

THE ECDYSONE AGONIST METHOXYFENOZIDE AFFECT THE ADULT REPRODUCTIVE PROCESSES AND LONGEVITY OF BEET ARMYWORM

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INTRODUCTION

The long-term effects of methoxyfenozide, an ecdysone agonist, on the longevity and reproductive processes of beet armyworm, *Spodoptera exigua* Hübner (Lepidoptera: Noctuidae), adults were assessed following exposure by ingestion. The carbohydrate, protein, and lipid content in the eggs were determined as representatives of the biochemical effects of methoxyfenozide associated with the disruption of reproductive processes



Damage of *S. exigua* on tomato

MATERIALS AND METHODS

Effects on fecundity and longevity:

- The adults were offered continuously a 15% honey solution (75 or 150 mg of Intrepid 2F).
- Counting the number of eggs laid, at 48, 72, and 96 h.

Effects on the biochemical composition of eggs:

- Eggs laid in the fecundity experiment were subjected to nutrient composition. The carbohydrate, lipid, and proteins content was determined according to the method of Soltani (1990), Goldsworthy et al. (1972), and Le Bras and Echaubard (1977), respectively.

RESULTS

Effects on fecundity. The number of eggs laid per female had decreased compared to controls at 72 h by 71 and 79% for concentrations of 75 and 150 mg AI/liter, respectively, and at 96 h, it was decreased by 62% under both treatment concentrations compared with the controls (Table 1).

Effects on longevity. Methoxyfenozide had a significant effect on the longevity of *S. exigua* males but not that of females. In males, longevity was reduced by 1.11 and 1.54 d compared with females under treatments of 75 and 150 mg AI/liter, respectively.

Biochemical composition of eggs. Levels of carbohydrate increased significantly at 72 h and at 96 h after treatment in both concentrations tested (Fig. 1a). The levels of protein decreased significantly at 72 h and at 96 h after treatment (Fig. 1b). Finally, levels of lipid only decreased significantly at 48 and 96 h after treatment in both concentrations tested (Fig. 1c).

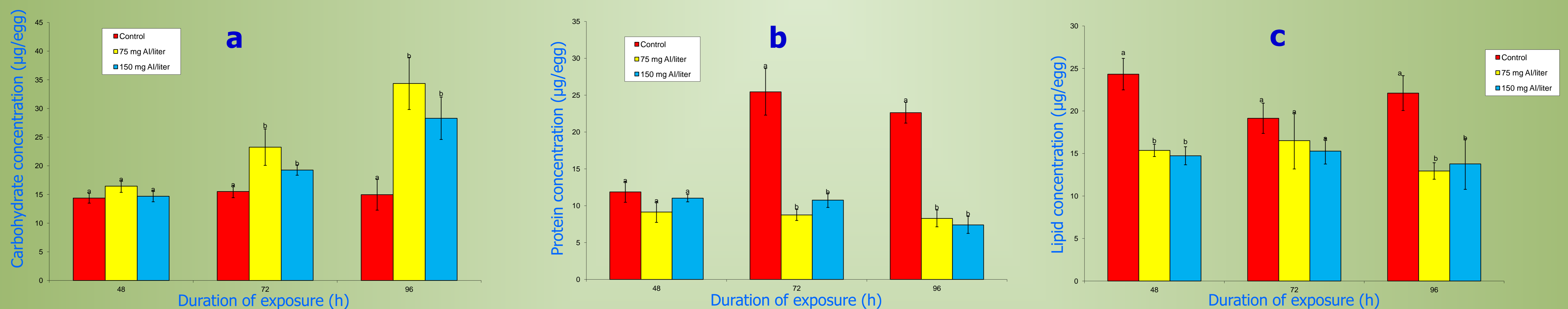


Fig. 1. Contents ($\mu\text{g}/\text{egg} \pm \text{SE}$) of carbohydrate (A), protein (B), and lipid (C) in the eggs of *S. exigua* adults treated with methoxyfenozide. Bars in each group labeled with the same letter are not significantly different from each other.

Table 1. Effects of methoxyfenozide on the fecundity of *S. exigua* adults

Concn (mg (AI)/liter)	Duration of exposure (h)		
	48	72	96
0 (Control)	173 \pm 27a	249 \pm 24a	121 \pm 12a
75	132 \pm 22a	52 \pm 6b	46 \pm 19b
150	150 \pm 30a	73 \pm 10b	46 \pm 7b

Within the same column, values followed by the same letter are not significantly ($P < 0.05$).

CONCLUSIONS

Methoxyfenozide interferes with the biochemical processes associated with vitellogenesis and oogenesis in *S. exigua* and reduces the amounts of some compounds essential for larvae hatching from eggs (proteins, carbohydrates, and lipids).

This effect could explain the reduction in reproductive parameters reported previously in studies using ecdysone agonists in several insect pests.

Future studies should clarify where and how methoxyfenozide acts to cause the observed changes in the concentrations of carbohydrates, proteins, and lipids.

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