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LIFE HISTORY AND LONGEVITY OF THE COTTON HARLEQUIN BUG (TECTOCORIS DIOPHTHALMUS (THUNB.))

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SUMMARY

The malvaceous native plant *Pavonia hastata* was a satisfactory host food for the determination of the complete life cycle of the cotton harlequin bug under controlled laboratory conditions.

The mean egg incubation period was 19·2 days in the temperature range of 72–76°F and the relative humidity range 60–70%. Under these conditions the mean periods for the five nymphal instars were progressively greater from 8 days for the first instar to 25 days for the fifth instar.

Adult longevity extended to 144 days for males and 176 days for females, which is in conformity with overwintering in the field in the adult stage.

I. INTRODUCTION

The cotton harlequin bug (*Tectocoris diophthalmus* (Thunb.)) occurs in Central and southern Queensland cotton crops from January until the end of the season. Adults are first noted at or about the commencement of flowering. The insect, in both the adult and nymphal stages, feeds directly upon the green bolls and feeding punctures usually result in internal proliferations of boll wall growth from the point of penetration. Rotting organisms may gain entry to the boll through the puncture wounds, and under humid conditions such bolls may be lost.

Investigations on the bionomics of the insect were reported by Ballard and Holdaway (1926) from work conducted mostly in large field cages in the Callide Valley of Central Queensland. In the present study the life cycle was investigated under controlled laboratory conditions at Toowoomba in southern Queensland.

II. METHODS

The investigations were conducted in a controlled incubator of approximately 10 cu ft capacity, maintaining a temperature of 72–76°F, and in the relative humidity range 60–70%.

Determinations of the incubation period were made by placing freshly laid egg rafts in muslin-covered plastic vials and recording the number of days to the emergence of first instar nymphs.

Nymphal development was studied on cotton leaves, squares and bolls and on branches and fruit forms of *Pavonia hastata.* This malvaceous native plant is common on unoccupied red soil country in the hilly country surrounding Toowoomba. Fresh cotton food material was provided three times per week. The *P. hastata* shoots were held in water and replaced two or three times per week.

Field-collected nymphs enabled studies of some development periods on cotton. The complete egg-to-adult cycle was studied on *P. hastata* with both field-collected and laboratory-bred insects.

The adult longevity study was conducted with *P. hastata* as host food, each bug being identified by an ink number on its scutellum.

III. RESULTS

Data on development periods for the several instars and on adult longevity are given in Table 1.

TABLE 1

Mean Development Periods for the Egg and Nymphal Instars, and Longevity of the Adult

Development Stage	No. of Specimens	Development Period (days)	No. of Specimens	Development Period (days)
Egg	696	$19{\cdot}2 \pm 1{\cdot}9$		
	With cotton as food		With *P. hastata* as food	
First instar	272	$10{\cdot}3 \pm 0{\cdot}8$	38	$8{\cdot}0 \pm 0$
Second instar	..	..	35	$10{\cdot}5 \pm 0{\cdot}5$
Third instar	..	..	32	$11{\cdot}9 \pm 0{\cdot}8$
Fourth instar	13	$14{\cdot}2 \pm 5{\cdot}8$	23	$16{\cdot}4 \pm 1{\cdot}2$
Fifth instar	93	$22{\cdot}0 \pm 2{\cdot}4$	9	$24{\cdot}9 \pm 2{\cdot}7$
Adult longevity (days)	..	..	53	Mean 96 Range 14–176

IV. DISCUSSION

Viable eggs were deposited by laboratory-reared bugs and no differences were noted in the incubation periods required for eggs from field-collected and from laboratory-reared females.

First instar nymphs developed without difficulty on cotton leaves, squares and green bolls, but second instar nymphs almost invariably died when given cotton plant material as food. Third, fourth and fifth instar nymphs usually fed on the green bolls supplied but sometimes fed on leaf midribs and stems.

On *Pavonia hastata* as food, bug development through each stage was satisfactory and mortalities were low, particularly in the first, second and third instars. During the third and fourth instars the bugs showed a marked preference for maturing seed capsules, but feeding also occurred on the green stems. Much of the gregarious habit exhibited by the earlier nymphal stages disappeared during the fourth instar. Fifth instar nymphs were the most active and tended to scatter. These moved freely over the plant material and also on the internal walls of the incubator.

Fifth instar nymphs fed at every opportunity on *T. diophthalmus* eggs. Ballard and Holdaway (1926) observed a similar predatory habit among first instar nymphs when eggs had been laid on unpalatable frosted twigs of standover cotton. Lack of green plant matter in that instance might have contributed to feeding of this kind, but such a reason cannot be supported in the present case. Feeding was observed by holding the egg mass to the light—the fifth instar nymph's stylets were thrust to the full depth of the egg and moved about rapidly, only the "egg shell" remaining after feeding.

Development of the immature stages (Table 1) was slow although comparable with the observations of Ballard and Holdaway (1926).

The adult longevity records varied, possibly due in some instances to the effects of frequent handling. These showed that under laboratory conditions adults may live for almost 6 months. Such an extended adult life indicates that the species may readily overwinter in this stage. This was demonstrated by placing new adults on cotton bushes in the open adjacent to the insectary during May. These remained on the stalks and old bolls to as late as the middle of September, with numerous light frosts occurring in the winter months.

The food preference shown, particularly among late instars and adult bugs, for green bolls as a source of food demonstrates the importance of the species in the potential spread of boll-rotting infections. Under present irrigated cotton production methods the bug cannot be considered directly a major pest, because populations are kept to a low level by insecticides applied regularly for control of lepidopterous pests. Under rain-grown conditions, however, where such regular insecticide applications are usually economically unsound, high bug populations occurring simultaneously with high humidity can cause significant crop loss by boll rotting resulting from feeding punctures by the bugs.

REFERENCE

BALLARD, E., and HOLDAWAY, F. G. (1926).—The life history of *Tectocoris lineola*, F., and its connection with internal boll rots in Queensland. *Bull. ent. Res.* 16:329-46.

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