Extraction of Limonene from Citrus Peels and Its Application as an Eco-Friendly Insect Repellent

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Many plants are frequently referred to as natural pesticides because of their insecticidal qualities. The peel of the orange fruit contains large amounts of the compound d-limonene, which makes it a valuable fruit in addition to being edible. A common pesticide in commercial insect repellents is d-limonene. D-limonene, found in orange peel oil, ranges from 90 to 95 percent and acts as a repellent for ants, mosquitoes, and flies. Flies and mosquitoes are kept away from gardens by scattering pieces of orange peel around. An at-home method for avoiding mosquito bites is to rub orange peel on the skin. Important naturally occurring bioactive substances such as ascorbic acid, essential oils, and antioxidants are found in citrus species. Citrus fruit peels, which are frequently thrown away as waste, contain a complex mixture of volatile and non-volatile compounds that are extracted into essential oils. Conventional methods such as steam distillation and solvent extraction, while simple and robust, yield lower percentages. In contrast, novel methods, despite being more effective, tend to be less cost-efficient. This paper specifically focuses on refining the steam distillation process for improved extraction of orange oil, and the experimental setup involved a forced choice test, where ants were given the option to escape from a petri dish via two microscope slides: one treated with the limonene solution and one untreated as a control. The results indicated a significant repellent effect, with a much lower number of ants choosing the treated slide. This demonstrates the potential of limonene as a sustainable alternative to synthetic insect repellents.

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