

National Research Centre for Spices, Calicut, India

Seasonal incidence of *Hexamermis* sp. (Dor., Mermithidae) parasitising larvae of top shoot borer *Cydia hemidoxa* Meyr. (Lep., Tortricidae) on black pepper¹

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Abstract

The entomophagous nematode *Hexamermis* sp. was recorded for the first time parasitising larvae of top shoot borer *Cydia hemidoxa* Meyr. on black pepper *Piper nigrum* L. at Peruvannamuzhi (Calicut District, Kerala State) in India. The incidence of parasitism was observed in the field during June to November and was high during July and August; up to 76.7% of larvae were parasitised during August 1991. A highly significant and positive correlation was observed between incidence of parasitism and rainfall. *Hexamermis* sp. appears to play an important role in the natural control of *C. hemidoxa* on black pepper.

1 Introduction

The top shoot borer *Cydia hemidoxa* Meyr. is an important pest of black pepper *Piper nigrum* L. in India especially in younger (1-2 years) plantations (DEVASAHAYAM et al. 1988). The larvae of the pest bore into tender terminal shoots resulting in drying up of the same; repeated attack of terminal shoots results in stunting in growth of affected vines. We initiated studies on identifying the natural enemies of the pest during 1988 and found that a significant population of larvae in the field were parasitised by an entomophagous nematode at the Experimental Farm of the National Research Centre for Spices. We undertook detailed studies during subsequent years on the seasonal incidence of the parasite in relation to the incidence of the pest and its role in the natural control of the pest.

2 Materials and methods

The studies were conducted at the Experimental Farm of the National Research Centre for Spices at Peruvannamuzhi (Calicut District, Kerala State, India). Larvae of top shoot borer were collected from the field at monthly intervals during June to December (when tender terminal shoots were available on the vines and the pest is generally observed in the field) and reared on tender shoots of black pepper placed in petri dishes of 14 cm diameter. The shoots were changed on alternate days and the emergence of entomophagous nematode observed. Thirty larvae were collected and reared every month and the percentages of parasitised larvae during different months were determined. For determining the seasonal incidence of the pest, 100 tender terminal shoots were observed at random on different vines and the number of infested shoots noted; thus the percentages of shoots infested were determined during different months. Studies on the seasonal incidence of the entomophagous nematode and the pest were conducted for two consecutive years viz., 1990 and 1991. During 1991, the number of nematodes that emerged from each infested larva and their lengths were also noted. The identity of the entomophagous nematode was determined by the International Institute of Parasitology, United Kingdom.

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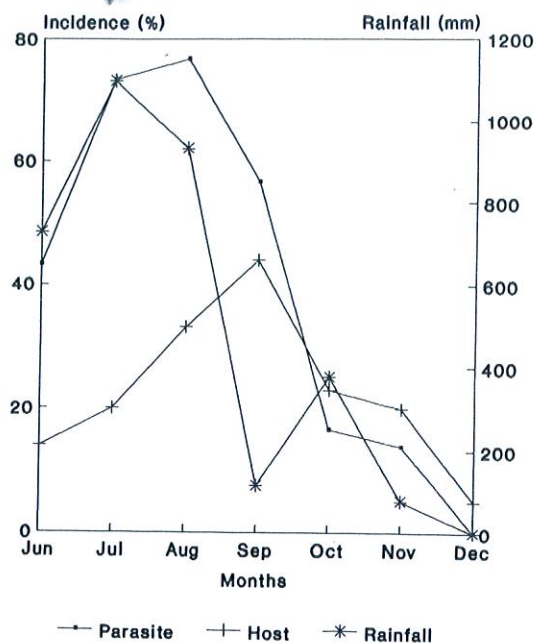


Fig. 1. Incidence of *Hexameris* sp. on larvae of *Cydia hemidoxa* on black pepper (1990)

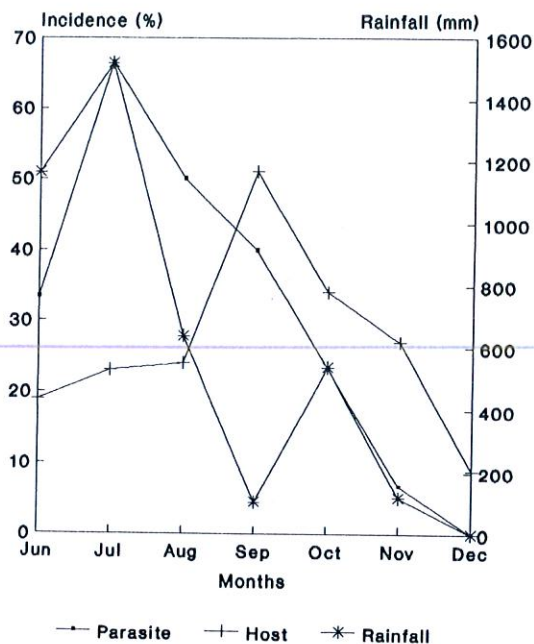


Fig. 2. Incidence of *Hexameris* sp. on larvae of *Cydia hemidoxa* on black pepper (1991)

