

# Female sex pheromone components of *Helicoverpa gelotopoeon*: first heliothine pheromone without (Z)-11-hexadecenal

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## Abstract

*Helicoverpa gelotopoeon* Dyar is a very important pest of economic importance on cotton in Argentina. Analysis of female pheromone gland extracts prepared from 1- to 2-day-old virgin female moths demonstrated the presence of a 1 : 0.84 blend of hexadecenal (16:Ald) and (Z)-9-hexadecenal (Z9-16:Ald), with trace quantities of tetradecenal in some samples, 2.4% of 16:Ald. The average quantity of Z9-16:Ald extracted per female was estimated to be 33 ng, with a range of 18.9–46.4 ng per female when collected 2–3 h into the scotophase. In field trials conducted in both cotton and tomato crops in Santiago del Estero, Argentina 1 : 1 blends of 16:Ald and Z9-16:Ald caught significantly more male *H. gelotopoeon* than Z9-16:Ald alone, although there was no significant difference between blends containing between a 0.2 : 1 and 2 : 1 ratio of 16:Ald and Z9-16:Ald. There was no analytical evidence for the presence of (Z)-11-hexadecenal (Z11-16:Ald) in pheromone gland extracts, although this compound has been identified in all female sex pheromones of Heliothinae to date. In field trials, the addition of Z11-16:Ald at the 1% level to either a 1 : 1 blend of 16:Ald and Z9-16:Ald or Z9-16:Ald alone significantly reduced the catch of male *H. gelotopoeon*. Sympatric *Heliothis virescens* were not caught in any of the blends tested for *H. gelotopoeon*, but were caught in low numbers in traps baited with a 4 : 100 blend of (Z)-9-tetradecenal and (Z)-11-hexadecenal.

## Introduction

*Helicoverpa gelotopoeon* Dyar (Lepidoptera, Noctuidae) is an endemic species in Argentina, Chile, and Uruguay (Mitter et al., 1993). It has been recorded on maize, alfalfa, tomato, line, beans, soybean, sunflower, and cotton crops (Velasco et al., 1969; Angulo & Weigert, 1975; Lobos et al., 1997), and occurs on the weed *Physalis angulata* L. in some regions of Argentina (Lavalle & Arias, 1984). *Helicoverpa gelotopoeon* and *Heliothis virescens* (F.) form a bollworm complex in the cotton growing area of Argentina; however, *H. gelotopoeon* is the principal member of the complex (Velasco et al., 1978; Lobos et al., 1997), and two or three applications of insecticides are typically applied per season

to achieve control (Barral & Zago, 1983; Lobos et al., 1997).

Up to the present time, two criteria have been used to decide whether the control of cotton bollworm pests is economically justified: density of larvae, and larval damage levels (Barral & Zago, 1983), although egg populations are used as an indicator of the presence of the pest. Similarly, adult populations of *H. gelotopoeon* and other lepidopterous pest species are monitored in some cotton zones, with light traps at the experimental stations of INTA Saenz-INTA Reconquista. However, in order to make more effective management decisions about *H. gelotopoeon* (Tingle & Mitchell, 1981) there is a need for a sensitive and species-specific monitoring system. This paper reports our work in identifying and optimising the pheromone of *H. gelotopoeon* in an effort to develop a cost-effective means

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