



Essential Practices for Beekeepers in Ontario

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HONEY BEE
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Introduction

Essential Practices for Beekeepers in Ontario outlines recommended practices to ensure healthy, productive managed honeybees in Ontario. This document is intended to instruct beekeepers on *what* they must do, rather than *how* they should do it. The *how* can be found in other materials referenced in the Education and Training section on pages 10 to 12 of this document. All beekeepers should be aware of the practices described in this document and incorporate them into their beekeeping operations to support a thriving apiculture

industry and the overall health of managed honey bees in Ontario.

A second major focal point of this document is to highlight sources of information relevant to beekeeping in Ontario. In recent years, there has been a dramatic increase in beekeeping information on the Internet. While the Internet does contain valuable information, with beekeeping it is critical to use credible information relevant to Ontario's unique geography, climate and pest status.

Basic Colony Management

A honey bee colony is defined as an aggregate of a queen bee, drones and several thousand worker bees living together as one social unit in a hive or in any other dwelling. Colonies have variable populations ranging from less than 1,000 bees to more than 50,000 bees. The management of honey bee colonies encompasses all of the activities conducted by a beekeeper which influence the health, production and population of their colonies. Activities include employing Best Management Practices (BMP), biosecurity, Integrated Pest Management (IPM) and sampling and testing of bees and/or equipment. Management practices can vary based on the focus of the beekeeping operation (e.g., honey production, queen and nucleus production, pollination). When managing your colony, consider your operation and plan your beekeeping health and production strategies in advance.

Biology and Integrated Pest Management

The biology of honey bees and how a colony functions and interacts with its environment is central to the health, production and sustainability of the colony in all management practices.

Understand the basics of colony management, honey bee biology and the biology of honey bee pests and diseases.

Be familiar with what a healthy colony looks like as well as the signs and symptoms of honey bee health problems. This knowledge is essential for recognizing problems and understanding how to resolve them. Be familiar with the signs and symptoms of pests and diseases that can affect Ontario-managed honey bees. This knowledge is required to develop an effective IPM strategy to safeguard your colonies and those of nearby beekeepers

from health risks. Refer to the Education and Training section for workshops and further information on this topic.

Follow IPM practices suitable for your beekeeping operation.

The goal of IPM is to manage pests and diseases so they are below damaging thresholds. IPM can include chemical or non-chemical methods, and the method chosen must be approved, effective and appropriate for your geographic region. Monitor colonies for pest and disease levels regularly and manage pests and diseases to keep them below defined treatment thresholds for Ontario. Note that some diseases are so serious they may require destruction of colonies, which is the case for American foulbrood. Take action, as per the *Ontario Treatment Recommendations for Honey Bee Disease and Mite Control*, whenever pest and disease levels are above defined thresholds. These recommendations are important as they

include legally registered treatment options and Ontario-based research has found them to be effective in our climate.

www.omafra.gov.on.ca/english/food/inspection/bees/2017-treatment.htm

When using pest and disease treatments, ensure they are approved for use in Ontario and follow the label instructions.

Illegal or off-label treatments may harm the honey bees or the beekeeper, contaminate honey, be ineffective against the pest or disease you are attempting to control, encourage development of pathogens that are resistant to the treatment, and increase the risk of pests and disease spreading to neighbouring operations. Avoid resistance by using treatments according to label instructions and rotating between treatments of different active ingredients. Repeated exposure to the same compound will hasten the development of pests resistant to that treatment.



Brood nest inspections should be conducted on all colonies on a regular basis.

Beekeeper examining a frame of brood.

Honey bees on a cleansing flight during spring.

Some beekeepers may wish to manage colonies organically, but this requires a higher level of pest and disease surveillance. If pests and diseases cannot be kept below treatment thresholds, the use of chemical (i.e., synthetic) treatments should be considered for the welfare of these colonies and to prevent spread to nearby colonies, bee yards and operations. The philosophy and practice of *treatment-free* beekeeping has gained popularity in recent years. While there are varying definitions of these practices, beekeepers must be cautious if they take this approach. For example, no intervention in pest levels or using methods that are not recognized as being effective in Ontario are not acceptable and may result in the death of honey bee colonies, as demonstrated through peer-reviewed research done in Ontario (Guzman *et al.* 2010).

