

Protocol for the Tech Transfer Program Colony Health Monitoring

Details of the service plan for 2025 are describe below, please read this protocol carefully before sampling begins and contact Nicole McCormick (403 506-2886) or Renata Labuschagne (587 343-69 47) with any questions.

The Tech Transfer Program Colony Health Monitoring was designed based on the Canadian National Health Survey and the existing USDA sampling protocol, which is available in video format for reference, with minor modifications.

USDA National Honey Bee Survey (part 1) <https://www.youtube.com/watch?v=hH53nZ7gYY4>

USDA National Honey Bee Survey (part 2) <https://www.youtube.com/watch?v=x2EdDBLGoK0>

LIST OF EQUIPMENT

Sampling Equipment (Fig 1 and 2)

- Live Bee shipping box w/ bee candy
- 1 sponge
- Shipping labels
- Varroa sample identification labels
- Live bee box label
- Colony tags (spring sampling only)
- 10 vials with ethanol
- 2 measuring scoops (1/2 cup and 1/4 cup)
- Honey sampling jar + label
- Double-lid field varroa shaker + 2 vials
- 1 Wash tub
- Packing tape
- Pens
- Water container
- Bottle of soap + sponge
- Paper towel
- Disposable gloves
- Beekeeping equipment - smoker, lighter, bee suit & veil, etc.
- Apiary Surveillance Field Report



Overview:

The purpose of this program is to provide temporal monitoring and evaluation of pests and pathogens in the honey bee hive. Colonies will be sampled in early spring, summer (only pollinator colonies) and fall for major pests and pathogens.

In the spring, during the first visit to each apiary, tech transfer program staff and/or contractors will randomly select 10 queen-right colonies in each apiary that they sample and mark each one with a colony ID number (colored labels). For each of the 10 colonies they open, they will need to remove a frame that contains young developing brood and shake the adult bees into the collection wash tub. They will collect two scoops: one **1/2 cup** of bees will go into the 500 ml vial (individual colony sample), and a **1/4 cup** of bees will be placed in the live bee box (apiary composite sample). In addition to the bee samples, a nectar/honey sample will also be collected. After collecting both bee samples, they will also collect a nectar sample from fresh uncapped honey cells from 1 super per colony. The nectar sample is a composite sample; therefore, all 10 CHM colonies will be sampled into the same sampling jar. Nectar samples must be at least 10 ml in total, or about 1/2 of the jar full.

They will leave the apiary with **one composite sample of live bees in the ventilated cardboard box, 10 samples of bees in alcohol in 10 large vials, and a composite sample of nectar.** Colonies sampled and marked during the spring visit will be re-sampled in the summer and fall. If an apiary is missing a tagged colony (or all), they should select at random and sample the number of tagged colonies missing. For example, if only 7 tagged colonies are found at the apiary, they should randomly select 3 untagged queen-right colonies in the same apiary for sampling. The additional untagged colonies selected to replace missing tagged colonies do not need to be marked. They should write on the field datasheet under ‘additional comments’ when a tagged colony is missing.

NOTE: Pre-paid shipping labels will be e-mailed to them the day before they collect the bees for the Colony Health Monitoring program. They should contact Nicole McCormick by text/phone (403-506-2886) or email (ttp@albertabeekeepers.ca) 24 hours before sampling to receive the shipping labels. They will need to print the labels at home, and the labels will expire after 48 hours. They will receive 1 label for every 3-4 boxes. If they do not use all the shipping labels, they should inform us so we can receive a refund from Canada Post.

For specifics on how to collect the samples, see the steps below.

Steps followed by TTP staff:

1. Before leaving for an apiary sampling, ensure that all the equipment is on hand including your beekeeping protective gear and beekeeping tools.
2. The apiary being tested needs to have at least 10 colonies. Ensure you know where the nearest post office is, as you will need to mail the live sample of bees immediately after collecting them and on the same day before the Post Office closes whenever possible.
3. Open one live bee shipping box (Fig 2), it should contain:
 - a. A petri dish glued to the box floor w/ bee candy
 - b. Sponge
4. In addition, you will use 10x 500 ml vials with 70% ethanol per apiary.



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5. Place identification labels onto:
 - a. 500 ml vials.
 - b. Live bee shipping box. Place the sticker on the **top** of the box.
6. Set up sampling equipment:
 - a. Submerge sponge in water until it fully expands into half circle (Fig 3).
 - b. Place a wet sponge on the dish, on top of the queen candy (Fig 3).
 - c. Close the shipping box making sure the two sides with metal screen match up to ensure proper ventilation for live bees and place the funnel into the hole on top of the box (Fig 4).
 - d. **BE SURE TO KEEP THE LIVE SHIPPING BOX IN THE SHADE AND OUT OF DIRECT SUNLIGHT OR WIND.**
 - e. Open the large 500 ml vial. (Fig 5)
7. Open the colony and examine 3 central frames with brood for disease and queen status/condition. Record any disease/queen conditions on the data sheet. IF the colony is queen-less, choose another colony.
8. Find a frame containing at least some uncapped brood. **Ensure the queen is not present on this frame.** IF no brood is present, and another colony is available, do not sample the broodless colony but choose another colony with brood. IF no other colony is available, take an adult bee sample from a frame in the center of the brood nest. If you have a choice, try and chose a well wired, sturdy frame to sample.

