LABORATORY REARING OF *CYRTORHINUS LIVIDIPENNIS* (HEMIPTERA : MIRIDAE)

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ABSTRACT : Laboratory rearing of *Cyrtorhinus lividipennis* Reuter in three types of cages was compared – chimney cage, plastic sleeve cage, 30×25×25 cm, and large wooden cage, 105×75×60 cm. *C. lividipennis* cultures in the chimney cage diminished to 79% of the original population in the first generation. The population in the wooden cage showed peaks of 200% increase during a 7 month period. The plastic sleeve cage was the most successful, with population increases ranging from 300% to 500%. The plastic sleeve cage was also the most economical and easiest to handle. *C. lividipennis* adult females oviposited only in mature stems of 4 — 6 week old rice plants.

Introduction

Cyrtorhinus lividipennis Reuter is a predator of the planthopper and leafhopper pests of the rice crop in Southeast Asia and the Pacific (Chiu 1979, Yasumatsu *et al.* 1981, Liquido and Nishida 1985). Its increased importance in recent years as a biological control agent is due to the rise to pest status of the planthopper and leafhopper complexes, following the introduction of high yielding rice varieties (Smith 1972, Nickel 1973). In Sri Lanka, *C. lividipennis* has been reported from the districts of Amparai, Batticaloa and Kilinochchi (Rajendram 1982, 1984), Jaffna (Rajendram 1982, 1984; Rajendram and Devarajah 1990), Kandy and Kurunagala (Rajendram : Unpublished data). Rajendram and Devarajah (1987) also reported the results of laboratory studies on the effectiveness of *C. lividipennis* as a predator of *Nilaparvata lugens* (Stal) in Sri Lanka.

Studies on the biology of *C. lividipennis* have been forthcoming from different countries. Studies on the biology have been carried out on *C. lividipennis* reared in cages 45×50×50 cm in the Philippines by Reyes and Gabriel (1975) in cages 55×55×60 cm in Hawaii by Liquido and Nishida (1985) and in chimney cages in India by Samal and Misra (1977). In Sri Lanka, the biology of *C. lividipennis* was studied on cultures maintained in cages of smaller dimensions, 20×25×25 cm, made of clear plastic and provided

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with cloth sleeve on one side (Rajendram and Devarajah 1986). The present study compares the rearing of *C. lividipennis* in three types of cages – the chimney cage used by Samal and Misra (1987), the plastic sleeve cage used by Rajendram and Devarajah (1986) and a large wooden cage 105×75×60cm.

Materials and Methods

C. lividipennis cultures used in these experiments were collected from rice fields in Paranthan and reared on *N. lugens* cultured in the laboratory at the University of Jaffna on rice variety Bg 90–2. The temperature in the laboratory registered a range of 26 – 32° C and relative humidity 40–92%.

Chimney Cage

The chimney cage (Fig.1) was constructed as follows. A 500 ml plastic bottle was sawed off at a height of 10 cm, and a 4–6 week old rice plant from a garden plot was placed in it and covered with mud to a height of 8 cm. A 10 cm high chimney with a narrow base, 7·5 cm in diameter, fitted snugly into the plastic container. The height of the chimney above the level of the plastic container was 17 cm.

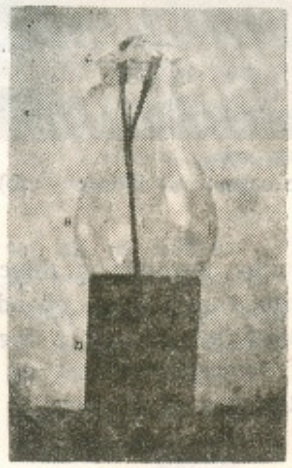

Fig. 1 Chimney cage: (a) Chimney; (b) Plastic container; (c) Cotton gauze.

The culture was set up by introducing a male - female pair of *C. lividipennis* adults and two male - female pairs of *N. lugens* adults into the chimney cage by means of an aspirator. The mouth of the chimney cage was covered with cotton gauze. Sixty-five chimney cages were set up during the course of this study.

