



3 VARROA MITE MONITORING METHODS USING THE ONE TOOL – VARROA EASY CHECK!



Alcohol wash



Sugar roll



CO₂ injection

VARROA EASYCHECK MONITORING GUIDE



--- WWW.VARROA-EASYCHECK.COM ---

Greetings,

This document is to help you become familiar with Varroa EasyCheck, and to answer the questions you may have regarding this monitoring tool. Not only will this document provide you with information on EasyCheck's use, but also information on the importance of varroa monitoring. Feel free to contact us for more information. We remain at your disposal to answer all your questions.

The Vétô-pharma team

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1. What are the benefits of monitoring my hives?

The objective of varroa monitoring is to prevent varroa infestation from reaching critically high levels which may lead to colony losses, and aid in decision making of varroa control strategies. The benefits of varroa monitoring are:

1. Aid in determining the best method & timing for varroa treatment



Help in answering questions such as:

- Use a “flash” or “slow-release” treatment?
- Should I “treat immediately or can I wait”?
- “Can I wait for the ideal temperature range for the treatment product that I have used in the past, or should I use a treatment that is not dependent on temperature”?
- “Is it necessary to treat in the spring before the beginning of the season”? Or between two honey flows”? Or both?

Varroa monitoring is an important tool for helping beekeepers **to decide when to treat colonies and to avoid fixed routines by adopting a realistic treatment program, based on varroa infestation levels in their colonies.**

By implementing a pre-planned treatment strategy based on not allowing varroa infestation to increase to critical points, versus reacting when they do, varroa monitoring can avoid or limit the damage caused by varroa.

2. Ensure that previous treatments have been successful

To properly assess a treatment’s efficacy, monitoring should be performed both BEFORE and AFTER treatment. Not just “AFTER”.

Varroa monitoring BEFORE treatment will aid you in knowing when to treat. Knowing pre-treatment mite loads will also provide you with information about what to expect from your mite treatment. The information you collect from post-treatment monitoring will aid you in assessing the efficacy of the end summer treatment. Your goal should be achieving a high efficacy of treatment, of at least 95%¹, which is a good minimum expected efficacy for a varroa treatment.



However, if your initial mite load was too high (i.e. 10,000 varroa mites per colony), then, based on the 95% efficacy, we should expect a high number of residual mites remaining in the hive at the end of the treatment (in this case, 500 mites). This relatively high remaining mite population after treatment can jeopardize successful overwintering and colony survival. In a case such as this, if you only estimated / counted the residual mites left in the hive after treatment, it would be easy to conclude that the applied treatment was not effective in reducing the varroa infestation level.

However, looking more closely, the treatment in this case resulted in the expected level of efficacy, but the high initial mite count leads to a “runaway effect”. **Had the initial mite counts been lower, 95% efficacy would have been enough to ensure successful overwintering of the colony.**

A high initial mite count prior to treatment (say 5-6 mites per 100 bees), indicates to beekeepers that a post-treatment monitoring of the infestation level as well as a colony evaluation are clearly called for.

Therefore, we must take into consideration that the initial number of mites will play a role in final efficacy.

¹ - Guideline on veterinary medicinal products controlling Varroa destructor parasitosis in bees (5.4. Evaluation of efficacy)
– https://www.ema.europa.eu/en/documents/scientific-guideline/guideline-veterinary-medicinal-products-controlling-varroa-destructor-parasitosis-bees_en.pdf

3. Limit the impact on your colonies' health => financial losses

By making the right decisions, beekeepers not only limit varroa damage to their colonies, **but also avoid financial losses**. Comparing the financial cost of doing a monitoring vs. the cost of losing the whole colony, the benefit is apparent.

Here are a few ways how varroa infestation can impact the health of your colonies, their activity, and eventually lead to their mortality:



Weakening of individual bees

Dramatically reduces bees' body mass (-11% to -18%)² and proteins (-27% to -50%)³



Decreasing bee activity

Disturbs the behavior and abilities of the bees (brood feeding: size of the hypopharyngeal glands -13% to -31%⁴, foraging, reproduction: sperm production⁵...)



