



ATTTA

**Atlantic Tech Transfer
Team for Apiculture**

May 2026

Varroa Mite Management Options for Atlantic Canada

Important

This publication was compiled by representatives from the Atlantic Tech Transfer Team for Apiculture (ATTTA) using information from the Pest Management Regulatory Agency of Health Canada, and specific pesticide labels.

This information is continuously changing and therefore it can cease to be current and accurate. Pesticide labels are the best source of information and should always be consulted prior to using a product. The label is the best source of information on registered uses, rates, withdrawal information, compatibility with feeding and honey production, toxicity, and other special information on its effective and safe use. By printing this publication, ATTTA does not offer any warranty or guarantee, nor do they assume any liability for any crop loss, animal loss, health, safety or environmental hazard caused by the use of a pesticide (miticide) mentioned in this publication.

Warnings

This publication is meant to be used as a reference for possible varroa mite control options. Where there are multiple brand names of a specific active ingredient registered in Canada, ATTTA has only listed a few for reference purposes and as such does not endorse one brand over another. If you have purchased a generic product not specifically mentioned in this guide which has varroa mite on the label, always follow that product label. If any information in this or any other publication conflicts with the information on the label, always use the label recommendation. If you have an old label, your pesticide supplier should be able to provide you with the newest label. All pesticide products that are registered for use in Canada have a Pest

Control Product (PCP) registration number on the label. It is important to read the label on a pesticide carefully, as it also contains specific information on using the product safely including what PPE is required. You are legally responsible for the safe use of miticides you purchase. This means the safe transport and storage of these materials, the label rates used, and the safe disposal of containers.

Monitoring for Varroa Mite

Colonies should be monitored for varroa mites at least monthly. Furthermore, monitoring should always be done both before and after treatment to determine if mite populations were adequately reduced. For information on how to accurately monitor varroa mite levels, check out ATTTA's Summer Disease and Pest Monitoring in Honey Bees fact sheet (<https://www.perennia.ca/wp-content/uploads/2018/04/07-summer-disease-and-pest-monitoring-eng.pdf>).



PARTNERSHIP WITH

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Avoiding Acaricide or Product Resistance

Treatment products should be rotated to avoid mites developing resistance to a miticide. Synthetic miticides should not be used more than once in a 12-month period. For example, if Apivar® is applied in the fall, it should not be used the following spring.

Treatment Options for Varroa Mites

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons
<p>ApiLife Var®</p> <p>Season:</p> <ul style="list-style-type: none"> spring, summer or fall 	<p>1 tablet per application, cut into 4 pieces. Place each piece on top bars in corners of hive.</p> <p>3 applications per treatment</p> <p>1st application: 7-10 days</p> <p>2nd application: 7-10 days</p> <p>3rd application: 12 days</p>	<ul style="list-style-type: none"> cannot use while honey supers on 30-day withdrawal period: remove tablets 30 days before placing honey supers 	<p>Pros:</p> <ul style="list-style-type: none"> natural treatment safer to use than organic acids can be applied in spring or fall <p>Cons:</p> <ul style="list-style-type: none"> expensive long treatment period requires multiple applications product efficacy may be temperature dependent (optimal temperature range 18-35°C)
<p>Thymovar®</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall <p>Mfr: Biovet AG</p>	<p>Single chamber:</p> <ul style="list-style-type: none"> 1 wafer (cut in half) for 3-4 weeks then removed, and another wafer (cut in half) for 3-4 weeks <p>Double chamber:</p> <ul style="list-style-type: none"> 1 wafer, uncut, per brood chamber, two rounds of 3-4 weeks 	<ul style="list-style-type: none"> cannot use while honey supers on 	<p>Pros:</p> <ul style="list-style-type: none"> natural treatment no withdrawal period safer to apply than organic acids <p>Cons:</p> <ul style="list-style-type: none"> does not kill varroa mites under capped cells (reason for two rounds of 3-4-week applications) brood mortality and queen supersedure may occur if applied above 30°C (optimal temperature range 10-26°C) relatively expensive long treatment period only effective above 15°C may reduce feed intake when used while feeders are in place

