

## Natural enemies of major insect pests of black pepper (*Piper nigrum* L.) in India<sup>1</sup>

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### ABSTRACT

The natural enemies recorded on major insect pests of black pepper (*Piper nigrum* L.) in India including new records are given. The potential of utilising them in biological control programmes are discussed.

Key words: black pepper, *Piper nigrum*, insect pests, natural enemies.

Black pepper (*Piper nigrum* L.) (Piperaceae), a perennial climbing vine from which the spice of commerce is obtained, is of considerable economic importance for the country earning around Rs. 75 crores annually (1991-92) by foreign exchange. However, the productivity of the crop is considerably low mainly due to ravages by pests and diseases. Thirty four species of insects have been recorded on the crop in India among which 'pollu' beetle (*Longitarsus nigripennis* Mots.), top shoot borer (*Cydia hemidoxa* Meyr.), leaf gall thrips (*Liothrips karnyi* Bagn.) and scale insects (*Lepidosaphes piperis* Gr. and *Aspidiotus destructor* Sign.) are important (Devasahayam, Premkumar & Koya 1988). At present all the major insect pests are controlled by application of

insecticides. Since black pepper is an export oriented crop, it is essential to keep the levels of insecticide residues below tolerable limits. Hence development of integrated pest management schedules incorporating biological control and involving minimum use of pesticides would be advantageous.

A perusal of literature on natural enemies of insect pests of black pepper indicated that only a few biocontrol agents have been recorded. Hence as a first step in developing biological control programmes in black pepper, work on documenting the natural enemy complex of major insect pests was initiated at National Research Centre for Spices (NRCS), Calicut during mid 1980's. Observations on occurrence of

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**Table 1. List of natural enemies of major insect pests of black pepper (*Piper nigrum* L.) in India**

Insect pest / Natural enemy	Reference
a. 'Pollu' beetle ( <i>Longitarsus nigripennis</i> Mots.)	
1. Genus et sp. indet (Nematoda : Mermithidae)	New record
2. Genus et sp. indet (Araneae)	Premkumar (1980)
3. <i>Oecophylla smaragdina</i> Fabr. (Hymenoptera : Formicidae)	New record
b. Top shoot borer ( <i>Cydia hemidoxa</i> Meyr.)	
1. <i>Hexameris</i> sp. (Nematoda : Mermithidae)	Devasahayam & Koya (1994)
2. <i>Clinotrombium</i> sp. (Acarina : Trombidiidae)	New record
3. <i>Apanteles</i> sp. (Hymenoptera : Braconidae)	Visalakshi & Joseph (1965)
4. <i>A. cypris</i> Nixon (Hymenoptera : Braconidae)	Devasahayam & Koya (1993)
5. Genus et sp. indet (Hymenoptera : Braconidae)	Devasahayam & Koya (1993)
6. <i>Eudederus</i> sp. (Hymenoptera : Eulophidae)	Visalakshi & Joseph (1965)
7. <i>Goniozus</i> sp. (Hymenoptera : Bethylidae)	Visalakshi & Joseph (1965); Devasahayam & Koya (1993)
c. Leaf gall thrips ( <i>Liothrips karnyi</i> Bagnall)	
1. <i>Geogarypus</i> sp. (Pseudoscorpiones : Geogarypidae)	Devasahayam (1992)
2. Genus et sp. indet (Acarina)	Visalakshi & Joseph (1967)
3. <i>Montandoniola moraguesi</i> Puton (Heteroptera : Anthocoridae)	Ananthakrishnan (1978); Devasahayam (1992)
4. Genus et sp. indet (Heteroptera : Anthocoridae)	Visalakshi & Joseph (1967)
5. <i>Androthrips flavipes</i> Schmutz (Thysanoptera : Phlaeothripidae)	Ananthakrishnan (1978); Devasahayam (1992)

**Table 1. (Contd.)**

Insect pest / Natural enemy	Reference
6. <i>Lestodiplosis</i> sp. (Diptera : Cecidomyiidae)	Devasahayam (1992)
7. <i>Rhodesiella</i> sp. (Diptera : Chloropidae)	Devasahayam (1992)
d. Scale insects ( <i>Lepidosaphes piperis</i> Gr. and <i>Aspidiotus destructor</i> Sign.)	
1. <i>Bdella</i> sp. (Acarina : Bdellidae)	New record
2. Genus et sp. indet (Heteroptera : Miridae)	New record
3. <i>Karnyothrips melaleucus</i> (Bagnall) (Thysanoptera : Phlaeothripidae)	New record
4. <i>Aleurodothrips fasciatus</i> (Franklin) (Thysanoptera : Phlaeothripidae)	New record
5. <i>Chilocorus circumdatus</i> (Gyllenhall) (Coleoptera : Coccinellidae)	New record
6. <i>Pseudoscymnus</i> sp. (2 species) (Coleoptera : Coccinellidae)	New record
7. <i>P. dwipakalpa</i> Ghorpade (Coleoptera : Coccinellidae)	New record
8. <i>Pharoscymnus horni</i> (Wiese) (Coleoptera : Coccinellidae)	New record
9. <i>Sticholotis exsanguis</i> Sicard (Coleoptera : Coccinellidae)	New record
10. <i>Cybocephalus</i> sp. (Coleoptera : Nitidulidae)	New record
11. <i>Encarsia lounsburyi</i> (Berlese & Paoli) (Hymenoptera : Aphelenidae)	New record

natural enemies were carried out mainly in black pepper plantations at Kuppadi, Kalpetta (Wynad district, Kerala), Calicut and Peruvannamuzhi (Calicut district, Kerala). The natural enemies recorded during these studies and those recorded earlier are presented here (Table 1).