Increased virus load

- Deformed Wing Virus (DWV) found in 60% to 90% of adult bees, and in 20% to 60% of pupae.⁶
- *Varroa destructor* could also be a vector of fungi⁷, such as *Ascosphaera apis*⁸



Lifespan reduction / mortalities

- Winter colony losses increase with higher levels of varroa mite infestation.
- Winter losses are very likely to occur with a natural mite fall of 3 mites per day in December.⁹

IMPACT ON HONEY PRODUCTION

Honey production is also reduced varroa infestations. A study conducted by the ADAMI, INRA and ITSAP (France) from 2009 to 2015 shows that at the beginning of the year, **a 3% infestation of phoretic varroa mites can cause an average production loss of 5 kg (11lbs) per hive/per year (from 1 to 13 kg [2 to 28 lbs] per hive depending on the year).**¹⁰



2 - KOTWAL S, ABROL DP (2009). Impact of Varroa destructor infestation on the body weight of developing honeybee brood and emerging adults. Pak. Entomol., 31, 67-70

3 - WEINBERG KP, MADEL G (1985). The influence of the mite Varroa jacobsoni OUD on the protein concentration and the haemolymph volume of the brood of worker bees and drones of the honey bee Apis mellifera L.. Apidologie, 16, 421-436.

4 - SCHNEIDER P, DRESCHER W (1987). Einfluss der Parasitierung durch die Milbe Varroa jacobsoni Oud. auf das Schlupfgewicht, die Gewichtsentwicklung, die Entwicklung der Hypopharynxdrüsen und die Lebensdauer von Apis mellifera L.. Apidologie, 18, 101-110.

5 - SCHNEIDER, P; DRESCHER, W; RATH, W (1988) Die Folgen eines unterschiedlich hohen Varroa-Befalls während der Puppenentwicklung auf die erwachsene Biene, Teil 2: Einfluss auf Gewicht, Verweildauer im Volk, Ausflugaktivität und Spermienzahl der Drohnen. Allgemeine Deutsche Imkerzeitung 22: 54-56.

6 - [Baker, A. C., and D. C. Schroeder. 2008. «Occurrence and genetic analysis of Picorna-like viruses infecting worker bees of Apis mellifera L. populations in Devon, south west England.» J. Invertebr. Pathol. 98:239-242.]

7 - [Aronstein, K. and Holloway, B. 2013. «Honey bee fungal pathogen, Ascosphaera apis; current understanding of host-pathogen interactions and host mechanisms of resistance.» In: Méndez-Vilas, A. (Ed.), Microbial pathogens and strategies for combating them: science, technology and education. FORMATEX, pp. 402-410.]

8 - [Benoit, J.B., Yoder, J.A., Sammataro, D., Zettler, L.W. 2004 «Mycoflora and fungal vector capacity of the parasitic mite Varroa destructor (Mesostigmata: Varroidae) in honey bee (Hymenoptera: Apidae) colonies.» Int. J. Acarol. 30 (2), 103-106].

9 - Dr. Pia Aumeier & Dr. Gerhard Liebig (2015). «Kopf hoch». Article in «Deutsches Bienen Journal

10 - Maisonnasse, et al, 2014.

2. Why can't I just apply my treatment schedule as usual?

As we know, Varroa infestations may be very different from one beehive to another and from one year to the next. In the same apiary, at the end of the season, you may have hives with infestations below 500 varroa mites, and others with over 15,000 mites. What does that mean for treatment strategy? A varroa control strategy must be decided on a case-by-case basis and deployed right from the beginning of the season.

THE MAIN ENEMY IN THE FIGHT AGAINST VARROA MITES IS THE FORCE OF HABIT

While it is tempting to fight varroa infestations routinely (a single late-season treatment always at the same date), varroa infestations can CHANGE and we should keep that in mind. Infestations may differ from one beehive to another (within the same apiary), and from one year to the next.

