



Project *Apis m.* supports a multi-year bee breeding project, to develop and test bees selected for *Varroa* resistance. The breeding continues year-round in Hilo, Hawaii. The Hilo Bees have been in annual side-by-side trials with unselected bees from Hawaii in several locations throughout the USA, starting in North Dakota in 2016. These state-of-the-art *Varroa*-resistant bees show promise as a practical, sustainable *Varroa* control option for commercial beekeepers, which could pay great dividends in healthier bees, reduced colony losses and improved pollination security.

Detailed project history, progress and videos are available at [www.HiloBees.com](http://www.HiloBees.com).

### RESULTS:

This report summarizes the 4 years of North Dakota data evaluating Hilo Bees.

The performance of Hilo Bees was compared to that of commercial Italian bees for four consecutive years (2016 to current) in Browning's beekeeping operation near Jamestown, ND. Thirty-two to 60 colonies of each stock were established in May each year. Bees were managed as is typical for the operation, except that Hilo bees were not treated against *Varroa* when the Italian bees

were treated in late summer. The colonies were overwintered indoors beginning in late autumn, and then moved in early February for almond pollination.

Performance parameters (survival of original queens, adult bee population, honey production and *Varroa* infestation) were measured in August, October and February; note the final observation of the current trial will occur in February 2021



*Summer & Fall: Colonies were sampled to verify queens, and monitored for health and production, including honey crop.*

Queen losses averaged ~30% for both bee types between May and August. In August, Italian colonies were more populous than Hilo colonies (15.1 vs. 13.4 frames of bees, respectively). This may have driven the greater honey production found in Italian colonies (69 vs. 46 lbs. per colony). Shortly after honey production, *Varroa* infestations (see figure) were 3.4X greater in Italian colonies than in Hilo colonies (4.8 vs. 1.4 mites per 100 bees); Italian colonies then were treated with miticide. In October, Italian colonies continued to have more mites than untreated Hilo colonies (8.4 vs. 6.1 mites per 100 bees) and had smaller bee populations (7.5 vs. 10.8 frames of bees). In February, queen survival was greater in Hilo colonies (53% vs. 38% alive) while Hilo and Italian stocks had similar bee populations (7.5 vs. 7.2 frames of bees) and *Varroa* infestations (0.9 vs. 0.7 mites per 100 bees).



*Jamestown, ND in Spring: Zac Browning, Danielle Downey and Bob Danko install marked queens in equalized splits, then sampled and measure mites, disease and colony strength.*



**Average *Varroa* Infestation in Hilo and Italian bees 2019-2020**

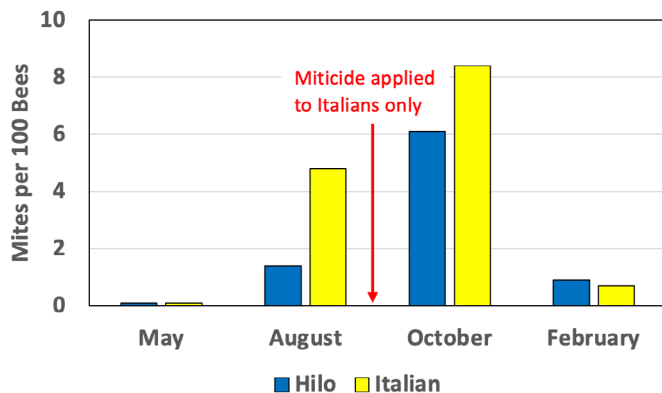


Figure 1: Mite levels in Hilo and Control colonies assessed during the 2019 North Dakota field trial.

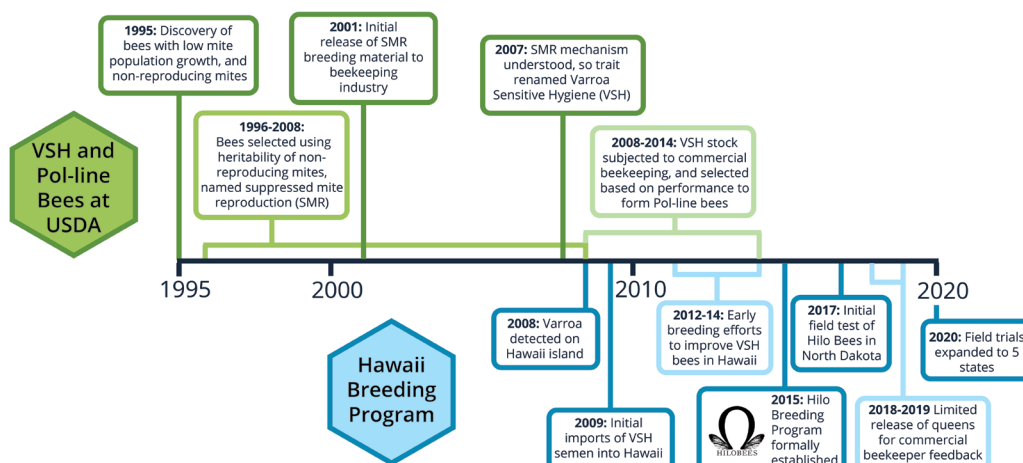


February: Colonies were sampled and measured in California almond orchards, to verify queens, assess strength, and measure survival and health.

These field tests reveal two significant trends regarding mite levels and honey production. Honey production was less in Hilo Bees than in the Italian controls; a finding that has led to more emphasis on selection toward productivity in the Hilo breeding program.

The greater mite resistance in Hilo may have accounted for relatively better survival over winter and thus greater availability of Hilo colonies that made the grade for almond pollination.

## Timeline of Hilo Bee Development



### This project is supported with funding from:

- USDA-APHIS, USDA-ARS, USDA-OCS
- California Department of Food and Agriculture
- North Dakota Department of Agriculture
- Project Apis m./Costco USA

### Project partners include:

- Project Apis m.
- Hawaii Island Honey Company
- USDA-ARS Honey Bee Breeding, Genetics, and Physiology Lab, Baton Rouge

### Additional cooperators make this work possible:

- Browning's Honey Company,
- Foothills Honey
- Bee Informed Partnership
- Arista Bee Research