Varroa Treatments: Efficacy and Economic Impact: 2014-2015 Almond Pollination

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INTRODUCTION

Varroa destructor continues to be a threat for the beekeeping industry despite the efforts by beekeepers to control it. Commercial and hobbyist beekeepers suffer tremendous colony losses throughout the year due to mite infestation. The repeated application and misuse of a variety of acaricides over the years led the mites to become resistant to these products and chemical residues have been found in brood combs as well as in apiculture products. The high levels of miticides and agrochemicals found in honey bee colonies have been suspected to cause honey bee losses as well as affecting brood development and adult longevity. Residues of such control agents in hives and their negative effect on bee health have become an important issue and need to be taken in consideration when making management decisions for Varroa control treatments. Last year, under Almond Board grant project number **13-POLL9-Ahumada**, we screened and tested four different commercially available mite treatments: Apiguard, HopGuard II, Mite Away Quick strips and Apivar. This feasibility study enabled us to determine the efficacy of the treatments to control the mites with one fall application and any adverse effect in the colony. Post-treatment mite levels after one fall application showed no significant differences among the treatments.

The current research is a continuation of last year's study and focuses on the efficacy and treatment schedule during two almond pollination seasons. In addition, the economic impact of these treatments will be determined. This research will enable us to determine which one/s of these products is the most effective in controlling *Varroa* and have a better understanding of the treatment efficacy and thresholds without putting the colonies at risk. We envision that the results obtained will contribute to a "Best Practices Protocol" for beekeepers preparing their bees for almond pollination and overall colony health. As a result, almond growers will benefit from having the adequate number of strong and healthy colonies they need to pollinate their orchards efficiently to produce higher yields.

OBJECTIVES

The project objectives are as follows:

1. Determine the efficacy of the treatments on mite levels.
2. Determine the treatment effect on colony strength and behavior.
3. Determine the economic impact of the treatments.

METHODS

A total of forty-eight full size colonies with equal strength were selected for the study in Monterey County, CA. Pre-treatment mite population and colony strength were measured in all colonies. A set of twelve colonies with equalized mite levels was randomly assigned to each treatment group. Apiguard, HopGuard II (HGII), Mite Away Quick Strips (MAQS) and Apivar were applied following manufacturer's instructions. Any adverse post-treatment effect on bees and/or brood was noted. All queens were marked at the beginning of the study and its presence was accounted for on every colony inspection. Queens were replaced as needed but subject to availability. Significant differences among treatments will be determined by a two-way analysis of variance using proportional changes in mite levels and colony size and sample time as factors. A detailed expense record log will be kept to calculate the financial costs at the end of the study. This will allow us to analyze the total costs to determine the economic impact of the treatment on the beekeeper's operation.

RESULTS

This is a progress report of an ongoing study, and the results presented in this poster correspond to measurements and observations collected between March and November 2014. Since this is a continuing field study, the results obtained so far should be considered as preliminary, and further conclusive data will be presented later, at the conclusion of the study on June 2015.Mite levels were monitored from March through November 2014 and treatments were applied in Spring and Fall following manufacturer's instructions. The results show that mite levels started to increase in June achieving its highest peak in August. At this time, the first set of fall treatments were applied followed by consecutive treatments in late fall to reduce mite levels before the winter season. Apivar colonies received 3 treatments, MAQS colonies 4 treatments and HopGuard and Apiguard colonies 5 treatments. Mite levels in Apivar colonies remained low over time but increased in November. Mite levels in HopGuard, Apiguard and MAQS were higher than Apivar needing additional treatments. It needs to be noted that HopGuard colonies received half of the recommended dose in March, May and September due to lack of product availability. The results are shown in figure 1. Colony size was recorded and the number of frames of bees and brood was similar among the treatments and no adverse treatment effect on colony size was observed. The results are shown in figures 2 and 3. Colony losses were recorded for all treatments and the highest percentage was observed in September especially in MAQS colonies (see figure 4). Queen losses were also recorded and the highest percentage was observed in June on MAQS and Apivar colonies. Queen losses for HopGuard and Apiguard remained low until October where a second peak was observed in all treatments except for MAQS colonies (see figure 5). It needs to be mentioned that MAQS colonies received half of the recommended dose of 2 pads/colony due to Mr. Brandi's colony configuration. An expense report log was kept and the total costs of the treatments up to date are shown in table 1.

