National Bee Diagnostic Centre
NORTHWESTERN POLYTECHNIC

National Bee Diagnostic Centre
100038 Township Rd 720
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780.357.7737 | NBDC@NWPolytech.ca
NWP.me/NBDC

National Varroa Research Project Participation

The National Bee Diagnostic Center is conducting a national Varroa research project to compile a nation-wide database and to contribute to research in Varroa management and mitigation. Below is information about the project and how to participate.

Project Information

Name: Detection of Miticide Resistance in *Varroa destructor* Mite Populations across Canadian Apiaries

Background: Over the past decade, honeybee health has significantly declined, with the primary driver of colony losses being the parasitic mite Varroa destructor and its associated viral load. In 2024, Canada's national winter loss rate was 34.6%, with provincial losses ranging from 9.8% to 61.3%[1]. Controlling Varroa mites has become a year-round challenge for beekeepers.

Amitraz has been the primary acaricide used to manage Varroa infestations and has been widely applied in Canadian apiculture for over a decade. However, resistance to amitraz has been reported in mite populations in Europe and the United States. In Canada, anecdotal reports and beekeeper concerns suggest reduced efficacy of amitraz, but no comprehensive national survey has been conducted to assess miticide resistance in Varroa populations. Current information is fragmented and often limited to high-impact cases.

This study aims to screen *Varroa destructor* populations in Canadian apiaries for genetic mutations associated with resistance to common acaricides. The findings will support evidence-based decision-making for Varroa control and contribute to improved colony health management.

Sampling Instructions

The NBDC will provide sampling packages and instructions to provincial representatives - provincial apiculturists and Tech Transfer Program (TTP) teams. From there, the provincial representatives will distribute the packages and information to select apiaries, receive completed samples from beekeepers, and mail completed samples in bulk to the NBDC. A copy of the instructions and FAQ information provided in each sample package has been included, for your reference. Some other key points for the provincial representatives:

Mite Collection: If you are running a varroa monitoring program, we can align sampling efforts, otherwise, the NBDC can provide containers and labels for storing and shipping varroa mites. Please send us your shipping address so we can arrange delivery.

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Beekeepers can perform mite washes themselves and submit mites from one yard (larger producers with multiple locations may submit from more than one yard).

Apiary Selection: The NBDC determined the number of apiaries required for sampling per province using a tailored version of the Humphry, Cameron and Gunn's formula[2]. The number of samples required from your province is listed below:

Province	Number of Samples (min-max)
Manitoba	43 (33-53)

We will need your assistance in identifying which apiaries should be included, based on the size and location of their operations. Where possible, the number of apiaries sampled per region will be proportional to each region's share of the provincial colony population, with a minimum of 3 apiaries per region.

A note on bee clubs: We may collaborate with well-organized bee clubs to submit samples. These will be analyzed separately and should not represent the majority of a region's samples. If you know of suitable clubs in each area, please let us know and we can provide them with sampling packages.

Storage Guidelines: Mites are to be stored in ethanol or 70% isopropyl alcohol in an appropriate container that is clean of bees and bee parts or debris. They may be stored and shipped at room temperature. Ensure the mites are fully submerged with minimal excess liquid to reduce flammability risk.

Collection Forms (required): Along with contact information and colony details, a history of treatments from the last two seasons (e.g. Fall and Spring 2024) will need to be collected from the beekeeper. A digital collection form has been prepared and can be accessed by the QR code or link below:

https://forms.office.com/r/SZKafLZUSZ

Please have this form completed, either by the beekeeper or a provincial representative, as soon as possible after collection. We can not process the sample if it does not have a corresponding collection form.

Minimum number of mites: A minimum of 16 mites per yard (8-10 hives combined) are required for sampling live hives. Dead-out colonies can still be tested but require a minimum of 30 mites to account for variations in DNA quality. Please note on the container if the sample is from a dead-out colony.

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Sampling Season: Sampling will take place in the spring and/or fall, depending on colony losses and mite infestation levels.

Historical Samples: If you have any historical mite or bee samples with mites that you'd like to contribute to the project, we would d be happy to include and test them.

Shipping: Samples will be collected by the provincial representative and shipped in bulk to the NBDC – the fewer number of parcels, the better to reduce shipping expenses. Please contact the NBDC for a shipping waybill when you are ready to send samples.

NBDC contact information:
780-357-7737
nbdc@nwpolytech.ca

References

[1] Canadian Association of Professional Apiculturists (2024). Final CAPA Statement on Colony Losses in Canada (2024). Available from: https://capabees.com/shared/CAPA-Statement-on-Colony-Losses-2023-2024_FV.pdf

[2] Humphry R. W, Cameron A, Gunn G. J. (2004). A practical approach to calculate sample size for herd prevalence surveys. Prev. Vet. Med. 65: 173-188.

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Varroa Sample Submission Instructions

The National Bee Diagnostic Center appreciates your participation in their national varroa research project. To submit your sample and ensure it can be used please read these instructions carefully and complete all the steps as outlined below:

1. Collect varroa samples as per the "Varroa Collection - Hand Shaker" instructions provided. These instructions are from the Government of Alberta "Honey Bee Pests and Diseases" publication that can be found here: https://www.alberta.ca/apiculture-publications-and-resources.

   Note: a minimum of 16 mites required per bee yard.

2. Apply ONE of the provided code labels to the collection container.

3. Carefully pour the liquid and mites into the collection container so that NO bees and limited bee parts or debris are transferred. It is very important that the samples are as clean as possible and contain only mites and fluid. Please consolidate all samples from one bee yard into the same collection container.

4. Seal the collection container tightly and place in the provided Ziploc bag.

5. Follow this QR code to fill out the collection form. You will need to know the collection container label code to complete the form. **Your submission cannot be processed without a completed collection form**.

6. Return your sample to your local club representative who will submit it to the NBDC on your behalf.

   Please collect 2 samples per bee yard: one in spring and another in the fall.

FAQ

What do I wash the bees in and where can I buy it?
The Government of Alberta instructions suggest winter washer fluid or 70 percent alcohol. At the NBDC, we prefer you use 70 percent isopropyl alcohol.

Isopropyl alcohol can be purchased at any drug store or department store in the first aid section.

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What if I use a non-lethal collection method?
There is no problem with using a sugar shake to collect mites from your bees, however, they must still be transferred into isopropyl alcohol before transferring to the collection container. The same minimum requirement of 16 mites applies.

If I do not have any mites (or not enough) at one of my sampling times, what do I do?
If you do not have 16 mites after washing all your hives in your yard, first off, hooray!, and second, keep your sample kit and sample again the following sampling season. For example, if you have no mites in spring, sample again in fall and the following spring.

Can I send mites from a Dead-out?
Yes! A minimum of 30 mites per yard are required for dead-out colonies. To collect, follow the same directions but be extra vigilant about keeping the sample clean. Minimal to no debris, bees, or bee parts can be in the collection container.

Can I sample from sticky board?
Yes. If beekeepers are using sticky boards and mites can easily be removed without damage, please send these mites. If not possible to remove mites without damaging them, send the entire sticky board with visible mites. Maximum 8 sticky boards per yard.

Will OA (oxalic acid) application affect mites' integrity?
No, you can send mites collected after or during OA application without compromising sample testing.

Who do I contact with questions?
Please reach out to NBDC or your provincial representative if you need any help with collection or submission of your varroa samples.