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| **Cooperator:** |  |
| **State**: |  |
| **Project**: | National Survey of Honey Bee Pests and Diseases |
| **Project funding source:** | PPA 7721 Survey  |
| **Project Coordinator**: |  |
| **Agreement Number** |  |
| **Contact Information:** | **Address:** |  |
| **Phone:** |  | **Fax:** |  |
| **Email Address:** |  |

This Work Plan reflects a cooperative relationship between the University of Maryland (UMD) and the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ) under Notice of Cooperative Agreement Award No. XXXX. It outlines the mission-related goals, objectives, and anticipated accomplishments as well as the approach for conducting a survey of honey bee pests and pathogens and the related roles and responsibilities of the parties [e.g., mutual roles, APHIS role(s), Cooperator role(s)] as negotiated.

**I**. **OBJECTIVES AND NEED FOR ASSISTANCE**

Honey bees contribute between $15 and $18 billion dollars to the value of the agricultural industry nationally due to their pollination efforts. Compared to other livestock, honey bees are ranked third, only behind cattle and pigs, in terms of their economic value. It is imperative to have a healthy pollinator supply if we wish to continue to produce pollinator dependent fruit, nuts and vegetables in this country. Honey bee health challenges are attributable to parasites, diseases and environmental toxins. Therefore, USDA-APHIS is funding a national bee survey in an attempt to document which diseases /parasites/pests of honey bees are and are not present in the U.S.

An emphasis of this survey is early detection of certain exotic honey bee pests if they enter the U.S. Specifically, this survey continues to verify the absence of the parasitic mite *Tropilaelaps* spp. and other exotic threats to honey bee populations (e.g., Asian honey bee*,* *Apis cerana*). Early detection would be critical if these serious pests of honey bees are to be contained efficiently, as these exotics will likely cause extensive and severe damage if they become well established. To maximize the information gained from this survey effort, samples will be analyzed for other diseases and parasites known to be present in the U.S. The resulting data from this effort will be combined with past years’ data, acting as a baseline from which beekeepers and bee health professionals can identify emerging issues, identify risk factors, and design bee health mitigation programs.

Baseline data on disease and toxin loads in honey bee populations also have utility in helping understand the drivers of colony losses. Broad surveillance data over several years improves the quantity of data needed to help tease apart complex drivers thought to contribute to colony loss and poor colony health.

Pesticide residue analysis is a service that states are increasingly interested in, especially in concentrated agricultural regions because it provides a critical indicator of the accumulation of colony exposure to pesticides. We have collected pesticide residue results on two different types of samples. Bee bread samples provide a short term “snapshot” of pesticide exposure. While brood comb wax provides a historical record of a colony’s pesticide exposure. We have seen varroacides predominating in bee bread; however, more fungicides were found (35.3%) in wax samples than varroacides (31.3%). The more controversial insecticides were only found in 21.7% of all samples.

Survey efforts will also support U.S. honey bee queen producers to requests for the opening of and/or continued access to foreign markets such as Canada. The Canadian market remains closed to continental U.S. bee exports largely based on speculative assumptions of U.S. disease profile. Robust data, such as past and proposed efforts refute these assumptions, and will provide data needed to remove trade barriers.

**II. RESULTS OR BENEFITS EXPECTED**

A decline in honey bee health has been documented over the past 60 years. Honey bee health is at risk from factors such as parasites, diseases, poor nutrition, stress, and environmental toxins. The National Honey Bee Survey data is used to ascertain the scope of parasites, diseases, and pests that may have a negative impact on honey bee populations in the U.S. This nation-wide survey has become the most comprehensive honey bee pest and health survey to date, and provides essential disease and pest load information. This information provides additional benefit through informing and guiding the direction of honey bee parasite, disease, and pest research and mitigation recommendations to the U.S. apiculture industry. All of the data collected from the National Survey are included in the nationwide Bee Informed Partnership (BIP) database (programmatic details here: <https://ushoneybeehealthsurvey.info/>, diagnostic data provided here: <https://bip2.beeinformed.org/state_reports/> and viral data provided here: <https://bip2.beeinformed.org/state_reports/viruses/>). The BIP database contains a wealth of information for state apiarists, beekeepers of all operational types, and researchers. It is considered the gold standard for comparing disease loads regionally and nationally. A new repository of APHIS national survey data, information and protocols are now available at this new website <https://ushoneybeehealthsurvey.info/>.

