

# Apivar® F.A.Q.

## 1. What are Varroa mites?

Varroa mites are external parasitic mites that attack both the Asian, or Eastern, honey bee (*Apis cerana*) and the European honey bee (*Apis mellifera*). The disease caused by the mites is called varroaosis or varroosis.

The parasite (*Varroa jacobsoni*) was first described on the Asian honey bee a century ago. The mite has been in contact with the European honeybee since the 1950s as a result of the modernization of beekeeping in many areas of the world and the massive use of imported European honeybees to increase honey crops. Movement of colonies and migratory beekeeping practices have allowed the mite to spread throughout the world. In 2000, researchers discovered a slight difference between the original *Varroa jacobsoni* and the mite currently infesting European honeybees and renamed it *Varroa destructor*.

Varroa is considered to play a key role in unexplained bee losses, such as Colony Collapse Disorder. Varroa mites also spread other pathogens, and are known to spread bee viruses, such as Deformed Wing Virus.

## 2. How do Varroa mites affect honey bees?

Varroa mites weaken the bees by feeding on their blood. As a result, the lifespan of the bees is shortened, they become less-resistant to other diseases, and sometimes their wings become atrophied. Fewer forager bees can fly to find pollen and nectar to feed larvae in the brood, and their ability to return to the hive becomes increasingly impaired. Wintering bees that are infested during their development often do not survive to contribute to their colony's development in spring. The colony therefore produces less honey and eventually becomes unable to feed new bees. A hive weakened in this manner is prone to collapse, despite the laying activity of the queen.

### 3. Why should I treat my honey bees for Varroa mites?

Bees play a vital role in plant pollination, helping to produce an estimated \$40 billion worth of products annually in the United States alone. The American Institute of Biological Sciences estimates that native insect pollination saves the US agricultural economy some \$3.1 billion annually through natural crop production. Given the vital role that bees play in North America's agricultural economy, ensuring their long term health and productivity is an imperative.

Varroa mites harm bees by feeding off their haemolymph (blood) at the larva stage. The resulting damage includes:

- Reduced size and weight
- Reduced life-span
- Poorly-formed wings
- Reduced immunity to disease
- Reduced resistance to pesticides
- Reduced ability to feed
- Reduced capacities for males to efficiently mate with queens
- Reduced ability to perform their duties in the colony

Mites also introduce disease, viruses and bacteria. When the Varroa mite pierces the bee larva cuticle to feed on its haemolymph, it inoculates the larva with a number of viruses, such as Acute Paralysis Virus, Deformed Wing Virus, and Cloudy Wing Virus, as well as a wide range of bacteria. Recent studies have proven that the Varroa mite amplifies and/or activates some viruses. Once weakened, the colony becomes susceptible to robbing by bees from other colonies. It can take only a few hours for a colony to rob honey and pollen stocks from a weakened hive. Varroa mites are attracted to the robbing bees and are quickly transferred by them to their origin hive. This natural bee behavior increases the risk of contamination and re-infestation, and contributes to the spread of Varroosis.

### 4. What are my treatment options?

Beekeepers employ a number of treatment techniques, but many of these are not fully effective and/or safe. One popular treatment option – Apivar® – provides proven effectiveness and safety for the treatment of hives infested with Varroa mites. Apivar's controlled-release technology is very effective in controlling Varroa infestations and ensuring a productive honey season.