Plastic Sleeve Cage

The second type of cage used was a clear plastic cage measuring 20×25×25 cm, covered with fine mesh nylon at the sides, a plastic door in front, and a cloth sleeve fitted on one side (Fig. 2). Six plastic bottles with rice plants were placed in the cage.

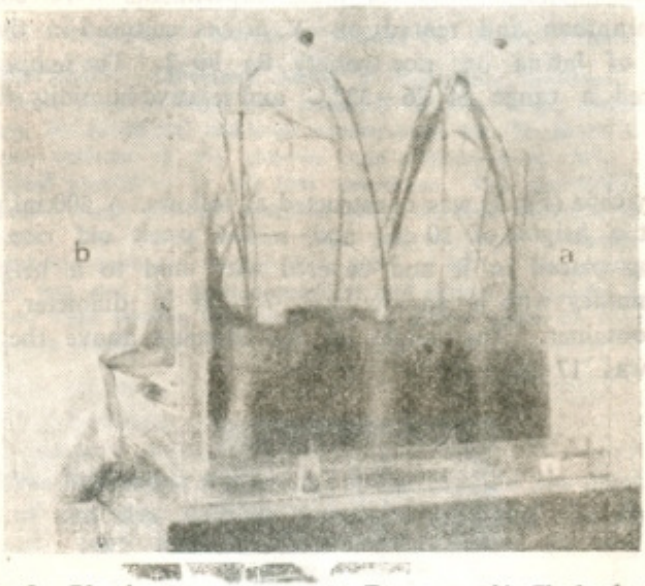

Fig. 2. Plastic sleeve cage : (a) Door; (b) Cloth sleeve.

The culture was set up by introducing three pairs of *C. lividipennis* adults into each cage along with three pairs of adults and 10 nymphs of *N. lugens*. Two adult pairs and 5 nymphs of *N. lugens* were introduced into each cage weekly. A total of 16 cages was set up in this experiment and a population count taken at the end of 30 days.

Large Wooden Cage

The third type of cage was a wooden cage measuring 106×73×60 cm, made of a wooden frame, fitted with glass at the back, fine wire mesh on the top and the sides, and two sliding glass doors in front (Fig. 3). A cloth sleeve with a wooden frame could be fitted below a partially open door for use in transferring cultures. Rice plants grown in 25×15×9 cm wooden boxes were placed in the cage for the host insects. Six plastic containers, with 4 – 6 week old rice plants, were introduced for oviposition by *C. lividipennis*.

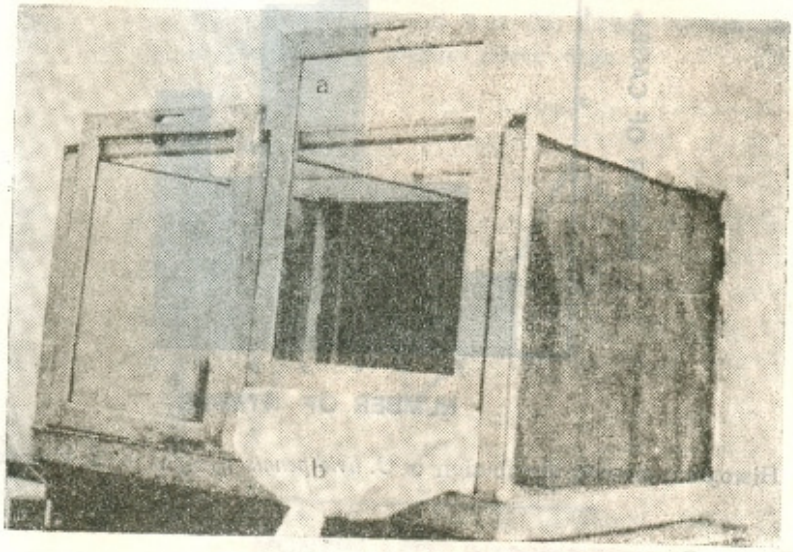

Fig. 3. Wooden cage: (a) Door; (b) Cloth sleeve in position.

The culture was set up as follows. Three male - female pairs of *C. lividipennis* were introduced into the cage, as well as four pairs of *N. lugens* adults and 10 nymphs. Only one large cage was used and the population fluctuation noted during 7 consecutive months.