Colony Inspections

The brood chamber is the section of the hive that contains the queen and developing brood. It is where most of the biological activity of the colony takes place and, as such, it is where most pests and diseases are typically found. Brood nest inspections should be conducted by the beekeeper regularly on all colonies, ideally every two weeks, throughout the active beekeeping season. During inspections, consider and ensure the following:

Colonies are queenright

- Prevents colony failure resulting from the prolonged absence of a healthy and laying queen.
- Prevents lost production that occurs in the time it takes for a colony to requeen itself.
- Healthy and adequately mated honey bee queens are essential for a productive colony. Egg laying capacity

typically declines after 2 to 3 years in healthy queens. Replacing older queens with a new and mated queen is recommended.

- These measures will help to keep small hive beetle and other opportunistic pests and diseases in check.

Colonies have a sufficient amount of food

- Avert the risk of starvation. This is a particular risk in the early spring; however, honey bee colonies may starve or experience setbacks during the active season after a prolonged lack of nectar or pollen dearth.
- Avoid collecting pollen from colonies during pollen dearth.
- Every colony should have at least two frames of honey at all times.

Regularly monitor for pests and diseases

Regular monitoring for pests and diseases and the health status of colonies will allow a beekeeper to develop an effective IPM strategy. This involves:

- Visually examining the brood for clinical symptoms of disease
- Regularly monitoring varroa mite levels with an accepted sampling method
- Looking out for new pests and diseases (such as small hive beetle)
- Considering how other pests and diseases may influence threshold levels for treatment (e.g., if a colony has tracheal mites in addition to varroa, the treatment thresholds for varroa would be lower)

Keep records, make notes and document colony health and management activities

- Enables trends in colony health over time to be tracked and the effectiveness of treatments to be determined.
- Pay particular attention to underperforming colonies.

Biosecurity

Applying the principles of biosecurity in your beekeeping operation will reduce the risk of spreading pests and diseases between your colonies, your bee yards, both throughout Ontario or beyond its borders. Identified below are a few areas for consideration of biosecurity. A comprehensive overview of managed honey bee biosecurity practices can be found in the *Honey Bee Producer Guide to the National Bee Farm-level Biosecurity Standard*:

www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/honey-bee-producer-guide/eng/1378390483360/1378390541968

Do not leave used brood nest equipment exposed in outdoor settings

- Used equipment increases the risk of spreading diseases. In particular, wax

comb from the brood nest (when no longer in contact with an active colony) presents a risk of harbouring and spreading American foulbrood through bacterial spores. Brood comb should always be stored in bee-tight facilities and not left exposed in the outdoors.

Introductions of pests and diseases

- Feral colonies and those managed by nearby beekeepers may provide a reservoir of pests and diseases that can no longer be managed by a beekeeper. Always assume you have neighbours as well as pests and diseases that may transfer to your bees.
- Be mindful of new and additional pests and diseases:
 - If catching a swarm. This is especially important for swarms caught at locations near neighbouring jurisdictions (e.g., USA).



Close up of adult varroa mites.



A beekeeper conducting an alcohol wash to determine varroa levels.

Beekeepers may manage the pests and diseases within their own colonies using the guidelines of Integrated Pest Management and Biosecurity.

- When purchasing colonies — ensure that the beekeeper you are purchasing from has a valid permit to sell or to import.

Ensure beekeeping equipment and tools are free of pests or diseases

- Be aware that honey bee equipment can harbour and spread pests and diseases (see resources on biosecurity above).
- An inspection and a permit are required to sell used beekeeping equipment (i.e.,

colony equipment). When purchasing used equipment, request a copy of the seller's permit.

- Regularly sterilize beekeeping equipment such as hive tools.
- Do not use reuseable gloves (such as leather gloves).