## 5. What is Apivar and how does it work?

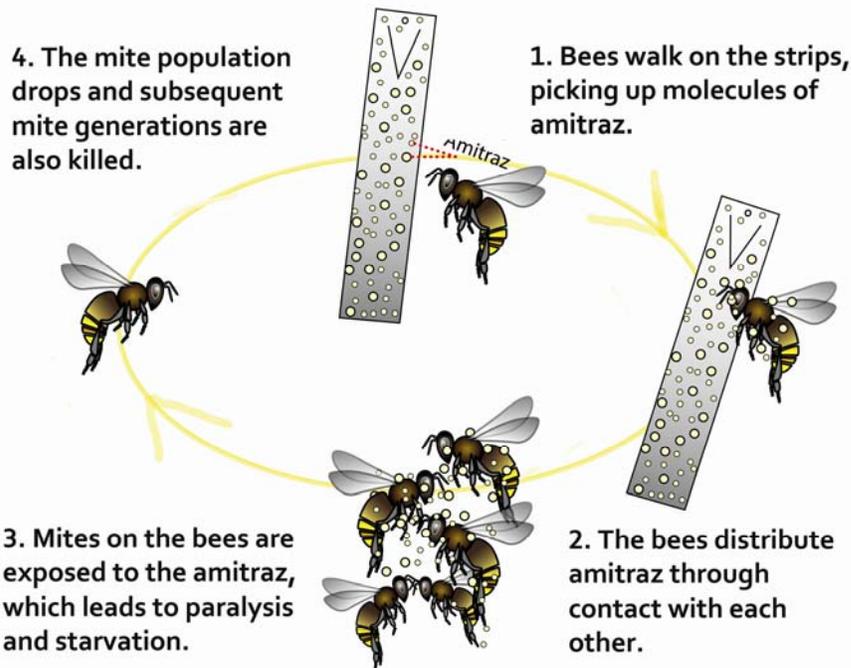
Apivar is a miticide that kills Varroa mites without leaving significant residues in honey or wax. The active ingredient – Amitraz -- is delivered to the honey bees via polymer strips that are hung in the brood chambers. Apivar strips consist of two components:

- The active ingredient in Apivar strips is an acaricide. It is a sub-lethal miticide, meaning that it does not kill mites directly, but instead paralyzes them, leading to their starvation.
- This active ingredient is delivered to the honey bees via a plastic polymer strip, chosen for its rigidity and its ability to slowly and continuously release amitraz over an extended period of time.

Applying Apivar is as simple as hanging two strips per brood chamber for six weeks. During the application period, honey bees walk on the strips and come into contact with each other, thereby spreading the active ingredient throughout the hive. At the end of the treatment period, the strips are removed from the hive and disposed of in accordance with instructions and local regulations.

Apivar has been used in this manner for more than 15 years and has proven effective in eliminating up to 99 percent of Varroa mites. The active ingredient is quickly hydrolyzed and disappears from the hive without leaving significant pesticide residues.

The illustration below describes Apivar's mode of action in a bee colony.



## 6. How can I maximize the efficiency of Apivar?

Apivar is a pesticide, so you should read and follow all instructions, and be aware of local regulations concerning its application and disposal.

### 1. Positioning of the strips

Apivar works by contact only, so it is very important to position the strips in areas where bees are most active and near the brood area, where Varroa mites breed. This ensures that the active ingredient will be effectively distributed throughout the colony. The ideal placement is to hang each strip between two frames inside the brood area, with a minimum distance of two frames between strips.

### 2. Respect the recommended dosage

Apivar has been tested and proven effective at a dosage of two strips per brood chamber. Regulatory authorities in your state may have additional recommendations or requirements for the use of Apivar. If so, this information is included on the label, so be sure to read and follow all instructions.

### 3. Treat all of the hives at the same time

Adult Varroa mites attach themselves to adult bees and are transferred to new hives whenever hives are robbed, when males emigrate from one hive to another, and when pollen is gathered by foraging bees. Hive member exchanges, meetings of colonies, artificial swarming and even bee shipments may



The purpose of the fall treatment is to decontaminate the colony before winter bees are produced. This helps maximize the breeding capacity of winter bees and is essential to prepare the colony for a good wintering. The fall treatment should be initiated as soon as honey supers are removed.

### Spring Treatment

The purpose of the spring treatment is to decrease mite populations (and reduce the risk of colony collapse) before the nectar-collecting season begins, thereby maximizing honey yield. The spring treatment should be completed two weeks before honey supers are installed.

Source: Mariano Higes, *Efficacy and security of Apivar studies realized in Spain from 1995 to 2001 by the Centro Apicola Regional CAR Guadalajara* (unpublished).

## 8. Why shouldn't I leave Apivar strips in my hives over winter?

Although the practice of leaving strips in the hive over winter does not appear to be harmful, it is not recommended because it may promote resistance to the active ingredient. Strips must be removed after a maximum of 56 days.

The amount of active ingredient being released by the strips is lower at the end of the treatment period, (and varies depending on wax or propolis deposited by the colony on the strips' surface). This could result in an opportunity to develop resistance to the active ingredient.

(See Question 32: Will Varroa mites become resistant to Apivar in a similar time frame to synthetic pyrethroids?)

