INNSPUB

Journal of Biodiversity and Environmental Sciences (JBES)
ISSN: 2220-6663 (Print) 2222-3045 (Online)
Vol. 11, No. 5, p. 268-273, 2017
http://www.innspub.net

RESEARCH PAPER OPEN ACCESS

Damage assessment of the pea blue butterfly *Lampides boeticus* L. (Lepidoptera: Lycaenidae) on cowpea (*Vignaung uiculata*)

Nauman H. AL-Janabi, Hameed H. Al-Karboli*

Department of Plant Protection, College of Agriculture, Baghdad University, Iraq

Article published on November 30, 2017

Key words: Pea blue butterfly, *Lampides boeticus,* Damage assessment, Cowpea, Iraq

Abstract

This study was carried out at the fields of the college of Agriculture, university of Baghdad (Al-Jadriya) and Al-Musayyib (Babylon governorate) to study the nature and amount of the damage caused by the pea blue butterfly, *Lampides boeticus* L. on cowpea yield for spring and summer seasons 2016. Results showed that larvae feed on each of the floral buds, flowers, and bods of cowpea plants causing them losses in the quality and quantity of crop yield. Infestation started in June when adult females laying their eggs on these parts, Infestation rates were 24 and 22.6% in Al-Jadriya and Al-Musayyib respectively. Then Infestation rates decreased to 18.66 and 17.80% during August for the tow location above. The highest Infestation rates of 34.66 and 33.33% have occurred during October. Mean Infestation rate rates on floral buds were 26.66 and 24.64 % and 27.53,25.59 % for Al-Jadriya and Al-Musayyib respectively. Percentage of loss in pods weight were (21.40-30.51)% at Al-Musayyib and (15.36-31.38) % at Al-Jadriya during the season thus mean reduction rates in cowpea pod weight, length and seeds/pod were 25.95, 30.45 and 30.75 % respectively.

***Corresponding Author:** Hameed H. Al-Karboli ✉ alkarbolihameed@yahoo.com

Introduction

Cowpea is an important grain legume in the tropics and sub tropics and considered to be an important source of protein food in these regions (Devendra *et al.* 2016; Naveen *et al.*, 2017).

Several insect species are recorded to attack this crop at different stages of growth. The most important of these pests are the pod borers which reported to cause a severe damage and yield loss up to 60% (Sahoo and Senapati, 2002 and Anil *et al.*, 2015).

Pea blue butterfly, *Lampides boeticus* L. is a global insect pest that infests several leguminous crops, such as cowpea, beans, peas, beans and soybeans (Al-azawi *et al.*, 1990; Nebile and Hical, 1991; Mavi, 1992 and Naveen *et al.*, 2017).

Pea blue butterfly, causes a considerable damage to buds, flowers and pods and its reduce the cowpea yield between 60-90% (Durairaj, 2006). Larvae feed on floral buds, flowers and tunnels in pods of the host plants. It reduces the possibility of pod holding and makes tunnels inside pod which affect its quality (Harinath, *et al.*, 2015). When the full-grown larva leaves the pods it leaves a large hole in pods.

L. boeticus cause significant damage to cultivated legumnious crops (Nabire et al., 2003) Nebile *et al.*, (1991) reported that the pea blue butterfly, *L. boeticus* is one of the most important pest attacking legumes in Turkey and caused losses estimated at 42.2% and 33% in cowpea during the growing seasons of 1985 and 1986 respectively.

In Iraq, Al-azawii *et al.* (1990) listed 4 insect species were attacking cowpea which including, pea blue butterfly*, Cosmolyse (Lampides) boeticus*, the leaf miner, *Phytomyz*a *articornis*, *Thrips* sp. and leafhopper, *Empoasca* sp. Science that time the pest status of any of these pests has not been clearly investigated. Recently, cow pea growers complained from a heavy infestation on cowpea pods which we think its attacked by some Lepidopteran species such as *L. boeticus*.

The present study aimed to estimate the nature of damage caused by this insect to cowpea crop as a part of detailed study on its biology and control.

Materials and methods

Preparation of experimental field

The present investigation was carried out during the cowpea growing season 2016/2017 at the College of Agriculture/University of Baghdad/Al-Jadriya and in Musayyib County (Babil governorate). All experiments were laid out according to the complete randomized block design (CRBD), Each field divided to3 replicate consist 3 rows of 3 m long and a spacing of 1 m between rows and 40 cm between plants. Cowpea seeds (Bayder variety) were sown in in15/3/2016 and 15/6/2016 for the Spring and Summer season respectively. All agricultural practices such irrigation, tillage, fertilization and crop service operations were carried out according to the recommendations for crop cultivation (Matlub, 1997).

