

(Z, E)-9, 12-Tetradecadienyl Acetate (ZETA) disrupts mating of *Ephestia cautella*

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Abstract

The tropical warehouse moth *Ephestia cautella* is a major pest of stored products in Sri Lanka, and difficult to control using currently-available insecticides. The sex pheromone (Z, E)-9, 12- tetradecadienyl acetate (ZETA) emitted by the females attracts males of this species. Hence it can potentially be used in the management programs but the limited information on pheromone concentration and air movement impede the potential use of this pheromone in pest management programs. This experiment was conducted to determine the effects of ZETA concentration and air movement on the mating disruption of *E. cautella*. The male and female moths of *E. cautella* were introduced into a cubicle in which ZETA was placed at different concentrations. Later, the female moths were dissected to determine the presence/absence of spermatophore. All the pheromone concentrations tested recorded lower mating percentages than the hexane control. Mating disruption varied with the pheromone concentration and the availability of air flow. This study reveals that ZETA can be used to disrupt mating in *E. cautella*.

Keywords: *Ephestia cautella*, Mating disruption, Spermatophore, Concentration, ZETA

1. Introduction

The Tropical warehouse moth *Ephestia cautella* (Lepidoptera: Pyralidae) is a major pest of stored products (Hill, 1990) and reduce the quality of food commodities (Boshra, 2007). The current control measures by synthetic chemicals or extreme temperature exposure accompany disadvantages/limitations. Therefore, the grain-handling personnel seek for alternatives. The female moth releases the sex pheromone (Z, E)-9, 12-tetradecadienyl acetate (ZETA) to attract the males for mating (Kuwahara *et al.*, 1971). This is a promising pest management tool through mating disruption (MD) (Trematerra *et al.*, 2011) but certain information on the effective concentration and air movement on MD of *E. cautella* is not yet available. The objectives of this study were to evaluate the effect of pheromone (ZETA) concentration and the presence/absence of air movement on MD of *E. cautella*.

2. Materials and methods

Ephestia cautella adults were reared under ambient environmental conditions (30±2°C and 60±5% relative humidity), sexed at the pupal stage, and the adults emerged were used in the experiments. A cubicle (2.5 m×2.5 m× 2.5 m) having two opposite sides and the top covered by polythene, and the remaining two opposite sides covered by insect proof net was used to test the mating disruption. Each of the four pheromone concentrations prepared using commercially-available ZETA, diluted in hexane, was placed at the middle of the cubicle separately. Equal number of male and female adults of *E. cautella* was released into the cubicle at each concentration. The insects were recaptured after 24 hours and the female moths dissected to determine the mating status (Ryne *et al.*, 2001). The control experiments were conducted by using hexane solution. The highest mating disruption with respect to the pheromone concentration or the air flow was determined.

3. Results

Tab. 1 Mating disruption of *Ephestia cautella* at different ZETA concentrations (absence of air flow).

ZETA concentration (mg)	Mating disruption (%)*
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0.05	25b
0.1	25b
1.0	37.5b
4.5	50a

*mating disruption (%) followed by the same letter are not significantly different at $p=0.05$ according to contrast option in binary logistic regression.

Tab. 2 Mating disruption of *Ephestia cautella* at different ZETA concentrations (presence of air flow).

Pheromone concentration (mg)	Mating disruption (%)*
0.05	37.5c
0.1	37.5c
1.0	62.5b
4.5	75a

*mating disruption (%) followed by the same letter are not significantly different at $p=0.05$ according to contrast option in binary logistic regression.

4. Discussion

This study reveals that MD of *E. cautella* increases with the increase in ZETA concentration and the presence of air flow. The higher MD with the presence of air flow compared to that without the air flow may be due to the increase in the dispersion of ZETA through the air.

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Suitability of Poaceae seeds for *Plodia interpunctella* development

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Abstract

One of the most important pests of stored grains is *Plodia interpunctella* (Hübner), whose larvae feed primarily on germinal part of the kernels, causing a reduction of seed germination and seed viability. This is detrimental for seeds of high category. However, seeds of different species within the same taxonomic family have different morphology (thickness of seed-coat, presence or absence of palea, palea loose or firmly attached to the seed etc.), which affects the susceptibility of seeds to *P. interpunctella* attack. The hypothesis was that seed hardness and the absence of palea could also significantly influence the life history of this pest. We assessed the suitability of different seeds from family Poaceae (maize, wheat, barley, oats, ray, forage sorghum (variety), forage sorghum (hybrid), Sudan grass and millet) for *P. interpunctella* development and seeds susceptibility to pest attack (expressed in Susceptibility index –SI). The following parameters were monitored: larval mortality, adult emergence, mean developmental duration (from egg to adult) and female fecundity. Observations were carried out weekly, for 49 days. Data were statistically analyzed using Duncan's multiple range Test. The highest larval mortality, the lowest number of emerged moths and the lowest fecundity were recorded on millet, Sudan grass