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Predatory efficiency and biology of two species of anthocorid bugs feeding on *Megalurothrips distalis* (Karny) (Thysanoptera:Thripidae)

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ABSTRACT: ***Megalurothrips distalis*** **(Karny) is an oligophagous and pollinivorous species invading invariably the flowers of leguminous crops and causes considerable damage to the flowers. Two species of anthocorid bugs, namely, *Carayonocoris indicus* Muraleedharan and *Orius maxidentex* Ghauri were collected from leguminous flowers. The biology and predatory efficiency of the bugs were studied by rearing the bugs on *M. distalis*. The feeding rate of *C. indicus* was 112 individuals and that of *O. maxidentex* 145 thrips per predator during the period of their five larval stages. The intrinsic rate of increase in number of thrips was 0.21, while that of *C. indicus* and *O. maxidentex* were 0.118 and 0.112 respectively. The population doubling time (DT) of the prey and the predator was 3.3, 5.9 and 6.2 days under laboratory conditions. As the two species occur together, the collective efforts of the predators will certainly reduce thrips infestation under field conditions.**

KEY WORDS: Anthocorid bug, *Megalurothrips distalis*, predator, thrips

INTRODUCTION

Megalurothrips distalis (Karny) is an oligophagous species inhabiting invariably the flowers of leguminous crops. Although it is primarily pollinivorous in habit, *M. distalis* pierces the ovary and nectar gland and sucks the exudations, thereby causing considerable damage to the flowers. While studying the biology of this pest from the view point of control, two species of anthocorid bugs, namely, *Carayonocoris indicus* Muraleedharan and *Orius maxidentex* Ghauri were collected from leguminous flowers and they were found feeding on thrips larvae. As such, studies related to the basic biology and predatory efficiency of anthocorids are scarce with the publication of a few papers pertaining to the systematics, population dynamics and feeding efficiency of certain species that predate on gall thrips, flower, leaf litter, pest and phlaeophilous thrips (Viswanathan and Ananthakrishnan, 1974; Muraleedharan and Ananthakrishnan, 1978; Sureshkumar and Ananthakrihnan, 1984; Ananthakrishnan, 1984; Singh *et al.*, 1994; 2002). But their life table statistics and feeding potentials have not been studied so far along with the biology of the prey species. The present paper discusses the comparative biology of both prey and predators mentioned above with the feeding voracity of the latter on the larval forms of *M. distalis*.

MATERIALS AND METHODS

Field collected thrips were reared in small glass chimneys as per standard procedures (Ananthakrishnan, 1984). The larvae were reared in transparent plastic petri-dishes (8.5 cm diam) and provided with fresh pollen and floral parts to study the duration of different developmental stages. To assess the fecundity rate of *M.distalis*, newly emerged adult male and female were released into a glass tube (3cm diam x 1.5 cm ht.) @ one pair each. The two open ends of the tube were covered with a double layer of parafilm membrane and at each end 2 or 3 droplets of water and 5 per cent honey solution

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were sprinkled in between the double layered membrane so as to facilitae thrips to feed on the honey and water. Inside the tube, pollen grains were dusted as food for thrips (Murai and Ishii, 1982). As the thrips species under the suborder Terebrantia lay eggs within the plant tissue, it becomes difficult to count and assess their fecundity. But the present method would enable us to take easy observation due to transparent nature of the glass and membrane. Thrips could oviposit in between the membrane layer which facilitated easy counting of eggs even with the help of small magnifying lens. The membrane could be replaced once in 2 or 3 days and the emerging larvae were reared within the above chamber or in a simple Petri-plate. Six replications were maintained under the lab conditions (22 ±1.5°C with 72 ± 5 per cent R.H. and 29±2°C with 60 ± 5 per cent R.H.) at the Department of Life Sciences, Manipur University during 2003-2005, for studies relating to fecundity and life table parameters of thrips.

The field collected predatory bugs were reared *en masse* in glass chimneys by providing thrips infested blossoms. After attaining final moult, adults were separated and subcultured with a pair each of male and female in a chimney in order to assess their fecundity. The early instars of the bug on hatching from the eggs were individually reared in glass tubes (5 x 2.5 cm) and fed with thrips larvae till their death. To assess the feeding voracity of the bug, 10-60 thrips were provided daily depending on the stage of the bug. All the cultures were maintained under the indoor rearing condition, especially during summer months (22 ±1.5°C with 72 ± 5 percent R.H. and 29±2°C with 60 ± 5 percent R.H.) and there were five replications in each case. To construct life table, different parameters were arrived at by following the expressions given by Southwood (1966) and Varatharajan *et al.* (1998).