Estimation of floral buds, flowers, and pod damage

Check control replicates were sprayed with Alpha cypermethrin (0.5ml/L) to prevent infestation by *L. boeticus* every 3 weeks untill the end of the season and used as check control treatment. The percentage of floral buds, flowers and pods from treated and untreated plants were estimated by counting the numbers of floral buds, flowers, pods damaged out of total number from randomly selected 5 plants from each experiment replicates during the season according to the following equations (Anusha, 2013).

Percentage of flowers buds damaged (%)

$$\frac{\text{Number of flower buds damaged}}{\text{Total number of flowers buds}} \text{ x } 100$$

Percentage of flowers damaged (%)

$$\frac{\text{Number of damaged flowers}}{\text{Total number of flower}} \text{ x } 100$$

Pod damage (%)

$$\frac{\text{Number of damaged pods}}{\text{Total number of pods}} \text{ x } 100$$

Estimation of green pods loss

At the time of harvesting, all pods of five randomly selected plants for each replicate were examined and

the weight of 10 treated and untreated pods in (g) to estimate the percentage of loss in pods yield according to the Al- Baraki (2007).

$$\text{Yield loss (\%)} = 1 - \frac{\text{Yield in treatment}}{\text{Yield in control}} \times 100$$

Statistical analysis

Statistical analysis of the research data was done using the program SAS, The differences between treatment means were compared using L.S. D (p=0.05) and Qi-Square (SAS, 2012).

Results and discussion

Percentage of cowpea floral buds infestation

The infestation of the blue butterfly, *L. boeticus* on cowpea floral buds in Al-musayyab and Al-Jadriya regions during the growing season 2016/2017 are presented in Table 1. Pod borer infestation rates ranged between (29.33- 38.67 %) in Al-musayyab and (21.33-37.33 %) in Al-Jadriya.

Table 1. Percentage of cowpea floral buds infestation by pea blue butterfly, *L. boeticus* in the Al-Musayyab and Al-Jadryia regions during the growing season 2016/2017.

Month	% infestation in Al-Mussayab	% infestation in Al-Jaderyia	Mean
June	26.67	22.67	24.67
July	29.33	26.67	28.00
August	22.67	20.00	21.33
September	36.00	34.67	35.33
October	38.67	37.33	38.00
November	29.33	21.33	25.33
Mean	30.44	27.11	
L.S.D	Regions	Months	Interaction
(P< 0.05)	1.696	2.938	4.155

There were significant differences in the means of floral bud infestation rates which is 27.11% in Al-Jadriya and 30.44% in Al-Musayyab regions. The highest rate of infestation of 38.67% was recorded during October for two regions respectively. In general, floral infestation rates for the two regions showed a higher infestation during the summer plantation than for spring season.

Percentage of cowpea flower infestation

The data of the percentage of the flower damaged have been presented in Table 2, Much similar to the results of floral buds infestation, There were a significant differences in the means of the monthly rate of infestation and the total percentage of the flowers infestation for spring and summer seasons during the growing season between the two regions, The highest flower infestation of 37.33% and 36.00% was recorded during October in both regions, and the lowest during the Summer plantation. The mean rate of infestation during the growing season were slightly higher in Al-musayyab (27.56%) compared with (25.56%) in Al-Jadriya. Usually, Al-Mussayib famous with its cowpea fields which occupy most of agricultural lands through the season, compared with Al-Jaderyia were most lands are orchids; This will make required food for the growth and development of the pod borer available during the whole season. In a similar study in India, Anusha (2013) reported the least flower damage was 19.62% on cowpea genotype C-125, which were superior over other 5 cowpea genotype tested. The highest losses were 34.89% on the genotype PGCP-6.

Table 2. Percentage of Cowpea flowers infestation by pea blue butterfly, *L. boeticus* in Al-Musayyib and Al-Jaderyia regions during the growing season 2016/2017.

Month	% infestation in Al-Mussayb	% infestation in Al-Jaderyia	Mean
June	25.33	21.33	23.33
July	28.00	26.67	27.33
August	21.33	18.67	20.00
September	34.67	33.33	34.00
October	37.33	36.00	36.67
November	18.67	17.33	18.00
Mean	27.56	25.56	
L.S.D	Regions	Months	Interaction
(P< 0.05)	1.730	2.996	4.238

Percentage of cowpea pods infestation

The results in Table 3 indicate significant differences in the pod percentage rate of infestation in Al-Mussayab and Al-Jadryia regions, the mean pod infestation rates were 26.67 and 24.67 % respectively. As the results of infestation rates of floral buds and flowers above.

