH of their digestive system and hemolymph. Even with a low concentration (30–50 ml of 3.5% solution, corresponding to 175 micrograms/bee) of oxalic acid, and despite of an increase in hygienic behaviour of bees, it has been observed that there is a reduction in worker activity, a decrease in brood rearing activity and a decline in longevity.

Schneider, Eisenhardt et al. (2012), Papežikova (2016), Rademacher, et al. (2017), Gregorc, A. et al. (2018), Tihelka (2018), Diaz, del-Val et al. (2019) found that after treatment with oxalic acid there is a significant shortening of bee lifespan. Oxalic acid can reach the internal organs, alter the structure of microorganisms in the bee digestive tract, and affect the nervous system and consequently affect honeybees' learning ability.

When summarizing the known facts about the effects of oxalic acid on honeybees, then the effect of the substances used in combating the *Varroa* mites can lead to a significant colony damage if there is

even a low mite infestation. The application of oxalic acid may have long-term adverse effects on bee health as well as on beekeepers (namely, a formation of oxalate kidney stones and other diseases).

Other aspect to consider is the methods of application of oxalic acid. Most often it is the sublimation or dripping of bees with a solution of oxalic acid in sugar water, glycerine or other substances. Safety instructions should be followed in all applications because oxalic acid is a substance that dissolves in water and can pass through the skin of the body. According to the information that can be found in all chemical safety data sheets, the maximum permissible concentration in the working environment is 5 mg/m³. As a result, **always wear protective rubber gloves, a half mask with a filter, safety goggles and disposable work clothes.**

An increasing number of beekeepers are looking for chemical-free methods to control *Varroa* mites. A very efficient and safe method, such as hyperthermic (*thermal*) treatment of capped brood and the breeding of *Varroa* tolerant queen bees and colonies, can be already applied these days. It has been observed that more and more beekeepers around the world are becoming familiar with these new chemical-free methods, which is a pre-requisite for sustainability in beekeeping.

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4 • C • TREATMENT OF VARROA MITES ATTACHED ON ADULT BEES

Lactic acid $C_3H_6O_3$



In this section we explain the method of applying 15 % lactic acid against Varroa mites attached on the adult bees.

Mixing of 1 part of 80 % lactic acid and 4,33 parts distilled water will give us 5,33 parts of 15 % lactic acid. This concentration will be applied directly on the adult bees against the mites parasitizing on bees.

Example

So maybe you use 100 ml 80 % lactic acid and add 433 ml of distilled water to start with. Please be careful with the 80 % lactic acid – in any case always wear protection glasses and gloves. Pour the acid slowly into the water while stirring.

(NO ACID INTO WATER!)

You only mix as much as you need – not more since a 15 % lactic acid is not very stable. Lactic acid diluted is not a stable substance. Then once you have the 15 % lactic acid put it in a sprayer that can be adjusted. Make sure you set it to a very fine spray.

Then open the hive, get the first frame and spray bees left and right gently – only that they get a light mist do not water them heavily.

Then spray the next frame and so on. Once done you close the hive and clean the Varroa-tray. Within 2 days you will see a result. Do all the hives also the ones with the hand full of breeding cells. After 12 days you repeat the exercise since then bees in the closed breeding cells are for sure born and you catch the remaining mites.

Don't wait and do it. It takes a few minutes per hive. The advantage of the lactic acid in 15 % is that it is very mild and no problem to bees. On the contrary the oxalic acid is a contact poison that is also poisoning bees and you can only apply in one max. two times. With the lactic acid 15 % you can repeat the treatment without any problems to bees.

APPLICATION OF LACTIC ACID



Scan the QR code with your smartphone or enter the address in your browser.

<https://youtu.be/4aJ1z4hWFDg>