RESULTS AND DISCUSSION

Presence of both prey and predators was observed in the flowers of *Cajanus cajan, Dolichos lablab, Phaseolus vulgaris* and *Vicia faba,* from March to August under the climatic conditions of Imphal valley, Manipur. However, in the flowers of *D. lablab*, the anthocorid nymphs outnumbered their adults with a mean density of 4.5 nymphs and 1.2 adults / 20 cm twig during maximum period of abundance, *i.e.*, April. Of the two predators, *C. indicus* was observed to be dominant, followed by *O. maxidentex*. The prey density was more in April and May (mean population = 6 thrips / flower) than in June-August (3 thrips/flower). Appreciable density of thrips during summer months could be attributed to the abundance of flowers as well as the influence of climatic condition on flower thrips in general and *Megalurothrips* in particular (Taylor, 1969).

The biology of *M. distalis* indicated that the egg hatched in 3-4 days. There were two larval instars followed by a prepupal and pupal stage with a developmental duration of 8.5 days for larva and 3 days for pupa; of which the prepupal stage lasted for about 15 hours. The total duration of development of immature stage till adult eclosion was 14 ±1.5 days. The adult longevity varied from 8 to 12 days. The intrinsic rate of increase in number (r_m) was 0.21. The true generation time and population doubling time were 18.5 and 3.3 days, respectively (Table 1). The duration of life cycle of thrips in general varies with temperature, food plant and the type of food like pollen, nectar, foliage, etc.(Ananthakrishnan, 1984). However, in the present context, thrips were reared with pollen and nectar and therefore, insect's performance was found to be better than that of pollen free diet (Chochong *et al.*, 2002).

The biology of the two predatory species such as *C. indicus* and *O. maxidentex* showed similarity in the number of instars, but revealed only subtle variation in terms of duration of growth and development. For instance, the incubation period as well as duration of the five larval instars of *C. indicus* and *O.maxidentex* were found to be 24 and 27 days, respectively. Each nymphal stage lasted 3–5 days. The intrinsic rate of increase in number (r_m) was 0.118 and 0.112 and population doubling time (DT) was 5.9 and 5.58 days for *C. indicus* and *O. maxidentex*, respectively (Table 1). The longevity of the adult bug was 25 days for *C.indicus* and 38 days for *O. maxidentex*. Almost similar trend on the duration of development of the predatory species could be due to the same prey species as food and similar rearing conditions. But earlier studies have shown that different species of bugs exhibited varying periods of growth and development when the microhabitat happened to be either flower or gall and the bug fed on gall or flower thrips (Muraleedharan and Ananthakrishnan, 1978).

The feeding efficiency of the two predators varied significantly. *C. indicus* consumed nearly 112 thrips larvae while *O. maxidentex* devoured 145 thrips during the five stages of nymphal period. Feeding voracity of the adult bug has not been compared here because of inconsistent prey feeding. Under field condition, they move from one flower host to another for ovipositing

Table 1. Predatory efficiency of anthocorid bugs on *M. distalis*

Predatory stage	No. of thrips larvae consumed / predator	
	C. indicus	*O. maxidentex*
1st instar	5.8±0.4	7.3±0.6
2nd instar	12.5±0.8	17.8±0.7
3rd instar	18.0±0.4	29.8±1.2
4th instar	32.0±1.2	42.0±0.7
5th instar	44.5±1.2	48.8±1.8
Total	112.8	145.7

Each value given above is mean ± SD of 5 replications

eggs and at times they also feed on pollen grains. On the contrary, the nymphs of the bug invariably occur on the same flower till they reach adult stage. Therefore, in terms of prey consumption the last two instars of the nymphs were found to be potential biocontrol agents. While comparing the feeding efficiency of different instars, the observation showed a gradual increase in their prey consumption from I instar to V instar, i.e., from 5 thrips/predator / I instar to 49 thrips /predator/ V instar (Table 2).

Although the predatory efficiency of the bug appears to be little poor when we consider each species individually, the combined action of both predators can certainly bring down the pest density to a satisfactory level especially under field condition.

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