

National Honey Bee Pests and Diseases Survey: Questions and Answers

Why should the public care about honey bees?

Bee pollination is responsible for \$15+ billion nationwide in added crop value and are particularly important for specialty crops such as almonds and other nuts, berries, fruits, vegetables and seed crops. About one mouthful in three of a diverse diet directly or indirectly benefits from bee pollination. While there are native pollinators, honey bees can be managed in much larger numbers for the immense scale of pollination that US agriculture requires. As an example, in California, the almond crop alone requires almost 2 million colonies for the 1 million acres, which represents more than one half of all honey bees in the United States.

Why conduct the honey bee health survey?

The number of managed honey bee colonies has dropped from 5 million in the 1940s to approximately 2.5 million today. At the same time, the call for honey bee colonies to supply pollination services continues to increase. Pollination based agriculture is expanding to feed our growing population faster than pollinators can be provided. This means honey bee colonies are transported across the nation by truck to meet the growing pollination demand. It is imperative to our national food supply to monitor and assess the threats to this extensive pollination force. The primary goal of a national survey is to surveil for exotic pests and pathogens that could further stress colonies and add to colony loss.

In concert with invasive surveillance, this survey further provides a baseline of national colony health. Current stressors, such as reduction of forage, new pathogens and pests, pesticide use and multiple pollination events take a toll on honey bee colonies. The spread to the United States of *Varroa* mites is arguably the most crippling pest to challenge colonies and beekeepers alike. A national survey is a major step in searching for these and other factors that are affecting the health of the Apiculture Industry in the US.

This survey is sponsored by the USDA Animal and Plant Health Inspection Service (APHIS) in collaboration with the USDA Agricultural Research Service (ARS), and is primarily geared at establishing the absence of *Apis cerana* and the parasitic mite *Tropilaelaps* in the US. To maximize the information gained from this survey effort, samples will be analyzed for other diseases and parasites known to be present in the US.

DATA QUESTIONS:

How will the resulting data be stored and used in the future?

The National Honey Bee Pest and Disease Survey data is stored in a comprehensive database on honey bee health developed in collaboration with the Bee Informed Partnership (www.beeinformed.org). The data are securely stored to protect individual results but will permit giving temporal and geographic context to future disease diagnosis results. For instance, a beekeeper can compare his or her *Nosema* load with all other *Nosema* loads in a certain month in a certain area on the BIP website (www.bip2.beeinformed.org). These data are made available to honey bee researchers who are interested in looking at disease trends in the US and correlations with crops, pesticide use, management practices, etc.

Physical samples are archived for long term storage so that researchers can go back in time to resolve the introduction of a new virus (such as was done with VDV1, also known as DWV-B) or to determine any correlations with mites, physiological changes, etc. where evidence was perhaps not obvious at the time. Archived samples provides a window into the past that aids us in identifying risk factors, especially when we have loss data to accompany the disease data.

Why does the survey now include longitudinal sampling?

The apiary inspections and diagnostics offer a snapshot of the health of the colonies at a specific time of the year. This data acts as a comparative baseline of pest and pathogens loads, and allows us to place sample results in seasonal context. This allows us to know if a certain disease load is abnormally high or about normal for a particular time of year.

One limitation of our general sampling data set is that samples were not taken at the same rate every month of the year. How could they be – we can't sample bees in northern states during the winter. Also, since we did not sample the same colonies more than once a season, we did not know directly, how disease loads change in managed colonies over the production season. This later point is important, because if we did know how disease load changed in colonies, and if those changes happened in a consistent way, we could begin to predict future disease problems and give beekeepers advice on preventive management.

In an attempt to collect data which will eventually permit us to predict future colony health conditions based on infield sampling, we need to sample the same colony twice over the season. This approach is called longitudinal sampling. It requires that a set of state samples be collected from colonies twice: once early in the season (May/June) and once again towards the end (September/October).

The longitudinal sampling is a golden standard in health studies. The data obtained, over several years, would permit us to estimate fall bee health based on early summer sampling.

What data is gained by longitudinal data collection?

Longitudinal data collection will provide new insights into colony health. In addition to getting information on the prevalence (frequency) and load of pests and diseases. This means that we will be able to investigate factors associated with a change in health status, rather than the mere presence of the health issue.

Where can I find the annual survey results (pest, pathogens, and pesticides)?

The annual reports can be found at the APHIS website here:

<https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/honeybees/honeybees>

For dynamic state reports over all years of the survey, you can access the *Varroa*, *Nosema*, pesticide, and viral data at the Bee Informed Partnership website here:

https://research.beeinformed.org/state_reports/

An interactive map with viral results from this survey can be viewed here:

https://research.beeinformed.org/state_reports/viruses/

Can I access raw data?

At this time, we do not allow general access to raw data. If you are a state apiary inspector and would like to have these data for your state records, please contact us.

FOR PARTICIPATING BEEKEEPERS:**How many samples will be collected?**

Each state participating in the survey will take 24 samples. Eight hives will be selected for sampling within each apiary. Once all the samples from an apiary are collected, they are packed and transported to the University of Maryland (UMD) Honey Bee Research lab in College Park, Maryland for analysis.

Who will collect the samples?

State and County cooperators collect samples using standardized collection protocols. This ensures uniform sample collection, consistent analysis, and a verifiable chain of custody for the samples. The sample collector will schedule a visit with beekeepers; provide them information on the collection and when an individual apiary results analysis will be sent.

Are beekeepers required to complete a survey for the sampling?

