

Biology and Seasonal Incidence of Cauliflower Head Borer, *Hellula undalis* Fabricius Under Junagadh (Gujarat State) Condition*

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Among the various pests of cole crop head borer, *Hellula undalis* Fabricius has been noted to be a polyphagous pest in Gujarat. Lefroy (1909) report it as a minor pest of cabbage and cauliflower. Fletcher (1914) studied its preliminary biology in south India and reported as a pest of cabbage, cauliflower, turnip, radish and mustard crops. Its biology has been studied to some extent in Madhya Pradesh by Rawat, *et al.* (1968) and in Punjab by Sandhu and Bhalla (1973). In Punjab, 30 to 58 per-cent of plants were damaged due to this pest (Sandhu and Bhalla, 1973).

A. Biology of Head Borer, *Hellula undalis* Fabricius:

The biology of a pest is appreciably influenced by the climatic and agronomic practices of a region. Hence, detailed studies were made on the biology in the laboratory at room temperature of 29° C and relative humidity 67.5 per cent during March and April, 1978 at Junagadh.

The laboratory culture was obtained by collecting the larvae and pupae

of head borer from the field of cauliflower crop. The pupae were placed in petri dishes (6 cm × 2.5 cm) for adult emergence. The newly emerged adults were used for further studies. The fresh twig of cauliflower plant and 10 per cent honey solution were provided to adult for oviposition and food respectively. Detailed observations were noted on the entire life stage of the pest from hatching of eggs to the death of adults.

Egg : The female moths laid eggs singly or in group of upto 12, on either side of a leaf and total of 116 to 157 (mean-143) eggs during its life time. The egg laying capacity of female has earlier been reported to be 125 to 150 (Sandhu and Bhalla, 1973). The freshly laid egg was creamy white, measuring 0.47 mm in length and 0.3 mm in width and before hatching it changed to pink. Rawat, *et al.* (1968) observed eggs colour to be pinkish (fertile) and creamy white (infertile). The incubation period lasted 2 to 4 days with an average of 2.03 days. Fletcher (1914) reported incubation period to be 4 days.

Larva: There were usually four larval instars and it is confirmed with the finding of Sandhu and Bhalla (1973). Whereas, Rawat, *et al.* (1968) recorded five distinct larval instars of this pest. The newly hatched larvae were creamy white in colour, measuring 0.9 to 1.04 mm in length and 0.23 to 0.36 mm in width. The full grown larvae

*This paper is dedicated to late Dr. G. M. Talati, Professor of Agri. Entomology, College of Agriculture, Junagadh.

were creamy yellow with pinkish tinge and five distinct brown longitudinal stripes on the back. Head and prothoracic shield was black in colour and changed to creamy white before going to pupation. The full grown larvae measured 10.13 to 11.44 mm in length and 1.53 to 2.25 mm in width. Duration of the four larval instars ranged from 2 to 3 days (mean 2.54 days), 2 to 3 (mean 2.31 days), 1 to 2 days (mean 1.52) and 1 to 4 days (mean 2.18 days), respectively. The total larval period was completed in 9 to 12 days with an average of 10.80 days. While, Fletcher (1914), Rawat *et al.* (1967) and Sandhu and Bhalla (1973) reported the total larval period to be 9 days, 9.36 days and 17 to 27 days respectively.

Pre-pupa and Pupa: In field, pupation normally occurred inside the

stems at about ground level within silken cocoon. Whereas in laboratory it also occurred between two leaves or inside the leaf petioles or stem. Pre-pupae were creamy white in colour and within 1 to 2 days they pupated. The pupae were pale yellow in beginning and turned light brown with passage of time. The pupa measured 7.28 mm in length and 2.29 mm in breadth. The pupal period ranged from 3 to 6 days with an average of 4.4 days. Fletcher (1914), Rawat, *et al.* (1968) and Sandhu and Bhalla (1973) recorded pupal period to be 6 days, 5.45 days and 5 to 7 days respectively. Total life period from egg to emergence of adult ranged from 15 to 18 days. Whereas, it was recorded 3 weeks by Fletcher (1914), 5 to 7 weeks by Sandhu and Bhalla (1973) and 15 to 25 days by Rawat, *et al.* (1968).

TABLE 1

Life history of *Hellula undalis* Fabricius infesting cauliflower.

