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Short communication

Longevity of adult Heliothis armiger (Hübner) (Lepidoptera:Noctuidae)

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Summary

The effects of liveweight, sex, temperature, water and food supply on the longevity of *Heliothis armiger* adults were investigated in the laboratory at Toowoomba, Queensland. Longevity of starved moths was related to liveweight at emergence and temperature (range 15.8° to 33.1°C), according to the equation

$$Y = 18.4097\ X_1 - 0.3298\ X_2 + 9.8037$$

where Y = longevity (days), X_1 = liveweight (g) and X_2 = temperature (°C). Longevity of adults was increased by providing water or honey solutions, but there was no difference between the sexes.

Introduction

Heliothis armiger (Hübner) is a serious agricultural and horticultural pest in Australia (Common 1953), yet there are few data on the relationships of sex and environmental factors to adult longevity. This investigation examines the effects of sex, liveweight at emergence, temperature, water and food supply on the longevity of *H. armiger* adults.

Observations

A population of *H. armiger* was established in the laboratory from larvae collected on sunflowers on the 11 May 1977 at Hodgsonvale, south east Queensland. Larvae were reared individually on artificial diet (Twine 1971) in pomade jars, at 25°C, under a 12:12 h light:dark cycle.

Trial 1. Unfed moths: Relationships of sex, liveweight at emergence and temperature to longevity.

First generation pupae were sexed and placed in 24 × 15 × 18 cm plastic containers. On the morning following eclosion, individual males and females were weighed to 10^{-5}g, and transferred to 5 cm long by 2 cm diameter vials, fitted with gauze windows in the plastic lids. For each sex, a range of moth liveweights suitable for regression analysis was selected and subjected to the following temperature regimes:33.1°, 28.6°, 24.4°, 20.6° and 15.8°C. Moths were held in the vials at 31-33% R. H. in a 12:12 h light:dark cycle, without food or water. Adult survival (days) was recorded, and related to sex, liveweight at emergence and temperature using a stepwise multiple regression procedure (forward selection of variables). Sex was included as a dummy variable (1 if male, 0 if female).

The following relationship was developed over the temperature range 15.8° to 33.1°:

$$Y = 18.4097^{**}X_1 - 0.3298^{**}X_2 + 9.8037 \ (R^{2**}\ 0.75, \text{ as } P < 0.01)$$

where Y = longevity (days), X_1 = liveweight (g) at emergence and X_2 = temperature (°C). The partial F value for sex was not significant, so sex was not included in the equation. The equation shows that increasing liveweight and decreasing temperature (in the range considered) increases the life span of starved adults, and that the longevities of male and female moths are not significantly different.

Trial 2. Relationship of food supply and sex to moth longevity

The effects of four treatments on longevity of males and females were evaluated in two 4 × 4 randomised block experiments, using five moths per plot. Treatments were: no food, water only, 5% v/v honey in water solution and 20% v/v honey in water solution. Replicates were based on moth liveweight at emergence (0.161-0.180 g, 0.181-0.200 g, 0.201-0.220 g, 0.221-0.240 g for males; 0.181-0.200 g, 0.201-0.220 g, 0.221-0.240 g and > 0.240 g for females).

Moths were confined in 20 × 20 × 12 cm plastic containers held at 30°C and 60-80% R.H., in a 12:12 h light:dark cycle. Honey solutions were replaced every second day. Age (days) of each moth at death was recorded, and data were transformed ($\sqrt{x}$) before analysis of variance. After it was shown that the variances for males and females were homogenous, a combined analysis was performed in the two experiments.

Results of each experiment are presented in Table 1. For both males and females, the provision of water significantly ($P < 0.05$) increased longevity, and the provision of 5% honey solutions resulted in a significantly ($P < 0.05$) greater life expectancy than for those moths given water alone. For either sex, there was no significant difference between the longevity of moths fed 5% or 20% honey solutions. Non-significant block differences indicated that liveweight of moths at emergence had little effect on longevity of fed moths, and the combined analysis showed that longevity of males and females did not differ significantly.

Table 1. Effect of food and sex on longevity of adult *H. armiger* at 30°C and 60-80% R. H.

Treatment	Mean longevity males (days)*	Mean longevity females (days)*
No Food	2.163 (4.70)	2.202 (4.90)
Water only	2.799 (8.00)	2.694 (7.35)
5% honey solution	3.488 (13.00)	3.317 (11.35)
20% honey solution	3.146 (10.60)	3.280 (11.00)
P = 0.05	0.482	0.412
P = 0.01	0.701	0.592

* $\sqrt{x}$ transformation was performed on data. Numbers in brackets are true means.

References

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