Prevent robbing in beeyards

- Robbing can further spread pests and diseases as well as further stress on honey bee colonies.

Responsibility to the Beekeeping Community and Honey Bee Population

Honey bees, like other populations, require a community health approach. Since a honey bee colony can freely interact with another one within a three-km radius (or greater), pests or diseases can easily transfer between neighbouring colonies and operations. Therefore, all beekeepers must ensure they are effectively managing pests and diseases in order for the population of honey bees in Ontario to be healthy and sustainable. A mismanaged colony may also spread pests and diseases to native bee species, thus causing harm to wild pollinators.

Communicate and interact with local and provincial beekeeping associations. They are an excellent resource for current information that beekeepers can use to keep current with the dynamic and evolving beekeeping industry. Associations can help inform you of the beekeepers and bee yards in your vicinity, provide timely updates and communications, and link you to the apiculture community:

www.ontariobee.com/community/local-beekeepers-associations

Regulations and Legal Requirements

Ontario's *Bees Act* and Regulation 57 regulates managed honey bees and beekeeping in Ontario. The main purpose of the act is to protect the health of honey bees, particularly from pests and diseases. As a beekeeper in Ontario, you are required to comply with this legislation.

Ontario *Bees Act*:

www.ontario.ca/laws/statute/90b06

Regulation 57:

www.ontario.ca/laws/regulation/900057

Certificate of registration

Anyone who owns or is in possession of honey bees must register annually with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). There is no charge for registration. As part of the registration process, beekeepers are required to identify

the location of bee yards and the number of honey bee colonies. Registration provides OMAFRA with the information it needs to ensure continuation of ministry services including:

- inspections and permits (i.e., import, including pollination; selling; and queen and nuc);
- processing of claims under the wildlife damage compensation program;
- annual reporting on industry statistics; and
- monitoring and responding to current and emerging diseases, pest outbreaks, and bee health issues.

A honey bee registration form can be obtained from:

www.omafra.gov.on.ca/english/food/inspection/bees/info_registration.htm



Honey bees and honey in wax comb.

Honey bees in the brood nest.

Selling permits

Selling permits allow beekeepers to sell (or transfer ownership of) honey bees, honey bee queens and/or bee equipment from one registered Ontario beekeeper to another. Issuance of these permits is supported by a recent inspection report with the inspection being focused on the mitigation of the transfer of serious honey bee pests and diseases from one operation to another. Your local OMAFRA apiary inspector can work with you to obtain a permit. When purchasing honey bees, honey bee queens, and/or bee equipment, be sure to request a copy of the seller's permit.

Report bee health issues (pests and diseases) to your apiary inspector

Immediately contact your local apiary inspector if serious honey bee pests or diseases are suspected or found within your operation, including:

- American foulbrood
- Varroa that cannot be controlled through treatment
- Small hive beetle
- Africanized honey bees

A list of provincial apiary inspectors is found here:

www.omafra.gov.on.ca/english/food/inspection/bees/info_beeinspectors.htm

Education and Training

The following resources are recommended for all beekeepers in Ontario. They are from reputable sources, are science-based, and have proven to be successful in the province. Be wary of sources that recommend practices contradictory to those recommended here as they may not be relevant to beekeeping in Ontario.

- OMAFRA's Apiary Program
www.omafra.gov.on.ca/english/food/inspection/bees/apicultu.html
- Ontario Beekeepers' Association's (OBA) Technology Transfer Program
www.ontariobee.com/outreach/ttp
www.ontariobee.com

- University of Guelph Honey Bee Research Centre
www.uoguelph.ca/honeybee/videos.shtml
www.youtube.com/channel/UC3mjpM6Av4bxbxps_Gh5YPw/feed
- Niagara College Commercial Beekeeping Course
www.niagaracollege.ca/environment-horticulture-studies/programs/commercial-beekeeping/

Pursue continuous learning on apiculture through reputable sources of information specific to Ontario such as workshops and training manuals. It is important to stay up to date as information changes, new pests and diseases emerge, and new management solutions or science become available.