Figure 1: Infestation variations within the same apiary at the end of the 2014 season in Chaillac (Indre, France). 2014 was a year of high varroa infestation in France.¹¹

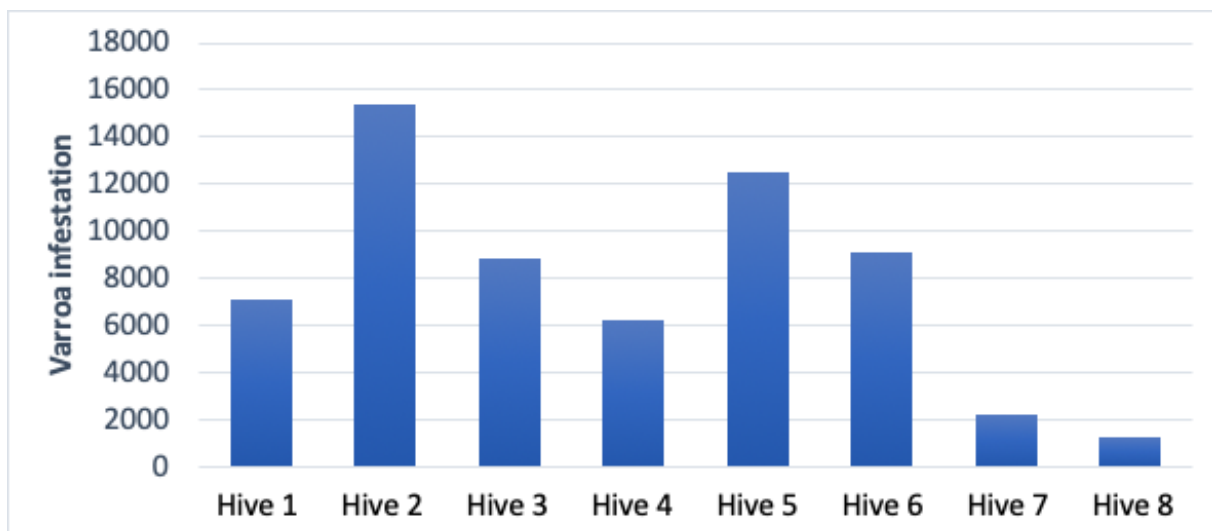


Figure 1 shows the infestation differences within the same apiary:

- **Least infested hive:** 1,272 varroa mites
- **Most infested hive:** 15,418 varroa mites (a ratio of 1 to 12 between the minimum and the maximum infestation).
- **Average infestation:** 7,844 varroa mites

According to a technical association in France (ADA Grand Est, Alexis Ballis), an average of 5 to 10% of the hives in a single apiary can reach infestation levels far above the apiary average.¹²

¹¹ - Data from the Vétô-pharma apiary in 2014 in Chaillac – Total average infestation of each hive recorded after a 10-week conventional varroa mite treatment, followed by a control treatment.

¹² - BALLIS A. (2015) Varroa infestation in Alsace, Speech at the ADA Franche Comté General Assembly. Alsace Regional Chamber of Agriculture.

INFESTATION LEVELS OVER SEVERAL YEARS

Figure 2: Infestation variations in the same apiary in the Alsace Region (East of France), between 2010 and 2014⁴

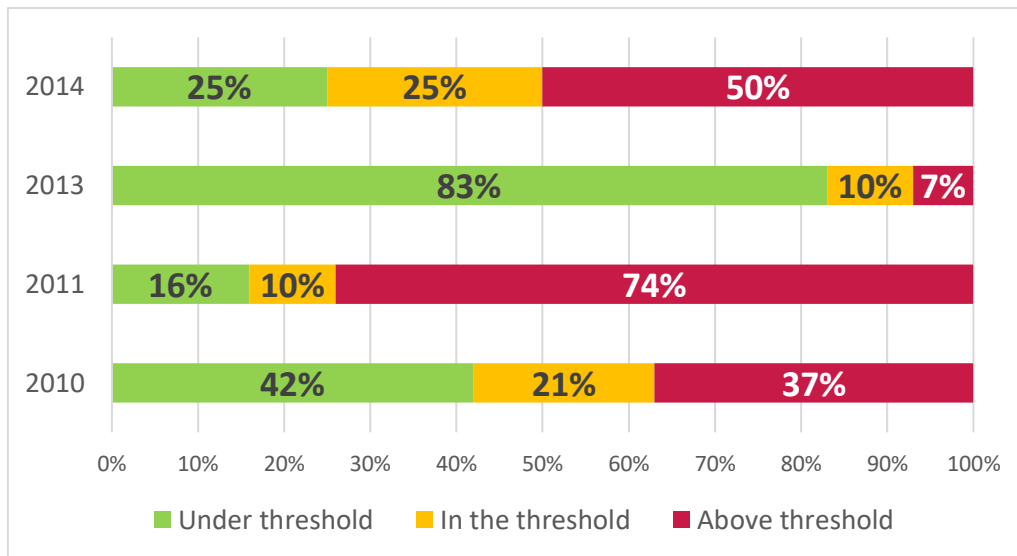


Figure 2 shows the varroa infestation level in hives from the same apiary in the Alsace Region (East of France), over several years.

