

Management of Varroa Mite in Organic Beekeeping: Is it Possible?

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INTRODUCTION

Varroa mite (*Varroa destructor*) is an ectoparasite of the European honey bee (*Apis mellifera*) (Figure 1) and presents one of the most difficult challenges to organic as well as conventional beekeeping. Integrated management of varroa mites in organic systems must be based on the selection of resistant honey bee stock, regular mite monitoring and action thresholds, and use of alternative therapeutic practices when mite populations reach those thresholds. However, this may still be insufficient for organic certification.

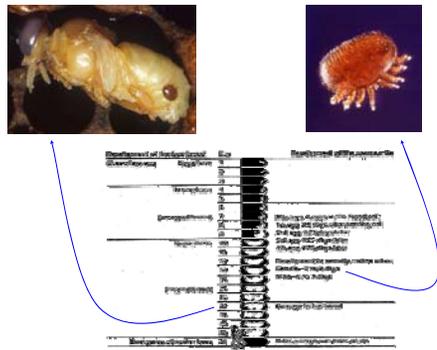


Figure 1. Varroa mite (*Varroa destructor*) life cycle on honey bees (*Apis mellifera*). Life cycle diagram from http://creatures.ifas.ufl.edu/misc/bees/varroa_mite.htm. Photographs by Scott Bauer, USDA.

STOCK EVALUATION

Selecting and breeding honey bees for resistance to varroa mite involves testing for hygienic behavior (Spivak and Reuter 2005). This can be done by freeze-killing an area of capped brood with liquid N and measuring the rate at which the worker bees clean out the dead brood (Figure 2). Although differences have been found among hives at the Berea College apiary, no significant differences among different stock have been found (Figure 3).



Figure 2. Application of liquid N for hygiene testing in honey bees in the Berea College apiary.

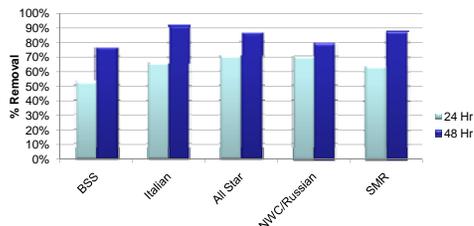


Figure 3. Percent removal of freeze-killed brood following application of liquid N (following method described in Spivak and Reuter 2005). BSS = Berea survivor stock; NWC = New World Carniolan.

MONITORING & THERAPEUTIC TREATMENT

Several methods are used to monitor varroa mite infestations in hives. The most common is the use of a sticky board placed below a screened bottom board (Figure 4). Mites that drop from the bees stick to the trap and can be counted. Thresholds for action are not well researched but 50 or more mites per day in the late summer is basis for concern. Powdered sugar was initially evaluated at Berea College for mite suppression by comparing it to a thymol-based product (Figure 5). Although it appeared to work well, the results were not replicated in 2007 (Figure 6). Further evaluation will be necessary.

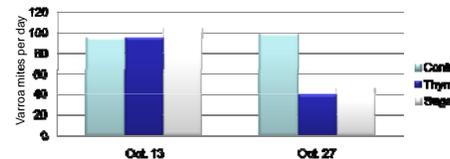


Figure 5. Varroa mites collected per day on sticky traps in hives treated with thymol and powdered sugar, Oct. 2004. Pre-treatment measured on Oct. 13; Post-treatment, Oct. 27. N = 3 for each treatment.

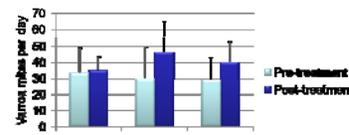


Figure 6. Comparison of powdered sugar and thymol in Oct. 2007. No treatment effects found. N = 4 for each treatment.



Figure 4. Sticky boards used for monitoring varroa mite populations. They are positioned below a screened bottom board for several days. There are two varroa mites in the white area above. Can you find them?

OTHER CONSIDERATIONS

Although management of varroa mites without synthetic chemical miticides is probably the single greatest obstacle to organic beekeeping today, it may be insufficient for obtaining organic certification. Because honey bees may forage more than 2 miles from the apiary, few beekeepers can account for activities in the foraging range for purposes of certification (Figure 7). According to the National Organic Standards Board Apiculture Task Force (2001), organic apiculture plans must describe the forage zone in detail. Therefore, activities outside of the beekeepers control may dictate whether a particular apiary can be certified as "USDA Organic."



Figure 7. Location of the Berea College apiary in a landscape of agricultural, suburban, urban, and industrial uses. Outlined areas are part of College Farm. Can this organically managed apiary be certified?

REFERENCES CITED

Spivak, M., and G. Reuter. 2005. A sustainable approach to controlling honey bee diseases and varroa mites. Sustainable Agriculture Research and Education Fact Sheet. <http://www.sare.org/publications/factsheet/pdf/03AG12005.pdf>
National Organics Standards Board Apiculture Task Force Report. 2001. Draft Organic Apiculture Standards. <http://www.beesource.com/pov/organic/nosb.htm>