Pacific Northwest Tech-Transfer Team

Project No.: **14-POLL5-Sagili/vanEngelsdorp**

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Objectives:

Funding from the Almond Board of California and other sources sustains the Pacific Northwest Tech-Transfer Team that is serving the needs of commercial beekeepers in this region with the focus of improving colony health and reducing colony mortality. Specific team objectives include:

1) Provide routine evaluation of colony health for beekeepers by obtaining numerous samples at regular intervals round the year in the PNW region.
2) Determine best management practices by collecting data that includes migratory history, disease and pest control strategies, and supplemental feeding for each beekeeper.

Interpretive Summary:

Commercial beekeepers face a growing set of challenges to keep honey bee colonies healthy. The Bee Informed Partnership (BIP) created Tech Transfer Teams across the nation to assist commercial beekeepers in providing solutions to reduce colony mortality. With overwhelming interest and encouragement from the regional beekeeping community, BIP launched its fourth team in the Pacific Northwest (PNW). The PNW Tech Team monitors colony health in Oregon, Idaho, and Washington by quantifying disease and pest levels throughout the season from migratory beekeepers in the area. The majority of beekeepers involved in this team pollinate crops for the most of the year, including CA almonds and PNW seed, vegetable, and fruit crops.

The PNW Team is currently functioning in its second year with 17 participating beekeepers. The team regularly obtains samples from each participating beekeeper for *Varroa* mite, *Nosema*, virus, protein, and pesticide levels. With data collected over time, we hope to increase beekeepers' ability to identify and adopt best management practices in the future.

Materials and Methods:

Objective 1. Routine colony sampling

We have 2 full-time professionals to operate the PNW team, which are currently partners with 17 beekeepers. Both team members travel around the west coast to sample each beekeeper 4 times a year. This typically includes one site visit in late winter during almond pollination followed by a spring, summer and fall site visit. Each site visit includes a) standardized colony evaluation and b) colony samples for further analysis of various pests and disease. Each colony evaluation consists of population estimation, queen quality, weight, and presence of pests and brood disease observations. In addition to evaluation, the team takes samples from each colony. The most common type of sample is the collection of approximately 300 bees in saline solution to quantify levels of both *Varroa destructor* (parasitic mite) and *Nosema* spp. (gut pathogen). Other types of samples include adult bees for virus and nutritional analysis as well as hive products (pollen or bee bread) for pesticide residue analysis. We also have one queen producer that participates in our team, and we offer freeze-kill brood assays for his breeder colonies to assess hygienic behavior.

Objective 2. Best management practices

The data is stored anonymously in the BIP database where it will join a vast and growing archive of data from other Tech Teams as well as disease and colony loss survey data. Beekeepers and researchers will be able to access aggregate summaries of these records to give context to disease loads in specific seasons and locations.

Results and Discussion:

Objective 1. Routine colony sampling

Sample results from each site visit are presented to the beekeeper in a succinct report. With the collaborative effort with the University of Maryland (UMD) Diagnostic Lab, we are able to provide beekeepers with a 7-10 day turnaround time for sample analysis. Thus by providing results to beekeepers in near real time, we are able to assist them in determining the efficacy of their management practices and amend as needed. We sample the same colonies during each site visit when possible. With longitudinal monitoring, we are able help beekeepers understand seasonal trends in the pest and disease levels within their colonies.

At the end sampling period (winter, spring, summer, and fall), we provide each beekeeper with a seasonal summary report of their pest levels. This allows them to anonymously compare their sample results among other beekeeping operations. The report expands the information on both a regional and national level while still maintaining the confidentiality of each beekeeper's identity. **Figure 1** is an example of how this is achieved.

