Slaying the "Destructor": The Effectiveness of Alternative Varroa Mite Treatments

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In 1987, the Varroa destructor mite, an apivorous parasite, was introduced to the Western honeybee, Apis mellifera. Mite infestations are detrimental to honeybee hives, and if a colony containing Varroa is left untreated it will collapse. There are multiple known treatments for these mites, although Varroa are becoming increasingly resistant to many of these, making the battle against Varroa destructor progressively harder. Therefore, it is necessary that an effective treatment be researched. In this study, two essential oil-based treatments of which Varroa destructor has not built up resistance to, were studied; a traditional treatment, Api-life VAR, and a relatively new application style of Oxalic Acid (OA) called Vaporization. The purpose was to discover which treatment is most effective at increasing mite mortality rates. Five hives were used for testing: one control hive (no treatment), two Api-life VAR hives, one hive receiving 1g of OA, and one receiving 2g of OA. After statistically analyzing the experiment's results using a two proportion Z-test to compare all the hives to each other, all the treatment hives produced a notably higher mortality rate than the control ($p<0.0001$). When comparing OA Vaporization to Api-life VAR, Api-life caused a significantly higher mortality rate ($p<0.0001$). Also, OA at a 1g dosage was found to have a considerably lower mortality rate than OA at 2g ($p<0.0001$). By understanding and using this information, beekeepers will be better prepared to use these treatments to protect their hives and their honeybees from overwhelming mite infestations, viruses, and potential collapse.

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