Quantifying Varroa Resistance to Miticides in US Honey Bee Colonies

Project No.: **15-POLL6-vanEngelsdorp**

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Objectives:

We propose to quantify varroacide susceptibility in varroa mite populations across the US.

Interpretive Summary:

Dating back to 2012, we have conducted over 2,500 resistant assay tests on bees submitted as part of the National Honey Bee Disease survey and BIP tech team sampling. Of these, about one half had sufficient mite levels to consider the sample valid. Our results show that mite populations are resistant to some US registered miticides (Comaphous and Fluvilante), but remain susceptible to others (Amitraz). The percentage of mite populations that show susceptibility or resistance to miticides has remained stable over the last 3 years.

Materials and Methods:

We began preforming resistance assays on live bees collected for National Honey Bee disease survey in 2012 and for BIP tech team collected samples beginning 2014. In all samples from 662 operations were received, of which 389 had sufficient mites per bee (>5%), to perform a resistance assay using one or more mite control product. The resistance assay involves placing approximately 300 bees in a cage along with a small strip of miticides (after Pettis et al. 1998). Mites that fell from the bees after 6 hours of exposure were counted. Sugar powder was used to remove and quantify any mites remaining on the caged bees. When the total number of mites removed from caged bees was less than 5, the assay was not considered for further analysis.

Results and Discussion:

Table 1: Percentage of Mite populations with sufficient mites to permit testing that were susceptible (killing 80% or more of the mites present) or highly resistant (killing less than 20% of mites present).

Product	n	Susceptible (%)	Highly Resistant (%)
Amitraz	284	79	0
Coumaphos	285	20	12.2
Flumethrin	114	49	0.02
Fluvalinate	174	50	0.02

These results show that miticides resistant populations are wide spread in the US. Fortunately, Amitraz resistance has not been detected, but the effectiveness of the product has been declining, with only 79% of mite populations truly susceptible to the product. Comaphous and Fluvilante resistance remains widespread. Flumethrin is a pyrethriod registed in the European Union. These results show it would not be effective for Varroa control in the US.

A clear and pressing need for more Varroa mite control management tools is evident.