SHORT COMMUNICATIONS

Rearing of the Armyworm, *Leucania separata* WALKER on Haycubes

Ken'ichi KANDA and Atsushi NAITO

Entomology Laboratory, National Grassland
Research Institute, Nishinasuno,
Tochigi 329-27, Japan

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Fresh grass is not available for the food of *Leucania separata* WALKER during the winter season in northern parts of Japan, so that it is indispensable to develop substitute diets for the continuous rearing of this species. SATO (1965) reported use of the wheat bran diet with ascorbic acid for rearing *L. separata*, and SHOREY and HALE (1965) reared the armyworm, *Pseudaletia unipuncta* (HAWORTH) (= *L. unipuncta* (HAWORTH)) on an artificial diet based on beans. The authors have obtained a successful result for the larval development of *L. separata* by making use of the processed haycubes as the diet.

The haycube used here is a sort of preservative diet for cattles, and made by drying orchardgrass at ca. 100°C, cutting to 5-cm long pieces and then pressing in a cylindrical mass of ca. 5 cm in diameter (Fig. 1).

Eggs were layed on the folded paraffin-paper in the glass-container (10-cm diam. × 14-cm depth) by a female which was provided with 10% sucrose solution. The moths were able to mate in the container, nevertheless, a larger cage was usually used for mating.

Young larvae of the 1st to the 3rd instars were

reared in plastic vessels (9-cm diam. × 2-cm depth) covered with lids (Fig. 1). The lid had a 1-cm-wide circular ventilation hole covered with a nylon gauze. For the 4th-instar larvae were used larger plastic boxes (30 × 20 × 9 cm), each of which had a lid with six ventilation holes. A water-moistened absorbent cotton ball was placed in a petridish at the center of each vessel. One hundred of eggs were placed on the surface of an unfastened haycube in a vessel. A haycube and water were added once every 3 days until the beginning of the 4th instar. Then the larvae were transferred to a larger box and the provision was made every 2 days until pupation. Usually the larvae progressed to the 6th instar before the pupation.

The duration of the larval period, the pupal weight, and the adult fecundity when reared on the haycubes were compared with those reared on fresh orchardgrass under the conditions of 23 ± 1°C, 50 ± 10% R. H. and 16-hr photoperiod (Table 1). All inoculated eggs hatched completely. An average of 23 days was required to complete the larval stage on the haycubes, whereas 21 days on the fresh grass. Escape of the 4th-instar larvae from the rearing box was the main cause for the larval death. The mean length of the pupal stage reared on the haycubes was essentially the same as that on the fresh orchardgrass, both being 16 days. The mortality in the pupal stage was nil. The weight of pupae reared on the haycubes was a little larger than that on the fresh orchardgrass. The adult emergence continued usually for 6 days and ca. 80% emerged within the first 3 days. No significant difference was observed between the number of eggs layed by the adults reared on the haycubes and that on the fresh orchardgrass; the average numbers were 1,228 and 1,215 per female respectively. We have successfully reared them

Table 1. REARING OF *Leucania separata* ON HAYCUBES AND FRESH ORCHARDGRASS^a

Diet	Duration of growth period		Weight of pupae (mg)	Number of eggs layed /Female ^d	Yield ^e		
	Larvae ^b (days)	Pupae ^c (days)			4th-instar larvae (%)	Pupae (%)	Adults (%)
Haycubes	23 (21—25)	16 (15—18)	{ ♀ 335 ± 39 ♂ 316 ± 43	1,228 ± 335	90	56	56
Fresh orchard-grass	21 (20—23)	16 (15—18)	{ ♀ 309 ± 38 ♂ 312 ± 33	1,215 ± 335	92	46	46

^a Temp.: 23 ± 1°C; R. H.: 50 ± 10%; photoperiod: 16L-8D.

Number of insects used in each group: ^b 45; ^c 20 males and 20 females; ^d 20 females.

^e Calculated on 100 eggs. All eggs hatched.

¹ Appl. Ent. Zool. **12** (1): 75—76 (1977).

Fig. 1. Cylindrical orchardgrass haycubes (left) and the 3rd-instar larvae of *Leucania separata* on unfastened haycube (right).

through more than 4 generations on the haycubes as well as on the fresh orchardgrass with no addition of any nutrients to the diets until now.

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Bionomics of *Gryon gnidus* NIXON (Hymenoptera : Scelionidae), an Egg Parasite of *Acanthomia tomentosicollis* STÅL (Hemiptera : Coreidae) in Nigeria

R. I. EGWUATU and T. A. TAYLOR

Entomology Unit, Department of Agricultural Biology, University of Ibadan, Ibadan, Nigeria.

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In southern Nigeria, the eggs of *Acanthomia tomentosicollis* STÅL, which is an important pest of *Cajanus cajan* (L.) Druce and some other leguminous crops, are heavily parasitised by *Gryon gnidus* NIXON (TAYLOR and OMONIYI, 1970; TAYLOR, 1975). *G. gnidus* is specific on *A. tomentosicollis* so that it never attacks even *A. horrida*, a closely related species of *A. tomentosicollis*. According to TAYLOR (1975), the parasite completes its life cycle in only 8–14 days when reared at 30°C in 80% R. H.

In this paper, the authors describe laboratory studies on the bionomics of this parasite.

G. gnidus and *A. tomentosicollis* were reared in a cabinet kept at 30°C in 60% R. H. as stock cultures for the experiments. To examine the effect of temperature on the development of *G. gnidus*, the eggs of *A. tomentosicollis* which had already been

parasitised within 24 h from deposition were reared at 22, 25, and 30°C in 60% R. H. Thereafter, we took out 4–5 eggs daily from the chamber and examined the development of the parasite in the host egg. The examination of the development of parasite in the host egg shell was made by dissection after softening of the egg shell by warm 5% KOH solution.

A pair of male and female parasite, just after emergence, was introduced into a glass tube (2.5 cm in diameter × 7.5 cm in length) and kept in a cabinet at 30°C in 60% R.H. for examining the preoviposition period, fecundity and longevity. The parasites were fed on a streak of 10% solution of honey, and fresh host eggs were placed for oviposition. The host eggs were changed daily, and kept at 30°C in 60% R. H. until the parasite ceased to emerge.

To examine the effect of host age on parasitism, host eggs at different age classes (0–24, 24–48, 48–72, 72–96, and 96–120 hours from deposition) were randomly placed in a plastic cage (13.8 cm in length and 6.3 cm in width) and kept in a cabinet at 30°C in 60% R. H. after introduction of 50 newly emerged female parasites. The parasites were removed after 24 h. The eggs at different age classes were separately kept and the parasites which emerged from these eggs were counted.

Table 1 shows the mean durations of the egg, larval, pre-pupal and pupal stages of *G. gnidus* at constant temperatures of 22°, 25°, and 30°C.