



"Now or Never": Late Season Colony Management for Survival, Varroa Treatment Options and the Importance of Timing.



Paul Kozak – Provincial Apiarist / Apiary Specialist, Ontario Ministry of Agriculture, Food and Rural Affairs Dr. Colette Mesher – Lead Specialist, Technology Transfer Program, Ontario Beekeepers' Association The end of the season is fast approaching and it's time to get down to business. While the closer you get to the end the beekeeping season the more important the management can be for the survival of the colonies. On the flip side of that early management of colonies influences their health and condition for the entire season. And in between these is late summer, where the pest and disease levels and health of the colonies have progressed, and beekeepers are at a point where what they do (or don't do) now is critical. The following are important management actions for preventing winter loss focusing on late summer (August and very early September). This article primarily addresses Varroa mites as (and ineffective control of varroa mites) as this has been demonstrated to be the primary cause of winter mortality in Ontario (Guzman et al., 2010).

[The following draws from past Treatment Recommendations available through OMAFRA with updated varroa mite treatment options and a table which outlines details on each treatment (table 2. at the end of the article). This will align with the next version of the treatment recommendations.]

Brood inspection and Sampling / Monitoring for Levels of Varroa Mites:

- This is still important even in late summer. Brood must be examined for signs of disease and the health of the queen and population of the colony. If this is delayed, pest and disease or queen issues may be too late to correct.
- This is also a key opportunity to sample for varroa mites through either the alcohol wash or sticky board method. It is key to know the levels of varroa.
- You are still likely going to treat for varroa either way. However, knowing the levels of varroa provides the beekeeper with important information on how soon they may need to treat (even before September if levels are high) and potentially providing some guidance on what type of treatment they may choose.
- And, the 2022 Ontario Varroa Monitoring Campaign provides additional advisory on varroa monitoring specific as well as some summaries of varroa levels from 2022. https://www.oahn.ca/resources/varroa-monitoring/
- <u>Varroa Management</u>: There are established thresholds for varroa treatment and management:
 - *E.g. treatment threshold by alcohol wash 2% (or 2 varroa / 100 bees in May and 3 varroa / 100 bees in August). https://www.ontario.ca/page/varroamites#section-3 (see Table 1)

| Monitoring Method | # of Varroa Mites (May) | # of Varroa Mites (August) | |
|-------------------|---------------------------------|----------------------------|---|
| Alcohol Wash | 2 mites / 100 bees | 3 mites / 100 bees | |
| Sticky Board | 9 mites / 24 hour drop | 12 mites / 24 hour drop | |
| Table 1: Or | torio Treatment Threshold for V | Attes | _ |

Table 1: Ontario Treatment Threshold for Varroa Mites

- The presence of multiple parasites/diseases may require treatment below before any the recommended treatment threshold(s) are reached.
- These thresholds, along with sampling of varroa levels can guide management of varroa
- In almost all cases it is essential for beekeepers to apply chemical treatments to lower the levels of varroa in honey bee colonies to as low as possible.
 - All treatments have their pros and cons and this may be relevant to the time of year, environmental conditions and preference of the beekeeper. This is covered in Table 2 at the end of this article.
 - Read product labels before applying disease or mite control products.
- As part of an integrated pest management strategy beekeepers should also incorporate biosecurity; additional cultural control of pests and diseases and consider their choice of honey bee stock.

Timing of Treatments:

- **Timing of treatments are critical**. Varroa mites increase exponentially within a honey bee colony. This means that once the levels get high, the increase and the rate of increase accelerate. This is where low levels (or barely perceptible) can become very high, very fast.
- Once varroa levels get out of control:
 - It can be hard to get varroa levels back under control
 - The bees that those varroa have parasitized are reduced in health and life span
 by bodily damage and increase viral infection

Mid-Season Treatments:

Mid-season treatments or treatments that can be used during ('Treating while honey supers are on the colony' may also fit in to your overall treatment plan. Towards the end of the season these treatments may still be a useful part of your varroa management if varroa levels are very high (as determined by sampling). However, it is more likely to something that should have already been applied earlier in the season or perhaps something in late summer with the potential for a follow up treatment.

