Implementing an Integrated Pest Management program for *Varroa*

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INTRODUCTION

Varroa destructor (Anderson et al; 2000) is a chronic problem in the beekeeping industry and continues to be a threat despite the efforts by beekeepers to control it. The Bee Informed Partnership 2014-2015 management survey reported a 42 % annual colony loss across the country. Research studies have shown that miticides are failing and beekeepers are faced with the unfortunate reality of having to apply four to five mite treatments per year. The repeated application and misuse of registered acaricides over the years has resulted in mites that are resistant to these products, and in chemical residues being found in brood combs as well as in apiculture products. This is an important issue that needs to be taken into consideration when making management decisions for Varroa control treatments.

The main objective of this research project is to implement a cost-effective Integrated Pest Management (IPM) treatment regime by alternating natural and synthetic miticides throughout the year. This will minimize the development of resistance and residue deposits in the colony by decreasing the use of synthetic miticides. The development of an IPM program that alternates the use of "soft and hard" chemicals throughout the year can minimize the resistance development as well as decrease the rate of colony losses due to high mite infestation levels.

The results obtained from the **14-POLL9-Ahumada** study allowed us to determine the efficacy of the products, thresholds, and the economic impact of the treatments. Now we have on hand all the necessary information to set up a treatment rotation study to implement an integrated pest management (IPM) program for *Varroa*.

OBJECTIVES

The objectives of the research study are the following:

- Determine the efficacy of various treatments for Varroa control.
- Determine the treatment effect on colony strength and behavior.
- Determine the economic impact of the treatments.
- Implement an IPM Varroa program.

METHODS

The study will be set up in Spring of 2016 in Tucson, AZ. A total of 40 bee packages will be purchased, and upon installment, brood frames will be added to help the colony establish and build up. The colonies will be divided into 2 sets of 20 colonies each and labeled as treatment and control blank groups. The miticides selection will be based on the results obtained on efficacy, effect on colony strength, and treatment cost from **14-POLL9-Ahumada.** Treatment colonies will receive a combination of natural and synthetic treatments at different times of the year while control blank colonies will receive no treatment. Colony strength and mite levels will be monitored monthly throughout the study. Alcohol washes will be used to determine mite levels. Changes in colony size relative to colony strength at the start of the study will be used as the test statistic. Any adverse effect of the treatments on bees and/or brood will be noted. All queens will be marked prior to the start of the study. Queen presence will be recorded at the time of each treatment application in both treatment and control colonies. Queens will be replaced as needed subject to availability. Treatments will be purchased for each of the proposed products and the total cost including labor and shipping will be recorded. The cost per treatment will be calculated by dividing the total cost by the number of applications per colony per year. Significant differences among treatments will be determined by a two-way analysis of variance using proportional changes in colony size, mite levels and sample time as factors. This study will allow us to gather all the information and necessary tools to implement an IPM *Varroa* program through a treatment rotation regime to improve the efficacy of the current miticides and minimize mite resistance development.

TREATMENTS TESTED

Apiguard

Mite Away Quick Strips

Apivar

COLONY GRADING AND VARROA SCREENING

RESULTS

This is a progress report of an ongoing study, and the results presented in this poster correspond to measurements and observations collected from March 2014 through March 2015.

The **14-POLL9-Ahumada** results showed that mite levels started to increase in the summer achieving the highest peak in late August. At this time, the first set of fall treatments was applied followed by consecutive treatments to reduce mite levels before the winter season. The average fold increase in mite levels was significantly different among the treatments in summer and fall 2014 as shown in Chart 1. The number of frames of bees and brood were recorded monthly during the study and the data was analyzed up to October 2014 due to high 2015 overwinter colony losses. Frames of bees in MAQS colonies were significantly different than Apivar and Apiguard in the fall. Frames of brood in Apiguard and MAQS were not significantly different from each other. The results are shown in Charts 2 and 3. Colony losses were recorded for all treatments throughout the study and the highest percentage was observed in fall and overwintered colonies as shown in Chart 4.