Workshops

Online Courses / Workshops

- Technology Transfer Program (OBA)
www.ontariobee.com/outreach/workshops/apiology101

Basic Beekeeping

Introduction to honey bees, basic colony management, honey production

- Technology Transfer Program (OBA)
www.ontariobee.com/outreach/workshops/springworkshops
- University of Guelph – In-field workshops and Youtube training videos
www.uoguelph.ca/honeybee/videos.shtml
www.youtube.com/channel/UC3mjpM6Av4bxbxps_Gh5YPw/feed
www.uoguelph.ca/honeybee/education-beekeeping.shtml

Pests and Diseases, Treatment and Management of Pests and Diseases, Integrated Pest Management

- Technology Transfer Program (OBA)
www.ontariobee.com/outreach/workshops/springworkshops
- University of Guelph – In-field workshops and Youtube training
www.uoguelph.ca/honeybee/videos.shtml
www.uoguelph.ca/honeybee/education-beekeeping.shtml

Queen Rearing

Technology Transfer Program (OBA)
www.ontariobee.com/outreach/workshops/oba-ttp-further-advanced-beekeeping-workshops

Advanced or Commercial Beekeeping

- Technology Transfer Program
www.ontariobee.com/outreach/workshops/oba-ttp-further-advanced-beekeeping-workshops
- Niagara College
www.niagaracollege.ca/environment-horticulture-studies/programs/commercial-beekeeping/



Ontario is fortunate to have credible beekeeping resources that are reputable science-based, and proven to be successful.

Beekeeper examining the brood pattern of the colony.

Foraging honey bees returning to the colony.

Manuals

- *Ontario Beekeeping Manual* – Technology Transfer Program, OBA
www.ontariobee.com/outreach/manuals-books-dvds
- *Integrated Pest Management for Beekeeping in Ontario* – Technology Transfer Program, OBA
www.ontariobee.com/outreach/manuals-books-dvds
- *Ontario Introductory Queen Rearing Manual* – Technology Transfer Program, OBA
www.ontariobee.com/outreach/manuals-books-dvds
- *Elemental Genetics and Breeding for the Honey Bee* – Ernesto Guzman-Novoa – University of Guelph – Honey Bee Research Centre
www.ontariobee.com/outreach/manuals-books-dvds
- *Honey Bee Diseases and Pests* - Canadian Association of Professional Apiculturists
www.ontariobee.com/outreach/manuals-books-dvds
- *Canadian Best Management Practices for Honey Bee Health* – Industry Analysis and Harmonization – Les Eccles, Melanie

Kempers, Raquel Mijares Gonzalez, Daniel Thurston and Dan Borges.
www.honeycouncil.ca/wp-content/uploads/2016/12/BMP-manual-for-honey-bee-health-Feb-2017-English.pdf

Information Sheets

- OMAFRA's Apiary Program
Numerous info sheets, recommendations, and updates:
www.omafra.gov.on.ca/english/food/inspection/bees/apicultu.html#infosheets
- OBA's Tech Transfer Program
www.ontariobee.com/outreach/fact-sheets-and-publications

Courses

- Niagara College
www.niagaracollege.ca/environment-horticulture-studies/programs/commercial-beekeeping/
- University of Guelph
www.uoguelph.ca/honeybee/education-apiculture.shtml
- Algonquin College
www.algonquincollege.com/ccol/courses/the-urban-beekeeper/

Glossary

The following is a glossary of beekeeping terms referenced throughout this document.

American foulbrood (*Paenibacillus larvae*):

A virulent and highly infective bacterial brood disease of honey bees, spread by spores from infected colonies and equipment.

Bees Act (Ontario): The legislation governing honey bees and beekeeping activities in Ontario. Most of this legislation addresses the health of honey bee colonies in relation to pests and diseases.

Biosecurity: A set of practices used to minimize the transmission of pests or diseases in animal and plant populations, including their introduction, spread within the population and release.

Brood: The developing stage of honey bees (larvae and pupae) before they develop into adults.

