



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



**CARIBBEAN
FOOD
CROPS SOCIETY**

*SOCIETE CARAIBE
POUR LES PLANTES ALIMENTAIRES*

25

Twenty fifth
Annual Meeting 1989

25^e CONGRES ANNUEL

Guadeloupe

Vol. XXV

DISTRIBUTION, HOST PLANTS AND NATURAL ENEMIES OF CABBAGE BUD-WORM (*Hellula phidilealis* (Walker) IN THE CARIBBEAN

M.M. ALAM

CARDI - UWI, Mona Campus, Kingston 7, Jamaica W.I.

ABSTRACT

Hellula phidilealis and other members of this genus usually regarded as the primary pests of crucifers, were observed feeding in pods and terminal shoots of *Cleome spinosa*, *Cleome viscosa*, *Cleome* spp. and *Gynandropsis gynandra* in greater numbers almost throughout the year, in the Caribbean, Guyana (South America) and Mexico. These studies suggest that *Cleome* spp. are the main hosts of this genus, and it is only a secondary pest of crucifers. *Hellula undalis* was reported feeding on *C. viscosa* in Pakistan (Alam et al. 1961-62). Munroe (1972) also stated that *H. phidilealis* and *H. rogatalis* feed on other plant families.

The relative abundance of natural enemies of *H. phidilealis* in *Cleome* spp. in contrast to their paucity in cruciferous hosts further support this hypothesis that *H. phidilealis* has shifted from *Cleome* spp. to crucifers.

Although many of the parasites recorded from *Cleome* spp. may not readily switch to *H. phidilealis* on cabbages and cauliflowers, there are a number of other parasites recorded from this and other *Hellula* spp. on cabbage and cauliflowers, which can be introduced in countries where *Hellula* is a serious pest on crucifers.

RESUME

DISTRIBUTION, PLANTES-HOTES ET ENNEMIS NATURELS DU VER DU BOURGEON DU CHOU : *Hellula phidilealis* (WALKER) DANS LES CARAIBES

Hellula phidilealis et d'autres espèces appartenant à ce genre considéré généralement comme les principaux ravageurs des crucifères, ont été observés s'alimentant en grand nombre et presque toute l'année dans les

gousses et les pousses terminales de *Cleome spinosa*, *Cleome viscosa*, *Cleome* spp. et *Gynandropsis gynandra* dans les Caraïbes, Guyane (Amérique du Sud) et le Mexique. Ces études suggèrent que les *Cleome* spp. sont l'hôte principal du genre *Hellula* et que celui-ci est seulement un ravageur secondaire des crucifères. *Hellula undalis* a été signalé s'alimentant sur *C. viscosa* au Pakistan, (Alam et al. 1961-62). Munroe (1972) a également mentionné que *H. phidilealis* et *H. rogatalis* s'alimentaient sur d'autres familles de plantes.

L'abondance relative des ennemis naturels de *H. phidilealis* sur *Cleome* spp. contrastant avec leur absence sur crucifères et renforce l'hypothèse que *H. phidilealis* s'est déplacé des *Cleome* spp. vers les crucifères. Bien que beaucoup de parasites mentionnés sur *Cleome* spp. pourraient ne pas facilement passer de *H. phidilealis* sur chou et chou-fleur, il existe certains parasites collectés sur cette plante et d'autres proviennent d'*Hellula* spp. sur chou et chou-fleurs qui pourraient être introduits dans les pays où *Hellula* est un ravageur important sur crucifères.

INTRODUCTION

The cabbage bud-worm *Hellula phidilealis* (Walker) while being a minor pest of crucifers in Jamaica, Barbados and the Eastern Caribbean islands, is seasonally the most serious pest of cabbage and cauliflower in Trinidad.

