SEX PHEROMONE OF TOMATO PEST \textit{Scrobipalpuloides absoluta} (LEPIDOPTERA: GELECHIIDAE)

ALEŠ SVATOŠ,1,3 ATHULA B. ATTYGALLE,1,*
GULAB N. JHAM,1,4 ROSA T. S. FRIGHETTO,1,5
EVALDO F. VILELA,2 DAVID ŠAMAN,3
and JERROLD MEINWALD1

1Baker Laboratory, Department of Chemistry
Cornell University
Ithaca, N.Y. 14853

2Department of Animal Biology
Universidade Federal de Viçosa
Viçosa, MG 36571, Brazil

3Institute of Organic Chemistry and Biochemistry
Academy of Sciences of the Czech Republic
Flemingovo nám. 2, 166 10 Prague 6, Czech Republic

(Received September 11, 1995; accepted December 4, 1995)

Abstract—The sex attractant of \textit{Scrobipalpuloides absoluta} females is a 90:10 mixture of \((3E,8Z,11Z)-3,8,11\text{-tetradecatrien-1-yl acetate and } (3E,8Z)-3,8\text{-tetradecadien-1-yl acetate. Tetradecadienyl acetates bearing } 8Z,11Z; 3E,8Z;
\text{and } 3E,11Z \text{ double bonds were synthesized by stereospecific procedures; the mass spectral and gas chromatographic properties of the } 3E,8Z \text{ isomer were found to be congruent with those of the tetradecadienyl acetate from } S.\text{ absoluta. In wind tunnel bioassays, a } 10:1 \text{ mixture of synthetic } (3E,8Z,11Z)-3,8,11\text{-tetradecatrien-1-yl acetate and } (3E,8Z)-3,8\text{-tetradecadien-1-yl acetate was highly attractive to } S.\text{ absoluta males. Interestingly, the presence of } (8Z,11Z)-8,11\text{-tetradecadien-1-yl acetate (10\%)} \text{ inhibited the response to } (3E,8Z,11Z)-3,8,11\text{-tetradecatrien-1-yl acetate completely.}

Key Words—Lepidoptera, Gelechiidae, \textit{Scrobipalpuloides absoluta}, tomato, pest, pheromone.

*To whom correspondence should be addressed.

4Permanent address: Department of Chemistry, Universidade Federal de Viçosa, Viçosa, MG 36571, Brazil.

5Permanent address: Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), Rodovia SP 340, Caixa Postal 69, Jaguariuna SP, Brazil.

787
INTRODUCTION

We found recently that the female sex pheromone of *Scrobipalpuloides absoluta* (Lepidoptera: Gelechiidae), a devastating tomato pest in South America, consists of two components. The major component, which represents about 90% of the volatile material found in the sex gland of calling females, was identified as (3E,8Z,11Z)-3,8,11-tetradecatrien-1-yl acetate (1, Figure 1) (Attygalle et al., 1995; 1996). The minor constituent (10%), was characterized partially by GC-MS as a tetradecadienyl acetate. However, the minute amount of natural material available precluded a full structural assignment by conventional methods.

In order to identify the diene acetate, we decided to synthesize the three possible dienes (2-4, Figure 1) with double-bond positions and configurations corresponding to those of the major pheromone component, (3E,8Z,11Z)-3,8,11-tetradecatrien-1-yl acetate, and to compare the properties of the synthetic samples with those of the natural material. Results of these experiments, and subsequent bioassays, established the pheromone as a mixture of (3E,8Z,11Z)-3,8,11-tetradecatrien-1-yl acetate (1) and (3E,8Z)-3,8-tetradecadien-1-yl acetate (3).

METHODS AND MATERIALS

NMR spectra were recorded on a Unity-200 (1H, 200 MHz, Varian), a Unity-400 (1H NMR, 400 MHz; 13C NMR, 100.6 MHz, Varian), and a Unity-