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons	
<p>Apistan® (10% fluvalinate)</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall <p>Mfr.: Wellmark International</p>	<ul style="list-style-type: none"> 1 strip per 5 frames of bees in each brood chamber minimum 6-week treatment (maximum 8 weeks) 	<ul style="list-style-type: none"> no withdrawal period but cannot be in hive while honey supers on hives 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites temperature has no effect on the active ingredient does not require multiple applications high efficacy when applied correctly no withdrawal period 	<p>Cons:</p> <ul style="list-style-type: none"> relatively expensive cannot be applied during honey flow minimum 10°C outdoor temperature pyrethroid; possible resistance lipophilic
<p>Bayvarol® (flumethrin)</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall <p>Mfr.: Bayer</p>	<ul style="list-style-type: none"> 4 strips per brood chamber treatment period of 6 weeks (42 days) 	<ul style="list-style-type: none"> cannot use while honey supers on 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites does not require multiple applications High efficacy if applied correctly 	<p>Cons:</p> <ul style="list-style-type: none"> may show cross-resistance with Apistan® relatively expensive cannot be applied during honey flow lipophilic
<p>Apivar® (3.3% amitraz)</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall 	<ul style="list-style-type: none"> 1 strip per 5 frames of bees minimum 6-week treatment (maximum 8 weeks) 	<ul style="list-style-type: none"> cannot use while honey supers on 14-day withdrawal period: remove strips 2 weeks before placing honey supers 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites does not require multiple applications high efficacy if applied correctly 	<p>Cons:</p> <ul style="list-style-type: none"> temperature has no effect on active ingredient relatively expensive cannot be applied during honey flow withdrawal period minimum 10°C outdoor temperature for effective product distribution formamidine; possible resistance

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons
<p>Apivar 2.0® (3.00% amitraz)</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall 	<ul style="list-style-type: none"> 2 strips per brood box strips should remain in the hive for a minimum of 42 days if there is a lot of brood when starting the treatment, strips should be left in the hive for a total of 70 days 	<ul style="list-style-type: none"> no withdrawal period but cannot be in hive while honey supers on hives 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites same efficacy as Apivar® being achieved with a lower concentration of amitraz no withdrawal period prior to placing honey supers does not require multiple applications <p>Cons:</p> <ul style="list-style-type: none"> cannot be applied while honey supers are present incorrect usage can contribute to amitraz reduced efficacy
<p>Amiflex® (1.99% amitraz)</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall 	<p>For a single colony:</p> <ul style="list-style-type: none"> 2 doses of 3mL (6mL) <p>For a double colony:</p> <ul style="list-style-type: none"> 4 doses of 3mL (12mL) the treatment period is 7 days the product can be used 2 times a year: 2 applications 14 days apart or as 2 separate applications (7 days each) at different times during the year 	<ul style="list-style-type: none"> no withdrawal period but cannot be in hive while honey supers on hives 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites no withdrawal period prior to placing honey supers the product is different from other amitraz products as it has a relatively quick action and therefore a shorter treatment period <p>Cons:</p> <ul style="list-style-type: none"> cannot be applied while honey supers are present incorrect usage can contribute to amitraz reduced efficacy the product does not target mites under capped brood cells

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons
<p>Formic acid (65% liquid)</p> <p>Season:</p> <ul style="list-style-type: none"> spring or fall 	<p>Multiple applications:</p> <ul style="list-style-type: none"> 30-40 mL on pad for 2 chambers (note: use two small pads in place of one larger pad if larger pads are difficult to find) 15-20 mL on pad for single chamber apply up to 7 times in 3-5 day 	<ul style="list-style-type: none"> could not be used during honey flow 	<p>Pros:</p> <ul style="list-style-type: none"> natural treatment inexpensive kills phoretic and developing mites also controls tracheal mites no withdrawal period <p>Cons:</p> <ul style="list-style-type: none"> requires multiple applications colonies must be strong (6 frames of brood covered with bees – no nucs) hive entrances must be fully open, but screen bottom board closed brood mortality and queen supersedure may occur if applied above 30°C (optimal temperature range 10-26°C)
<p>Formic Pro™ (14-day or 20-day treatment)</p> <p>Season:</p> <ul style="list-style-type: none"> spring, summer or fall <p>Mfr.: NOD Apiary Products</p>	<ul style="list-style-type: none"> 14-day: place 2 strips, staggered, across tops of frames in lower brood chamber, near the centre of the box. Leave approximately 2 inches between strips and allow 4 inches between strips and ends of box. 20-day: place 1 strip across tops of frames centre of lower brood 	<ul style="list-style-type: none"> allow a minimum of one month between applications can be used during honey flow with supers on but feeding with Formic Pro™ strips is not recommended 	<p>Pros:</p> <ul style="list-style-type: none"> natural treatment relatively inexpensive kills phoretic and developing mites can be applied in spring or fall can be applied during honey flow 14-day treatment doesn't require multiple applications <p>Cons:</p> <ul style="list-style-type: none"> colonies must be strong (6 frames of brood covered with bees - no nucs) feeding is not recommend during the treatment period (except barrel feeding) hive entrances must be fully open, but screen bottom board closed