The monthly infestation of the two regions also varied, with the highest rate during October for both areas which reached 38.66 and 37.33% respectively. A similar result of cowpea pod infestation of (40%) was observed in Egypt by Copr (1981). Also, feeding of the blue pea butterfly larvae inside pods may cause an accumulation of larval waste and fungal infection which the marketing value of the crop (Ajeigbe and Singh, 2006).

Table 3. Percentage of Cowpea pods infestation by pea blue butterfly, *L. boeticus* in the Al-Musayyab and Al-Jaderyia regions during the growing season 2016/2017.

Month	% infestation in Al-Mussayb	% infestation in Al-Jaderyia	Mean
June	24.00	22.67	23.33
July	26.67	24.00	25.33
August	18.67	17.33	18.00
September	33.33	32.00	32.67
October	34.67	33.33	34.00
November	22.67	18.67	20.67
Mean	26.67	24.67	
L.S.D (P< 0.05)	Regions 1.503	Months 2.603	Interaction 3.682

Effect of infestation on yield of cowpea

Results in Tables 4 and 5 indicate the percentage of losses in pods weight due to infestation by the pea blue butterfly, *L. boeticus* in the fields of Al-Musayyib and Al- Jadriya during the growing season. The yield data on weight basis (g) showed that plants under protection significantly out yielded the plants that were untreated. the mean yields per 10 plants of protected and unprotected were 55.76 and 40.81 in Al-Musayyib and 62.70, 46.97 (g) in Al-Jadriya respectively.

Table 4. Mean weight of 10 pods from treated and untreated plots under field infestation by blue pea butterfly, *L. boeticus* during the growing season 2016/2017.

Month	Al-Mussayb		Al-Jaderyia	
	Treated	Untreated	Treated	Untreated
June	46.16	33.83	54.17	45.93
July	55.73	43.83	59.93	48.20
August	45.50	34.80	56.70	45.40
September	59.66	44.43	69.00	47.90
October	65.60	46.13	69.87	48.83
November	61.93	43.03	66.46	45.60
average	55.76	40.81	62.70	46.97
L.S.D	3.09	2.20	1.90	2.28

Table 5. Percentage of losses on the pod cowpea due to infestation blue pea butterfly *L. boeticus* in the Musayyib and Jadriya regions.

Month	% Losses in Al-Mussayb	% Losses in Al-Jaderiya	Qi square value
June	26.71	15.30	5.174 *
July	21.40	19.58	0.773 NS
August	23.51	19.92	0.894 NS
September	25.52	30.57	1.182 NS
October	29.67	30.21	0.041 NS
November	30.51	31.38	0.046 NS
Overall average	26.22	24.49	–––
Qi square value	4.281 *	6.026 *	---

NS: Non Significant, * (P<0.05), ** (P<0.01).

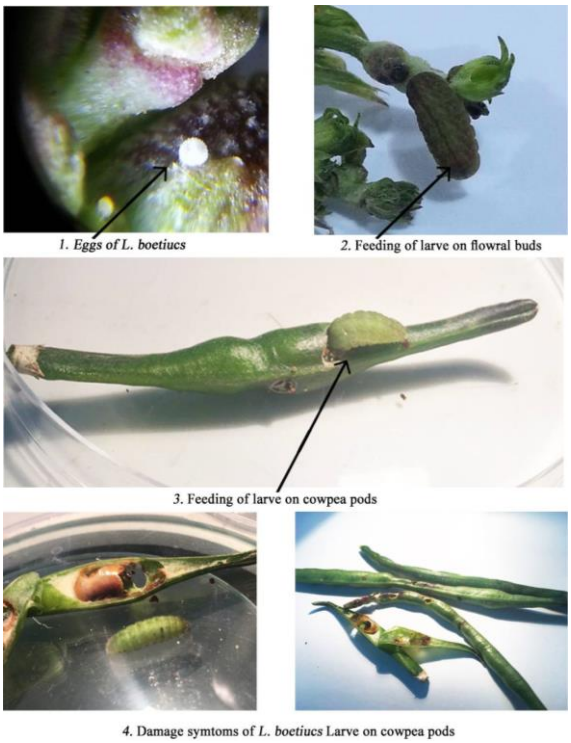

Fig. 1. Laying eggs on floral buds, feeding, and damage of larvae of *L. boeticus* on cowpea pod.

