Varroa Treatments: Efficacy and Economic Impact

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INTRODUCTION

Varroa destructor continues to be a threat for the beekeeping industry despite the efforts by beekeepers to control it. It has been brought up to the public attention and beekeeping community once again at the 2013 American Honey Producers and at the American Bee Federation Conferences, the need for alternative treatments to control the parasitic mite *Varroa*. Commercial and hobbyist beekeepers suffer tremendous colony losses throughout the year due to mite infestation.

The repeated application and misuse of registered 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. Studies performed by Mullin et al detected acaricide residues in beeswax and indicate that bee exposure to these compounds may continue long after the treatment has ceased. Residues of such control agents in hives and their negative effects on bee health have become an important issue and need to be taken in consideration when making management decisions for Varroa control treatments.

Commercially available natural treatments are one of the best options for beekeepers to control *Varroa*. The treatment time is usually seven to ten days and the active ingredient tends to dissipate rather quickly once applied. Therefore, the chances for the mites to become resistant to the compounds as well as the build up of toxic residues in the colony and bee products are minimized.

The current study field study compares commercially available natural treatments against Apivar. Although Apivar is not a natural treatment we have decided to include it in the trial since it has been registered under Section 18 in many states. We will compare their efficacy on mite control, effect on colony strength, queen survival and evaluate the economic impact of these treatments. 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 performed in all colonies. Mite levels were equalized among treatment groups and a set of twelve colonies were randomly assigned to each 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. Changes in colony size relative to colony strength at the start of the study will be used as the test statistic. All queens were marked prior to the start of the study. Queen presence was recorded at the time of each treatment application and five weeks post-treatment. Queens will be replaced as needed but are subject to availability.

Significant differences among treatments will be determined by a two-way analysis of variance using proportional changes in 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.

HopGuard II

Apiguard

Mite Away Quick Strips

Apivar

RESULTS

The current research project focuses on the efficacy of commercially available natural treatments for mite control and their economic impact. The efficacy of the natural treatments will be tested against Apivar. The ongoing field study was set up in September 2013 at a berry farm in Monterey County, CA and Mr. Gene Brandi provided 48 colonies. Colony assessment, mite counts and queen marking were performed in all colonies before the treatment application. The treatments are: Apiguard, HopGuard II (HGII), Mite Away Quick Strips (MAQS) and Apivar.

Colonies were evaluated one month after the treatment application in mid-October 2013. The data collected has shown that post-treatment mite counts are not significantly different among treatments after one application. Colony data recorded at this time has also shown that no significant changes were observed on the number of frames bees and brood. Some brood damage was observed on Apivar colonies where the strips were hung but not significant enough to have a negative effect in the colony. All the queens were alive and accounted for at this time. It was noted that natural forage was dwindling in the area and nutritional supplements along with sugar syrup were fed to the colonies. The results are shown in figures 1 through 3.Colonies will over-winter in Monterey County, CA and will be evaluated and treated again in late January of 2014. Colony measurements along with queen survivorship will be performed before almond pollination and after each subsequent treatment in the Spring of 2014. Significant differences among treatments will be determined by a repeated measures analysis of variance. A detailed expense report 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. The main goal is to have strong and healthy honeybee colonies in sufficient numbers to provide efficient almond pollination.

Figure 1. Proportion of Mites Dropped After One Fall Treatment

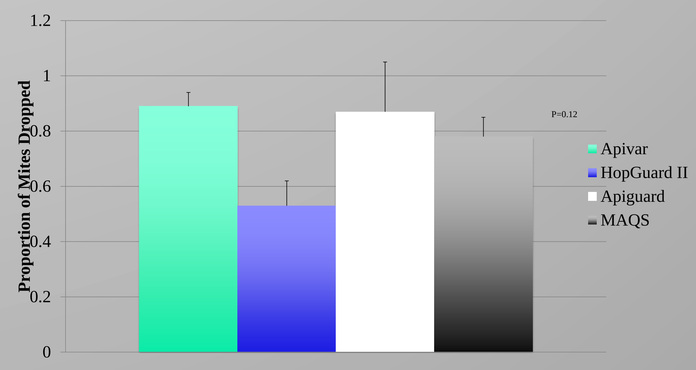


Figure 2. Frames of Bees Before and After the Treatment

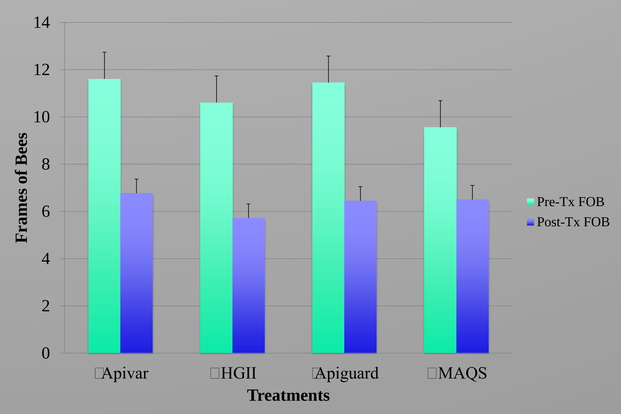
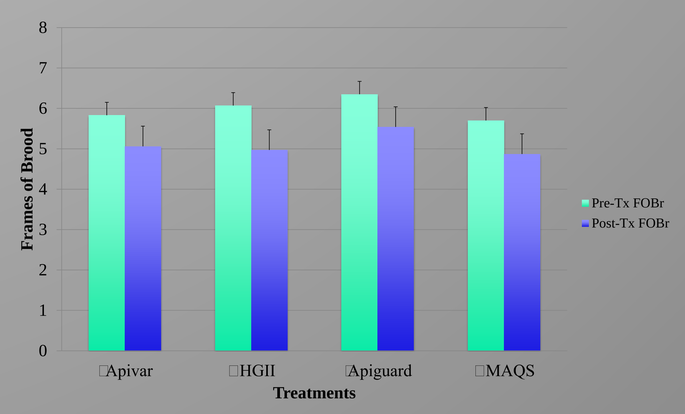


Figure 3. Frames of Brood Before and After the Treatment



DISCUSSION

This *Varroa* treatment comparison study and the complete economic impact evaluation will provide beekeepers with a detailed analysis of the cost of each treatment. A treatment schedule rotation throughout the year will maximize efficacy and minimize mite resistance development. This information will help beekeepers make decisions about cost-effective treatments for their operation. As some of the treatments used in the study are non-biodegradable and will have to be removed, this needs to be taken into consideration when evaluating the economic impact for each treatment.

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