

SHORT COMMUNICATION**Observations on the Natural Enemies of *Cephonodes hylas* (Linnaeus) (Lepidoptera: Sphingidae) on Robusta Coffee in Ibadan, Nigeria.*****Okelana, F.A.¹ and **J.A. Odebiyi²**¹Entomology Division, Cocoa Research Institute of Nigeria, P.M.B. 5244, Ibadan, Nigeria. ²Department of Crop Protection and Environmental Biology, University of Ibadan, Ibadan, Nigeria. *Corresponding Author: email: okelana_feyi@yahoo.com

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Abstract

Field observations conducted over a period of eight years revealed a number of natural enemies of *Cephonodes hylas* (L.) (Lepidoptera: Sphingidae) which is one of the major foliar insect pests of robusta coffee (*Coffea canephora* (Pierre ex. Froehner) in Nigeria. The natural enemies identified are predominantly arthropods belonging to the Insecta and the Arachnida. *Telenomus* species (Hymenoptera: Scelionidae) was the egg parasitoid while *Ooencyrtus* sp near *epilachne* (Hymenoptera: Encyrtidae) was less dominant than *Telenomus*. *Euplectrus* species (Hymenoptera: Eulophidae) and *Ceromya femorata* (Mesnil) (Diptera: Tachinidae) were the two larval parasitoids encountered. The only larval ectoparasite recorded was the ceratopogonid *Forcipomyia* species. (Diptera). The insect predators were mostly members of the orders Dictyoptera (represented by the family Mantidae) and the Hymenoptera (represented by families Formicidae (sub-families-Ponerinae, Mymicinae, Formicinae and Dorylinae) and the Vespidae. Various species of unidentified predatory spiders (Araneae) were the dominant predators of especially the early larval instars of *C. hylas*.

Keywords: Observations, Bee-hawk moth, natural enemies, robusta coffee, Nigeria.

Introduction

The Oriental bee-hawk moth *Cephonodes hylas* Linnaeus (Lepidoptera: Sphingidae) is the most important and very serious sphingid defoliator pest of robusta coffee (Le Pelley, 1978; Okelana, 1987). The pest devours the leaves of coffee and clears its bushes with astonishing rapidity (Le Pelley, 1978; Okelana, 2000).

For many years in Nigeria, control of robusta coffee insect, especially the foliar pests, has been mostly by the application of insecticides and to a less extent, the use of mechanical and cultural means. Furthermore, very little attention had been paid to the existence of their natural enemies, which abound in the coffee ecosystem. Thus the potential of these biological control agents as formidable tools in helping to bring pest populations (including the sphingid defoliator, *C. hylas*) below economic injury level is yet to be exploited.

According to the Le Pelley (1978), eggs of *C. hylas* are parasitised by *Ooencyrtus malayensis* Ferriere (Hymenoptera: Chalcididae) while the larva is parasitised by *Exorista sorbillans* Wiedemann (Diptera: Tachinidae) in Malaya but in Uganda, the larva is parasitised by *Actia heterochaeta* Bezzi (Diptera: Tachinidae).

Well-known predators of *C. hylas* in the field include the reduviid *Sycanus leucomesus* Walker that preys on the larvae and adults but has little controlling influence and the ceratopogonid *Forcipomyia hirtipes* de Meijere which sucks the larva in Malaya without causing any permanent injury (Le Pelley, 1978).

This paper highlights the various natural enemies of *C. hylas* observed over eight years at two robusta coffee experimental plots (one shaded 600-1, 500 Lux) and one open (>2000 Lux) located at the headquarters of Cocoa Research Institute of Nigeria, Idi-Ayunre, Ibadan, Nigeria (Latitude 7°25'N and Longitude 3° 25' E with altitude of about 122m. above sea level).

Materials and Methods:

The study was conducted at two well-established and managed robusta coffee experimental plots located at the headquarters of Cocoa Research Institute of Nigeria, Idi-Ayunre Ibadan, Nigeria between 1992 and 1999. The plots were not treated with pesticides throughout the period of study. Thus while conducting weekly monitoring of the abundance of *C. hylas*, the activities of natural enemies operating on the pre-imaginal stages of the pest were also closely monitored.

All eggs and larvae encountered in the course of population estimation and pupae collected from the litter were removed and taken to the laboratory. Leaves bearing eggs were cut into 30 x 10 mm strips and placed separately in a small glass specimen tube (75 x 10 mm) covered with muslin, which was held in place with rubber band. The eggs were incubated at 24.5-28.5° C and relative humidity of 69-80%) and observed daily until they hatched. Any parasitoid that emerged was noted. Under similar laboratory conditions, all larvae including aberrant, moribund or sluggish ones and pupae were reared individually on coffee leaves of cut shoots dipped in water in a small tube in muslin-sleeved cages (20 x 12 cm). The shoots were replaced with fresh ones every 48-72 hours. Observations were made on the stages until emergence of adult moths or parasitoids. Furthermore, each field-collected dead larva was taken to the laboratory and placed on moistened cotton wool in a small vial (4 x 2.5 cm). The vial was placed in a tilted position in a 200 ml beaker with dry tissue paper shreds at its bottom to serve as pupation medium for mature larva of any parasitoid. The beaker with the vial was then enclosed in cheesecloth for possible emergence of parasitoids.

