

Natural enemy complex of coconut leaf eating caterpillar, *Opisina arenosella* Walker (Lepidoptera: Xylorictidae) in Karnataka

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ABSTRACT: Surveys in coastal and interior Karnataka during 1996 and 1997 revealed the occurrence of four larval, one larval-pupal and thirteen pupal parasitoids and eleven predators of *Opisina arenosella* Walker. Eight hyperparasitoids were also recorded.

KEY WORDS: Hyperparasitoids, *Opisina arenosella*, parasitoid, predator

The coconut leaf eating caterpillar, *Opisina arenosella* Walker is a serious defoliator of coconut, palmyra and wild date palm in India. It often assumes severe proportions in certain tracts. Coconut palms of all ages are infested by *O. arenosella*. Nirula *et al.* (1951) observed that massive damage to crown of leaves affected the thatching quality, in addition to decline in yield in the years following the outbreak of the pest. Perera (1993) estimated the economic injury level at 15.5 per cent defoliation per palm and reported that the pest causing over 40 per cent visually assessed leaf damage can be considered as an outbreak.

Adverse effects of chemical pesticides administered by stem injection, root feeding and spraying have prompted the research workers to select biological control as a long term strategy to manage the insect pests in this perennial crop. Earlier reports revealed that *O. arenosella* supports 40 parasitoids and 22 predators (Pillai and Nair, 1993; Veeresh *et al.*, 1995), and 26 species of spiders (Sathiamma *et al.*, 1987). Among these natural enemies, occurrence and field efficacy of larval parasitoids, *Apanteles taragamae* Viereck, *Goniozus nephantidis* (Muesebeck); pupal parasitoid, *Brachymeria* spp. (Nadarajan and Channabasavanna,

1980; Pushpalatha and Veeresh, 1995); larval predator, *Parena nigrolineata* (Chaudoir) (Gulagannavar, 1987) and egg predator *Cardiastethus affinis* Poppies (Srinivasa, 1996) have been studied in Karnataka. In order to strengthen the profile of natural enemies of *O. arenosella* in Karnataka, a survey was conducted during 1996 and 1997 in coastal and interior areas, where the pest infestation ranged from 50-90 per cent.

MATERIALS AND METHODS

Observations on the occurrence of *O. arenosella* and its natural enemies at monthly interval were made at Kalmady and Malpe (coastal) and Maddur (interior). In coastal area the coconut gardens selected as monocrop were located on riverbanks. Interior areas covered irrigated mixed cropping system involving coffee, guava, sapota, banana, shoeflower, rose, jasmine, etc. At both locations, observations were made on seedlings (< 5 year - old), young palms (5 to 15 years) and tall palms (above 15 years) of coconut.

Observations on *O. arenosella* (egg, larva, pupa) and its natural enemies were recorded in the middle 40-60 per cent leaflets of 20 per cent leaves (80 leaflets per palm) (George *et al.*, 1982). Larvae and pupae of the pest were kept in separate glass jars covered with muslin cloth for the emergence of parasitoids and hyperparasitoids. Predators were separated by brushing out of larval galleries and tested in the laboratory for predatory efficiency. Natural enemies collected were preserved

in 70 per cent alcohol for determining the taxonomic status.

RESULTS AND DISCUSSION

In coastal and interior Karnataka, four larval, one larvo-pupal, thirteen pupal parasitoids and eleven predators were recorded from *O. arenosella*. The natural enemies recorded are listed in Tables 1 and 2.

In coastal Karnataka, three larval parasitoids *viz.*, *Apanteles taragamae*, *Goniozus nephantidis* and *Bracon brevicornis* and ten pupal parasitoids *viz.*, *Antrocephalus hakonensis*, *A. maculipennis*, *Brachymeria nephantidis*, *B. nosatoi*, *B. atteviae*, *B. lasus*, *Trichospilus pupivora*, *Xanthopimpla punctata*, *Eupelmus* sp. and *Anastatoidea brachartoniae* were recorded.

