

Title Using food-safe ingredients to optimize the efficacy of oil-in-water emulsions of essential oils for control of waxy insects

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Abstract

Waxy insects such as mealybugs and scale insects are difficult to kill using contact insecticides because the waxes produced by these insects form a physical barrier preventing chemical penetration. Exported horticultural commodities can be rejected or destroyed if found infested at the destination. Post-harvest dips of soaps and paraffinic oils can be used to control these pests, but these remedies are relatively ineffective and/or phytotoxic in comparison to properly formulated oil-in-water emulsions of terpene oils such as limonene or essential oils such as peppermint oil or spearmint oil. In bioassays with longtailed mealybugs [*Pseudococcus longispinus* (Targioni Tozzetti)] we found that insecticidal soap containing 49.5% potassium salts of fatty acids or Tween® containing 100% polysorbate 80 can be used to create aqueous, plant-safe emulsions of these oils that are effective in controlling waxy insects. When sodium lauryl sulfate and citric acid are included in the formulation, efficacy increases dramatically. It is expected that many types of ornamental plants will tolerate these enhanced mixtures, which penetrate and kill mealybugs within seconds.