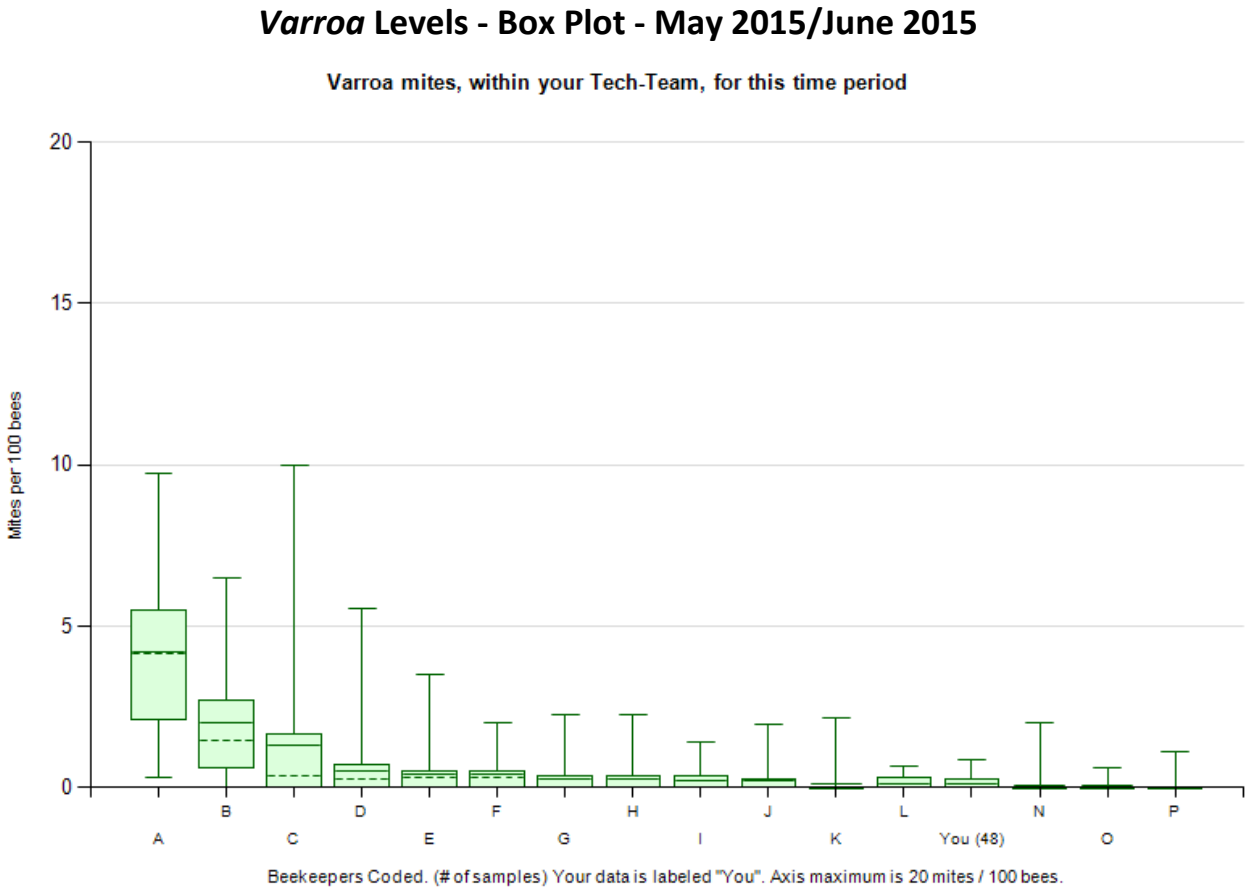

Figure 1. An excerpt from a seasonal summary report for participating beekeepers that compares Varroa mite levels of the spring sampling period (May and June 2015).

Since we started this team in May 2014, we have taken over 5,000 samples for *Varroa* and *Nosema* levels for participating PNW beekeepers. 2,858 samples were taken in 2014 and 2,531 currently for 2015. **Figure 2** shows monthly *Varroa* levels from all samples taken by the PNW Team compared to the average of all Tech Teams within the last year.

Every year, we offer 5 virus samples to each beekeeper at no additional cost. Starting in the summer of 2014, OSU offers protein sample analysis for any nationwide beekeeper that participates in BIP Tech Teams. To enhance this sampling program, the PNW Team has offered free protein samples for each beekeeper. For 2015, we will be taking 64 protein samples for every participating PNW beekeeper. The data from this extensive sample offers relative values and recommended sample sizes per yard group for this US region.

