Varroa Populations in Colonies of Honey Bees Housed in Hives Made of Western Juniper (*J. occidentalis*) Wood

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Introduction

The use of acaricides in honey bee colonies over the past 10 years has allowed the continuation of beekeeping and pollination by honey bees in the US, but problems of continued pesticide use are now showing up. These problems include sublethal effects on reproductive casts (Rindiner et al 1999) and resistance to the pesticide by the mites (Elzen et. a. 1999). Resistance to Apistan (a synthetic pyrethroid) has pushed most states in the US to apply annually for an emergency exemption to use CheckMite (an organophosphate) a new product for the control of Varroa. It is clear that this is not a final solution to the Varroa problem. The development of alternate control techniques and the implementation of integrated pest management (IPM) programs are essential to the health of the beekeeping industry. IPM programs will vary depending on the size of the beekeeping operation and its geographic location

The purpose of these experiments is to determine the effect on honey bee mite populations when exposed to juniper wood or juniper chips. The effects of juniper on honey bee populations will also be monitored.

Materials and Methods

The first trials were set up in 1998. Five treatment colonies were housed in hive boxes made of Juniper. Five control colonies housed in hive boxes made of Pine. Colonies were established in early July from nucleus colonies that had two frames of brood and two frames of food (pollen and honey). They were monitored monthly for adult worker bee population and mite drop. The adult bee population estimation were done following the technique of Burgett and Berikam (1985). To look at changes in mite population a single Apistan strip was placed into the colony and a sticky board was placed on the bottom board for 24 hours. After 24 hours the strip was removed and the mites that had fallen and stuck to the sticky board were counted.

The next season, 1999, the experimental set up was expanded to include juniper chips and at the same time repeat the juniper wood trials. The treatment sets included juniper chips in place of a frame in the brood chamber, juniper chips in the hive cover, bottom boards made of juniper wood, hive covers made of juniper wood, the deep brood chamber made of juniper wood, and colonies housed in standard pine equipment receiving no treatment (control). Each treatment set includes four replications. The chips were kept in place with 1/4 inch hardware cloth. The colonies were monitored as in the first trials for bee population and mite drop and will continue to be monitored in 2000.

Results and Discussion

In l998 all colonies started with similar bee and mite populations. Honey bee populations in both types of wooden hives showed similar growth patterns (fig.1).

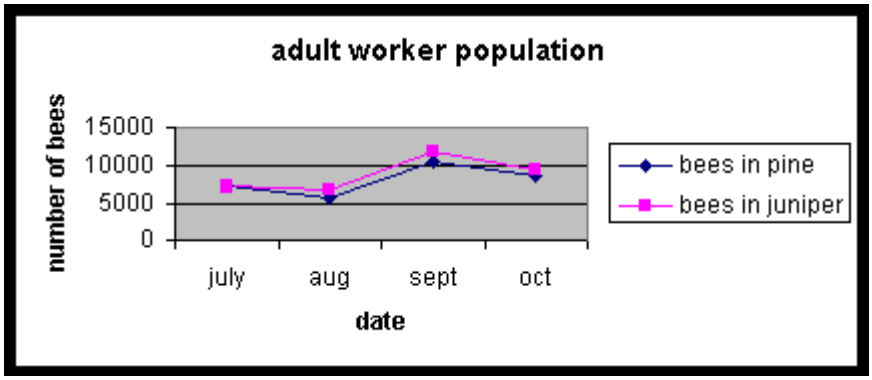

Fig. 1. Average adult worker population for experimental honey bee colonies housed in pine (diamonds) and juniper (squares) boxes, estimated on the 15th of each month from July through October 1998.

Mite populations in hives made of juniper had consistently lower levels compared to mite populations in hives made of pine (fig. 2); this difference is apparent after the first 30 days. Winter loss occurred in four colonies housed in pine and only one colony housed in juniper.

Lowering mite populations by exposure to juniper as seen in the 1998 trial may still result in mite populations too high to be tolerated by the honey bees; however, juniper could play a role in integrated pest management programs for control of varroa mites.

