

Request for Approval under the “Generic Clearance for Citizen Science and Crowdsourcing Projects” (OMB Control Number: 2080-0083)

TITLE OF INFORMATION COLLECTION:

HiveScience*; Contributing to a Better Understanding of Honey Bee Health

PURPOSE:

The United States Environmental Protection Agency (EPA) and United States Department of Agriculture (USDA) are helping to lead a national effort to promote the health of honey bees and other pollinators. As part of this effort, we are reaching out to beekeepers to help us identify indicators of honey bee colony health.

NEED AND AUTHORITY FOR COLLECTION:

Honey bee numbers have declined significantly while the demand for insect-pollinated crops has been steadily increasing with no end in sight. In response to this potential crisis, President Obama issued a memorandum in June of 2014 instructing the EPA and the USDA to coordinate a multi-agency federal response to ensure the health of honey bees and other pollinators. In April of 2015, the US EPA and USDA released the *National Strategy on Pollinator Health*. This project is responsive to EPA commitments to the National Strategy on Pollinator Health which calls for more research and utilization of citizen scientists.

USES OF RESULTING DATA:

Data will be organized into temporal and geographic context to identify mite management trends and outcomes as they relate to colony pests (e.g, Varroa mites), diseases (e.g., ‘foulbrood’) and other potential indicators of hive health (e.g., abnormal cappings, foraging behavior).

Honey samples will be analyzed to aid in the discovery of potential biomarkers of colony health.

DATA COLLECTION METHODS:

Participants will be asked to collect the following information for a single honey bee colony monitored throughout the year: (1) register to participate in the project using a smart phone mobile application, (2) complete a brief colony health survey, (3) determine the Varroa mite load (minimum one time/year; maximum four times/year), (4) report these data to the EPA using a mobile application (paper-based submission may be used as a backup), (5) once per year, provide a sample of honey for analysis of potential biomarkers of health and disease, and (6) report overwintering success of the sampled colony. Participants will also be asked to feedback on data collection and reporting procedures.

PARTICIPANT UNIVERSE:

Category of Respondent	No. of Respondents	Number of responses per respondent	Participation Time per response	Burden Hours
Participant	500	5	1 hours	2,500
Totals				2,500

AGENCY COST: The estimated annual cost to the Federal government is \$2,520.00.

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50 hours at EPA cost of \$50.41/hour

STATISTICAL ANALYSIS:

Given the nature study, we will be working with a convenience sample provided by volunteer beekeepers. The unit of analysis (for statistical analysis) is the honey bee colony (i.e., hive), and the variable of interest is overwinter survival status (i.e., Yes or No) of the sampled colony. As described above, for this project, citizen scientists will report information on hive overwinter survival status and will submit this dichotomous data using the mobile app. We will perform descriptive statistics on colony survival data (e.g., mean, standard deviation) and will fit logistic regression models with the dependent variable of colony survival. Independent variables for the logistic model include candidate biomarkers hydrogen peroxide, defensin-1 and quercetin, for which the limits of detection are unknown, from two (duplicate) blinded aliquots of each sample of honey. Additionally, beekeeper practices (e.g., mite treatment-free colony vs. mite-treated colony) and mite counts will be included as independent variables. Participating beekeepers are considered one potential source of bias because the distinction and value of being “treatment-free” is a highly contentious subject, and it is conceivable that some beekeepers may wish to promote a particular hive management style. Outliers will be detected using box plots, and the analysis can be repeated with and without the suspect data to assess robustness of logistic modeling results. Outliers, whether influential or not, will remain in the data set.

DATA QUALITY ASSESSMENT PROCEDURES:

The *Show Me the Honey* data collection has several built in quality assurance elements including, participants may only monitor one honey bee colony, access to on-line training materials, the ability to ask project organizers questions, use of EPA-provided, pre-labeled honey collection tubes (associated with sampled hive by use of hive-specific QR code), collecting honey straight from the comb (eliminates risk of collecting honey from a different hive) and application of general beekeeping knowledge to design the research goals, objectives and the questions necessary to address those targets. In addition, the primary data reporting mechanism for this project is a smart phone mobile application which enables real-time data entry, collection of photographs of counted mites (facilitating data confirmation), collection of photographs documenting foraging behavior, obligatory screen progression (i.e. cannot move to next section until current section has been completed), use of smart phone QC scanner to link honey sample to the sampled hive, automated date/time reporting and automated mathematical calculations. Together, these measures are intended to increase the completeness of the citizen scientist provided dataset and to also assure the integrity of that dataset.

QC control requirement will consist of the following: inclusion of appropriate negative (blanks), positive controls (recombinant protein, commercially-sourced substances), routine performance checks performed on all equipment used, measurements will be made in duplicate (minimally), technician will be blinded to the sample origin and other data, adhering to appropriate standard operating procedures, adhering to NHEERL quality assurance guidelines for note booking, data storage and archiving.

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ADMINISTRATION OF THE INSTRUMENT: (Check all that apply)

Web-based or Social Media

Mail

Telephone

Other, Explain

In-person

The primary instrument for data collection for this project will be via a smart phone mobile application, but limited use of a paper and mail-based instrument may be necessary in some circumstances (i.e., when mobile application is not accessible to participant, see Honey Bee Survey_Paper-based Addendum 1 and Pilot_2016_Datasheet.pdf).

INSTRUMENT: Append a copy of the questionnaire or a screen shot of the website or app that includes the information collection.

See app-based instrument attached (Honey Bee Survey_Mobile App 1). A copy of the mail and paper-based instrument is also attached, but this instrument will only be used under the circumstances described above.

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