Yes, participating beekeepers are required to fill out a pre-sampling survey at time of sampling.

Why am I receiving a survey with my sample kit?

Your sample data is very important but it can be made even more valuable with your participation in the abbreviated management survey. The intent of this survey is to relate management practices to the results of your disease sampling, especially in the 3 months prior to your sample collection. Linking management practices (including treatment, feed, etc.) can help researchers determine if there is a relationship with increased pests/pathogens. Gathering as much data as possible will help us tease out those relationships.

Why am I getting a Bee Informed Partnership Loss and Management Survey in the mail?

We collaborate with the Bee Informed Partnership and strongly encourage all APHIS survey participants to add their data to the BIP Annual Loss and Management Survey. Using your code from the APHIS survey, we will send you a paper Loss and Management Survey during the month of April. For the same reason as above, linking disease diagnostics, colony mortality and management practices is extremely important for researchers and early results have already led to suggested best management practices. You can see specific correlations between management practices and mortality in your region here: <https://research.beeinformed.org/survey/>

Why did the survey switch from (bee bread to wax/wax to bee bread) sampling for pesticide analysis?

Bee bread analyses are preferred for identifying immediate or current pesticide exposure events; however, wax pesticide residues are more indicative of a long-term record of exposure. The survey will switch from one type of sample to the other periodically to capture both exposure routes in honey bees.

When and how do I get my samples results?

Samples will be processed in the order they are received. To preserve privacy, sample results will be mailed directly to participating beekeepers and the Apiary Specialist. Beekeepers participating in this survey receive a summary report from the University of Maryland (UMD) 4 - 6 months after sampling.

This report provides information on the average level of *Nosema*, viruses, and *Varroa* loads in an apiary. This report also includes the visual screening results for exotic honey bee species or subspecies such as the Asian honey bee (*Apis ceranae*) and the *Tropilaelaps* mite. Annual reports summarizing results will be posted on the internet at the APHIS website location listed above.

Why does it take so long to get my results?

The testing process takes a few months to complete due to the complicated nature of the processing. Although timely turnaround is our priority, these reports are not aimed to be a real-time, actionable results for beekeepers.

Varroa, *Nosema*, and *Tropilaelaps* diagnostic microscopy samples are processed relatively quickly after arriving at the UMD lab. Molecular testing requires much more time and is more labor intensive. Live bee samples are flash frozen to -80C upon arriving at the lab, preserving the delicate viral RNA for future testing. Testing occurs in batches and samples may need to be rerun due to the delicate nature of the testing. Sending in samples early in the season helps prevent backlogs.

Pesticide samples, processed off site by the USDA Agricultural Marketing Service, have the longest turnaround time. In an effort to get states and beekeepers their pest and pathogen results quickly, pesticide reports are sent separately.

Is the survey voluntary?

Yes, states and beekeepers voluntarily participate in the survey.

What is the benefit of participating?

A beekeeper participating in this survey will receive a summary report on the average apiary level of *Nosema*, virus, and *Varroa* loads in their sampled apiary. If their apiary was sampled for pesticides, they will receive a comprehensive report of all the pesticides detected in their sample as well as the pesticide loads, in parts per billion. This provides a valuable snapshot in time of the relative health of their colonies. These results can be shared within regional beekeeping groups. Additionally, the data are used to develop a baseline of both regional and national honey bee health metrics as well as surveillance of possible invasive exotic threats.

What if I do not participate?

Beekeeper help is needed and appreciated, but participation is voluntary.

Is there a charge for the sampling?

No. APHIS is funding the collection and analysis of the samples.

FOR PARTICIPATING STATES:

What if we don't get funding in time for spring sampling?

Sampling kits are sent to participating states in the early spring to allow time for spring sampling. If funding is needed but is not received in time, a pre-award may be possible. The cooperator should discuss this option with the ADODR of their agreement.

Is there a specific honey bee accomplishment template?

Cooperators may use the standard accomplishment report (see below) and customize as appropriate. <https://download.ceris.purdue.edu/file/3685>

For further guidance and/or examples of customized accomplishment reports, contact the National Operations Manager at: josie.k.ryan@usda.gov

When will the kits arrive?

Kits will arrive by the first of April.

What if my state would like to participate but we do not have an apiary program?

For states wanting to be sampled but not able to collect samples, there may be an opportunity for the Bee Informed Partnership (BIP) staff to assist. Please contact Josie Ryan (National Operations Manager) at: josie.k.ryan@usda.gov if you would like to pursue the option of BIP collecting samples.

Where should I mail samples?

All samples should be mailed to:

University of Maryland Honey Bee Lab
4291 Fieldhouse Drive
Plant Sciences Building Rm. 4112
College Park, MD 20742

Please note that all live bee samples should be shipped on a Monday or Tuesday so that they arrive at UMD before the end of the week.

Pesticide samples should be shipped on dry ice if possible. If not, they should be shipped overnight.

Where should I look for sampling procedures?

For answers to questions about protocols, sampling, shipping, project plans, *Tropilaelaps* information sheets, etc., please go to this APHIS site: <https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/honey-bees/survey>

For pest and pathogen sampling: https://www.youtube.com/watch?v=MZ_a6BJEGmI

For wax pesticide sampling: <https://www.youtube.com/watch?v=Znv2Bs9ZrjM>

Who should I contact for more information?

Contact the USDA APHIS at HoneyBeeSurvey@aphis.usda.gov

If you have questions about the protocol or logistics, please contact Rachel Fahey at nhbs@umd.edu