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Bionomical Study of Diamondback Moth on Cauliflower

P.N. Sangale[1], R. S. Yeole[2], S. K. Pawar[3]

[1, 2, 3]Department of Agricultural Entomology, College of Agriculture, Latur-413512, (Marathwada Agricultural University, Parbhani) Maharashtra, India

Abstract: ***The study on biometrics of Plutellaxylostellaon cauliflower was undertaken at the Department of Agricultural Entomology, College of Agriculture, Latur during the year 2015. The mean measurements of larval head capsule width, larval body length,body width and weight of P.xylostellareared on cauliflower was 0.55 mm, 8.10 mm, 1.05 mm and 1.00 mg.***

Keywords: Biometrics,*Plutellaxylostella,* cauliflower

1. Introduction

Among vegetable crops, cruciferous (cole) crops are economically important throughout the world.Diamondback moth (*Plutellaxylostella*Linnaeus), a cosmopolitan pest hampers the successful cultivation of cabbage in the world. It is being a ubiquitous pest, the knowledge of its biometrics is very much essential especially with respect to the influence of geographic location, climate change and host plants.

2. Material and Methods

The studies on biometrics of *Plutellaxylostella*(L.)on cauliflowerwere conducted at the Department of Agricultural Entomology, College of Agriculture, Latur during the year 2015-2016.

Biometrical Studies

The studies on biometrics of *P. xylostella*(L.) were also carried out on cauliflower crop at room temperature. Immediately after hatching fifteen larvae of *P. xylostella*(L.) for each instar were transferred into separate small plastic container. They were reared individually on cauliflower. Every day fresh leaves of the respective host plants were provided to the larvae. The observations on the casting of exuviae were made under microscope. During each instar immediately after moulting, the head capsule width and body length, width and weight of each larva was measured with the help of occular and stage micrometer to the nearest value of 0.0091 mm. The regression relationship between the instar and mean head capsule width, body length, body width and body weight of larvae in different instars was calculated by using the following formula.

$$\text{Log10 } Y = a + bx$$

Where,
Y = Head capsule width / body length / body width /body weight of larva (mean)
a = Constant
b = Logarithm of growth ratio
x = Number of instars

Growth ratio

It was calculated by dividing the mean value of head capsule width / body length / body width / body weight of larval instar by the value of mean head capsule width / body length /body width/ body weight of larva of preceding instar.

Progression factor

It is the average of growth ratio.

3. Result and Discussion

Larval head capsule width on Cauliflower

The results presented in Table 01 revealed that the larvae of *P. xylostella*fed on cauliflower passed through four instars. The larval head capsule width was 0.19 ± 0.01, 0.31 ± 0.01, 0.50 ± 0.01and 0.55 ±0.01 mm for I, II, III and IV instars, respectively. The mean observed and calculated progression factors were 1.44 each.

Parameter	Larval instars				Progression Factor
	I	II	III	IV	
Observed head capsule width (mm) ± S.E.	0.19± 0.01	0.31± 0.01	0.50± 0.01	0.55± 0.01	
Growth ratio	--	1.63	1.61	1.10	1.44
Calculated head capsule width (mm)	0.20	0.45	0.42	0.61	
Growth ratio	--	1.45	1.44	1.45	1.44
Difference	-0.01	0.01	0.07	-0.06	
Per cent difference	-5.26	3.22	14.00	-10.90	

Larval body length oncauliflower

The results presented in Table 02 revealed that the larval body length of *P. xylostella*for I to IV instars reared on cauliflower ranged from 1.43 ± 0.02 to 8.10 ± 0.09 mm. The mean observed and calculated progression factors were 1.79 and 1.78, respectively.

Parameter	Larval instars				Progression Factor
	I	II	III	IV	
Observed larval body length (mm) ±S.E.	1.43± 0.02	2.90 ± 0.05	5.10± 0.07	8.10±0.09	
Growth ratio	--	2.02	1.72	1.60	1.79
Calculated larval body length (mm)	1.51	2.71	4.85	8.60	
Growth ratio	--	1.79	1.78	1.78	1.78
Difference	-0.08	0.18	0.24	-0.46	
Per cent difference	-5.59	6.20	4.70	-5.60	

Larval body widthon cauliflower

The results presented in Table 03 revealed that the larval body width of fourth instar *P. xylostella*when moulted three times was 1.05 ± 0.03 mm. The mean progression factors for observed and calculated values were 1.86 and 1.80, respectively.

Parameter	Larval instars				Progression Factor
	I	II	III	IV	
Observed larval body width (mm) ± S.E.	0.22±0.02	0.28± 0.06	0.88± 0.03	1.05± 0.03	
Growth ratio	--	1.27	3.14	1.19	1.86
Calculated larval body width (mm)	0.20	0.36	0.65	1.17	
Growth ratio	--	1.80	1.80	1.80	1.80
Difference	0.01	-0.08	0.22	-0.12	
Per cent difference	4.54	-28.57	25.00	-11.42	

Larval body weight on cauliflower

The results presented in Table 04 indicated that the larvae of *P. xylostella* reared on cauliflower recorded their body weight to the tune of 0.44 ± 0.04, 0.65 ± 0.09, 0.80 ± 0.10 and 1.00 ± 0.10 mg for I, II, III and IV instars, respectively.

Parameter	Larval instars				Progression Factor
	I	II	III	IV	
Observed larval body weight (mg) ± S.E.	0.44± 0.04	0.65± 0.09	0.80± 0.10	1.00± 0.10	
Growth ratio	--	1.47	1.23	1.25	1.31
Calculated larval body weight (mg)	0.46	0.60	0.79	1.03	
Growth ratio	--	1.30	1.31	1.30	1.30
Difference	-0.02	0.04	0.09	-0.03	
Per cent difference	-4.54	6.15	11.25	-3.0	

The results of the larval body length and width of *P. xylostella* reared on cabbage are in confirmity with the results reported by Bhalla and Dubey (2010) and Hafeez (2012).

BhallaandDubey (2010) recorded the mean measurements of larval body length and width of *P. xylostella* on the cabbage to the tune of 1.34, 3.53, 5.92 and 9.92 mm, 0.20, 0.25, 1.18 and 1.50 mm, for I, II, III and IV larval instars, respectively. According to Hafeez (2012) the larval body length and width of *P. xylostella*on cabbage was found to be 1.25, 3.14, 4.63 and 8.62 mm and 0.17, 0.23, 1.09 and 1.34 mm respectively.

Ooi (1979) reported that in lowlands, the caterpillar of diamondback moth was grown to above 8 mm long, while in the highlands, the larval growth was slightly longer.

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