In Jamaica, in November 1988, the author recorded only one larva of *H. phidilealis* from several acres of cabbage at Guys Hill, but about 5 % to 10 % infestation in the pods of *Cleome spinosa* (*Capparaceae*) in a citrus grove in Bog Walk. Similarly, Dr. F.D. Bennett, (1980) (personal communication) found it feeding in the pods of *Cleome viscosa* in Colima State, Mexico. Alam (1982) reported it attacking the pods and terminal shoots of *C. spinosa*, *C. viscosa*, *Cleome* spp. and *Gynandropsis gynandra*, in Barbados and the Eastern Caribbean Islands. Alam, et al. (1961-62) had earlier recorded *Hellula undalis* (Fab.) on *C. viscosa* in Pakistan.

DISTRIBUTION OF *Hellula* spp.

H. phidilealis has been reported from Barbados, Trinidad, the Greater and Lesser Antilles, Puerto Rico, U.S. Virgin Islands, Mexico, Guyana (S.A.) and the continental U.S. It also occurs in Hawaii, Florida, Texas and Arizona (Munroe, 1972). This author recorded five species of *Hellula* from North America. One of these, *Hellula rogatalis* Hulst., the cabbage webworm has been frequently confused with the Old World species *H. undalis*. Although, *H. undalis* has not been detected in North America, it occurs in Hawaii and

is a widespread pest of crucifers in the warmer parts of Europe, Asia and Africa. The hosts of the three other North American species are not yet known. *Hellula kempae* Munroe is recorded only from Florida, *Hellula aqualis* Barnes and McDunnough only from Arizona and *Hellula subbasalis* from California.

HOST PLANTS

H. phidilealis, *H. rogatalis* and *H. undalis* are all well known pests of crucifers, and it has generally been regarded that all members of this group develop primarily on plants of this family. Munroe (1972) noted that *H. phidilealis* and *H. rogatalis* are recorded from other plant families. Alam et al. (1961-62) reported *H. undalis* on *C. viscosa* in Pakistan.

In Barbados, the cruciferous hosts recorded were : cabbage (*Brassica oleracea* var. *capitata*), cauliflower *Brassica oleracea* var. *botrytis*), cultivated mustard (*Brassica juncea*), radish (*Raphanus sativus*), and wild mustard (*Brassica integrifolia*). It was further reported that in Barbados, and the Windward and Leeward islands, *H. phidilealis* was breeding in large numbers in the pods and shoots of *C. spinosa*, *C. viscosa*, *Cleome* spp. and *Gynandropsis gynandra*. The average pod infestation on *C. spinosa* was 68 %, on *C. viscosa* 69 % and on *G. gynandra* 36 %. The number of larvae per pod ranged from 1 to 8 (Alam, 1982).

During 1979, in Guyana (S.A.), *H. phidilealis* was found feeding in *C. viscosa* pods and terminal shoots in the savannahs, the area far distant from cultivated crucifers. Similarly, in 1988 the pest was found in the pods of *C. spinosa* in a citrus grove, Bog Walk, Jamaica where there were no crucifers grown in the vicinity. Bennett, 1980 (pers. commu.) found it feeding in the pods of *C. viscosa* in Colima State, Mexico.

In Barbados, between 1969-75, the population of *H. phidilealis* on crucifers was very low. It increased steadily between 1976 and 1980, possibly due to increased reliance on permethrin (Ambush) an other non-systemic insecticides for the control of diamond-black moth *Plutella xylostella* (L). These chemicals do not control *Hellula* larvae which have already tunnelled into the plant tissues and also reduce the effectiveness of natural enemies (Alam, 1982). Similar observations were also recorded in South East Asia, where with the excessive use of Ambush against *P. xylostella*, *Hellula* became a serious pest (F. J. Simmonds, pers commu ; 1980).

During the early 1980's in Barbados, *H. phidilealis* suddenly become a pest, although its population on cabbage was cyclical in nature. It was more prevalent between May and July, when 44 % to 73 % of the plants were attacked, and the number of larvae per plant ranged from 1 to 13. Between November and January, the plant damage was minimal, when the maximum infestation was 10 % and the number of larvae per plant averaged 1.5. The damage was further reduced when farmers stopped using ambush.