## 9. Can I remove the strips after a short treatment and use them again later?

No. This is not recommended for two important reasons:

1. The treatment periods must be long enough to be effective when the brood is present. The active ingredient in Apivar strips is spread by contact to all areas in the hive. Thus, it is important to allow enough time for the active ingredient to reach phoretic mites when they emerge from the capped cells with the young emerging bee. We recommend treatment periods of at least two or three mite lifecycles to most effectively reduce mite populations.
2. Storing strips outside the hive for a long period of time is not recommended as the active ingredient continues to be released, regardless of how or where it is stored. We cannot guarantee that stored strips will have sufficient quantities of active ingredient to be effective for later treatments.

**10. How often can I use Apivar?**

A single treatment each year (one treatment in the spring or one treatment in the fall), when applied correctly, is often sufficient to control Varroa mite infestations. When infestation levels are high, however, treating twice a year can be recommended (once before the honey harvest and once after). The infestation level should be controlled on a regular basis as an element of an Integrated Pest Management Program

**11. Do high or low temperatures affect the efficiency of Apivar treatments?**

Temperature has no effect on the active ingredient in Apivar strips; however, low temperatures tend to reduce bee activity. Since the spread of Apivar's active ingredient throughout the hive is dependent on the bees coming into contact with the active ingredient, lower bee activity levels can reduce the efficacy of the treatment.

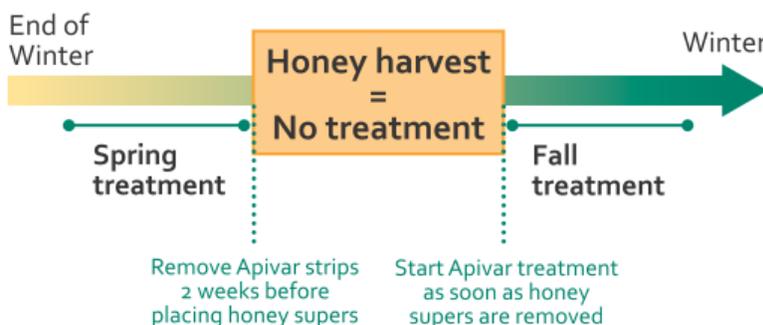
Other treatments for Varroa infestations – thymol-based products, for example – depend on vaporization with the hive atmosphere. Low temperatures reduce vaporization, while high temperatures accelerate vaporization, resulting in under-dosing and over-dosing, respectively. For this reason, Apivar is regarded as a safer, more effective solution than many of competing products.

**12. Can I treat a hive with Apivar when feeding my bees?**

Yes, Apivar does not interfere with feeding in any way (unlike thymol-based products). In fact, feeding increases activity in the colony and therefore increases the spread of active ingredient throughout the hive. Also, feeding and treating at the same time is a good way to prepare a hive for winter because it reinforces the brood-laying activity and increases the effectiveness of the treatment.

**13. Can I treat whenever I want during the year?**

A single treatment each year (one treatment in the spring or one treatment in the fall), when applied correctly, is sufficient to control Varroa mite infestations in most situations. United States regulations forbid the use of Apivar when honey supers are present.



**14. Can I treat in the presence of brood?**

Yes, we recommend treating the hive when there is some brood in the colony as the resulting bees will be stronger and more capable to do their jobs. In fact, Apivar’s controlled-release formulation ensures that the mite population is exposed to the active ingredient over several reproductive cycles. Be sure to position Apivar strips in high activity areas nearest to the brood, where the Varroa mite breeds.

Treatment with Apivar strips is also effective when there is no brood in the hive.

**15. Can I use Apivar when I have queen cells and virgin queens in my hives?**

Yes, there are no restrictions on the use of Apivar in hives when queen cells and virgin queens are present. Apivar is very safe and will not damage queens, bees or bee products.

**16. What should I do if Apivar strips become covered by propolis?**

If the Apivar strips become covered with propolis, we suggest you scrape the propolis from the surface of the strip using hive tools, and lengthen the treatment period for a few additional days. Propolis on the strips will prevent bees from having direct contact with the active ingredient. That said, Apivar strips are not typically prone to accumulation of propolis (unlike thymol-based treatments or other aggressive treatments).

**17. How long will Apivar strips remain effective after opening the package?**

Apivar strips are vacuum-packed to preserve their effectiveness. To guarantee a high concentration of active ingredient in the hive, Apivar strips should be used as soon as possible after opening the packaging. The effectiveness of Apivar strips could be reduced by prolonged exposure to light.