NOTE: Although every effort is made to double- and triple-check that the queen is not on the sampling frame, it's not necessary to locate the queen in each colony before sampling.

9. Shake bees from frame into wash tub (Fig 6).
10. Knock the wash tub to gather bees into one corner of the tub.
11. Scoop $\frac{1}{4}$ cup of adult bees (Fig 7) into the funnel inserted into the lid of the live bee shipping box (Fig 8). Gently tap the box to force the bees from the funnel into the box (Fig 9). Do not collect more than $\frac{1}{4}$ cup of bees because overcrowding will result in mortality during shipping. Do not overfill the $\frac{1}{4}$ cup with bees.
 - a. **BE SURE TO KEEP THE LIVE SHIPPING BOX IN THE SHADE AND OUT OF DIRECT SUNLIGHT AND WIND.**
 - b. Place the $\frac{1}{4}$ cup in the funnel so that you reduce the risk of live bees escaping from the box. Alternatively, you can place a small piece of paper towel to block the gap.
12. Scoop a $\frac{1}{2}$ cup of bees from the tub and put into the wide-mouth vial with 70% ethanol (Fig 10). Cap the jar with the double-lid shaker in preparation for shaking. Take an empty jar and attach it to the other side of the screened lid. Proceed to shake the sample of bees for 2 minutes. Be sure to shake hard enough to dislodge the mites from the bees. After 2 minutes, flip the jars so that all the fluid flows into the jar without the bees. By holding up the jar and looking at the bottom you will be able to see and count the number of mites in the sample. Record the number of mites per 300 bees in the 'Varroa/300

bees' field for each colony. Transfer all the bees + mites + ethanol into the varroa sampling vial. **Make sure the colony number on the varroa sample identification label matches the colony number from where the samples were taken.**

13. Place the brood frame back into the colony, dump any bees remaining in the collection wash tub back into the colony and close the colony.
14. Repeat steps 8 through 13 until all 10 colonies have been sampled. Please note that we are sampling live bees at the apiary level and so samples from all 10 colonies are being placed in the same live shipping box. Varroa samples will be analyzed at the colony level, and so samples from each colony will be placed in a separate 500 ml vial.
15. Ensure that the TTP Apiary Surveillance Report is filled out completely.
16. Secure the hole in the lid of the live bee shipping box by closing the cardboard flap (Fig 13) and use clear tape along the red lines to ensure that the box is securely sealed. Wrap around the box one way and then the other way (Fig 14). Place the Canada post shipping labels inside the label sleeve, peel off the paper covering the adhesive plastic and place the sleeve with label on the box. But please try not to cover the live bee shipping box identification label during this process.
17. Before sampling at the next apiary, clean the sampling equipment (wash tub, funnel and measuring cup) with soapy water.
18. Drop off the live bee shipping box at the nearest post office on the same day that you have collected the sample so that they are mailed that day. If this is not possible, send them as soon as possible the next day.
19. Please email the NBDC-TAC (pwolfveiga@gprc.ab.ca) and Cc' ttp@albertabeekeepers.ca, within 24 hours of shipping the live bees to notify that a live bee shipment is to be expected.
20. Please email all TTP Apiary Surveillance Reports to ttp@albertabeekeepers.ca

National Bee Diagnostic Centre contact:

Patricia Wolf-Veiga 780-357-7737 pwolfveiga@gprc.ab.ca

Tech Transfer Program Lead Technician contact:

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Tech Transfer Program Lead contact:

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Please feel free to call any time if you have sampling or shipping question.



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Technician Sampling Equipment



Figure 1: Equipment needed for sampling apiaries. Materials include: (a) paper towel, (b) soap, (c) sponge, (d) wash tub, (e) packing tape, (f) measuring cups, (g) water container, (h) colony tags, (i) funnel, (j) gloves, (k) varroa sample labels.

Also needed are basic beekeeping protective equipment (coveralls, veil, etc.), beekeeping tools (smoker, hive tool, etc.).



Figure 2. (a) Live bee shipping box, (b) candy, (c) apiary identification label, (d) address label, (e) sponge, (f) shipping label, (g) sampling vial (for Varroa sample x10).



Figure 3: Bees require water and food during transport. Add queen candy to the petri dish, enough to cover (at least) half of the dish, and place a wet sponge on the other half (or on top of the candy).



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Figure 4: Live bee shipping box with funnel inserted to receive bees. This box should be set up and KEPT IN THE SHADE AT ALL TIMES after bees have been introduced, otherwise the sampled bees may overheat and die. Keep this box out of the wind.



Figure 5: Large bottle with funnel ready to receive bee samples + alcohol (or winter windshield washer fluid)



Figure 6: Removing bees from frame into wash tub.



Figure 7: Collecting ¼ cup scoop of bees for sample.



Figure 8: Place bees from cup into funnel inserted in the live shipping box.



Figure 9: Gently tap live bee shipping box and funnel so bees are forced into the collection box.



Figure 10: Place ½ cup of bees into the large alcohol vial.



Figure 11: Nectar sampling.



Figure 12: Secure the hole in the lid of the live bee shipping box with the cardboard flap.



Figure 13: Secure the lid of the live bee shipping box to the bottom of the box using the