**III. APPROACH**

Samples will be collected from 38 states, 2 U.S. territories, and the District of Columbia (see Table 1). This survey may be the only source of a state’s current and historical bee health data and the valuable information is used by beekeepers, the agricultural industry, and state apiarists. The adjacent U.S. territories of Guam and Puerto Rico, critical for surveying of exotics in our western and southern ports, are included. A survey effort in these areas could identify and prevent the spread of exotics into the U.S. Guam is of particular concern due to the volume of military traffic in goods and vehicles from the Far East that may harbor swarms of bees with parasitic *Tropilaelaps* mites and also the exotic bee species Asian honey bee. The Caribbean has already demonstrated the ability to allow pests such as the Africanized bee to pass between islands; thus a survey is of critical need in these islands.

The following states and territories have agreed to take samples or will have samples taken for them by the Bee Informed Partnership in the 2021 survey. The Bee Informed Partnership Field Specialists will supply samples from Louisiana, North Dakota, Colorado and a portion of California.

**Table 1: 2021 Participating States and Territories**

|  |  |  |
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| Alabama | Kansas | Oregon |
| Alaska | Kentucky | Pennsylvania  |
| Arkansas | Louisiana | Puerto Rico |
| California | Maine | South Carolina |
| Colorado | Maryland | South Dakota |
| Delaware | Massachusetts | Tennessee |
| District of Columbia | Michigan | Texas |
| Florida | Minnesota | Utah |
| Georgia | Montana | Vermont |
| Guam | Nebraska | Virginia |
| Hawaii | Nevada | Washington |
| Idaho  | New York | West Virginia |
| Illinois | North Carolina | Wisconsin |
| Indiana | North Dakota |  |

The 2021 National Honey Bee Survey sampling in each participating state will be divided into two sections, 1) longitudinal sampling of 5 beekeepers, and 2) 14 general survey surveillance samples split into 3 or more sampling trips throughout the year. Because the longitudinal sampling should be conducted twice for each of the 5 beekeepers, each state should have a total of 24 samples at the end of the sampling season. ***It is important to note that due to COVID 19 and the restrictions that may be imposed on state inspectors, longitudinal samples are encouraged but not required this year***. If a state is unable to take longitudinal samples, then they may select 10 random beekeepers to sample for pesticide analysis.

Using the methods published on the APHIS website, samples will be taken to allow us to confidently verify the absence of certain exotic pests including *Tropilaelaps* mites and the Asian honey bee. In collaboration with the ARS BRL, molecular techniques will be used to quantify the presence of the bee viruses listed in Table 2. Microscopic techniques will be used to determine *Nosema ceranae* levels, and established screening methods will be used to quantify *Varroa* *destructor*.

**Table 2: 2021 Target Pests and Sampling Methods**

|  |  |  |
| --- | --- | --- |
| **Scientific Name** | **Common Name** | **Sampling Method** |
| *Aethina tumida* | Small hive beetle | Visual inspection  |
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| *Aparavirus Acute Bee Paralysis Virus* |