There were a significant differences between the two regions only at the beginning of the spring season in June were the percentage of pod loss were 26.71 and 15.30% respectively. Then the percentage of pod loss increased gradually in both regions without any significant differences were percentage of pod loss ranged between (21.40-30.51) and (19.58 -31.38) % for the two regions respectively. Also the highest losses were in summer season during the months of October and November. Results also indicated that the loss in pods weight was higher and significant during the summer season.

Singh (2003) estimated a very high percentage of pod loss in cowpea due to *L. boeticus* infestation in India were pod loss reached 65.89%.

References

Ajeigbe HA, Singh BB. 2006. Integrated Pest Management in Cowpea: Effect of Time and Frequency of Insecticide Application on Productivity. Crop Protect **25(9)**, 920-925.

Al-azzawi AF, Ibrahim KQ, Haydar SA. 1990. Economic Entomology, College of Agriculture, University of Baghdad, Al-Hikma Printing Press 651 p.

Al-Baraki AK, Abdul Nabi B, Mohammed AS. 2007. Preliminary study of damage proportion cuased by legume-pod boror *Etiella zinckenella* (Treit) (Lepidoptera: Pyralidae) in some Cowpea (*Vigna Sinensis*) fields in countryside of damascus and qunaiterah. The Arab Journal for Arid Environments **3(1),** 12-19.

Anil PK, Keval A, Yavda A. 2015. Population dynamics of legume pod borer, *Maruca vitrata* (Geyer) and blue butterfly, *Lmpides boeticus* L. on short duration pigon pea, Res. Environ. Life Sci **8(4)**, 777-778.

Anusha C. 2013. Varietal screening, loss estimation, and management of cowpea pests, Ph. D. Thesis, University of Agricultural Sciences, Dharwad 84 p.

CoPR. 1981. Pest control in tropical grain legumes. London. (Centre for overseas research). UK.

Colvin M. 2014. Rearing the Long-tailed Blue - Personal Observations Dekker. Inc. New York 447-612.

Deshmush AY, Kan MI, Kande D. 2003. Seasonal incidence of pigon pea pod borers under *Akola conditions* (Maharashtra), Insect Environment **9(30)**, 127-128.

Devendra KY, Sachan SK, Singh G, Singh DV. 2016. Insect pests associated with pigon pea variety UPAS 120in western Uttar Pradesh, India, Plant Archives **16(1)**, 140-142.

Durairaj C. 2006. Evaluation of ceratin Neem formulations and insecticides against pigon pea pod fly, Indian J. of pulses Research **19,** 269-270.

Harinath P, Suryanarayana K, Venkata R, Purushottam S. 2015. Eco-biology and life cycle of the pea blue butterfly, *Lampides boeticus* (Linnaeus) (Lepidoptera: Rhopalocera: Lycaenidae) from Southern Andhra Pradesh, India. S. Asian J. Life Sci **3(1)**, 14-21.

Matlub AN. 1979. Practical vegetable crops, University of Baghdad, Dar Al-kutub for printing and publishing, Iraq, 242 p.

Mavi GS. 1992. Acritical review on distribution and host range of *L. boeticus* L., J. Insect Science **5(2)**, 115-119.

Nabirye J, *et al.* 2003. Farmer-participatory evaluation of cowpea integrated pest management (IPM) technologies in Eastern Uganda. Crop Protection **22**, 31- 38.

Naveen AS, Jayalaxmi NK, Shivanna KB, Chaitanya HS. 2017. Field reactions of cowpea genotypes against pod borers in cowpea, J. Entomology and Zoology Studies **5(6),** 700-703.

Nebile K, Pervin H. 1991. Researches on biological properties and control measures of *Lampides boiticus* L. (Lepidoptera:Lycandae) and *Etiella zinkenella* Tr. (Lepidoptera: Pyralidae) which cause damage on cowpeas in Aegean Region. Turk. Entomo. Derg **15(1),** 51–60.

Sahoo BK, Senapati. 2002. Effect of pod characters on the incidence of pod borers in pigonpea, Journal of Applied Zoological Research **13**, 10-13.

SAS. 2012. Statistical Analysis system, users Guide. Statistical version 9. 1th Ed. SAS. Inst- Inc. Cary N. C. USA.

Singh J, Mavi GS. 1984. Chemical control of pea blue butterfly *Lampides boeticus* on pea. Journal of Research Punjab Agricultural University **21(3),** 386-3.

Singh K. 2003. Estimation of losses, Management of insects pests of Mug bean (*Vigna radiate* L. Wilczek, Determination of economic threshold against the Lycaenid borer, *Lampides boeticus* L. Thesis, Mahrana Pratap University of Agriculture and Technology, Udairpur, 146p.