NATURAL ENEMIES

Herting (1965) and Thompson (1946) reported four parasites from *H. phidilealis* : *Bracon hellulae*, *Bracon hebetor*, *Chelonus* sp. (*Braconidae*) and *Nemorilla* sp. (*Tachinidae*). Alam (1982) reported two parasites attacking *H. phidilealis* larvae on cabbage. In May 1979, 61 % larvae were parasitised by *Bracon* sp. *hebetor* (Say) and in April 1980, 12 % parasitised by *Goniozus* (*Parasierola*) sp. (*Bethylidae*). The parasite complex on *Cleome* spp. was richer and consistent throughout the year. On *C. spinosa*, *Apanteles* spp. (2) parasitised 0-60 % (average 10 %) larvae and *Chelonus* sp. *nr. mexicanus* (Brether) (*Braconidae*) 11-62 % (average 33 %) ; *Eiphosoma annulatum* (Cresson) (*Ichneumonidae*) 2-25 % (average 10 %) and an unidentified Tachinid 2.2 % ; on *C. viscosa*, *Bracon* sp. *hebetor* 55-89 % (average 65 %) ; and on *G. gynandra*, *Chelonus* sp. *nr. Mexicanus* 0-70 % (average 35 %) and *E. annulatum* 0-22 % (average 13 %).

In St. Vincent, Grenada, St. Lucia, Dominica, Antigua, St. Kitts and Guyana (S.A.), *Bracon* spp. (2) parasitised 25-80 % (average 53 %) larvae in *C. spinosa* and *C. viscosa*.

During 1953, *Bracon thurberiphigae* (Mues.) and *Charops uncinatus* (Muls.) were reared from this host in cabbage in Trinidad and in 1980, in Mexico two *Bracon* spp. were recorded parasitizing *H. phidilealis* larvae in pods and stems of *Cleome* sp. (Bennett, personal commun., 1981).

DISCUSSION

These studies have shown that *H. phidilealis*, which occurs in greater numbers in pods and terminal buds of *Cleome* spp. and *G. gynandra*, in the Caribbean, Guyana and Mexico, almost throughout the year under different climatic conditions and most often far removed from the cultivated crucifers, like in the savannahs of Guyana, xerophytic climatic conditions in Mexico, citrus

groves in Jamaica and the waste lands in Barbados and the Windward and Leeward islands, support the view that *Cleome spp.* are natural hosts of *H. phidilealis*. It seems that this species is only a secondary pest of crucifers. Since *Cleome spp.* are widely distributed in the Caribbean, South and Central Americas and Mexico, and it is quite possible that intensive surveys will reveal a wider distribution of *H. phidilealis*.

The relative abundance of natural enemies of *H. phidilealis* in *Cleome spp.* in contrast to their paucity in cruciferous hosts lends further support to the possibility that *H. phidilealis* has transferred from cleomes' to crucifers. Certain parasites which have evolved as parasites of pod or stem borers may not readily switch even to the same host in other types of plants such as cabbage. As a parallel certain species of *Ipobracon* and *Agathis* which may be important parasites of *Diatraea spp.* in wild grasses may be less effective when these borers occur in the thick stalks of sugar cane. Nevertheless there are possibilities of biological control of *H. phidilealis* in areas where it is a pest.

Thompson (1964), Herting (1965) and other sources recorded several parasites and predators of *Hellula undalis* and *H. rogatalis* (Appendix 1). Recently at the CAB-IIBC Pakistan Station, three parasites - *Apanteles midas*, *Chelonus rufus* and *Bracon sp.* have been reared from *H. undalis*. There is also a possibility that this Pyralid is kept under good control in the Caribbean and other distribution areas by its natural enemies and this could be a reason why it has not become a pest of crucifers. Further studies to determine this would be of interest.

REFERENCES

ALAM, M.M. (1982). Cabbage pests and their natural enemies in Barbados, W.I. Proc. 8th CFCS Meeting, Barbados, August 22-27, 1982.