 | Acute bee paralysis virus (ABPV) | Molecular testing |
| Aparavirus Israeli Acute Paralysis Virus | Israeli acute paralysis virus (IAPV) | Molecular testing |
| Aparavirus Kashmir Virus | Kashmir bee virus (KBV) | Molecular testing |
| *Apis cerana* | Asian honey bee | Visual inspection  |
| *Ascosphaera apis* | Chalkbrood | Visual inspection |
| *Galleria mellonella* | Wax moth | Visual inspection  |
| Iflavirus Deformed wing Virus type A | Deformed wing virus-A (DWV-A) | Molecular testing |
| Iflavirus Deformed wing Virus type B | Deformed wing virus-A (DWV-B) | Molecular testing |
| Iflavirus Moku Virus | Moku virus (MKV) | Molecular testing |
| Iflavirus Sacbrood Virus | Sacbrood virus | Visual inspection |
| Iflavirus Slow Bee Paralysis Virus | Slow bee paralysis virus (SBPV) | Molecular testing |
| *Melissococcus plutonius* | European foulbrood | Visual inspection |
| *Nosema ceranae* | *Nosema ceranae* | Molecular testing |
| *Nosema spp.* | Nosema spores | Microscopic count |
| *Paenibacillus larvae larvae* | American foulbrood | Visual inspection |
| *Tropilaelaps spp.* | *Tropilaelaps spp.* | Visual inspection |
| Unassigned Chronic Bee Paralysis Virus | Chronic bee paralysis virus (CBPV) | Molecular testing |
| Unassigned Lake Sinai Virus-2 | Lake Sinai virus-2 | Molecular testing |
| *Varroa destructor* | *Varroa destructor* | Visual inspection |

Longitudinal apiaries will be sampled twice‒once in the spring (before or at the start of the honey flow), and again in the fall after honey flow. The longitudinal monitoring will include the full survey assessment, as explained in the previous paragraph, and bee bread sampling to determine in-hive pesticides. Additionally, the beekeepers who manage these apiaries will provide management information (such as feeding and mite treatment practices), as well as annual colony mortality rates by committing to taking the Bee Informed Partnership (BIP) Colony Loss and Management Survey conducted annually in April. This information will be used to identify how beekeeping events (e.g. migratory pollination, package production, honey flow) can affect seasonal honey bee health and colony mortality.

Results from these samples will be provided to the State Plant Health Director, State Plant Regulatory Official, State Survey Coordinator, State Apiary Specialist and the beekeepers who provided the sample. Beekeepers receiving these reports will be able to make data informed management decisions, as the report generation utilizes the Bee Informed Partnership database (lead by UMD) to place disease load levels in context.

**A. The Cooperator Will:**

1. By function, what work is to be accomplished?

Providing samples toward a national survey of honey bee pests and diseases as well as bee bread samples for pesticide analysis. Five apiaries will be sampled twice as part of the longitudinal survey and 14 apiaries will be sampled as part of the general survey in each state. Bee bread samples will be taken from hives used in the longitudinal survey.

The cooperator will also ask the beekeeper to sign a form agreeing to participate in a management survey.

1. What resources are required to perform the work?

a. What numbers and types of personnel will be needed?

At least one State Apiary Specialist to gather and submit samples.

b. Who will hire the personnel, and what mechanism will be used to hire them?

They are in place as state/university employees.

c. How will unemployment payments be handled upon terminating assistance?

N/A

3. What equipment will be needed to perform the work? Include major items of equipment with a value of $5,000 or more. Identify information technology equipment, e.g., computers, and their ancillary components.

1. What equipment will be provided by the cooperator?

All vehicles, protective equipment, smokers, tools.

1. What equipment will be provided by APHIS?

N/A

1. What equipment will be purchased in whole or in part with APHIS funds? N/A
2. How will the equipment be used?

N/A

1. What is the proposed method of disposition of the equipment upon termination of the agreement/project?

N/A

4. What supplies will be needed to perform the work? Identify individual supplies with a cumulative value of $5,000 or more as a separate item. All information technology supplies (e.g., small items of equipment, connectivity through air cards or high speed internet access, readers to record animal identification, radios for emergency operations) should be specifically identified.

Sampling kits and vials are to be provided to the participating states from UMD.

1. What supplies will be provided by the Cooperator?

Vehicle support, travel, salary, and misc. supplies like smokers and hive tools needed to inspect colonies. **State agencies are responsible for postage to send samples back to the diagnostic labs.**

1. What supplies will be provided by APHIS?

Outreach and training.