Green: < 3,200 varroa mites at the end of the season

Orange: 3,200 to 4,200 varroa mites at the end of the season

Red: > 4,200 varroa mites at the end of the season

The threshold of 3,200 to 4,200 varroa mites was described in the literature as a level of infestation triggering a financial loss for the beekeeper (lower production and increased mortality risk).¹³

When looking at Figure 2, it becomes clear that different infestation levels in the years 2013 and 2014 required different treatment strategies. A fixed treatment on the same calendar date does not work for all beekeeping years.

It is essential to be proactive and monitor the situation early in the season to assess the infestation level and apply – if necessary – flash treatments when the infestation level exceeds the threshold. Early monitoring helps control high infestation levels during or at the end of the season, preventing a reduced honey production or high winter colony losses.

We also often forget about environmental considerations such as climate changes, the strain of bee, floral density and the effects of urban sprawl. In the years to follow, we may have more brood populations with infestations that will become increasingly difficult to contain and control.

¹³ - DELAPLANE, K S; HOOD, W M (1999) Economic threshold for *Varroa jacobsoni* Oud. in the south-eastern USA. Apidology 30: 383-395.

3. What is Varroa EasyCheck?

Varroa EasyCheck was developed by V  to-pharma to provide a "ready-to-use" plastic monitoring tool, easy-to-use, and to obtain a quick and accurate estimation of the mite infestation levels in a hive. The V  to-pharma team opted for the alcohol wash method, as it is considered the most effective to separate the mites from the bees and widely supported by the technical beekeeping community and professional beekeepers.¹⁴⁻¹⁵

Recent investigations in our apiary showed that the Varroa EasyCheck can be used equally with the sugar roll and CO₂ injection methods as well. Beekeepers now have 3 methods (alcohol, sugar and CO₂) they can select from, depending on their preference.



Innovative design for a quick, easy and reliable sampling of Varroa infestations:



14 - Honey Bee Health Coalition - Tools for Varroa Management 7th edition, Page 7

15 - Efficiency of Varroa monitoring methods, the benefits of standardized monitoring devices. Ludovic de Feraudy, Dr. Ulrike Marsky & Ph.D. Jiri Daniluk. - Apimondia 2019 proceeding.

4. How is Varroa EasyCheck different from other monitoring tools?

Varroa EasyCheck is the first ready-to-use tool for monitoring that can be used with three different methods: alcohol, icing/powdered sugar and CO₂ injection. It allows beekeepers to select their method depending on their preference or depending on the weather (air humidity) and time of the year.

The special design (with holes all over the white basket, and not just at the bottom) allows a better separation of the mites from the bees, for a more accurate result.