3 Results and discussion

The entomophagous nematode was identified as *Hexameris* sp. (Dorylaimida, Mermithidae) which is the first record of the parasite on *C. hemidoxa*. Mermithid nematodes are well known parasites of lepidopteran larvae. *Hexameris* sp. has been reported to parasitise 42 species of lepidopterans belonging to 15 families. *H. truncata* has been reported from 68 species of lepidopterans belonging to 16 families (WOUTS 1984).

During 1990, the incidence of parasitised larvae was high during June to September with a peak incidence (76.7%) during August. The incidence of parasitism declined steadily after September with nil parasitism during December (fig. 1). A similar trend was also observed during 1991; however peak parasitism (66.6%) occurred during July (fig. 2). Such a high level of parasitism by mermithid nematodes is not unusual. CHATTERJEE and SINGH (1965) reported a 73% infection of *Antigastra catalaunalis* population on *Sesamum indicum* and a 92.5% infection of *Achara janata* on cotton. In the present study, a highly significant ($P < 0.05$) positive correlation was found between incidence of parasitism and rainfall ($r = 0.7079$). Rainfall plays a crucial role in the life cycle of mermithid nematodes. The newly hatched larvae which are infective remain in soil and during rainy periods when the vines are covered with a layer of moisture, they move up the vines to infect the host feeding within the tender terminal shoots.

The number of nematodes that emerged from each parasitised larva varied from 1–12 (table). However, a single nematode emerged from 36.4% of the larvae and 1–3 nematodes from 90.9% of the larvae. The lengths of the emerged nematodes varied from 7–133 mm. The mean lengths of nematodes ranged from 94.8–15.3 mm under various categories of parasitisation. The mean length was maximum when a single nematode infected a larva and was drastically reduced with increasing levels of multiple infections. The growth of the parasite is probably affected because of the limited source of food available.

Though the correlation between the incidence of parasite and pest was not significant, there was in general, a good degree of synchronisation between fluctuations in the incidence of the parasite and host during both the years. Though the incidence of parasitism kept pace with that of the host initially (June–July), the latter continued to increase during the subsequent months and reached its peak during September indicating that the host continued to increase at a higher rate than the parasite. As mentioned earlier, rainfall had a crucial role to play in the incidence of parasitism which began to decline after August due to reduction in rainfall. The incidence of the pest also began to decline a little later during September. The role played by other natural enemies especially hymenopteran parasites on the dynamics of pest incidence has not been quantified in this study. Though percentage of parasitism is not fully adequate to assess the role of the entomophagous nematode in the population dynamics of the pest, its high incidence especially during the initial stages of pest build up indicates that it is an important parameter in the natural control of *C. hemidoxa* on black pepper.

Emergence pattern of *Hexameris* sp. from larvae of *Cydia hemidoxa*

No. of nematodes that emerged from a single larva	% larvae	Mean length of nematodes (mm)
1	36.4	94.8
2	33.3	59.6
3	21.2	44.5
4	4.5	38.3
5	1.5	33.4
6	1.5	29.5
12	1.5	15.3

Acknowledgement

We are thankful to Dr. D. J. HUNT, International Institute of Parasitology, United Kingdom for identification of the entomophagous nematode.

Zusammenfassung

Zum Auftreten von Hexameris sp. (Dor., Mermithidae), ein Parasitoid von Cydia hemidoxa Meyr. (Lep., Tortricidae) an Schwarzem Pfeffer

Der entomophage Nematode *Hexameris* sp. wurde in Peruvannamuzhi (Indien, Distrikt Calicut Kerala) erstmalig als Parasit von *Cydia hemidoxa* an *Piper nigrum* festgestellt. Die Parasitierungsrate wurde im Freiland von Juni bis November ermittelt. Sie war im Juli/August bis zu 76,7% hoch. Eine hochsignifikante positive Korrelation konnte zwischen Parasitierung und Regenmenge ermittelt werden. *Hexameris* sp. scheint ein wichtiger natürlicher Feind von *C. hemidoxa* an *P. nigrum* zu sein.

References

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