ALBERTA BEEKEEPERS COMMISSION
TECHTRANSFER PROGRAM

Integrated Pest Management Plan Template
Varroa destructor Mite

Integrated Pest Management (IPM) is a sustainable form of pest management that works to suppress pathogens below economic thresholds, reducing overall colony damage[1]. A successful IPM strategy consists of disease prevention, pathogen identification, frequent monitoring, and the use of economic thresholds to guide treatment decisions. In combination, all of these components can be used to create a step-by-step plan that will help beekeepers act quickly on bee health issues, keeping bees healthy and reducing the impacts of new risks as they emerge. A useful tool that should be frequently referred to when making IPM decisions is the IPM pyramid (Figure 1). The pyramid outlines the recommended sustainable steps that can be taken leading up to chemical treatment, while accounting for factors such as colony stress, labour, and management costs. By adopting the basic principles of IPM, beekeepers can develop and frequently refer to a standard decision-making process that aids in preventing pest issues and, if applicable, determining appropriate treatment plans. This decision-making process helps raise awareness and streamline focus on colony health within an operation. An effective IPM plan can decrease treatment costs, increase treatment efficacy, and improve the safety of pest management practices.

The Tech Transfer Program (TTP) in conjunction with the Bee Health Assurance Team (BHAT) has developed a general Varroa IPM plan to be used as a guide for beekeepers developing their own IPM plan. One plan does not fit all and, therefore, it is important that beekeepers use this as a template for a personalized Varroa IPM plan, making modifications where necessary to meet their specific operational needs. This guide has been based on seasonal changes within Alberta and may not be applicable in warmer climates.

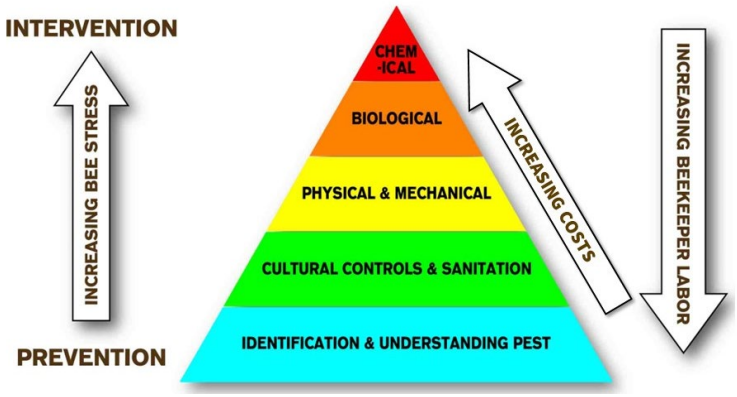

Figure 1. IPM Pyramid.

IPM Pro Tips:

It is strongly recommended that beekeepers always monitor before and after every treatment, especially between organic treatments.

It is recommended that every operation has at least one person designated to carrying out the IPM activities. This allows for a strong focus on disease monitoring.

Move suspected or sick colonies to a hospital yard. This reduces disease transfer to healthy colonies and makes it more convenient to monitor and treat sick colonies in one location.

Colony labels improve disease records and help easily identify problematic hives and apiaries. It is recommended that every colony gets its own unique ID tag.

Frequently check treatment efficacy **DURING** the treatment period. In colder weather use sticky boards to avoid opening the hive; in warmer weather use the mite shaker method.

When using sticky boards, the number of mites dropping should start high and get lower throughout the treatment period. If there is no mite drop then a different treatment method may be required.

SPRING – Late March to April

What	When	How	Action
Spring Varroa Sampling	**BEFORE Treatment & AFTER Treatment**	**Sampling Parameters** Per Operation: ▶ Sample ALL apiaries within an operation as mite levels can vary between locations[3]. Per Apiary: ▶ Number of colonies to be monitored is based on apiary size and should be sampled as per the table below.	**Monitoring** Varroa Sampling 101 Factsheet **Evaluating** Varroa Decision Tree **Intervening** Varroa Treatments

Apiary Size (# of colonies)	4-9	10-19	20-31	32+
# of colonies to be sampled at random	3	5	6	8

Per Colony:
▶ A single sample of 300 bees, which is approximately ½ cup of live bees[3].

Use General Management Inspection Data Sheet

Economic Threshold: Brood present = 1 mite/100 bees **(1% infestation)**[2]

SUMMER – May to August

What	When	How	Action
Monthly Monitoring/ Inspections Collecting varroa samples and visual inspection for honey bee diseases	**May & June & July & August**	**Sampling Parameters** Per Operation: ▶ Sample ALL apiaries within an operation as mite levels can vary between locations[3]. Per Apiary: ▶ Number of colonies to be monitored is based on apiary size and should be sampled as per the table below.	**Evaluating and Intervening** Honey Bee Diseases and Pests Hive-side Guide Varroa Decision Tree

Apiary Size (# of colonies)	4-9	10-19	20-31	32+
# of colonies to be sampled at random	3	5	6	8

Per Colony:
▶ A single sample of 300 bees which, is approximately ½ cup of live bees[3].
▶ Inspect for other honey bee diseases on 3 brood frames per brood box [4].

