J. Biol. Control, 17(2): 171-174, 2003

Feeding Potential of Fool's Gold beetle, *Aspidomorpha miliaris* (Fabricius)(Coleoptera: Chrysomelidae) on *Ipomoea carnea* Jacq.

A. G. MURUGESAN and M. GABRIEL PAULRAJ[1]
Manonmaniam Sundaranar University
Sri Paramakalyani Centre for Environmental Sciences
Alwarkurichi 627 412, Tamil Nadu, India
E-mail: agmspkce@rediffmail.com

ABSTRACT: **Laboratory and field studies revealed that *Aspidomorpha miliaris* (Fabricius) larvae and adults are voracious feeders of *Ipomoea carnea* Jacq. leaves. The feeding rate increased as the larvae grew. First, second, third, fourth and fifth instar stages consumed 15, 20, 26, 32 and 47 mg leaf per larva per day, respectively. Female and male beetle consumed 42 and 36 mg leaf per day, respectively. The field study clearly indicated that 100 larvae per plant caused more than 97 per cent leaves damaged within 10 days. The feeding index increased gradually from the first day (45) to the last day (149) of the experiment.**

KEY WORDS: *Aspidomorpha miliaris*, feeding potential, *Ipomoea carnea*, weed

INTRODUCTION

Ipomoea carnea Jacq. is a notorious weed found along the riverbeds, canals, ponds and lakes, and also in the agricultural ecosystems all over India. The weed grows very fast, occupies the water bodies rapidly, reduces the water spreading area of both lentic and lotic systems, and creates a demand for water for agricultural and domestic uses. The ill effects of *I. carnea* are felt by the farmers all over India. Efforts that are taken to destroy this weed by means of physical, mechanical and chemical methods fail due to the high cost and environmental pollution. The tortoise beetles are considered as better candidates for the control of *I. carnea* (Oudhia and Ganguli, 1999; Oudhia, 2000). Among the various species of tortoise beetles in India, fool's gold tortoise beetle, *Aspidomorpha miliaris* is more common on *I. carnea*. The larvae and adults of this beetles feed voraciously on the leaves of *I. carnea* and cause severe damage to the plants.

A study was undertaken to evaluate the feeding potential of *A. miliaris* on *I. carnea* in the laboratory as well as in the field.

MATERIALS AND METHODS

Insects

The egg masses of *A. miliaris* were collected from the leaves of *I. carnea* in Tirunelveli District, Tamil Nadu, India during October, 2001. These egg masses were put into plastic vials (50 ml volume) and allowed to hatch at laboratory conditions (28±0.5°C; 60–65 % RH; 11.0±0.5 h photoperiod). Newly hatched larvae were fed with *I. carnea*

[1] Present Address: Entomology Research Institute, Loyola College, Chennai 600 034, Tamil Nadu

leaves. Freshly emerged larvae of different stages, *viz*., first, second, third, fourth and fifth instars and male and female adult beetles were used for the study.

Food consumption experiment

Five gram of fresh *I. carnea* leaves were taken in a plastic jar (250 ml volume) and 10 first instar larvae were released on these leaves. After 24 hours, the final weight of the leaves was found. From the difference in the initial and final leaf weights, the consumption was calculated. The leaves taken for the experiment may lose some weight due to desiccation. In order to find out the true consumption, a separate set of same amount of leaves devoid of larvae were taken in another container and the weight loss due to desiccation at the room temperature was found out from this (control) set. Each control and experiment was replicated six times and the consumption rate was calculated as follows:

$$\text{Consumption} = \frac{\text{(Initial weight-Final weight) - Weight loss due to desiccation}}{\text{Number of larvae used}}$$

The same procedure was followed to find out the consumption rate of second, third, fourth and fifth larval instars and adult beetles.