Resistance:

- The most recent (field work in 2019) research in Ontario on resistance (Morfin et al., 2022) demonstrated that:
 - 72% average efficacy in active ingredient tau-fluvalinate (product Apistan®)
 - 78% average efficacy in active ingredient flumethrin (product Bayvarol®)
 - 92% average efficacy in active ingredient amitraz (product Apivar®)

- For context, many specialists consider ~90% efficacy (the proportion of target pests killed by a treatment) to be ideal for varroa control. While this may be more relevant for late season control of varroa (with proper timing) lower efficacies may be factored in whereby beekeepers are monitoring varroa levels, rotating types of treatments and using two or more treatments per beekeeping season.
- Beekeepers must rotate the treatment with another active ingredient to avoid the development of resistance (as they would for any other treatment). E.g. If you used Apistan in spring, use another active ingredient (something other than tau-fluvalinate) in mid-summer or late summer.
- Follow the label instructions:
 - Take the strips out at the end of the treatment
 - Use the appropriate number of strips per brood chamber

Don't use the treatment too late (beyond late summer) as even high efficacy may not kill all the varroa mites that have been allowed to flourish from a delayed treatment

For more on pests and diseases of honey bees:

- https://www.ontario.ca/page/honey-bee-pests-and-diseases
- https://www.ontario.ca/page/best-management-and-biosecurity-practicesbeekeeping-ontario

Agricultural Pesticides:

Pesticides may be a further challenge to honey bee and other pollination populations. If you suspected that your bees have been impacted by a pesticide during the regular season it is important to report this. The Agricultural Information Contact Center (through the Ontario Ministry of Agriculture, Food and Rural Affairs) [1-877-424-1300; http://omafra.gov.on.ca/english/realign/aicc.htm] has a process to document suspected pesticide incidents. These reports also go to the Ministry of the Environment, Conservation and Parks; and Health Canada – Pest Management Regulatory Agency. This information is important to gather and summarize to determine patterns of acute mortality. Inspectors may be assigned, depending on the availability and timing of the report.

To summarize: Timing is key with all varroa treatments, whether mid-season or once the honey supers have been removed. Once you develop your Integrated Pest Management plan informed by monitoring, timing becomes critical. The end of season can come upon you in whirlwind, which is why making a plan to treat for varroa and ensure you have enough time to complete the treatment and feed sufficiently prior to the start of winter. Use the chart below to help compare all registered treatments and their appropriate timings.

"NOW OR NEVER": LATE SEASON COLONY MANAGEMENT FOR SURVIVAL, VARROA TREATMENT OPTIONS AND THE IMPORTANCE OF TIMING.

Table for Varroa Mite Treatments

| Type of Treatment | Product Name | Active Ingredient | Method | Treatment Duration | Number of applications for a full treatment | Temperature Dependent / Range | Treating while honey supers are on the colony |
|---------------------|---|-------------------|--|-----------------------|---|---|---|
| Synthetic Acaricide | Apivar® | Amitraz | 2 strips per 5 frames of bees | 42 to 56 days | 1 application / per colony | None | No, not permitted |
| Synthetic Acaricide | Apistan® | Tau-fluvalinate | 2 strips per 5 frames of bees | 42 to 56 days | 1 application / per colony | None | No, not permitted |
| Synthetic Acaricide | Bayvarol® | Flumethrin | 4 strips per brood chamber | 42 days | 1 application / per colony | None | No, not permitted |
| Organic Acid | 65% liquid formic acid | 65% formic acid | 250 ml pad in a perforated Ziploc bag | 21 to 30 days | 1 application / per colony | Yes / Recommended temp range is from 10 to 26C. Damage to colony may occur at >30C. | No, not permitted |
| Organic Acid | 65% liquid formic acid | 65% formic acid | 15 to 20 ml absorbent pad for a single brood chamber / 30 to 40 ml absorbent pad for a double brood chamber | 3 to 5 days | Up to 6 applications / per colony – Minimum 4 applications / colony | Yes / Recommended temp range is from 10 to 26C . Damage to colony may occur at >30C. | No, not permitted |
| Organic Acid | Mite Away Quick Strips [™] (MAQS [™]) | 46.7% formic acid | <u>Option 1:</u> Full dose (1 sachet, 2 strips). <u>Option 2:</u> Half dose (1 strip). Apply a single Mite Away Quick Strip® | 7 days | Option 1: 1 to 2 applications <u>Option 2:</u> Every 2 to 6 weeks as needed throughout the beekeeping | Yes / Recommended temp range is from 10 to 26C. Damage to colony may occur at >30C. | Yes, consult label |

f

"NOW OR NEVER": LATE SEASON COLONY MANAGEMENT FOR SURVIVAL, VARROA TREATMENT OPTIONS AND THE IMPORTANCE OF TIMING.