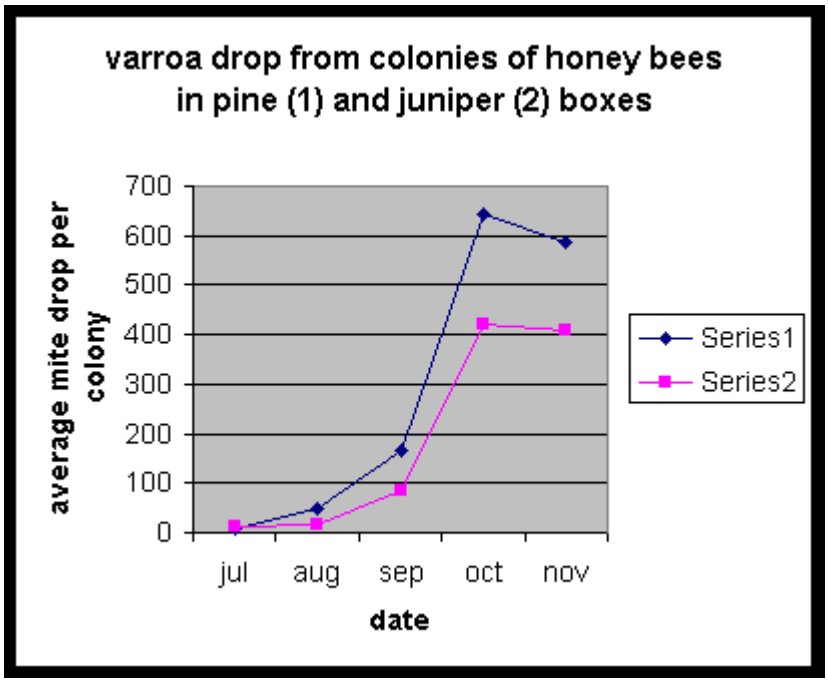

Fig. 2. Varroa drop counted on sticky boards placed in colonies for 24 hours. Counts were made on the 15th of each month from July through November 1998.

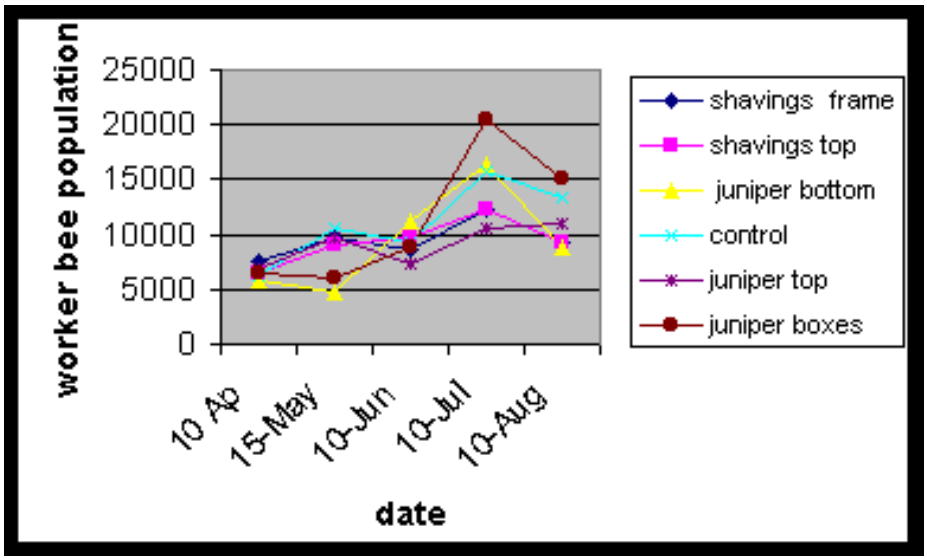

Fig. 3. Average adult worker population for experimental honey bee colonies of the six treatment sets for the summer of 1999.

In the 1999 trials bees were started from packages and were put on new frames with foundation, thus, establishment of brood was delayed. Many of these colonies also swarmed later in the spring. Both swarming and delay of brood rearing kept Varroa population low for the first season of this experiment. However, the bees tolerated all treatments well, with bee populations in colonies housed in juniper or exposed to juniper chips being similar to or greater than those housed in pine (fig. 3).

Since formulation and dose are critical to control of pests (Ellis et al 1997) it is important to continue to monitor bee populations in these colonies. Other considerations include cost and practicality of application. Juniper lumber is expensive and difficult to work with; therefore, it is critical to find a formulation, such as the juniper chips in these experiments that will lower costs and make application easier. Juniper may also have efficacy against other arthropod pests of honey bees, such as the small hive beetle.

Acknowledgements

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