Field study

In field trials, equal numbers of first, second, third, fourth and fifth instars of the tortoise beetle larvae were released on *I. carnea* plants that have been isolated from other plants of the same species in order to avoid the entry of beetles from non-experimental plants. A total of 100 larvae were released on the middle part of the *I. carnea* plant. Thus 20 numbers of each larval stage were released on a single plant. Such a test was carried out on three individual plants at a time to maintain three replications. The total number of leaves per plant was counted prior to the release. After the release the number of leaves damaged and percent leaf area consumed by the larvae were recorded in every 24 hours until the completion of the life cycle of all larvae that are released on the plant. From the percent leaf area consumption, feeding index was calculated by the following formula:

Feeding Index = [(0 x number of leaves undamaged) + (1x number of leaves with 25 % area eaten) + (2 x number leaves with 50% area eaten) + (3 x number of leaves with 75% area eaten) + (4 x number of leaves completely eaten)]

Any decrease in the total number of larvae during the study period will be substituted by the same larval stage.

RESULTS AND DISCUSSION

Consumption rate

Table 1 shows the consumption rate of different larval instars and adult beetles of *A. miliaris* on *I. carnea* leaves. The consumption per day increased as the larva grew older. First, second, third, fourth and fifth instar stages consumed 15, 20, 26, 32 and 47mg leaf per larva per day, respectively. The female beetle consumed more leaf (42 mg/female/day) than male (36.0 mg/male/day).

Table 1. Consumption of *A. miliaris* on *I. carnea*

A. miliaris Stage	Consumption of leaves (mg/insect/day)
I instar	15.00±3.76
II instar	20.00±4.65
III instar	26.00±4.86
IV instar	32.00±3.47
V instar	47.00±5.53
Male	36.00±4.76
Female	42.00±5.16

Field studies

The feeding potential of this beetle was

Table 2. Per cent leaf damaged by *A. miliaris* larvae and it's feeding index on *I. carnea* leaves

Days	Per cent leaf damage/plant	Feeding index
1	57.50 ± 4.60	45
2	73.62 ± 6.20	60
3	79.76 ± 5.87	66
4	82.55 ± 5.45	72
5	86.36 ± 7.26	77
6	92.13 ± 6.53	88
7	95.55 ± 4.80	92
8	96.15 ± 5.85	94
9	97.26 ± 6.21	102
10	97.29 ± 6.37	115
11	95.76 ± 4.75	123
12	95.78 ± 4.86	125
13	96.35 ± 3.65	135
14	94.87 ± 3.41	142
15	93.43 ± 5.00	145
16	92.96 ± 4.60	146
17	90.68 ± 3.57	149

clearly seen from the field studies. The percent leaf damage increased slowly and attained the peak level on 11th day. On the first day, 57.5 per cent leaf damage was recorded. After the 11th day, the percent leaf damage slowly decreased. This is because of the completion of the larval period of the later instar stages and the increasing number of plant leaves due to growth. However the feeding index increased gradually from the first day to the last day. On the first day the feeding index was 45 and it was 149 on the 17th day. On the 10th day the feeding index was recorded as 115. Ramesh (1996) reported that *A. miliaris* avoid to feed the agricultural crops like soybean, rice, maize, mung, groundnut, sesamum, castor, sorghum, cotton, etc. Oudhia (2000) has tested forty-seven plant species including agricultural crops, weeds, ornamental, medicinal and fruit plants for the host specificity and preference of *A. miliaris*. He stated that *A. miliaris* feeding was observed on seven out of 47 plant species and heavy feeding was observed on *I. carnea* followed by *I. aquatica*, *Convolvulus arvensis*, *I. palmate* and *I. reniformis*. All these plants belong to the family Convolvulaceae and are problematic weeds.

ACKNOWLEDGEMENTS

We thank Prof. N. Sukumaran, Dean, Fauculty of Sciences, Manonmaniam Sundaranar University, Tirunelveli for his encouragement and support.

REFERENCES

Oudhia, P. 2000. Studies on Host specificity and preference of the Metallic coloured Tortoise beeltle (*Aspidomorpha miliaris* F.). *Ecology and Environment conservation*, **6**(3): 357-359.

Oudhia and Ganguli, J. 1999. Outbreak of tortoise beetle *Aspidomorpha miliaris* F. (Coleoptera: Chrysomelidae) in Chhattisgarh plains. *Insect Environment*, **5**(3): 110-111.

Ramesh, P. 1996. Host specificity of the Tortoise beetle *Aspidomorpha miliaris* and its possible role in the management of *Ipomoea carnea* and *Ipomoea aquatica*. *Indian Journal of Entomology*, **58** (2): 140-142.