Brood Cycle: A period of time where brood is being produced.

Brood Nest: The region of the honey bee hive containing honey bee brood, the queen and much of biological activities of the hive. Ontario colonies typically have one or two boxes at the bottom of the hive dedicated to brood rearing.

Chemical Treatments: May include organic chemicals (registered uses of organic acids such as formic and oxalic, and essential oils such as thymol) or synthetic chemicals used to manage honey bee pests and diseases.



Honey bee foraging on buckwheat.



Honey bee colonies wrapped for winter.

Colony: Refers to the unit of the worker bees, drones, and queen.

Community Health: The improvement of biological communities (i.e., honey bees) focusing on a geographical region (e.g., Ontario).

Feral Colonies: A honey bee colony that has established itself in the wild (typically the result of a swarm) and is not managed by a beekeeper.

Integrated Pest Management (IPM): A management system for pests and diseases that uses all suitable techniques, in context of the associated environment and population dynamics of the pest, to maintain pest populations at levels below those causing economic injury.

Nectar Dearth: A period of time in the season where there is a shortage of nectar in the environment.

Nucleus (Nuc) Colony: A partial or beginner colony, typically composed of a queen, one or more frames of brood, three or more frames of worker bees and a frame of honey.

Ontario Apiary Program: An Ontario Ministry of Agriculture, Food and Rural Affairs program responsible for administering and overseeing Ontario's *Bees Act*. It also provides information and advice to beekeepers in collaboration with the Ontario Beekeepers' Association and the University of Guelph.

Organic: With respect to the treatment of honey bee pests and diseases this may include non-chemical management practices (i.e., cultural control such as breaking the brood cycle) as well as chemical controls (i.e., organic acids such

as formic and oxalic acids or essential oils such as thymol). Methods must be proven effective and chemical treatments (product, active ingredient and application method) must be legally registered for use in Ontario.

Pathogen: A biological agent such as a bacterium (e.g., American foulbrood), virus (e.g., deformed wing virus), or fungus (e.g. Nosema) that has the potential to cause bee disease.

Pollen Dearth: A period of time in the season where there is a shortage of pollen in the environment.

Queen and Nuc Production: The production of honey bee queens and small starter colonies (nuc or nucleus colonies). This can be done for replacing losses, increasing the size of an operation, or for sales.

Queen Rearing: The practice whereby a beekeeper produces honey bee queens.

Queenright: A colony that has a functional queen.

Requeen: The process of replacing a honey bee queen in a honey bee colony.

Resistance: A natural process where a population of organisms are no longer susceptible to a stressor (or method of control).

Robbing: The act of honey bees stealing nectar or honey from other colonies. Often occurs to weakened hives or during times of nectar dearth.

Small hive beetle (*Aethina tumida*): A species of beetle considered a pest to honey bee colonies.

Split: The product of dividing one honey bee colony into two or more smaller units.

Swarm: A queen and a large proportion of a honey bee colony that has left the rest of the colony and is looking for a new nesting site.

Synthetic Chemical Treatments: Chemical treatments used to manage honey bee pests and diseases that have been derived through synthetic processes, are not microbial organisms (bacteria, fungi, yeasts, viruses), and are not naturally occurring (e.g., plant extracts).

Tracheal Mites (*Acarapis woodi*): A parasitic species of mite that lives inside of the breathing tubes (trachea) of honey bees.

Treatment Thresholds: A defined level beyond which a treatment must be applied in order to manage a honey bee pest. The thresholds for Ontario have been established by the scientific community (e.g., varroa mites).

Varroa Mites (*Varroa destructor*): A parasitic species of mite that attaches to the exterior of adult and brood honey bees.

References

Guzman-Novoa E., Eccles L., Calvete Y., McGowan J., Kelly P. and Correa-Benitez A. 2010. Varroa destructor is the main culprit for death and reduced populations of overwintered honey bee (*Apis mellifera*) colonies in Ontario, Canada. *Apidologie*. 41 (4): 443-450.



Honey bee foraging on sunflower.