All parasitoids bred out and the predators found feeding on *C. hylas* were collected and preserved for subsequent identification from Standard Reference Collection of insects within Nigeria and the British Museum of Natural History.

Results and Discussion

Tables 1 and 2 show the diversity of natural enemies of *C. hylas* and the different developmental stages of the host attacked. They belong mostly to two classes of the Phylum Arthropoda- the Insecta and the Arachnida with the former constituting most of the natural enemies of the pest. Of the Insecta, members of the order Hymenoptera constituted most of the parasites and predators of the eggs and larvae of *C. hylas* while a dipteran was a parasitoid of caterpillars of the pest (Table 1)

The two egg parasitoids discovered were *Telenomus* (*Asolcus*) species and *Ooencyrtus* sp nr *epilachne* Ferriere while two larval parasitoids identified were *Euplectrus* species Ferriere and *Ceromya femorata* Mesnil. The egg and larval parasitoids were solitary.

The only ectoparasite recorded was the ceratopogonid *Forcipomyia* sp which sucked the body fluid of the last instar caterpillar. The predators were general feeders on coffee insect pests. The egg predators recorded was an ant, *Platythrea modesta*, which was seen carrying away the eggs of *C. hylas*. The larval predators consisted of mostly ant species, notably *Oecophylla longinoda* Latreille as well as the Mantis (Mantidae) and non-web spinning actively hunting spiders. The various web-spinning spiders, which abound on the coffee plant and in the general crop ecosystem throughout the year especially at the shaded coffee plot, trapped and sucked up and/or chewed any larva, which was caught. Members of the Hymenoptera were the dominant predators of *C. hylas*. They are closely followed by the spiders and the mantis (Table 2).

In view of the abundant natural enemies of *C. hylas* present in the coffee agro-ecosystem, there may be the need for judicious use of insecticides on and in the crop environment in order to conserve them and allow natural control of the pest by its natural enemies. Furthermore, breeding and mass release of the egg parasite *Telenomus* species and the larval parasitoid *Euplectrus* species may go a long way in reducing the damage to coffee by *C. hylas*.

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Table 1: Parasitoids of *Cephonodes hylas* (L.)

Type of Parasite	Host Stage affected	Name of Parasite
	Egg	- <i>Telenomus</i> sp. (Hymenoptera: Scelionidae)
ENDO-PARASITE	Egg	- <i>Ooencyrtus</i> sp.nr. <i>epilachne</i> (Hymenoptera: Encyrtidae)
ENDO-PARASITE	1 st & 2 nd Instar Larvae	- <i>Euplectrus</i> species (Hymenoptera: Eulophidae)
	2 nd & 3 rd Instar Larvae	- <i>Ceromya femorata</i> Mesnil. (Diptera: Tachinidae)
ECTO- PARASITE	5 th Instar Larvae	- <i>Forcipomyia</i> species (Diptera: Ceratopogonidae)

Table 2: Predators of *Cephonodes hylas* (L.)

Host Stage affected	Name of Predator
Egg	- <i>Platythyrea modesta</i> Emery (Hymenoptera: Formicidae)
Early Instar Larvae (1 st -3 rd)	- <i>Oecophyla longinoda</i> Latr. (Hymenoptera: Formicidae) - <i>Platythyrea modesta</i> Emery (Hymenoptera: Formicidae) - <i>Oxyphilus distinctus</i> Beier (Dictyoptera: Mantidae) - Various unidentified species of small and young Praying Mantis (Dictyoptera: Mantidae) - Various species of Predaceous Spiders (Araneae)
Later Instar Larvae (3 rd – 5 th)	- <i>Belonogaster</i> sp. (Hymenoptera: Vespidae) - <i>Synagris comuta</i> v. <i>iturienis</i> (Hymenoptera: Vespidae) - <i>Crematogaster africana</i> Mayr. (Hymenoptera: Formicidae) - <i>Crematogaster dariventris</i> (Hymenoptera: Formicidae) - <i>Plectroctena minor</i> Emery

	(Hymenoptera: Formicidae)
	- <i>Dorylus nigricans</i>
	(Hymenoptera: Formicidae)
	- Various species of adult Mantis
	(Dictyoptera: Mantidae) e.g.
	<i>Spodromantis lineola</i> Burns
	<i>S. viridis</i> Forsk and
	<i>Polyspilota aeruginosa</i>
	BIRDS (Unidentified)
Pre-Pupae	- <i>Plectroctena minor</i> * Emery
	(Hymenoptera: Formicidae)
	- * <i>Dorylus nigricans</i>
	<i>Pheidole</i> sp.D.
	(Hymenoptera: Formicidae)
Pupa	- <i>Crematogaster gabonensis</i>
	(Hymenoptera: Formicidae)
	- <i>Nasutitermes</i> sp.
	(Isoptera Termitidae)

*Predaceous or 5th Instar Larvae seeking pupation sites