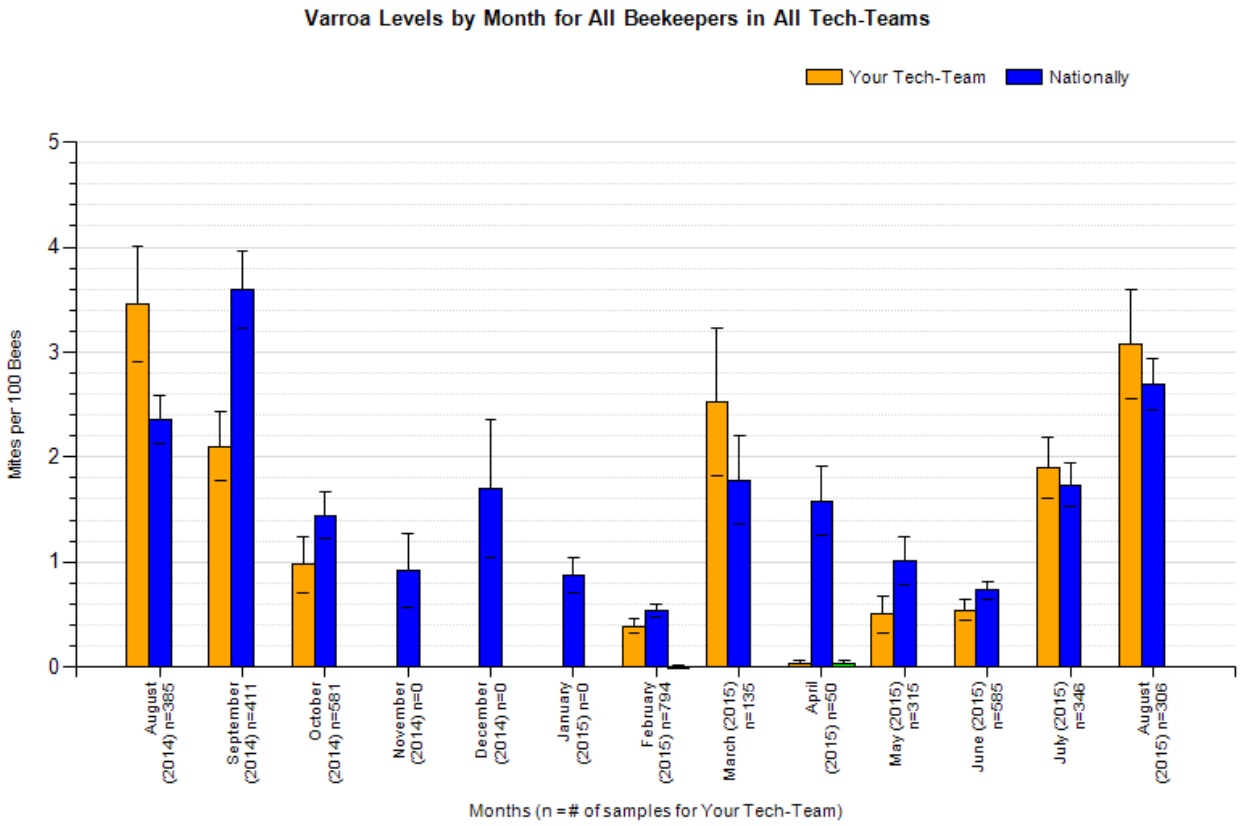

Figure 2. An excerpt from a seasonal summary report for participating beekeepers that compares monthly Varroa mite levels between a) PNW Tech Team (listed as Your Tech-Team) and b) All Tech Teams (listed as Nationally) from August 2014 to August 2015.

Objective 2: Best management practices

Collecting management data allows us to assist beekeepers in developing effective management strategies. However, we need multiple years of data to make this information available to our beekeepers. Thus, results are still pending at this time. By providing this information to beekeepers, they will be able to make more informed decisions that lead to improve colony health and survival rates.

Research Effort Recent Publications:

Lee, K. V., Steinhauer, N., Rennich, K., Wilson, M. E., Tarpy, D. R., Caron, D. M., & Sagili, R. (2015). A national survey of managed honey bee 2013–2014 annual colony losses in the USA. Apidologie, 46(3), 292-305.

References Cited:

Sagili R, vanEngelsdorp D, Topitzhofer E, Wyns D, Rennich K. “Enhancing the Tech Team Program for the Commercial Beekeeping Industry: Pacific Northwest Tech Transfer Team” Almond Industry Conference, Poster Session. (Sacramento, CA) December 9th, 2014.