ALAM, M.M., I.A. HAFIZ and M.A. GHANI (1961-62). Annual report of the scheme for the «Survey of parasites of insect pests of cultivated and useful plants and survey of insects destroying weeds and their parasites». The Commonwealth Institute of Biological Control (CIBC), Pakistan Station, Rawalpindi, 53 pp. (unpublished).

FENNAH, R. G. (1947). The insect pests of food crops in the Lesser Antilles. Dept. of Agri. for the Leeward Islands, Antigua, B.W.I. : 207 pp.

HERTING, B. (1965). A catalogue of parasites and predators of Trinidad

Arthropods Section A. Host or prey/enemy Vol. VI Lepidoptera part I (Microlepidoptera) Commonwealth Agricultural Bureaux, England : 218 pp.

MUNROE, E.G. (1972). Pyraloidea. Fascicle 13, 1B. in the Moths of North America. Ed. R. B. Dominick et al. E. W. Classey and R.B.D. Publ.

THOMPSON, W.R. (1946). A catalogue of the parasites and predators of insect pests. Sect. 1. Part 27. Parasites of the Lepidoptera (G-M.). Imperial Parasite Service, Belleville, Canada : 385 pp.

Appendix 1 : Parasites and predators of *Hellula* spp. and their distribution

Natural enemies	Host	Distribution
PARASITES		
Trichogrammatidae		
Trichogramma sp. (minutum)	<i>Hellula undalis</i>	Australia
Icheumonidae		
Campeletis facilis	<i>Hellula rogatalis</i>	U.S.A.
Cremastrus tibiator	<i>Hellula rogatalis</i>	U.S.A.
Eiphosoma annulatum	<i>Hellula phidilealis</i>	Barbados
Braconidae		
Apanteles hellulae	<i>H. undalis</i>	Senegal and Cameroon
Apanteles midas	<i>H. undalis</i>	Pakistan
Apanteles seageri	<i>H. undalis</i>	West Africa
Apanteles spp. (2)	Phidilealis	Barbados * and Guyana
Antanycolus sp.	<i>H. undalis</i>	West Africa
Bracon hellulae	<i>H. phidilealis</i>	Brazil
Bracon hebetor	<i>H. phidilealis</i>	Brazil
Bracon sp. Hebetor	<i>H. phidilealis</i>	Barbados *
Bracon Thurberiphigae	<i>H. phidilealis</i>	Trinidad
Bracon spp. (2)	<i>H. phidilealis</i>	Babados *
Bracon spp. (2)	<i>H. phidilealis</i>	St Vincent * ,Grenada * St Lucia * , Dominica Antigua * and St. Kitts *
Bracon spp. (2)	<i>H. phidilealis</i>	Mexico
Bracon sp.	<i>H. undalis</i>	Pakistan
Chelonus rufus	<i>H. undalis</i>	Pakistan
Chelonus sp. nr. mexicanus	<i>H. phidilealis</i>	Barbados *
Chelonus sp.	<i>H. phidilealis</i>	Brazil
Meteorus leviventris	<i>H. rogatalis</i>	U.S.A.
Bethylidae		
Gonizus (=Parasierola) sp.	<i>H. phidilealis</i>	Barbados *
Tachinidae		
Nemorilla pysti	<i>H. rogatalis</i>	U.S.A.
Nmorilla sp.	<i>H. phidilealis</i>	West Africa
Stomatomya sp.	<i>H. rogatalis</i>	U.S.A.
Gen. et sp. indet	<i>H. phidilealis</i>	Barbados *
PREDADORES		
Sphecidae		
Stictiella serrata	<i>H. rogatalis</i>	U.S.A
Araneidae		
Argiopidae		
Neoscona doenitzi	<i>H. undalis</i>	Japan
Thomsidae		
Misumena tricuspidata	<i>H. undalis</i>	Japan

* = Parasites recorded by the author ; information provided by Dr. F.D. Bennet.