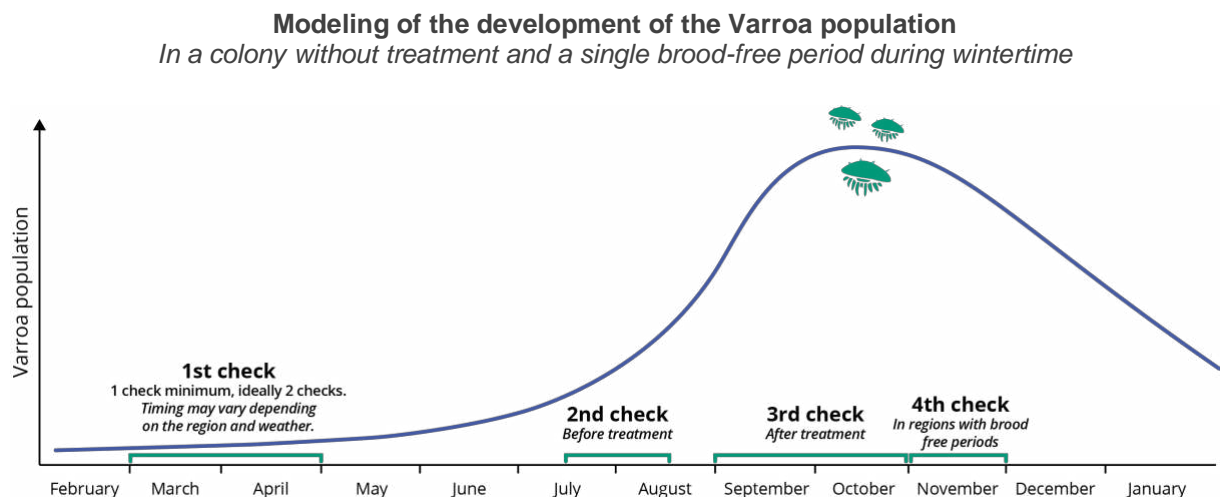
It is very convenient, lightweight, durable, and easy to use, making it the ideal tool for the field. Once you purchase it, it will be your fellow companion for many years.



Varroa EasyCheck is an innovative solution with an excellent price-quality ratio.

5. When to use Varroa EasyCheck?

To properly monitor mite infestation, colonies should be tested **at least 4 times a year**:



TIME OF MONITORING	OBJECTIVE
Early spring	Early detection makes it possible to effectively assess the need for an early springtime treatment, prior to placing honey supers.
During a honey flow*	Detect a massive Varroa build-up and plan possible intermittent treatment between honey flows.
Late July – August	Choose the best late-season treatment depending on the level of infestation. <i>This check is very important, as it will help you to compare the infestation rate before/after treatment, and thus the efficacy of your mite treatment.</i>
September – October - December	Ensure effectiveness of autumn treatment and assess the need for additional treatment in winter (when brood is absent) or early next spring.

*Particularly in areas where there are large number of hives belonging to different beekeepers.

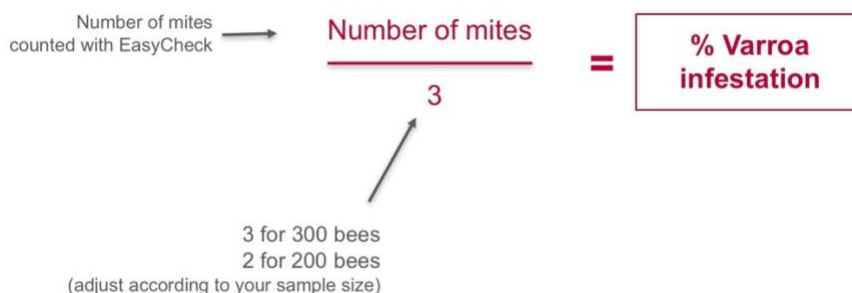


6. How many hives should I monitor?



SIZE OF APIARY	NUMBER OF COLONIES TO TEST*
≤ 10 hives	All colonies
≤ 20 hives	6 to 10 colonies
> 20 hives	25% minimum (at least 8 colonies)

7. How to calculate a varroa infestation % ?



To calculate the percentage of infestation, you have to divide the number of varroa counted with Varroa EasyCheck:

- By 3 (if 300 bees are sampled),
- By 2 (if 200 bees sampled) or adapt according to the size of your sample.

You will get the number of varroa for 100 bees.

Example:

*On a sample of 300 bees, you find 15 mites:
15 divided by 3 = 5% infestation (too high!)*

8. How do I interpret the results?

TIME OF THE YEAR	INFESTATION LEVEL
Early spring	$\geq 1\%$
Between two honey flows	$> 2\%$
End of season: July – August (before treatment)	$> 3\%$
Winter (after the end-of-season treatment)	$\geq 2\%$

**Treatment
required!**

Note on interpretations of infestation levels: The thresholds may vary with geographic area due to variations in honey bee populations, brood increase, and varroa populations. Local experts, such as bee inspectors or extension specialists, should be consulted. In some situations, even if infestation levels fall below these thresholds, it is better to treat immediately rather than wait. If treatment is required, it is best to treat the entire apiary to minimize infestation and robbing.