Figure 1. Average Fold Increase in Mite Levels Over Time

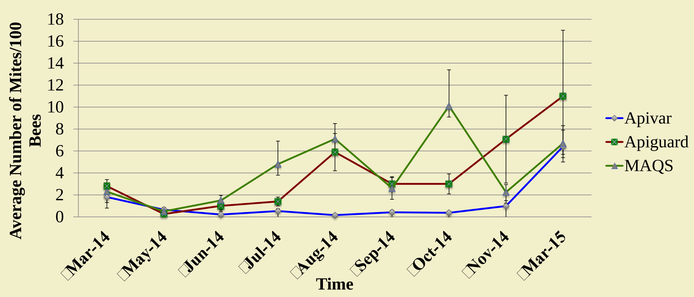


Figure 2. Frames of Bees Over Time

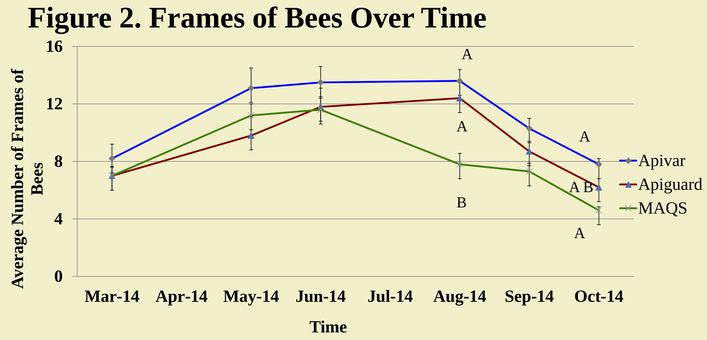


Figure 3. Frames of Brood Over Time

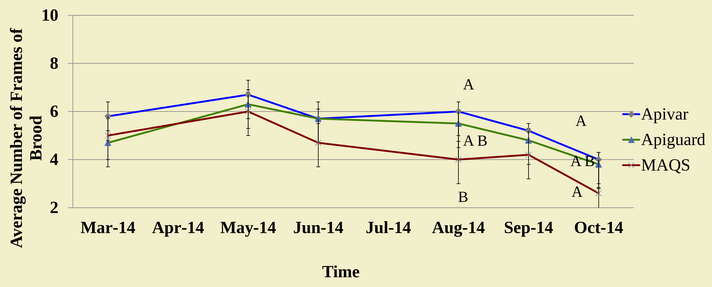
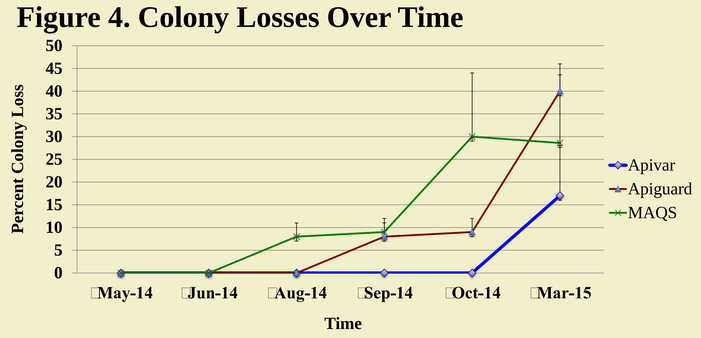


Figure 4. Colony Losses Over Time



DISCUSSION

The results obtained will allow us to determine the efficacy of the products, thresholds, and the economic impact of the treatments. This study will allow us to gather all the information and necessary tools to implement an IPM *Varroa* program through a treatment rotation regime to improve the efficacy of the current miticides and minimize mite resistance development.

The implementation of an IPM system will be a great addition to the "Honeybees Best Management Practices for California Almonds" to manage and support strong and healthy colonies.

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