

# Honey Bee Stock Improvement Program: Importation, Preservation, and Utilization of Honey Bee Germplasm

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## PROJECT SUMMARY

### Objectives:

- Continue collection of germplasm from endemic populations of Old World honey bees and importation into the US.
- Implement cryopreservation of collected honey bee germplasm and existing “top-tier” US genetic lines for both immediate and long term breeding use.
- Continue a selective breeding program to evaluate and improve honey bee stocks suitable for almond pollination under US conditions, concurrently screening for resistance to pests and diseases.
- Continue to cooperate with the California Queen Producers and the Tech Transfer program to improve and disseminate honey bee genetics and stocks.

### Background and Discussion:

Recent declines in honey bee populations and the difficulty to reliably maintain colony health are of concern to both beekeepers and crops needing pollination services. Amid widespread research directed to honey bee health issues, there remains a notable lack of research directed toward genetic improvement of honey bees.

There is a strong and active honey bee queen production industry in the US, although producers have limited access to novel genetic diversity. The most sustainable means to allow germplasm entry to the US is through collection of honey bee semen under permit and use of instrumental insemination for propagation of the genetic material.

From 2011 to 2016, we have collected honey bee semen both for immediate use in the breeding program and for cryopreservation. We maintain and screen stocks within our USDA-APHIS approved quarantine apiary at Washington State University.

We continue to work with California cooperators (bee breeders and the Tech Transfer Team) to facilitate industry access to and utilization of the new germplasm. With cryopreservation, semen can be stored and used over a matter of weeks, months or years via artificial insemination of queens. An increasingly important use for cryopreservation is to conserve and sustain existing “top tier” honey bee stocks currently available in the US.

Importation of germplasm from subspecies of European honey bees will continue. This includes semen from: *Apis mellifera carnica* (Slovenia); *Apis m. ligustica* (Italy), *Apis m. caucasica* (Republic of Georgia) and *Apis m. pomonella* (Kazakhstan). In 2016, we continued to release genetic stocks to queen producers and initiated the selection and maintenance of a new subspecies (*A. m. pomonella*) for distribution to beekeepers in 2017. We demonstrated that CA queen producers who have been using novel germplasm supplied by WSU (made possible by Almond Board funding), had a 38% increase in genetic diversity in their breeding populations compared to 2004 levels, while those queen producers who did not incorporate such germplasm experienced a 17% decline in genetic diversity over the same period (Taylor et al., in prep).

In 2016 we worked with the USDA National Center for Germplasm Resources Preservation, other USDA-ARS and University laboratories, California pollinators and queen producers to establish a “species group” for the honey bee. This group met in August 2016 to set priorities and procedures for future germplasm distribution.

In summary, funding provided by the Almond Board has been instrumental in acquiring and disseminating the honey bee genetic resources needed for both current and future breeding efforts.

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**Project Cooperators and Personnel:** Dr. Brandon Hopkins, Washington State University

### For More Details, Visit

- Poster location 120, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at [Almonds.com/ResearchDatabase](http://Almonds.com/ResearchDatabase)
- 2015 - 2016 Annual Reports CD (15-POLL7-Sheppard); or on the web (after January 2017) at [Almonds.com/ResearchDatabase](http://Almonds.com/ResearchDatabase)
- Related project: 16-POLL5-Sagili/vanEngelsdorp