9. What are the differences between the 3 methods: alcohol wash, sugar roll and CO₂ injection?



Alcohol wash

This method consists of immersing a sample of bees in alcohol and then gently shaking the EasyCheck to detach the phoretic mites so they can be counted. This method results in the loss of the honey bees in the sample, but it is the most consistent in terms of delivering accurate results. It has been recognized as the most accurate, reliable, and economical option for beekeepers. However, make sure that you know where your queen is, so that she does not end up in the sample!



- ✓ Fast, easy and inexpensive.
The liquid can be re-used for up to 10 counts.
- ✓ The most consistent in terms of delivering accurate results. Recognized as the most accurate, reliable, and economical option for beekeepers.¹⁴⁻¹⁵

COLLECTING A SAMPLE OF BEES: IMPACT ON THE COLONY?

- ▶ The bee colony is made up of tens of thousands of individuals sometimes referred to as a “super-organism”.
- ▶ The sample taken generally represents **less than 1% of the overall hive population**, and the bees are quickly replaced (the queen can lay more than 2,000 eggs a day at the peak of laying).
- ▶ The sacrifice of 200 to 300 bees with the alcohol wash method serves **to improve the colony's health management** and more generally the health of the entire apiary.
- ▶ The practice of alcohol wash gives an accurate diagnosis to adopt the appropriate treatment strategy, and therefore serves **to avoid potential colony mortalities**.





Sugar roll

During a sugar roll, the bees are gently rolled with powdered / icing sugar, causing the mites to separate from the bees. The EasyCheck is then gently shaken, causing the sugar and the mites to pass through the white basket's holes.

The powdered sugar method keeps the sampled bees alive, but the monitoring result may vary depending on the experience of use and air humidity (causing the sugar to clump).



- ✓ Inexpensive.
- ✓ Keeps the sample of bees alive.



The monitoring result may vary depending on the experience of use and air humidity (causing the powdered sugar to clump).





CO₂ injection

In the CO₂ method, bees and mites are anesthetized by exposure to carbon dioxide gas. They are gently shaken/rolled in the EasyCheck, causing mites to detach and fall off the bees, then passing through the holes in the white basket. Research conducted in Europe indicates results that are similar in accuracy to those obtained by an alcohol wash.¹⁵



- ✓ Fast.
- ✓ Keeps the sample of bees alive.
- ✓ Research conducted in Europe indicates results similar in accuracy to alcohol wash.¹⁵



Requires the purchase of the Varroa EasyCheck Injector + CO₂ cartridges refills.



10. How to use Varroa EasyCheck with one of the three methods?



Alcohol wash

Required material: Rubbing alcohol, or cleaning alcohol, or diluted ethanol, or windshield washer fluid containing alcohol.
Please note: In all cases, use a product that does not foam or foams very little (no dishwashing liquid or conventional soap).

Step 1

Fill half of the transparent container of the Varroa EasyCheck with the liquid.

Step 2

Collect a sample of 200 or 300 bees with the white basket, preferably from a frame of capped brood (make sure the queen is not in the sample). The lines for 200 and 300 bees are indicated inside the basket.

Put the basket back into the transparent bowl and quickly close the lid, to prevent the bees from escaping.

Step 3

Gently shake the Varroa EasyCheck® for 1 minute. Make rotations and side movements to help the mites pass through the holes.

Avoid turning the Varroa EasyCheck upside-down, as it might block the mites inside the lid.

Step 4

Count the mites directly by looking at the bottom of the transparent container.

Depending on if you took 200 or 300 bees divide the number of counted mites by 2 or 3 to get your infestation rate (%).

To interpret the results, please consult our Varroa Guide and/or your local thresholds.



Tip

You can then filter the liquid into a very fine sieve and re-use it up to 10 times for new hive counts.

VIDEOS

Check out our step-by-step video tutorial on this link:

www.varroa-easycheck.com/alcohol-wash



Sugar roll

Required material: Powdered / icing sugar, and a container to shake the sugar in.

Step 1

Pour two full tablespoons of powdered / icing sugar inside the transparent bowl of the EasyCheck.



Step 2

Collect a sample of 200 or 300 bees with the white basket, preferably from a frame of capped brood (**though most of the honey bees in the sample should survive, it is suggested that you still avoid allowing the queen to end up in the sample**). The lines for 200 and 300 bees are indicated inside the basket.