HopGuard II

Apiguard

Mite Away Quick Strips

Apivar

Figure 1. Number of Mites Over Time

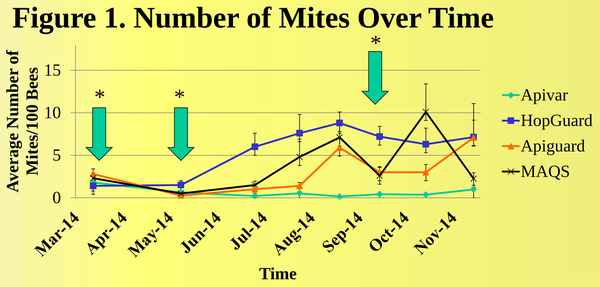
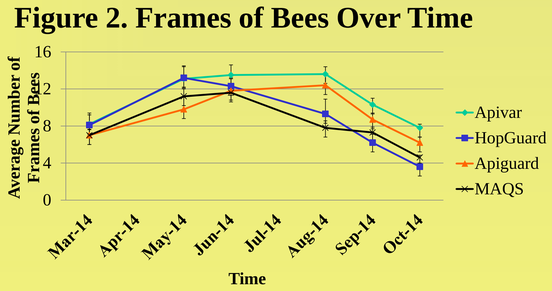


Figure 2. Frames of Bees Over Time



* Due to lack of HG availability half dose was applied at this time.

Figure 3. Frames of Brood Over Time

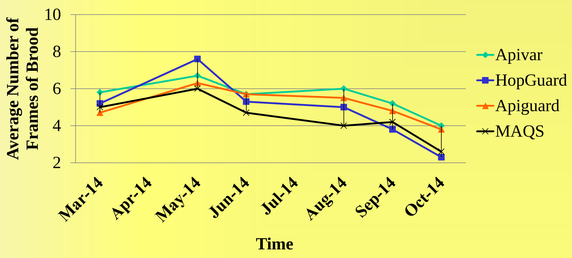


Figure 4. Colony Losses Over Time

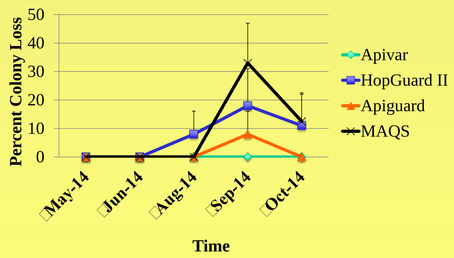


Figure 5. Queen Losses Over Time

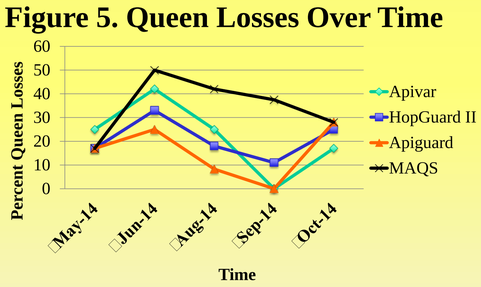


Table 1. Treatment Costs

Treatment	Treatment Dose	Number of Treatments	Total Cost/Colony
Apivar	2 strips/chamber	3	$7.20
Apiguard	100 gr	5	$5.61
MAQS	2 pads	4	$2.40 *
HopGuard II	2 strips/deep	5	$4.32

* Due to Mr.Brandi's colony configuration half of the recommended dose was used per colony. The cost reflects half of the dose applied (1 pad).

DISCUSSION

The preliminary results presented in this poster indicate that none of the tested mite treatments seem to have significant adverse effect on colony size. The efficacy of HopGuard and MAQS may have been affected due to the application of a lower than recommended dose. A complete statistical analysis will be performed at the end of the study to determine the efficacy on mite levels and the economic impact. This *Varroa* treatment comparison study and the complete economic impact evaluation will provide beekeepers with a detailed analysis of the cost of each treatment and help them make decisions about cost-effective treatments for their operation.

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