We recommend you install Apivar strips in the hive immediately after opening the package. If a short period of storage is necessary, we suggest placing the strips in a sealed container that provides protection from light and humidity. Further, we recommend that opened Apivar packages not be stored for more than two weeks and that the strips be used as soon as possible.

**18. Will sunlight affect the Apivar strips?**

The active ingredient in Apivar strips is sensitive to light, so prolonged exposure to sunlight or other light sources could decrease its effectiveness.

Apivar strips are packaged in a multi-layer foil pouch that protects the strips from light. Once the packaging is opened, the strips are placed inside the hive, where they are further protected from light sources.

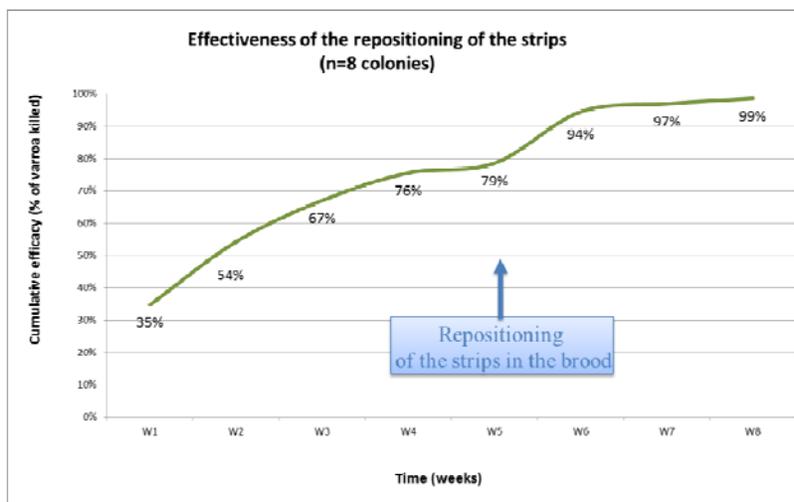
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**19. Can the application of the strips be dangerous for the queen ?**

Strips have been designed to be sufficiently rigid to be inserted very easily between the frames. They should be slowly and gently inserted -- without forcing or pushing – to allow the bees (and the queen) to move away from the strips during the insertion. Once strips are in place, the bees become accustomed to their presence and begin to walk on them, beginning the process of distributing the active ingredient within the hive.

**20. Should I check the position of the strips in the colony?**

If the bee cluster moves away from the strips (which happens frequently), reposition the strips in the bee cluster, and leave them in place for 14 more days before removal. Repositioning the strips in this way has been proven to increase the effectiveness of the treatment.



Strips must be removed after a maximum of 56 days.

**21. Will high temperatures affect Apivar strips?**

Apivar strips in their vacuum-sealed pouches have been tested for up to two weeks in temperatures as high as 130°F/54°C with no evidence of reduced effectiveness. Long-term storage (6 months) at 104°F/40°C has not indicated significant degradation of the active ingredient. Nevertheless, you should not store Apivar in environments (i.e., vehicles) where temperatures can rise to excessive levels.

**22. Will high humidity affect Apivar strips?**

The active ingredient in Apivar strips is sensitive to moisture and is degraded more quickly in extremely humid conditions. These conditions can impair the strips’ long-term effectiveness, and may result in an inadvertent over-dosing.

In extremely humid conditions, we recommend that you read and follow all instructions, using two strips per brood chamber and positioning the strips to optimize distribution of the active ingredient during the treatment. The positions of the strips should be checked to be sure that they are still in the middle of the brood area.

**23. How should I dispose of used Apivar strips?**

After removing the strips from the hive, they should be disposed of in accordance with instructions and local regulations. Regulatory requirements vary from location to location, so be sure to ask about disposal requirements in your area. Please read and follow all label instructions.

**24. Has Apivar been monitored for effectiveness over long periods of time? Is it still effective even though Apivar is in frequent use?**

Apivar was developed almost 20 years ago in Europe, where it is classified as a veterinary drug. As a result, Apivar has been subject to a variety of stringent regulatory studies and evaluations. For example, in France – where Apivar has been approved for large-scale use since 1995 – annual evaluations consistently demonstrate that Apivar remains a safe and effective means of controlling Varroa mite infestations.