| ype of Treatment | Product Name | Active Ingredient | Method | Treatment Duration | Number of applications for a full treatment | Temperature Dependent / Range | Treating while honey supers are on the colony | |
|------------------|---------------------------|---|--|--|--|--|---|--|
| Jrganic Acid | Formic Pro ⁷¹⁴ | 42.25% formic acid | <u>Option 1.</u> Full dose (1 sachet, 2 strips). <u>Option 2.</u> Half dose (1 strip) | Option 1: 2 strips for 14 days. 2 option 2: 1 strip for 10 days remove and replace with 2nd strip for an additional 10 days. | Option 2: Apply a single Mite Away Quick Strip® every two to six weeks as needed throughout the beekeeping season. | 10 – 29.5°C on day of application. Hot temperatures (233°C during the first 3 days) may lead to excessive may lead to excessive loss loss | Yes, consult label | |
| Jrganic Acid | Oxalic Acid | Oxalic Acid – Drizzle Method | Oxalic acid mixed with sugar syrup drizzled in between frames. | 1 to 2 days – intended for brood-free periods (very early spring or late fall or during a break in brood cycle) as it is a short treatment and only has the capacity to kill varroa on adult bees | Once | Apply on a cool day when the bees are clustered in the hive | No, not permitted | |
| Jrganic Acid | Oxalic Acid | Oxalic Acid – Vaporizer Method | 2.0 g Oxalic Acid Dihydrate powder into vaporizer. Follow the vaporizer manufacturer's directions for use. Insert the vaporizer apparatus through the bottom entrance. Apply heat until all Oxalic Acid has sublimated. | 1 to 2 days | Unknown for Ontario conditions. Beekeepers must be mindful that this treatment is intended for broodless conditions and there is risk of damage to colonies with high numbers of repeated applications | No temperature restrictions. However, the treatment is intended for colonies that are broodless. | No, not permitted | |
| ssential Oil | Thymovar® | Thymol | Wafters (also described as strips) placed on top bars within the colony. | 3-4 weeks | 2 applications | Yes / 13 to 30°C with best results at 20 to 25°C. Start with a reduced dose when > 30°C in the first 3 days of the treatment and complete the dosage after three days to one week. | No, not permitted | |
| ssential Oil | Api Life Var | thymol, camphor, levomenthol and eucalyptus oil | Tablets placed at the corners of the brood nest, on the top bars. | 7-10 days for the first 2 applications; 12 days for the final application | 3 applications | Yes / 18° - 35° C | No, not permitted | |
| eta Hop Acid | HopGuard® II | Potassium Salts of Hop Beta Acids | Strips hung between brood frames | 14 days | 2-3 consecutive treatments | Daytime temperature should be above 10°C. | Yes, consult label | |

P

f

Table 2. All legally registered treatments for varroa mites in Ontario with general information forcomparison. Beekeepers must refer to the product labels or Health Canada – Pest ManagementRegulatory Agency registration labels for further instructions.

References:

- Guzmán-Novoa, E., L. Eccles, Y. Calvete, J. McGowan, P. Kelly and A. Correa-Benítez (2010).
 Varroa destructor is the main culprit for the death and reduced populations of overwintered honey bee (Apis mellifera) colonies in Ontario, Canada. Apidologie 41(4): 443-450.
- Morfin, N., D. Rawn, T. Petukhova, P. Kozak, L. Eccles, J. Chaput, T. Pasma, and E. Guzman-Novoa. (2022). Surveillance of synthetic acaricide efficacy against Varroa destructor in Ontario, Canada. The Canadian Entomologist (2022), 154, e17, 1–7 doi:10.4039/tce.2022.4