
Technical Transfer Teams Serving Commercial Beekeepers in Almonds

Project No.: 17-POLL5-vanEngelsdorp

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Objectives:

The Almond Board has supported Tech Transfer Teams since 2011 and is currently providing support for all 5 Technical Transfer teams. Support from the Almond Board has included not only financial assistance, but expertise during the key initial growth years by attending our science advisory and stakeholder meetings. The input received at those meetings was critical to shaping the goals and outreach efforts for beekeepers involved in almond pollination.

Objectives of this specific project are:

- 1) Help sustain, in part, all regional tech teams whose participants migrate to pollinate almonds in California. The goals of these teams include improving the health of colonies prior, during and after this critical pollination event as well as continued monitoring of any health issues that arise during or after pollination.

Interpretive Summary:

BIP facilitates bee health surveillance and outreach through collaboration with nine of our nation's leading research labs and universities. We provide beekeepers with information and resources to promote the health of their colonies, and we educate the broader public about the vital role honey bees play in our lives, our communities, and across entire ecosystems. Our collaborative, cross-sector efforts have a proven track record of bringing new insights in understanding honeybee declines and increasing colony survivorship. Much of the in-field work is performed by our high trained Technical Transfer Teams (TTTs) who collaborate and become a critical and trusted second set of eyes and hands for many commercial beekeepers.

TTTs also work with industry and commercial beekeepers to evaluate new feed and treatment products or management practices in the field and this has become an increasing use of our TTTs. In 2018 alone, our TTTs have or are currently assisting in more than 10 different product

or research trials. These experiments benefit the industry, beekeepers, and researchers by providing highly trained field staff who can perform consistent colony assessments in a commercial operational setting. That in-field component coupled with the expertise of experimental design, implementation and analysis from our research staff makes for a comprehensive end-to-end testing environment. The commercial beekeepers who participate are equally enthusiastic and are highly engaged in the research questions.

We also collect census data from these beekeepers that we evaluate on both a seasonal and annual basis. We then generate reports for individual beekeepers, as well as provide nationwide statistics that are available to educators, policymakers and the general public so that we can evaluate geographic and temporal trends in bee colony mortality.

Since our formal inception as a nonprofit organization four years ago, the Bee Informed Partnership has directly helped thousands of hobbyists and over 120 commercial beekeepers who collectively manage 17 percent of the nation's honey bee colonies in over 14 of the largest beekeeping states in the country. Our colony health database is now the largest repository of bee health metrics in the U.S. and our collective data is freely available and thus an invaluable to beekeepers, industry organizations, researchers and policy makers.

This year has been pivotal to BIP. Starting late last fall, we instituted operational reviews for all our participating beekeepers. These one-on-one meetings help customize our services to their specific operation and let us know what their goals are, with most of them preparing healthy colonies for almonds as a high priority. We also discuss what BIP has done for them and what we can continue to improve upon. We will continue to use these meetings to begin evaluating concrete metrics of how BIP has and continues to improve these operations and relationships.

Because federal research funding is highly competitive and limited, BIP has also expanded to search and apply for Foundation grants outside of the university and federal funding stream. We are working with a granting organization that has deep roots in this space and are able to help us identify, target and apply for this type of funding. We hope to grow these Foundation grants to help continue subsidize and grow the future of BIP. We realize that the beekeepers who need our services the most are those that are likely unable to afford the membership and sampling fees. We are looking into raising funds for a scholarship program for these high-risk beekeepers so that they can become a more productive part of the pollination collective.

The Almond Board was critical in enabling us to begin to assemble, write and produce a commercial beekeeping guide. We are in the final stages of editing and will print and publish this guide by early fall. It will be available at no cost to all our participants and will be available for sale at the 2019 national conventions. We hope that this guide will train the next generation of commercial beekeepers as well as provide training guidance to operational crews.

Because of the trends we have seen over the last few years from our BIP Sentinel data, we are focusing our outreach and encouraging all commercial beekeepers to incorporate Sentinel apiaries in their home yards. We firmly believe that use of these sentinel colonies is part of a rigorous process beekeepers can use to monitor and evaluate pests and pathogens in the landscape, especially for *Varroa* mite infestations. By maintaining healthy colonies, we believe

that beekeepers will have greater success in sending not only more colonies for almond pollination, but healthier ones as well.

Materials and Methods:

Cultivation of pollination-dependent crops has intensified in the U.S. and around the world, making the role of honeybees and other pollinators increasingly vital. Unfortunately, as demand for pollination services has increased, the annual rates of honeybee colony loss have reached unprecedented levels.

It is natural for beekeepers to experience some colony losses due to a variety of reasons; 15 percent or lower loss rates per winter are considered acceptable for most beekeepers. However, in the last decade we have seen these values double, with some beekeepers experiencing annual losses approaching 90-100 percent. Such high colony mortality rates are unsustainable for beekeepers who must assume significantly increased labor and material costs required to replace dead colonies. These costs may then be passed to growers, thereby raising food prices and threatening our national food security.

To reduce this colony loss, and huge economic burden, there are currently 5 TTTs working closely with essential commercial operations in the US. They are composed of highly trained field agents, who regularly monitor colonies for pests, diseases, and environmental factors that contribute to honeybee health. These include *Varroa* mites, *Nosema*, viruses, and pesticides. When TTTs sample an operation, the beekeeper gets instant feedback on the health of their colonies. Beekeepers are notified immediately of any visual symptoms of disease, parasites, and pests. TTTs further investigate pathogen levels with laboratory analysis. The TTTs also provide hygienic testing to help beekeepers select disease resistant stock for queen breeding.

After every site visit, the beekeeper receives an individualized report with quantitative data. This allows them to implement appropriate management strategies in a timely manner. TTTs also send summary reports after each sampling period. These reports anonymously compare the beekeeper's disease loads to those of other beekeepers in their region. These data help beekeepers set long-term goals.

The skills of our highly qualified research teams, our rigorous sampling/reporting program, and collaborative network, enable all of our beekeepers' access to expertise, real-time data analysis, mentoring and support in making timely management decisions. We are strengthening the agricultural economy by improving the success of these beekeepers who are experiencing unprecedented challenges.

We also understand that there may be a trend of fewer beekeepers sending colonies to almonds for pollination either because they cannot prepare the colonies in sufficient strength or they are worried about the impact that pesticide application may have downstream on their operation. We hope to work with industry and beekeepers to determine what our Tech Teams can do prior, during, and after almond pollination to alleviate these concerns and proactively monitor the health during the crucial period.

Results and Discussion:

BIP is looking for a more complete nationwide coverage of honeybee colony assessments. This allows researchers, beekeepers and policy makers to better understand how, pest and disease intensity, insecticide exposure, and the interactive effects of these factors vary nationwide. Further, this geographic picture of honeybee colony risks results in better tracking of novel pests and diseases currently moving throughout the country's bee populations.

The number of experienced beekeepers is also declining, and many novice hobby and commercial beekeepers have limited beekeeping know-how. Without experience in these areas, beekeepers face a significant risk of annual colony losses that make these burgeoning businesses economically inviable. Furthermore, new commercial beekeepers also have large initial capital investment costs resulting in low initial profit margins as a new agricultural business owner. This decreases the long-term sustainability of these businesses if they suffer significant colony losses early in their career.

BIP has made major strides in improving colony health and outreach to our current program participants. Moving forward, our current goals are to expand beekeeper participation, and to improve our ability to improve our educational and outreach tools to better fulfil our unique role as a liaison between the scientific research community, beekeepers and the non-specialist general public and policymakers.

Research Effort Recent Publications:

N/A

References Cited:

N/A