	Percentage of hives having Varroa populations of 50 or fewer mites	Percentage of treated hives achieving efficiency levels greater than 95%
2007	68%	81%
2008	85%	80%
2009	80%	84%
2010	85%	80%

2011	71%	77%
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Data source: *FNOSAD – efficacy of available product for Varroa management in France.*

Recent trials conducted in the United States, Canada, Turkey, and Bulgaria have demonstrated similarly consistent results.

A study conducted by the research arm of the USDA in the spring of 2012 shows that Apivar was responsible for significant drop in mite population compared to an untreated hive. According to the report: "As a rule of thumb, we consider control adequate if there is a 10-fold difference between the negative control mite levels [and the levels achieved by] a known Varroa control product. Using this guideline, the four Apivar strips gave a 52-fold drop in mite populations."

Group	Number of colonies	# Varroa remaining after a six-weeks treatment (Mite fall during a three-day challenge)
Untreated control	20	446.6
<b>Apivar™</b> <i>2 strips per brood chamber</i>	20	<b>8.5</b>
Positive control <i>(0.77% amitraz grease patty)</i>	20	41.7

Source: Frank A. Eischen, R. Henry Graham, Paul Rivera, and Anthony Ison. *Controlling Varroa destructor with Apivar.* Field trial 17 April – 29 May 2012. , Honey bee research Unit, USDA-ARS, Weslaco, TX

### 25. Why is the treatment period for Apivar as long as 10 weeks in some countries, but only six weeks in the US?

The recommended treatment periods are established by regulatory bodies in each region or country where Apivar is registered. Typically, authorities conduct a battery of tests as part of the registration process and use the results to determine an ideal treatment duration: one that will generate the best results with the least risk. In the US and many other locations, the recommended treatment period is a minimum of six weeks; however, in some countries, the recommended treatment duration is 10 weeks. This is due to variables such as:

- Types of hives in use and specific beekeeping practices employed
- Local climate conditions
- Timing of treatment and local conditions of brood presence
- Regional or national regulatory environment

Regardless of the treatment duration specified for your area, it is essential to remove Apivar strips at the end of the treatment period and to dispose of the used strips and packaging materials in

accordance with local regulations. Regulatory requirements vary from location to location, so be sure to ask about disposal requirements in your area.

Do not leave Apivar strips in the hive throughout the winter.

## 26. Has Apivar participated in residues trials, and what were the findings?

Yes. The French agency for Food, Environmental and Occupational Health Safety, has conducted residue trials on Apivar strips and found that:

- No active ingredient residues were detected in honey after 10 weeks of treatment, regardless of the date of sampling. Others studies also proved that, in honey, the active ingredient is fully degraded after 10 days.
- No active ingredient residues were detected in beeswax 24 hours after the removal of the strips from the hive.

Amitraz does not accumulate in the honey and wax because of its instability in the hive's acidic environment where it is quickly broken down by hydrolysis.

Similarly, other studies concluded that residues of amitraz or its main components in honey consistently fall below maximum residue limits established by the European Medicines Agency.

Source: Martel A.C. et al, *Acaricide residues in honey and wax after treatment of honey bee colonies with Apivar or Asuntol 50*, *Apidologie* (2007), 38, 2002, 534-544

Source: R.M. Goodwin et al, *Residues of amitraz in wax honey and propolis after using Apivar*, 2002

## 27. I have heard that Varroa mites are resistant to amitraz in some countries. Does this mean that they will also be resistant to Apivar?

There is currently no evidence of resistance to amitraz, the active ingredient in Apivar strips. Amitraz has been used worldwide for Varroa mite control for a long time – as much as 30 years in some regions. Apivar strips have been authorized and widely used in Europe since 1995.

Amitraz is highly unstable in the typical hive environment. It is a sub-lethal miticide, meaning that it does

not kill mites directly, but instead paralyzes them. Apivar's unique strip formulation, when applied correctly, does not last long enough for Varroa mites to develop resistance.

Nonetheless, there is always a possibility that Varroa mites may develop resistant to amitraz if users fail to remove Apivar strips from the hive after treatment, or fail to properly dispose of used Apivar strips.

Beekeepers around the globe can prevent the development of resistance to amitraz by following these good practices:

- Never leave any amitraz products – including Apivar strips – in the hive after treatment.
- Always dispose of used amitraz products – including Apivar strips – in accordance with local regulations and never re-use old strips
- An excessively low concentration of active ingredient — resulting from the use of only one Apivar strip instead of the recommended two strips per brood chamber, the reuse of old strips, or failure to remove strips at the end of the treatment period — has potential to create resistance to the active ingredient.

