IDENTIFICATION OF SEX PHEROMONE COMPONENTS
OF THE PAINTED APPLE MOTH: A TUSSOCK MOTH WITH
A THERMALLY LABILE PHEROMONE COMPONENT

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(Received April 14, 2004; accepted November 15, 2004)

Abstract—The sex pheromone of the painted apple moth, Teia anartoides
(Lymantriidae) was investigated using GC-EAD and GC-MS analysis, derivati-
zation, TLC analysis, and field cage and field trapping bioassays. The major sex
pheromone components were identified as (6Z,9Z)-henicosa-6,9-dien-11-one and
(6Z,9Z)-henicosa-6,9-diene. Other minor components of pheromone gland
eXtracts included (6Z)-9R,10S-epoxyeicos-6-ene, (6Z)-9R,10S-epoxyhenicos-
6-ene, (6Z,9Z)-henicosa-6,9-dien-11-ol, (6Z)-henicos-6-en-11-one, and (6Z,
8E)-henicosa-6,8-dien-11-one, but the roles of these minor components re-
main equivocal. In field cage and field experiments, a blend of all seven iden-
tified components [(6Z,9Z)-henicosa-6,9-dien-11-one (relative amount 100),
(6Z,9Z)-henicosa-6,9-diene (100), (6Z)-9R,10S-epoxyeicos-6-ene (5), (6Z)-
9R,10S-epoxyhenicos-6-ene (10), (6Z,9Z)-henicosa-6,9-dien-11-ol (5), (6Z)-
henicos-6-en-11-one (1), and (6Z,8E)-henicosa-6,8-dien-11-one (25)] was as
attractive to males as calling females, but tests with blends of the major com-
ponent(s) with subsets of the minor components did not produce consistent
results that unequivocally showed the various minor components to be critical

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components of the active blend. (6Z,9Z)-henicosa-6,9-dien-11-one is thermally labile and rearranges to (6Z,8E)-henicosa-6,8-dien-11-one and other products at ambient temperature, rendering the synthetic pheromone lure inactive after two days of field exposure.


INTRODUCTION

The painted apple moth, *Teia anartoides* (Walker) is a native Australian moth that was accidentally introduced into New Zealand in 1999. It was first discovered in Glendene, west Auckland, and then spread to neighboring suburbs. This insect is a minor pest in Australia but has potential for significant economic and ecological damage to New Zealand horticulture and forestry because of its wide host range. Female painted apple moths are wingless, and the ballooning larvae are the main mechanism of dispersal in this species. On discovery of this pest, the New Zealand Ministry of Agriculture and Forestry initiated an eradication program using live female moths to monitor the distribution and dispersal of the moth.

The tussock moths (family Lymantriidae) are represented in Australia by about 70 species in 16 genera and are mainly distributed in the north and east of the continent (Common, 1990). In the Lymantriidae, sex pheromones have been identified for nearly 20 species belonging to six genera (El-Sayed, 2004), representing less than 1% of the 2,500 species in this family. The identified sex pheromones are polyene-derived compounds, mostly epoxides, ketones, and diene or triene hydrocarbons, which are different from the alkenyl acetates, alcohols, and aldehydes found more commonly in other lepidopteran families (El-Sayed, 2004). No sex pheromones have been identified previously for any Australian lymantriids, despite the abundance of this group in the Australian fauna.

The objectives of the work described here were to identify and characterize the sex pheromone of the painted apple moth, *T. anartoides*, and to develop a synthetic pheromone blend to monitor its spread in New Zealand.

METHODS AND MATERIALS

Insects. A colony was established at Mt. Albert Research Center (Auckland) using insects collected from west Auckland. After pupation, the sexes were separated and maintained at 25°C under a 16:8 L:D photoperiod. Pupae required for the field cage experiments were transported to Lincoln Research Center in 9 × 2.5 cm Petri dishes and maintained in quarantine. Pupae and adults were held