

# FIELD BIOASSAY OF THE SEX PHEROMONE (AND SOME ANALOGS) OF THE CITRUS MEALYBUG, *PLANOCOCCUS CITRI*

E. DUNKELBLUM\*, Y. BEN-DOV\*\*, Z. GOLDSCHMIDT\*\*\*, J.L. WOLK\*\*\* and LILA SOMEKH\*\*\*

\*Dept. of Pesticide and Natural Products Chemistry and \*\*Dept. of Entomology, ARO, The Volcani Center, Bet Dagan; and \*\*\*Dept. of Chemistry, Bar-Ilan University, Ramat Gan, Israel

The sex pheromone of the citrus mealybug, *Planococcus citri* (Risso) (Coccoidea: Pseudococcidae), was identified in 1981 as (+)-*cis*-(1R)-3-isopropeny1-2,2-dimethylcyclobutanemethanol acetate. Later a simple synthesis of the pheromone was developed at the Department of Chemistry, Bar-Ilan University, and the synthetic material was shown to be highly attractive to males in the field. In order to probe the structure-activity relationships, eight analogs of the pheromone were synthesized and field bioassayed. Most of them were significantly less active than the pheromone. The alcohol (+)-*cis*-(1R)-3-isopropeny1-2,2-dimethylcyclobutaneethanol was ineffective as sex attractant. Since this compound is a side product in the pheromone synthesis, its influence on the activity of the pheromone was assessed in mixtures with the latter. Addition of 2-20% of the alcohol to the pheromone indicated that the compound is neither a synergist nor an inhibitor. The most active analog was (+)-*cis*-(1R)-3-isopropeny1-2,2-dimethylcyclobutaneethanol acetate. At a concentration of 2000  $\mu\text{g}$ /dispenser, its activity almost equaled that of the pheromone at a concentration of 500  $\mu\text{g}$ .

It is concluded that all changes in the shape and electron distribution of the pheromone molecule resulted in a significant reduction of its biological activity. The most active analog retained all functional groups having the same polarity as the pheromone, with only a slight change in the molecular shape.