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons
<p>MAQS™ (46.7% formic acid)</p> <p>Season:</p> <ul style="list-style-type: none"> spring, summer or fall <p>Mfr.: NOD Apiary Products</p>	<p>14-day application:</p> <ul style="list-style-type: none"> 1 strip on top bars in hive for 14 days, replaced by another strip for an additional 14 days. Place between brood chambers if a double hive. <p>7-day application:</p> <ul style="list-style-type: none"> 2 strips on top bars in hive for 7 days 	<ul style="list-style-type: none"> 30 days between applications (for 7-day treatment) can be used during honey flow with supers on but feeding with MAQS™ strips in is not recommended <p>Pre-harvest interval: greater than two weeks to avoid unfavourable tasting honey despite formic acid naturally present in honey</p>	<p>Pros:</p> <ul style="list-style-type: none"> natural treatment relatively inexpensive kills phoretic and developing mites can be applied in spring or fall slow release: can be applied during honey flow 7-day treatment does not require multiple applications <p>Cons:</p> <ul style="list-style-type: none"> colonies must be strong (6 frames of brood covered with bees – no nucs) feeding is not recommend during the treatment period (except barrel feeding) hive entrances must be fully open, but screen bottom board closed do not use in conditions exceeding 33°C (optimal temp range 10-29 °C) product efficacy may be temperature dependent best used in spring and early fall corrosive to ferrous metals
<p>Oxalic acid (dribble)</p> <p>Season:</p> <ul style="list-style-type: none"> early spring for packages summer for swarms late fall for all hives 	<ul style="list-style-type: none"> mix 35 g of oxalic acid dihydrate in 1L of 1:1 sugar syrup (treats 20 colonies) trickle 3-5 mL between each frame (max 50 mL per hive) directly on top of bees 	<ul style="list-style-type: none"> should not be used during honey flow or when brood present 	<p>Pros:</p> <ul style="list-style-type: none"> relatively inexpensive natural treatment can be applied to swarms and packages of bees <p>Cons:</p> <ul style="list-style-type: none"> colony should be broodless (may harm open brood and does not kill developing mites under capped brood) only late fall treatment for established colonies must open hive to apply may require multiple applications dangerous: corrosive best used to supplement early fall treatment multiple applications may be damaging to bees

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons	
<p>Oxalic acid (vapour)</p> <p>Season:</p> <ul style="list-style-type: none"> late fall or early spring 	<ul style="list-style-type: none"> 1 g of oxalic acid dihydrate per deep hive super vapourize in sealed hive for 2-3 minutes, remove vapourizer and keep hive sealed for additional 10 minutes 	<ul style="list-style-type: none"> should not be used during honey flow or when brood present 	<p>Pros:</p> <ul style="list-style-type: none"> relatively inexpensive natural treatment do not have to open hive to apply treatment can be used on swarms and packages 	<p>Cons:</p> <ul style="list-style-type: none"> colony should be broodless (may harm open brood and does not kill developing mites under capped brood) therefore may require multiple applications when there is capped brood present only late fall treatment dangerous: corrosive; vapour harmful when inhaled, respirator required best used to supplement early fall treatment
<p>VarroSan™ (18.42% oxalic acid dihydrate)</p> <p>Season:</p> <ul style="list-style-type: none"> spring, summer or fall 	<ul style="list-style-type: none"> the number of strips should be adjusted depending on the total number of frames of bees but never exceeding 4 strips per 10-frames 1 strip for 0 – 2.5 frames of bees 2 strips for 3 – 5 frames of bees 3 strips for 6 – 7.5 frames of bees 4 strips for 8 – 10 frames of bees strips should be left inside the hive between 42 days to 56 days and must be removed after a maximum of 56 days 	<ul style="list-style-type: none"> can be used with honey supers on 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites can be used with honey supers on the product does not have strict temperature restrictions 	<p>Cons:</p> <ul style="list-style-type: none"> the product does not target mites under capped brood cells