Results

Chimney Cage

Of a total of 65 chimney cages set up, only 20 had nymphs, indicating an efficiency rate of about 29%. The number of nymphs produced in the cages ranged from 2 to 8, 5 being the median (Fig. 4). Although a total of 65 pairs or 130 individuals were used in setting up the chimney cages, only 103 nymphs hatched out. Hence the reproductive rate in the chimney cages was not sufficient to maintain the population.

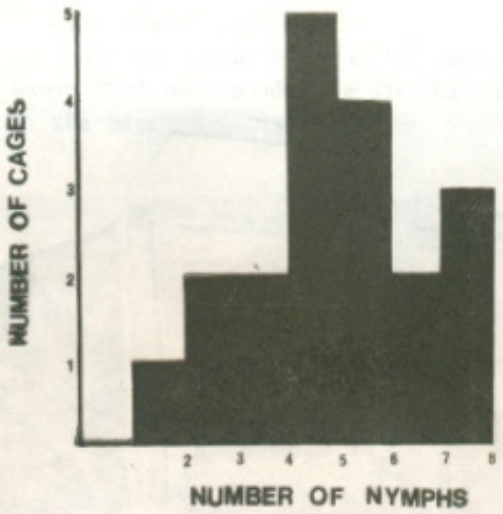

Fig. 4. Histogram showing distribution of *C. lividipennis* nymphs in the chimney cages.

Plastic Sleeve Cage

The number of *C. lividipennis* in the plastic sleeve cage at the end of 30 days ranged from 18 to 37, with a mean of 27·7 (Table 1). This represents a five-fold increase from the original 6 insects (3 males and 3 females) introduced into each cage.

Table 1. Number of *C. lividipennis* nymphs and adults in plastic sleeve cage after 30 days

Cage No.	Number of insects	Mean ± SD
1	37	
2	33	
3	23	
4	22	
5	18	
6	33	27·66±6·96

Large Wooden Cage

The total number of *C. lividipennis* nymphs and adults in the large cage was 20 at the end of the first month, 35 at the end of the second month and 30 at the end of the 7th month (Fig.5). The maximum number of *C. lividipennis* at any time during the 7 month period was 35. The number is approximately the same as in the smaller plastic sleeve cage.

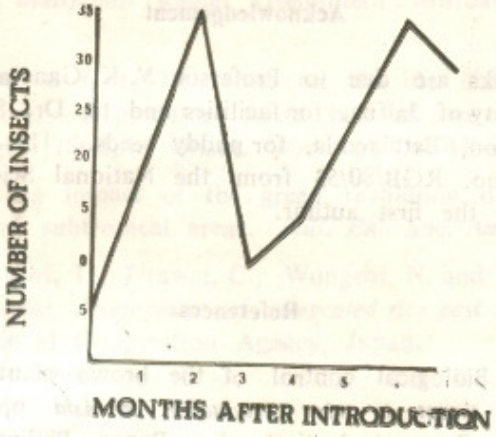

Fig. 5. Population fluctuation of *C.lividipennis* in the large wooden cage during a 7 month period.

Discussion

Of the three types of cages used in this study, the plastic sleeve cage was the most efficient. *C. lividipennis* reared in this cage showed an increase ranging from 300% to 500% at the end of 30 days. The cage was also easy to handle and required relatively few rice plants for the host insect.

C. lividipennis population in the large wooden cage showed an increase of up to 200%. Relatively more host plants were required to maintain the cultures of the host insect than in the plastic sleeve cage.

The chimney cage was the least effective, showing an efficiency rate of only 29%. Insects reared in these cages diminished to 79·2% of the original population in the first generation. Transferring of insects to cages with fresh plants was time consuming.

The age of the rice plants was critical in rearing *C. lividipennis*. Mature rice stems with a minimum girth of about 1·5 cm were required for oviposition by *C. lividipennis*. The rice plants had to be 4 – 6 week old. *C. lividipennis* did not oviposit in young rice seedlings. This observation is in agreement with the findings of Samal and Misra (1977) and Liquido and Nishida (1985) who used 30 day old rice plants for rearing *C. lividipennis*.

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