Put the basket back UPSIDE-DOWN into the transparent bowl and push it until it's correctly seated inside the bowl. Screw the yellow lid.



Step 3

Roll the Varroa EasyCheck gently for 1 minute until the bees are evenly coated with the powdered / icing sugar. Make sure the sugar does not pass through the holes of the white basket yet.

Set the Varroa EasyCheck in the shade for 3 minutes for better separation of the mites.



Step 4

Remove the lid, turn the Varroa EasyCheck upside-down and gently shake it above the yellow lid or a larger container.



Step 5

Add a bit of water to the sugar to dissolve it and count the mites. Depending on if you took 200 or 300 bees divide the number of counted mites by 2 or 3 to get your infestation rate (%).

To interpret the results, please consult our Varroa Guide and/or your local thresholds.



Step 6

Release the bees into the hive, or at the entrance.

VIDEOS

Check out our step-by-step video tutorial on this link:
www.varroa-easycheck.com/sugar-roll



CO₂ injection

Required material: CO₂ injector/dispenser (need to purchase separately) with a CO₂ cartridge.

Step 1

Collect a sample of 200 or 300 bees with the white basket, preferably from a frame of capped brood (make sure the queen is not in the sample). The marks for 200 and 300 bees are indicated inside the basket. Put the basket back UPSIDE-DOWN into the transparent bowl and push it until it's correctly seated inside the bowl (it should stay in place if you turn it over).



Step 2

Place the yellow lid on the top. Create a small opening between the yellow lid and the transparent container and inject the CO₂ through the holes of the white basket for 5 to 6 seconds, until the bees stop flying. Do not inject directly towards the bees.

Then, quickly screw the lid. Let the Varroa EasyCheck sit for about 10 seconds, until the bees are anesthetized.



Step 3

Turn the Varroa EasyCheck upside-down and **gently** shake the sample for 15 seconds, so you do not hurt the bees. Varroa mites will be dislodged from bees and fall through the holes of the basket.



Step 4

Open the yellow lid and count the mites inside. Calculate infestation rate per 100 bees, as for alcohol wash. Depending on if you took 200 or 300 bees divide the number of counted mites by 2 or 3 to get your infestation rate (%).

To interpret the results, please consult our Varroa Guide and/or your local thresholds.



Step 5

Put the bees back in the hive where they will recover.
Dispose of the fallen varroa mites, as most will still be alive.

VIDEOS

Check out our step-by-step video tutorial on this link:

www.varroa-easycheck.com/co2-injection



11. Where can I purchase the Varroa EasyCheck and the CO2 injector?

Vétô-pharma recently added the EasyCheck CO₂ injector in its product range.

You can now purchase both products directly from your beekeeping supplier.

We chose to sell the two elements separately, as not to increase the price of Varroa EasyCheck when the beekeeper only wishes to use the Varroa EasyCheck with alcohol or sugar.

More information about the CO₂ injector:

- ✓ It comes in a box with one 16g threaded CO₂ cartridge, so you can perform your first mite count as soon as you get it.
- ✓ The refills can be easily bought from various suppliers.
- ✓ One cartridge can make between 3 and 5 mite counts.



12. Testimonials from Varroa EasyCheck users

As part of the launch of Varroa EasyCheck, we offered beekeepers from different countries (mostly France, the United States and Spain) the opportunity to test the product on their hives in the autumn. The feedback was extremely positive, and we have selected a few to share with you:

"As a result of the tests I conclude that this is a product every beekeeper should buy: easy to use, simple to read to know the percentage of phoretic mites. [...] This is a tool that I will use without moderation for the next season to select my strains as best as possible and keep the population of varroa below 3% during the season."

Mickael Texereau (300 hives in France)

"I will use it abundantly next year for obtaining immediate and reliable data for monitoring the varroa infestation. Thank you for your work in support of beekeepers."

Didier Bettens (30 hives in Switzerland)

"EasyCheck is a quick and simple method to test the rate of varroa infestation, which is vital for the good life of the colony. It is accessible to all beekeepers."

Julien Jeuniaux (100 hives in Belgium)

"My opinion: This is a great device for field use. It's fast, easy, and cheap."