Miticide	Treatment period	Withdrawal period/ Pre-harvest interval	Pros and Cons
<p>Oxalic acid dihydrate (glycerin strip method)</p> <p>Season:</p> <ul style="list-style-type: none"> spring, summer or fall 	<ul style="list-style-type: none"> solution should be prepared using a 99.7% food-grade vegetable glycerin and oxalic acid dihydrate at a 1:1 (weight:weight) ratio apply prepared strips at a dosage of 40g of oxalic acid per hive <p><i>for example, if one strip absorbs 20g of solution, then half of that would be oxalic acid (10g) and therefore 4 strips would achieve 40g per hive</i></p> <ul style="list-style-type: none"> leave the strips inside the hive for 42 days 	<ul style="list-style-type: none"> can be used with honey supers on 	<p>Pros:</p> <ul style="list-style-type: none"> kills phoretic mites can be used with honey supers on relatively inexpensive <p>Cons:</p> <ul style="list-style-type: none"> the product does not target mites under capped brood cells the treatment must be prepared before application
<p>Hopguard® II (mfn. BetaTec®)</p> <p>Season:</p> <ul style="list-style-type: none"> spring, summer or fall (as long as daytime temperatures 	<ul style="list-style-type: none"> 2 Hopguard® II strips are applied per brood chamber (or 1 strip per every five frames of bees) strips are hung between brood frames strips are left in the colony for 10-15 days, and a second application for 10-15 days may be required 	<ul style="list-style-type: none"> safe for colonies with honey supers 	<p>Pros:</p> <ul style="list-style-type: none"> can be applied to honey bee colonies while honey supers are in place derived from natural hop compounds considered an organic treatment can be used up to a maximum of 4 times per year (but only twice per treatment interval, e.g. twice in the spring and twice in the autumn) <p>Cons:</p> <ul style="list-style-type: none"> temperature sensitive reduced efficacy with presence of brood, however product efficacy is limited below 10°C messy product application potential to cause brood injury

Integrated Pest Management

There are numerous natural and synthetic chemical treatment options available to control varroa mites in addition to alternative or complementary non-chemical means of control. Beekeepers are encouraged to practice Integrated Pest Management (IPM) in an effort to mitigate the development of miticide resistance. The following cultural and physical control methods are available to beekeepers.

Drone trapping

Varroa mites reproduce greater numbers of offspring in drone cells due to the longer developmental time of drone pupae. Honey bee colonies rear the highest number of drones in the late spring and early summer. Beekeepers can exploit the varroa mite's preference for drone brood as a means of cultural control by culling frames of capped drone brood in May and June. This process is advantageous as it is an alternative to chemical control, but it can be time consuming for those who manage many hives. Strict timelines must be followed for drone trapping to be effective to avoid raising unwanted numbers of drones and mites.

Furthermore, dedicating one frame's worth of space to raising drone brood results in less space the colony could use to rear worker brood or store food. Nonetheless, drone brood can be inspected for mites as a monitoring tool with or without the use of a drone trapping frame.

Screened bottom board

Bottom boards with screens are available as alternatives to solid bottom boards and are a useful IPM tool. Removable sticky boards can be placed beneath the screen and left for a period of time to monitor the number of mites that die and fall to the bottom of the hive naturally or as a result of a treatment. These sticky bottom boards can act as both a monitoring technique and a means of controlling mite populations by trapping mites to a sticky board that may otherwise crawl back onto bees. Screened bottom boards on their own will not adequately control varroa mite but they can be used in conjunction with other treatments.

References

Health Canada

<http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

Honey Bee Diseases and Pests. 3rd Edition. Canadian Association of Professional Apiculturists.

Ontario Treatment Recommendations for Honey Bee Disease and Mite Control
<http://www.omafra.gov.on.ca/english/food/inspection/bees/2014-treatment.htm>

Recommendations for Management of Honey Bee Diseases and Pests in Alberta 2014-2015

[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/prm13239/\\$FILE/2014-recommendations.pdf](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/prm13239/$FILE/2014-recommendations.pdf)

2017 Recommendations for Administering Antibiotics and Acaricides to Honey Bees

<https://www.gov.mb.ca/agriculture/crops/production/pubs/administering-antibiotics-and-acaricides-to-honey-bees.pdf>

For More Information, Contact The Atlantic Tech Transfer Team For Apiculture (Attta):

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			No Honey Supers			Honey Supers Allowed			No Feeders				Feeders Allowed		
Treatment Duration			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Synthetic Products															
Apivar® (2-week withdrawal)	6 – 8 weeks														
Apivar 2.0®	6 – 10 weeks														
Amiflex®	7 days														
Organic Acids															
Oxalic acid dribble	Trickle 5 mL of prepared solution (max 50mL per hive; repeat based on monitoring results)														
Oxalic acid vapour	Follow vaporizer manufacturer instructions; repeat based on monitoring results														
Oxalic acid glycerin	6 weeks														
VarroSan™	6 – 8 weeks														
Formic acid 65% (2-week withdrawal)	Repeat up to 6 times at 1 to 10-day intervals														
Formic Pro™	14-day or 20-day treatment options														
Essential Oils & Other Products															
ApiLife Var® (30-day withdrawal)	1 st application: 7-10 days 2 nd application: 7-10 days 3 rd application: 12 days														
Thymovar®	6 – 8 weeks														
Hopguard®	10 – 15 days														