

DEVELOPMENT AND EFFICIENCY OF *Coccinella undecimpunctata* Reiche  
AS RELATED TO FEEDING ON *Heliothis armigera* Hb.  
(COLEOPTERA : COCCINELLIDAE, LEPIDOPTERA : NOCTUIDAE)

By

N.A. Abouzeid

Department of Economic Entomology and Pesticides, Faculty of Agriculture,  
Cairo University

M.S.I. El-Dakrouy    M.S.T. Abbas    A.H. El-Heneidy

Plant Protection Research Institute, Agricultural Research Center, Ministry of Agriculture

#### SUMMARY

Development and efficiency of *Coccinella undecimpunctata* Reiche were studied when fed on *Heliothis armigera* Hb. larvae at  $27 \pm 1^\circ\text{C}$  and  $65 \pm 5\%$  R.H. The incubation period was 2.8 days, the larva moults 3 times before pupation. The respective durations of the first, second, third and fourth larval instars lasted 3.6, 3.6, 3.2 and 6.8 days. The durations of the total larval period, pupal stage and total developmental period were 17.4, 4.8 and 22.2 days, respectively.

Laboratory studies showed that *C. undecimpunctata* larva failed to feed on *H. armigera* eggs. It consumed 9.6, 33.5, 54.5 and 190.8 newly-hatched *H. armigera* larvae in its first, second, third and fourth larval instars. An average total number of 289.3 newly hatched *H. armigera* larvae were consumed during the total larval period. The respective maximum numbers of preys consumed in one day by the successive four larval instars of *C. undecimpunctata* were 5, 15, 30 and 41 newly hatched larvae. The daily consumption of *C. undecimpunctata* adult was about 200 newly hatched larvae of *H. armigera* and it lives about 3 months.

#### INTRODUCTION

Recently, the american bollworm *Heliothis armigera* Hb. is considered one of the main pests in Egypt. It causes severe damage to many economic crops, mainly cotton bolls, tomato fruits and corn ears.

A survey of the natural enemies of *H. armigera* had been made in Egypt and the lady bird *Coccinella undecimpunctata* Reich was included (Tawfik, 1977; El-Dakrouy *et al* : in progress). This predator is very common in cotton, corn and clover fields fruit trees infested with aphids, the cotton leafworm *Spodoptera littoralis* boisd, and the american bollworm *Heliothis armigera* Hb. Bishara (1934), Willcocks (1937) Kamal (1951), Ibrahim (1955), Azab *et al* (1965) and Afify and Farghaly (1970) considered *C. undecimpunctata* as predator of aphids, eggs and newly hatched larvae of *S. littoralis* but no record of its attack to *H. armigera* was reported in Egypt. Thus, a laboratory study was conducted on the development and efficiency of this predator in relation to its prey to evaluate its role as a controlling agent against this pest. Rate of mortality among the larval stage was also considered.

### MATERIALS AND METHODS

Adults of *C. undecimpunctata* were collected from the field and were confined for oviposition in glass chimney cages; each was provided with a sufficient amount of aphids. Newly laid eggs on plant leaves were transferred to Petri-dishes 5.5 cm. diameter and newly-hatched larvae produced from these eggs were isolated and kept individually in glass tubes 7x2 cm. stoppered with cotton-wool and provided with access number of newly hatched larvae of *H. armigera*. Rearing took place until imaginal stage at  $27 \pm 1^\circ\text{C}$  and  $65 \pm 5\%$  R. H. Moulting and daily amount of preys consumed were determined until pupation. For estimating the adult feeding capacity, newly emerged beetles were kept individually in glass tubes as afore mentioned and were provided with access number of newly hatched larvae of *H. armigera*. Other adults were paired and kept in the oviposition cages for estimating the incubation period.

### RESULTS AND DISCUSSION

#### (a) Durations of the immature stages \* :

Results obtained indicate that the incubation period averaged  $2.8 \pm 0.186$  days (2-3 days). The larva moults 3 times. The average durations of the four larval instars were  $3.6 \pm 0.267$  (2-4),  $3.6 \pm 0.267$  (2-4),  $3.2 \pm 0.133$  (3-4) and  $6.8 \pm 0.291$  (6-9) days, respectively. The total larval period averaged  $17.4 \pm 0.221$  days 16-81 days. The pupal stage lasted  $4.80 \pm 0.200$  days on the average (4-6 days). Consequently, the average total developmental period was  $22.2 \pm 0.249$  days (21- 33 days).

High larval mortality took place in the first (14.8%), second (24.1%) and third larval instars (14.8%). On the other hand, no mortality occurred in the last larval instar.

#### (b) Feeding capacity \* :

Laboratory studies showed that *C. undecimpunctata* larva failed to feed on *H. armigera* eggs during each of its four larval instars. These studies also showed the following:

1.—The larva consumed average numbers of  $9.6 \pm 0.679$ ,  $33.5 \pm 2.188$ ,  $54.5 \pm 2.953$  and  $190.8 \pm 8.100$  newly hatched larvae of *H. armigera* during its four larval instars that lasted 3.6, 3.6, 3.2 and 6.8 days, respectively. An average total number of  $289.3 \pm 6.600$  newly hatched larvae were consumed during the total larval period of 17.4 days. The respective daily average consumption of the four larval instars were  $2.71 \pm 0.120$ ,  $9.16 \pm 0.519$ ,  $17.02 \pm 0.857$  and  $28.24 \pm 1.188$  newly hatched larvae. The daily maximum consumption during each of the larval instars were 5, 15, 27 and 41 newly hatched larvae.

\* Data obtained from 30 individuals in each case.

2.—The predacious larva was unable to overcome the second and third instar larvae *H. armigera*, though some attempts were observed. However, no more than few second instar larvae of the prey could be devoured by the larval predator.

3.—The daily larval consumption of *C. undecimpunctata* adults was about 200 newly hatched larvae of *H. armigera*. This means that *C. undecimpunctata* adult could feed on about 18,000 newly hatched larvae of *H. armigera* during its lifespan which lasts for about three months.

These results might apparently indicate that *C. undecimpunctata* could play an important role as a natural enemies of *H. armigera* in reducing the population of this pest.

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