Criteria	No. observed	Developmental period		
		Min.	Max.	Average
Pre-oviposition period (Days)	25	0	1	1.00
Oviposition period (Days)	25	2	4	2.40
Post-oviposition period (Days)	25	1	2	1.10
Total No. of eggs laid/female	25	116	157	143.00
Incubation period (Days)	1180	2	5	2.88
First instar larval period (Days)	58	2	3	2.45
Second instar larval period (Days)	54	2	3	2.31
Third instar larval period (Days)	53	1	2	1.51
Fourth instar larval period (Days)	50	1	4	2.18
Total larval period (Days)	50	9	12	10.80
Pre-pupal period (Days)	50	1	2	1.08
Pupal period (Days)	50	3	6	4.40
Total developmental period (Days)				
from eggs to emergence of adult	50	15	18	16.43
Adult longevity period (Days)				
Male	50	1	4	2.84
Female	50	3	6	4.20
Sex-ratio (Male : Female)	250	—	—	1:1.03

Adult: Moths are greyish brown in colour and 15.45 to 16.48 mm in length with wing expended. The forewings have wavy grey markings and the hindwings are pale dusky. Copulation occurs a few hours after emergence. The average pre-oviposition, oviposition and post-oviposition period were 1, 2.4 and 1.1 days, respectively. Longevity of male moth was little short i.e., ranging from 1 to 4 days, with an average of 2.84 days. Sandhu and Bhalla (1973) recorded adult period to be 5 to 7 days.

Sex ratio: The sex ratio of male and female from the laboratory reared larvae was found to be 1 : 1.03.

B. Nature of damage and Seasonal Incidence of *H. undalis*:

A study was also undertaken to estimate the extent of damage on cauliflower crop under prevailing conditions of this area. For these, three farmers fields of cauliflower crop grown in *rabi* season were selected at Joshipura village near Junagadh. Twenty-five plants were randomly selected in each selected field during each observation. Wherein the number of plants infested and total number of head borer larvae were recorded. Observations were repeated at an interval of 10 days till the crop was harvested. The results are presented in Table-2.

During the survey of incidence of *H. undalis* in field and biological studies in the laboratory rearing, it was seen that the first larval stage is mined the leaf lamina and started nibbling the chlorophyll content of the leaves. Usually from second instar it entered the main veins, leaf petioles or stems.

TABLE 2

Incidence of head borer, *Hellula undalis* Fabricius in cauliflower during 1979 in Gujarat.

Date of Observation	Number of larvae		Percentage infested plants
	per 25 plants	per 100 plants	
19 Feb. 1978	17	68	8.00
2 Mar. 1978	26	104	12.00
13 Mar. 1978	45	180	16.00
24 Mar. 1978	52	208	20.00
4 Apr. 1978	36	144	16.00
14 Apr. 1978	34	136	16.00

Whereas, third and fourth instar larvae were invariably feed within the main veins of leaves, petioles or stems of cauliflower. The damaged leaf lamina and veins were papery white in colour and contained larval excreta. The infested plants showed impaired vigour and smaller deformed heads with holes. The secondary fungal infestation and tissue fermentation produced a foul odour.

The results presented in Table-2 revealed that the maximum incidence of head borer larvae were recorded in last week of March. It was also found that this pest damaged 20 per cent of the cauliflower plants. The infestation was so severe that 68 (February) to 208 (March) head borer larvae were ob-

Rawat, R. R., Y. S. Rathore and D. K. Saxena, 1968. Bionomics of *Hellula undalis* Fab. the cabbage borer (Pyralidae: Lepidoptera) at Jabalpur. *Indian J. Ent.* 30 (3) : 235-237.

Sandhu, G. S. and J. S. Bhalla (1973). Biology and control of cauliflower borer. *Hellula undalis* Fab. *Punjab Horti. J.*, 13 (1), 58-62.

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It is to be noted that the extent of damage on conditions of crop and prevailing conditions of the season for the three farmers was of considerable importance in determining the extent of damage to the various crops. The damage to the various crops was of considerable importance in determining the extent of damage to the various crops. The damage to the various crops was of considerable importance in determining the extent of damage to the various crops.

It is a very common mistake to suppose that the history of the United States is a mere chronicle of events. It is not. It is a story of the growth of a nation, of the struggles of a people to create a new and better world for themselves. The history of the United States is a story of the triumph of the human spirit over the forces of darkness and despair. It is a story of the courage and sacrifice of the men and women who have built this great nation. It is a story of the hope and faith that have sustained us through the darkest of times. It is a story of the love and compassion that have made us a people of peace and harmony. It is a story of the dreams and aspirations that have driven us to the frontiers of knowledge and discovery. It is a story of the power of the human mind to create a better world for ourselves and for all mankind. It is a story of the glory and grandeur of the American dream. It is a story of the greatness of the United States of America.