### 28. Is amitraz more toxic than pyrethroids?

No. In fact, some studies show that pyrethroids, such as fluvalinate, create longer-lasting residues in wax than does Amitraz. As a consequence, the risk for bees and human being to be in contact with the pyrethroids is higher than with amitraz.

Source: S. BOGDANOV et al, *Acaricide Residues in Beeswax and Honey*, 1997

Source: K. WALLNER, *Varroacides and their residues in bee products*, *Apidologie* 30 (1999) 235-248

### 29. Is amitraz toxic for bees or for humans?

Researchers have found there is little risk of toxicity for bees or for humans directly (during treatment), or indirectly (through hive products), exposed to amitraz in Apivar strips.

Apivar's long-acting, low dose formulation means that when beekeepers handle and apply the product in accordance with instructions (specifically, the wearing of chemical-resistant gloves) they can be confident they will not be exposed to dangerous pesticides as the active ingredient does not emit vapors into the hive atmosphere — or the environment — during application.

Studies have also proven that “the product had no effect on bee mortality, size of the brood-comb, hive activity, hive weight or the size of the honey harvest when used at twice the indicated dose.” Apivar has a considerable safety margin, particularly in view of its very low risk of overdose. Consequently, Apivar can be applied when queen cells and virgin queens are present.

Similarly, residues of amitraz in honey have consistently been below the maximum limits of residue that are allowed for human consumption.

Source: Martel A.C. et al, *Acaricide residues in honey and wax after treatment of honey bee colonies with Apivar or Asuntol 50*, *Apidologie* (2007), 38, 2002, 534-544

### 30. Should I use Apivar at the same period of the year as other synthetic treatments?

Please refer to question: When should I treat my hives with Apivar?

### 31. Will Varroa mites become resistant to Apivar in a similar time frame to synthetic pyrethroids?

Amitraz has been used for Varroa mite control worldwide for many decades and Apivar has been authorized and widely used in Europe since 1995. In these countries, there is no evidence of resistance and no scientific studies have indicated that resistance is likely to develop. How can this be explained? The resistances are selected when the Varroa mites and their offspring are exposed to very low quantities of active ingredient for long periods of time. This happens when:

- lower dosages than recommended are used, and;
- when residues accumulate in beeswax as a result of over-dosing or treatments that are longer than recommended.

Active ingredients composed of pyrethroids are very stable and their residues can accumulate in honey and wax following treatments, increasing the likelihood that mites will develop resistance to the active ingredient.

Amitraz, however, is highly unstable in the hive, and quickly breaks down, leaving very low level of residues in honey or wax that do not accumulate. For example, research has proven that there are no amitraz residues in wax as soon as 24 hours after removal of Apivar strips from the hive following a typical 10-week treatment. This characteristic makes it very unlikely that mites will develop resistance to amitraz when Apivar strips are used according to instructions.

Source: Martel A.C. et al, *Acaricide residues in honey and wax after treatment of honey bee colonies with Apivar or Asuntol 50*, *Apidologie* (2007), 38, 2002, 534-544

### 32. Is the Taktic product equivalent to Apivar?

No, despite the fact that both products are based on the same active ingredient. Taktic is a quick-acting product that kills only those Varroa mites present on adult honey bees at the time of application, with no control of the residues or the amount of active ingredient to which beekeepers are exposed. Use of

Tactic in beekeeping operations is illegal in the United States and many other countries, and its use presents high levels of risk for both honey bee and human health. Tactic does not treat successive generations of Varroa mites and therefore is ineffective as a long-term solution to the Varroa mite problem.

Apivar, however, is authorized as a safe and effective treatment for Varroa mites because it delivers controlled amounts of amitraz over a long period of time. This ensures that many successive generations of Varroa mites are exposed to – and die from – the treatment, which is essential to the long-term control of mite infestations. Moreover, the inherent instability of amitraz means that residues are always far lower than the regulatory threshold, making it safe for the health of both honey bees and humans.

The chart below illustrates how a single application of Apivar works to control Varroa mites through an entire beekeeping season, while short-acting treatments fail to fully control mite infestation even after multiple applications. Short-acting treatments also require frequent re-treatments that may significantly affect the health of the colony.

