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The Effect of Essential Oils on the Population of "Varroa destructor" Mites

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This study investigates the impact of essential oils from thyme (Thymus vulgaris L.), clove (Syzygium aromaticum L.), and peppermint (Mentha piperita L.) on the population dynamics of Varroa destructor, a major ectoparasite of honeybees (Apis mellifera L.). The experiment was conducted in three stages: two laboratory experiments aimed at determining the concentrations and toxicity of essential oils to both bees and mites, followed by a field experiment to assess the effects of these oils on mite infestation in beehives. Mites and bees were collected using the carbon dioxide method and subsequently placed in Petri dishes treated with essential oils at various concentrations. In the field phase, essential oil-impregnated wooden sticks were placed in the hives to assess their long-term impact on mite populations.

The results indicated that the highest concentration of essential oils (2 mg/ml) was the most effective in reducing Varroa destructor populations, with the greatest mite mortality observed both after 2 and 4 hours of exposure. Essential oils from clove, thyme, and peppermint caused significant mite mortality within the first 24 hours. However, bee mortality remained low, with clove oil resulting in the highest bee mortality. When assessing the treatment effectiveness, thyme essential oil proved to be the most potent, with an average of 12.7 dead mites per hive, compared to 3.7 with peppermint and 31.3 with the control. Additionally, data from the double control oxalic acid treatment showed that thyme oil significantly reduced mite numbers, with an average of 9.3 mites per hive, compared to 26.3 for peppermint and 31.3 for the control.

In conclusion, thyme essential oil demonstrated a 70% effectiveness in controlling Varroa destructor, suggesting its potential as a viable alternative treatment for mite infestations in honeybee colonies.