Apanteles taragamae was recorded throughout the year. Among the pupal parasitoids, *A. hakonensis* and *A. maculipennis* were the first to appear in February and continued their parasitising activity up to May. Similarly, *T. pupivora* was recorded from February to November. *Eupelmus* sp. was available in March-April, *A. brachartoniae* in April-May and *B. brevicornis* in April, November and December. *Goniozus nephantidis* was available from May to November and *B. nephantidis*, *B. nosatoi*, *B. atteviae* and *B. lasus* from June to September.

In interior Karnataka, three larval parasitoids, one larvo-pupal and 10 pupal

parasitoids were recorded. *Apanteles taragamae*, *M. hutsoni*, *B. nephantidis*, *B. nosatoi*, *B. atteviae* and *B. lasus* were recorded throughout the year. *Tetrastichus howardi* and *T. pupivora* were available from February to November, *A. hakonensis*, *A. maculipennis* and *A. phaeospilus* in April-May, *Bracon* sp. in April, June and August, *G. nephantidis* in April, August and December and *G. gibbosus* in October - December.

Xanthopimpla punctata, *Eupelmus* sp. and *A. brachartoniae* were recorded only in coastal Karnataka, and *A. phaeospilus*, *M. hutsoni*, *T. howardi* and *G. gibbosus* only in interior Karnataka. Out of the eleven predators recorded, 9 were available in coastal Karnataka and 7 in interior Karnataka. *Cardiastethus exiguus* and *Phytoseiulus* sp. were recorded throughout the year in coastal Karnataka and the former in interior Karnataka. *Parena nigrolineata*, and *Cardiocondyla wroughtoni* were recorded only in coastal

Karnataka. Similarly, *Mallada astur* was recorded only in interior Karnataka.

Eight hyperparasitoids were recorded from the primary parasitoids in the coconut ecosystem. *Apanteles taragamae* was hyperparasitised by maximum seven species while *Goniozus nephantidis* by six. *Aphanogmus manilae*, *Eupelmus albotibialis*, *E. braconidis*, *Pediobius imbreus* and *Tetrastichus howardi* were the hyperparasitoids recorded on both *A. taragamae* and *G. nephantidis* in coastal Karnataka. In interior Karnataka, *A. manilae*, *E. albotibialis* and *E. braconidis* were common on *A. taragamae*, and *G. nephantidis*. *Meteoridea hutsoni* was recorded from *A. taragamae* and *P. imbreus* from *G. nephantidis*. *Bracon* sp. was hyperparasitised by *A. manilae* and *P. imbreus* in interior and *Brachymeria* spp. by *E. albotibialis* in coastal Karnataka, respectively. The only tachinid recorded was hyperparasitised by *Nesolynx dipterae* in interior Karnataka.

Table 1. Hymenopteran parasitoids of *O. arenosella*

| Name | Family | Stage | Period | Region |
|--|------------|-------|---|----------------------|
| <i>Apanteles taragamae</i> Viereck | Braconidae | Larva | Throughout the year | Coastal and Interior |
| <i>Bracon brevicornis</i> Wesmael | Braconidae | Larva | April, November, December | Coastal |
| <i>Bracon</i> sp. | Braconidae | Larva | April, June August | Interior |
| <i>Goniozus</i> (= <i>Parasierola</i>) <i>nephantidis</i> (Muesebeck) | Bethylidae | Larva | November - May April, August, December | Coastal Interior |

| Name | Family | Stage | Period | Region |
|--|---------------|--------------|---|-------------------------|
| <i>Antrocephalus hakonensis</i> (Ashmead) <i>A. maculipennis</i> (Cameron) <i>A. hakonensis</i> (Ashmead) <i>A. maculipennis</i> (Cameron) <i>A. phaeospilus</i> Waterston | Chalcididae | Pupa | February – May April - May | Coastal Interior |
| <i>Brachymeria nephandidis</i> Gahan <i>B. nosatoi</i> Habu <i>B. atteviae</i> Joseph, Narendran & Joy <i>B. lasus</i> (Walker) | Chalcididae | Pupa | September – June Throughout the year | Coastal Interior |
| <i>Trichospilus pupivora</i> Ferriere | Eulophidae | Pupa | November – February | Coastal Interior |
| <i>Xanthopimpla punctata</i> (Fabricius) | Ichneumonidae | Pupa | June - March | Coastal |
| <i>Eupelmus</i> sp. | Eupelmidae | Pupa | March - April | Coastal |
| <i>Anastatoidea brachartoniae</i> Gahan | Eupelmidae | Pupa | April - May | Coastal |
| <i>Meteoridea hutsoni</i> (Nixon) | Braconidae | Larval-pupal | Throughout the year | Interior |
| <i>Tetrastichus howardi</i> (Olliff) | Eulophidae | Pupa | November – February | Interior |
| <i>Goryphus gibbosus</i> Jonathan and Gupta | Ichneumonidae | Pupa | October - December | Interior |

