Population Dynamics of Varroa Mite (Acari: Varroidae) on Different Honey Bee (Hymenoptera: Apidae) Stocks

Spencer Gravitt[1], Oliver Pogue[2], & Sean Clark[2]
Berea College, Berea, Kentucky
[1] Department of Biology, [2] Department of Agriculture and Natural Resources

INTRODUCTION

Varroa mites (*Varroa destructor*) are currently one of the greatest threats to commercial beekeeping (**Figure 1**). These ectoparasites have plagued beekeepers in the United States for two decades and are one of the possible causes being examined in the recent phenomenon of colony collapse disorder (CCD). Use of synthetic acaricides has proven to be of only limited value in the management of this pest due to the evolution of resistance in the mites. Greater emphasis is being placed on selection and breeding programs as a more durable strategy for long-term management.

OBJECTIVES

In this study we evaluated five genetic stocks of honey bees in central Kentucky during hive establishment by comparing colony growth and the mite population levels.

MATERIALS & METHODS

The experimental treatments included four Italian stocks and one cross of Russian and New World Carniolan stocks (NWC/Russian). The Italian stocks included: 1) Italian, with no claims of special traits; 2) All Star, bred for honey production and varroa mite resistance according to the supplier; 3) a stock derived from a local survivor hive that had not been treated with acaricides since establishment in 2001 (referred to as Berea survivor stock or BSS), and 4) a stock exhibiting the SMR (suppression of mite reproduction) trait (**Table 1**).

Figure 1. Varroa mite (*Varroa destructor*), ectoparasite of honey bees.

Table 1. Honey bee stocks evaluated for colony growth and varroa mite infestations during hive establishment.

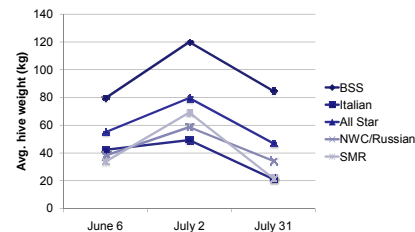| Stock	Source	Est. type	Initial # of Hives	Current # of Hives
Berea Survivor Stock (BSS)	Berea College (Berea, Kentucky)	Nuc	3	2
Italian	Rossman Apiaries (Moultrie, Georgia)	3-lb package	6	4
All-star	B. Weaver (Navasota, Texas)	3-lb package	5	3
New World Carniolan /Russian	Dixie Bee Supply (Lula, Georgia)	Nuc	5	5
SMR	B. Weaver (Navasota, Texas)	Nuc	3	2

Figure 2. Colony growth measure as weight. No treatment differences found.
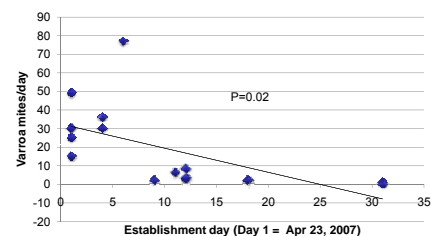

Figure 4. Correlation between hive establishment day and varroa mite populations.
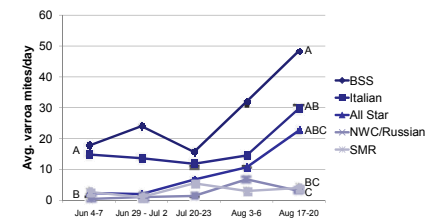

Figure 3. Varroa mite populations measured on bottom board sticky traps. Different letters within a sampling period indicate significant differences (P ≤ 0.05, ANOVA, Fisher's PLSD).
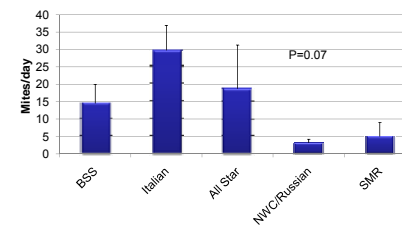

Figure 5 Comparison of mite populations on the five honey bee stocks corrected for differences in establishment period.

RESULTS & DISCUSSION

No significant differences were found in colony growth rates, measured either as weight (**Figure 2**) or area of capped brood and honey (data not shown), among the five stocks. Italian and BSS stocks had the highest mite populations, while the SMR and NWC/Russian stocks had the lowest, throughout most of the 3-month study (**Figure 3**). However, a correlation was found between hive establishment date and varroa mite abundance (**Figure 4**), with higher mite levels being associated with longer periods since establishment. When the data are corrected for the differences in establishment period, treatment effects are only marginally significant (**Figure 5**).

CONCLUSIONS

The significant correlation between hive establishment period and varroa mite abundance makes any conclusions about differences among stocks only tentative. Although the genetic stock does appear to have an influence on varroa mite populations, the hives will have to be monitored for a longer period to determine if the differences among the stocks persist.

ACKNOWLEDGEMENTS