Cam Lay (Former State Inspector in the United States)

We were also happy to see spontaneous video testimonials online:

K's Honeybees: <https://www.youtube.com/watch?v=iat4Zm5E1mk>

Vino Farm: <https://www.youtube.com/watch?v=OXwUFGcOpgc>

Brandon Wayne: <https://www.youtube.com/watch?v=x-qRktLM8JY&t=155s>

Mann Lake: <https://www.youtube.com/watch?v=CifvOGYSR54>

Kamon Reynolds: <https://www.youtube.com/watch?v=mzBrVp50sTo>

Kamon Reynolds (2): <https://www.youtube.com/watch?v=ZHSjpSs-0bA>

To Bee or not to bee: <https://www.youtube.com/watch?v=Y4dY5fr8jTA>

FemValley Farm Beekeeping: <https://www.youtube.com/watch?v=XN0dK7z6eP0>

FemValley Farm Beekeeping (2): <https://www.youtube.com/watch?v=kPktJcn16No>

Guthries Naturals: <https://www.youtube.com/watch?v=6gF-WUSBAyc&t=1s>

Erin Carlesimo: <https://www.youtube.com/watch?v=UBudvXyprs8>

Texas Bee supply: <https://www.youtube.com/watch?v=ts32jKkQMpA>

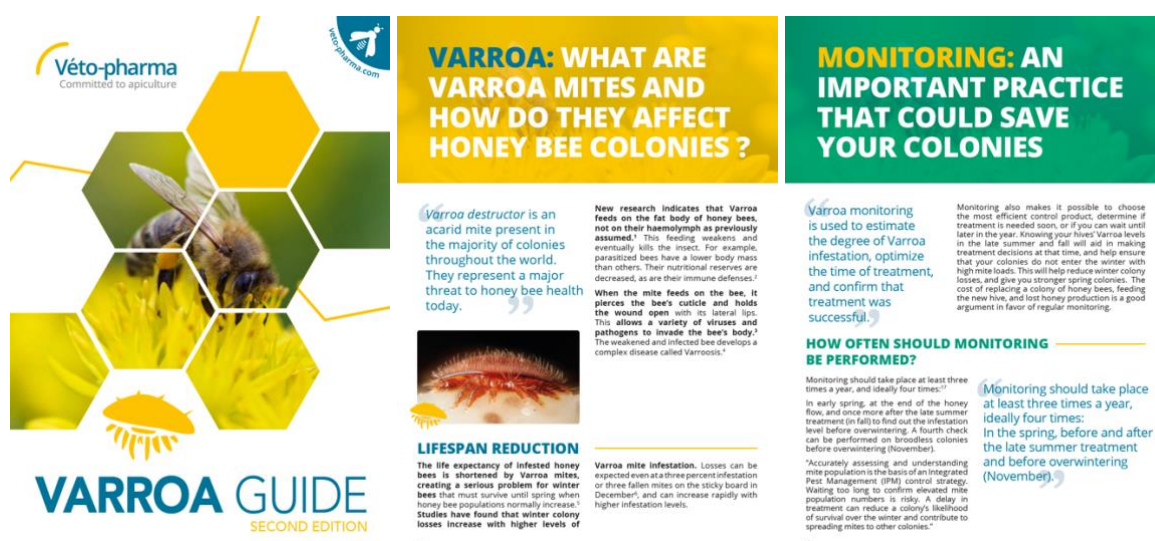
13. Vétô-pharma's Varroa Guide

Vétô-pharma recently unveiled a new edition of its Varroa Guide that describes the detrimental effects of Varroa mite infestations, outlines treatment techniques and restrictions, and educates customers about monitoring as a means of managing mite populations over the long term.

The guide can be downloaded (free of charge) on this link:

<http://newsletter.veto-pharma.com/LP/XmwGU5gtP4V8>

Veto-pharma printed more than 10,000 copies of the original Varroa Guide in three languages: English, Spanish and French. The new edition of the Guide will be distributed to beekeepers during conferences, tradeshow, and meetings, and will again be translated to provide copies in English, Spanish and French. Bulk quantities of the Guide can also be provided for beekeeping clubs and associations by contacting Veto-pharma via email at info@vetopharma.com



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