Use General Management & Disease Inspection Data Sheets

Economic Threshold: Brood present = 1 mite/100 bees **(1% infestation)**[2]

Fall – September to October

What	When	How	Action
Fall Varroa Sampling	**BEFORE Treatment** **&** **AFTER Treatment** **&** **REPEAT with every Treatment Cycle**	**Sampling Parameters** Per Operation: ▶ Sample ALL apiaries within an operation as mite levels can vary between locations[3]. Per Apiary: ▶ Number of colonies to be monitored is based on apiary size and should be sampled as per the table below. Per Colony: ▶ A single sample of 300 bees, which is approximately ½ cup of live bees[3]. **Use General Management Inspection Data Sheet**	**Monitoring** Varroa Sampling 101 **Evaluating** Varroa Decision Tree **Intervening** Varroa Treatments 101

Apiary Size (# of colonies)	4-9	10-19	20-31	32+
# of colonies to be sampled at random	3	5	6	8

Economic Threshold: Broodless = 1 mite/100 bees **(1% infestation)**

Additional Educational Resources

Tech Transfer Program Website

Government of Alberta Honey Bee Health and Apiculture

The Ultimate Key to Honey Bee Viruses

Supporting Literature:

[1]Jack, C. J., & Ellis, J. D. (2021). Integrated pest management control of Varroa destructor (Acari: Varroidae), the most damaging pest of (Apis mellifera L.(Hymenoptera: Apidae)) colonies. *Journal of Insect Science,* 21(5), 6. https://doi.org/10.1093/jisesa/ieab058

[2]Currie, R. (2008). *Economic Threshold for Varroa on the Canadian Prairies*. University of Manitoba, Dept. of Entomology, Winnipeg Manitoba. https://capabees.com/shared/2013/02/varroathreshold.pdf

[3]Lee, K. V., Moon, R. D., Burkness, E. C., Hutchison, W. D., & Spivak, M. (2010). Practical sampling plans for Varroa destructor (Acari: Varroidae) in Apis mellifera (Hymenoptera: Apidae) colonies and apiaries. *Journal of Economic Entomology*, 103(4), 1039-1050. https://doi.org/10.1603/EC10037

[4]Goodwin, M., & Eaton, C. V. (1999). *Elimination of American foulbrood without the use of drugs: a practical manual for beekeepers*. National Beekeepers' Association of New Zealand, Inc.

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General Management Inspection Data Sheet

Date: _____ Season: _____ Report filled by: _____ Apiary Name: _____

Colony ID	**Colony Strength** (Weak, 0-4 frames; Medium, 5-7 frames; Strong, 8 -10 frames)	**Queen Status** (Eggs, Queen seen, Queenless, Drone layer)	**Type** (Single, Double, Nuc)	**Brood** (Y/N)	**Honey** (Y/N)	**Pollen** (Y/N)	**Diseases** (Y/N) **If yes then the Disease Inspection Data Sheet should be filled out*	**Additional Comments**

Y = Present N = Not present

Double/Single brood chambered colony strength in Spring

	Frames of Bees		
Amount of Brood	**< 4 frames**	**5-7 frames**	**> 8 frames**
no brood	weak	weak/medium	medium
1-2 frames	weak	medium	medium/strong
3-4 frames	weak	medium/strong	strong
≥ 5 frames	medium	strong	strong

5 framed Nucleus colony strength in Spring

	Frames of Bees		
Amount of Brood	**≤ 2 frames**	**3-4 frames**	**5 frames**
no brood	weak	medium	medium
1 frame	weak	medium/strong	strong
2-3 frames	weak	strong	strong

*If there are diseases present then the Disease Inspection Data Sheet should also be filled out for the apiary

Other data points of interest that could be added:

- Queen age
- Date that splits were made
- When/what feeding
- Date supered
- When eggs were first seen (measure of queen quality)

Disease Inspection Data Sheet

Date:_____ Season: _____ Report filled by: _____

Yard:_____ Treatment: _____ Before/After Treatment: _____

Colony ID	**Colony Strength** (Weak, 0-4 frames; Medium, 5-7 frames; Strong, 8 -10 frames)	**EFB** (L/H/Sus)	**AFB** (L/H/Sus)	**SBV** (L/H/Sus)	**CB** (L/H/Sus)	**PMS** (L/H/Sus)	**DWV** (L/H/Sus)	**Brood Pattern** (Spotty, Solid)	**Number of mites in shaker or on sticky trap**	**Additional Comments**

Diseases:
EFB = European Foulbrood
AFB = American Foulbrood
CB = Chalkbrood
SBV = Sacbrood Virus
PMS = Parasitic Mite Syndrome
DFW = Deformed Wing Virus

Disease Level:
L = Low (1-2 frames, less than 10 cells)
H = High (more than 2 frames, keeping in mind colony strength, or 50% of frames infected)
Sus = Suspected (lab confirmation needed)