

α -Copaene lures: more potent, longer lasting & lower cost than trimedlure plugs for monitoring *Ceratitis capitata*.

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Abstract

A process was developed that converted a plentiful commercially available natural oil to ~90% pure α -copaene. Multiple trials over 4 years using traps baited with either 2-gram trimedlure (TML) plugs replaced at 6-week intervals, 2-grams of TML on a dental wick renewed weekly or 4-gram TML plugs revealed that traps baited with dispensers emitting 90% α -copaene gave superior performance for much longer than 12 weeks. Jackson traps baited with the plastic bulb dispenser, designed to fit in the lure-holding basket for TML plugs, outperformed Jackson traps baited with 2-g of TML on a dental wick renewed weekly (Tunisia, 22-week trial, Costa Rica 20-week trial). Traps baited with the bulb lure of α -copaene outperformed traps baited with new and aged 4-g TML plugs (24-week trial in Hawaii). Traps baited with the basket-fitting α -copaene lures (3 or 4 g a.i.) were not replaced during any trial. α -Copaene basket fitting lures (3 and 4-g a.i.) are less expensive than 4-g TML plugs.

Introduction

An exhaustive survey by USDA of attractants to major US crop pests led to the discovery of derivatives of trimedlure as attractants for male *Ceratatis capitata*. Additional attractants were essential oils (e.g., *Angelica* seed oil) later determined to contain relatively high amounts of α -copaene. The relatively small supply of the high α -copaene content oils in the 1950's led to the development of trimedlure as the preferred attractant for *C. capitata* in lures for area-wide monitoring programs. Repeated use has revealed that of the three principal attractants used in area-wide monitoring of fruit flies (trimedlure, methyl eugenol & cuelure) trimedlure is the weakest.

In 2020 Chemtica Internacional began a screening program to locate a natural attractant for *Ceratatis capitata*¹. This resulted in the discovery of a commercially available natural oil from which high purity α -copaene could be easily obtained. Online shipping databases report more than 500 metric tons of this natural oil entered commerce in 2025 so ongoing supply is not in question.

α -copaene bulb lure



Methods and Materials

Initial trials in Costa Rica and Tunisia utilized Dome traps baited with sachets loaded with 4.2 g of ~90% α -copaene, that were not replaced during a year-long trial. The control treatment was Dome traps baited with 2-g trimedlure (TML) plugs replaced at 6-week intervals².

A 20-week trial in a Hawaiian coffee plantation compared Jackson traps baited with the same sachet of α -copaene vs Jackson traps baited with 2-g of TML on a dental wick renewed weekly or 4-g TML plugs¹. Neither the α -copaene lures or the 4-g TML plugs were replaced during the trial.

A plastic bulb (3 or 4 g a.i.) that fit in the TML lure-holding basket of a Jackson trap, was tested in a 22-week trial in Tunisia (orange orchard), a 20-week trial in Costa Rica (coffee and orange plot) and a 24-week trial in Hawaii (coffee planting). In the Tunisian and Costa Rican trials control traps were baited with 2-g TML on a dental wick renewed weekly. In the Hawaiian trial fresh and field aged 4-g TML plugs were used³.

α -Copaene lures were not replaced in any trial.

Results

In the initial trials in Costa Rica and Tunisia traps with sachets loaded with 4.2 g of ~90% α -copaene, that were not replaced during the year-long trial outperformed traps baited with 2-g TML plugs replaced at 6-weekly intervals².

In the 20-week trial in Hawaii Jackson traps baited with the same sachet of α -copaene outperformed traps baited with 2-g of TML on a dental wick renewed weekly or 4-g TML plugs¹.

Traps baited with the α -copaene emitting plastic bulb that fit in the TML lure-holding basket of a Jackson trap, outperformed traps baited with 2-g of TML on a dental wick renewed weekly in a 22-week trial in Tunisia (orange orchard, Figure 1) and a 20-week trial in Costa Rica (coffee and orange planting, Figure 2). In the 24-week trial in Hawaii (coffee planting)³ traps baited with the basket-fitting α -copaene lures (3 or 4 g a.i.) outperformed traps baited with new or aged 4-g TML plugs. α -Copaene lures were not replaced during any trial.

Conclusions

Traps baited with bulbs emitting α -copaene capture more male Medfly than traps baited with either 2-g TML on a dental wick renewed weekly, 2-g TML plugs or 4-g TML plugs. Better performance of α -copaene baited traps lasts for much longer than 12 weeks. During portions of the year when populations are low α -copaene baited traps are ~4X more effective than TML baited traps

Figure 1 α -Copaene Bulb vs TML Control 22 Weeks Tunisia

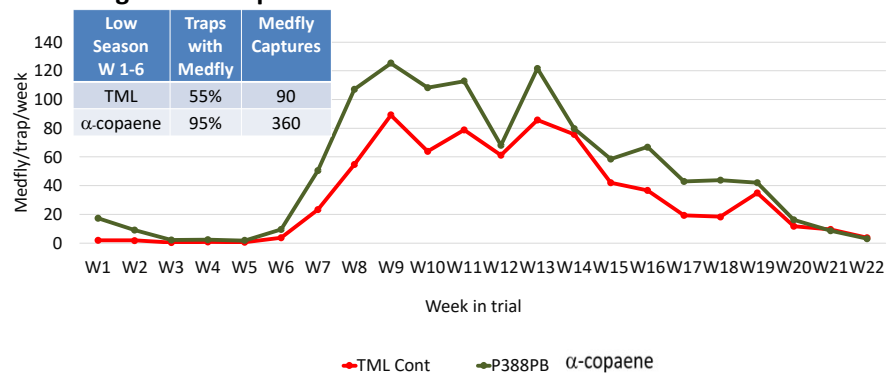
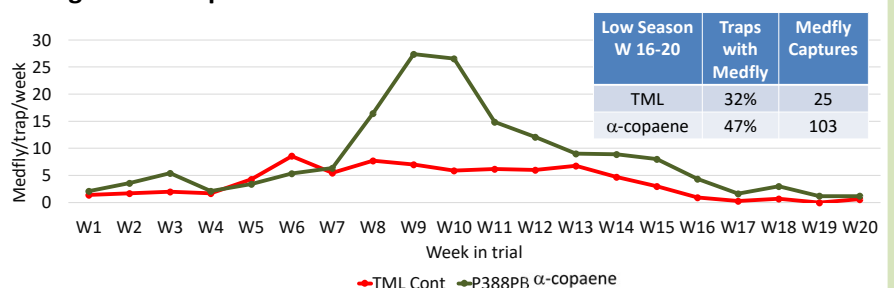


Figure 2 α -Copaene Bulb vs TML Control 20 Weeks Costa Rica



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