**'Pollu' beetle** (*Longitarsus nigripennis*)  
(Coleoptera : Chrysomelidae)

The 'pollu' beetle is the most destructive pest of black pepper especially in plains and midlands (below 300m MSL). The adults feed and damage tender leaves and the grubs bore into tender berries

and make them hollow. Apart from an unidentified species of spider (Araneae) predaceous on adults (Premkumar 1980), no other report of natural enemies of 'pollu' beetle is available. The natural enemies recorded during the present study include an unidentified entomophagous nematode (? Mermithidae) and weaver ant *Oecophylla smaragdina* Fabr. (Formicidae). The entomophagous nematode parasitised adult beetles (2-5 per cent) during July and August at Peruvannamuzhi. Workers of *O. smaragdina* occasionally predated on newly emerged adults at Peruvannamuzhi.

**Top shoot borer** (*Cydia hemidoxa*) (Lepidoptera : Tortricidae)

The top shoot borer is a serious pest of black pepper in younger plantations. The larvae of the pest bore into tender terminal shoots resulting in their decay and drying and ultimately affecting the growth of the vine. A few parasites have been recorded earlier on *C. hemidoxa*. These include *Hexameris* sp. (Mermithidae), *Apanteles* sp., *A. cypris* Nixon (Braconidae), *Eudederus* sp. (Eulophidae), *Goniozus* sp. (Bethyidae) and an unidentified species of Braconidae (Visalakshi & Joseph 1965; Devasahayam & Koya 1993; Devasahayam & Koya 1994). The seasonal incidence of some of these parasites was studied at Peruvannamuzhi. Parasitism by *Hexameris* sp. occurred in the field during July to November and was high during July and August; up to 76.7 per cent of larvae were parasitised during August. *A. cypris* was active in the field during September to November with a peak incidence of 20 per cent during October (Devasahayam & Koya 1993;

Devasahayam & Koya 1994). A parasitic mite *Clinotrombium* sp. (Trombidiidae) was recorded on larvae during the present study. About 8-10 juveniles of the mite occasionally parasitised late instar larvae at Peruvannamuzhi.

**Leaf gall thrips** (*Liothrips karnyi*) (Thysanoptera : Phlaeothripidae)

Leaf gall thrips infest leaves of black pepper and induce the formation of marginal, tubular galls on them. The pest infestation is generally serious at higher altitudes and also in nurseries in the plains. *Montandoniola moraguesi* Puton (Anthocoridae) and *Androthrips flavipes* Schmutz (Phlaeothripidae) are important predators of *L. karnyi* (Ananthakrishnan 1978; Devasahayam 1992). Visalakshi & Joseph (1967) reported that an unidentified anthocorid and mite also predated on juvenile stages of the pest. Recently, *Geogarypus* sp. (Geogarypidae), *Lestodiplosis* sp. (Cecidomyiidae) and *Rhodesiella* sp. (Chloropidae) were reported to be predaceous on juvenile stages of *L. karnyi* (Devasahayam 1992). The life cycle of *M. moraguesi* on *L. karnyi* was also studied (Devasahayam 1987). Apart from these records no other natural enemy was observed during the present study.

**Scale insects** (*Lepidosaphes piperis* and *Aspidiotus destructor*) (Heteroptera : Diaspididae)

Scale insects sometimes cause serious damage to black pepper especially at higher altitudes. Scale insects encrust stems, leaves and berries and suck plant sap resulting in drying of infested plant parts, especially during summer. Among the various species of scale insects recorded on black pepper, mus-

sel scale *L. piperis* and coconut scale *A. destructor* are important. A number of natural enemies were recorded on scale insects during the present study. These include a predatory mite, *Bdella* sp. (Bdellidae), a hymenopteran parasite, *Encarsia lounsburyi* (Berlese & Paoli) (Aphelinidae), two species of predatory thrips, *Karnyothrips melaleucus* (Bagn.) and *Aleurodothrips fasciatus* (Frank.) (Phlaeothripidae), seven species of predatory beetles, *Chilocorus circumdatus* (Gyllenhal), *Pseudoscymnus* sp. (two types), *P. dwipakalpa* Ghorpade, *Pharoscygnus horni* (Weise), *Sticholotus exsanguis* Sicard (Coccinellidae) and *Cybocephalus* sp. (Nitidulidae) and an unidentified species of mirid bug. These natural enemies were recorded from Kuppadi, Calicut and Peruvannamuzhi. Among them, *Bdella* sp., *E. lounsburyi*, *C. circumdatus*, *Pseudoscymnus* sp. and *Cybocephalus* sp. were more common. All the natural enemies are new records on scale insects infesting black pepper.

The study indicated that except in the case of 'pollu' beetle, a number of natural enemies are available on major insect pests of black pepper offering great potential in utilising them beneficially in biological control programmes. Studies on predatory potential, life cycle and seasonal incidence of these natural enemies and their interactions with the pests are in progress at NRCS, Calicut. Methods are also being standardised to develop techniques for propagation of major natural enemies for their augmentation in the field and for incorporating them in integrated pest management schedules.

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