Table 2. Predators of *O. arenosella*

| Name | Taxonomic status | Stage attacked | Period | Region |
|--|--|----------------------------------|--|-------------------------|
| <i>Cardiastethus exiguus</i> Poppius | Heteroptera : Anthocoridae | Egg and first instar larva | Throughout the year | Coastal and Interior |
| <i>Buchananiella sodalis</i> Buchanan-White | Heteroptera : Anthocoridae | Egg and first instar larva | August- September October- November | Coastal Interior |
| <i>Parena nigrolineata</i> (Chaudoir) | Coleoptera : Carabidae | Larva | January – August July-January | Coastal Interior |
| <i>Jauravia</i> sp. | Coleoptera : Coccinellidae | Egg | March – June July- December | Coastal Interior |
| <i>Phytoseiulus</i> sp. | Acarina : Phytoseiidae | Egg | Throughout the year | Coastal |
| <i>Monomorium floricola</i> (Jerdon) | Hymenoptera : Formicidae | Egg, larva and pupa | March-May September- November | Interior |
| <i>Monomorium</i> spp. | Hymenoptera : Formicidae | Egg, larva & pupa | June- September | Coastal |
| <i>Cardiocondyla wroughtoni</i> Forel | Hymenoptera : Formicidae | Egg, larva & pupa | June- September | Coastal |
| <i>Crematogaster</i> sp. | Hymenoptera: Formicidae | Egg, larva & and pupa | June – September November- December | Coastal Interior |
| <i>Tapinoma</i> sp. | Hymenoptera : Dolichoderinae, Formicidae | Egg, larva, pupa | June – September July – September | Coastal Interior |
| <i>Mallada astur</i> (Banks) | Neuroptera: Chrysopidae | Egg and first instar larva | July – December | Interior |

Table 3. Hyperparasitoids recorded on different parasitoids of *O. arenosella*

| Name | Family | Name of primary parasitoid (host) |
|--------------------------------------|---------------|---|
| Coastal region | | |
| <i>Aphanogmus manilae</i> (Ashmead) | Ceraphronidae | <i>Apanteles taragamae</i> Viereck <i>Goniozus nephantidis</i> (Muesebeck) |
| <i>Eupelmus</i> sp. | Eupelmidae | <i>A. taragamae</i> <i>G. nephantidis</i> |
| <i>Eurytoma albotibialis</i> Ashmead | Eurytomidae | <i>A. taragamae</i> <i>G. nephantidis</i> <i>Brachymeria</i> spp. |
| <i>E. braconidis</i> Ferriere | Eurytomidae | <i>A. taragamae</i> <i>G. nephantidis</i> |
| <i>Pediobius imbreus</i> (Walker) | Eulophidae | <i>A. taragamae</i> <i>G. nephantidis</i> |
| <i>Tetrastichus howardi</i> (Olliff) | Eulophidae | <i>A. taragamae</i> <i>G. nephantidis</i> |
| Interior region | | |
| <i>A. manilae</i> (Ashmead) | Ceraphronidae | <i>A. taragamae</i> <i>G. nephantidis</i> <i>Bracon</i> sp. |
| <i>E. albotibialis</i> Ashmead | Eurytomidae | <i>A. taragamae</i> <i>G. nephantidis</i> |
| <i>E. braconidis</i> Ferriere | Eurytomidae | <i>A. taragamae</i> <i>G. nephantidis</i> |
| <i>Meteoridea hutsoni</i> (Nixon) | Braconidae | <i>A. taragamae</i> |
| <i>P. imbreus</i> (Walker) | Eulophidae | <i>Bracon</i> sp. <i>G. nephantidis</i> |
| <i>Nesolynx dipterae</i> Risbec | Eulophidae | Indet. Tachinid |

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