1. What supplies will be purchased in whole or in part with APHIS funds?

N/A

1. How will the supplies be used?

N/A

1. What is the proposed method of disposition of the supplies with a cumulative value over $5,000 upon termination of the agreement/project?

Sample kits will all be used and shipped to UMD for analysis

5. What procurements will be made in support of the funded project? N/A

a. Who will handle acquisition needs?

b. What is the method of procurement (e.g., lease, purchase)?

c. Cooperator procurements shall be in accordance with OMB Circulars A-102 or A-110 (Attachment 0), as applicable.

6. What are the travel needs for the project?

1. Travel expenses should be related to sample collection and are not intended for travel to conferences and meetings.

a. Is there any local travel to daily work sites?

Yes

b. What extended or overnight travel will be performed (number of trips, their purpose, and approximate dates)?

7. What is the quantitative projection of objectives to be achieved?

Collection of samples from 19 apiaries within the state representing thousands of commercial / migratory honey bee colonies.

1. By activity or function, what are the anticipated accomplishments by month, quarter, or other specified intervals?

By the end of the agreement, Apiary Inspectors will be trained on sample protocols and will collect and submit samples.

1. What criteria will be used to evaluate the project? What are the anticipated results and successes?

Results from this survey provide baseline information on pests, pathogens and pesticides within honey bee colonies in the United States.

 c. What methodology will be used to determine if:

1. Identified needs are met: All apiaries are sampled for the longitudinal and general survey and results of the analyses are provided to the state.

2. Results and benefits are achieved: Pests, pathogens, and pesticides in the samples are identified.

8. What type of data will be collected and how will it be maintained? Address timelines for collection and recording of data. How will APHIS be provided access to the data?

Data will be collected by local Apiary Specialists, the Bee Informed Partnership, and UMD staff and a report will be provided to USDA APHIS annually. Data from all states participating in the survey will be compiled by the USDA APHIS and ARS in collaboration with the University of Maryland. A report of compiled results is provided by UMD and posted on the APHIS website and the newly created APHIS site for Apiary Inspectors of America (AIA) and the public. Data is stored in the BIP secure database as well as in APHIS database.

9. Are there any other contributing parties who will be working on the project?

UMD will assemble sampling kits, analyze collected samples, and prepare reports. USDA AMS will analyze the bee bread samples for pesticide residues. USDA ARS collaborates on methods development and sample analysis.

1. **APHIS Will:**

 1. Provide the cooperator with technical assistance as needed

2. Assist in clarifying survey methods and detections, as well as identification resources as needed

3. Support the work and financial plan development by the cooperator

4. Assist in training and outreach

5. Maintain data spreadsheets showing due dates for reports, requests for allocations, forms submitted, tracking by survey specialist

7. Ensures cooperator receives survey supplies as provided by the program

8. Provide general oversight and quality assurance of the program

**IV. In what geographic location is the project to take place?**

1. Is the project statewide or in specific counties, townships, and/or national or state parks? Statewide survey.
2. What type of terrain (e.g., cropland, rangeland, woodland) will be involved in the project?

Beekeeping apiaries across the state, mostly in wooded or agricultural settings.

How will the work be impacted by this terrain?

There will be no significant impact.

C. Are there any unusual geographic features, such as rivers, lakes, wildlife sanctuaries, etc., that may impact on the project or activity.

N/A.

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| ADODR: | Date Signed: |
| ROAR: | Date Signed: |

**Detailed Survey Financial Plan**

**COOPERATOR NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**TIME PERIOD: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Financial Plan must match the SF-424A, Section B, Budget Categories

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| **ITEM** | **APHIS FUNDS** | **COOPERATOR FUNDS** **(Show even if zero)** |
| **PERSONNEL**: |  |  |
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| **TOTAL DIRECT COSTS** |  |  |
| **INDIRECT COSTS**   |  |  |
| **TOTAL** |  |  |