

Seasonal abundance and the effect of sowing date on infestation of the pea blue butterfly, *Lampides boeticus* L. on cowpea *Vigna unguiculata* Walp. In Iraq*

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Abstract--A field experiment was carried out at the College of Agriculture/ University of Baghdad to study the seasonal incidence and effect of the sowing date in the infestation of the pea blue butterfly, *Lampides boeticus* L. Results showed that adults began to appear during the first week of June, where the number of eggs and larvae were 4 and 3 per 5 plants respectively, then began to increase gradually to its first peak of 8 and 7 per 5 plants in mid-July. The second peak reached 12 and 9 per 5 plants respectively during the middle of October. The infestation began after about 7 weeks of sowing, with infestation rates reaching 10.93 and 24.83%. As for the summer sowing time, it increased during the months of September, October and November to reach a second peak of 27.33, 38.33 and 29.47%, respectively, and its general rates were less than 18.04%, which significantly different from the spring sowing season. The overall rates of loss during the spring season were 31.88%, which is significantly different from the 26.92% during the summer season. The losses caused by the insect during the spring season are higher. The use of these results in the control program for this pest was discussed.

Keywords— pea blue butterfly, *Lampides boeticus*, cowpea seasonal incidence, Iraq .

I. INTRODUCTION

Cowpea, is an important crop grown in different parts of the world, its covering 4.64 million ha and an annual production rate of 3.43 million tons. Insect pests are the most important determinants of crop production. Pod borers are the most important of these pests and cause significant losses (Reddy, 1973). Deshmukh *et al.* (2003) noted that the amount of loss caused by Pod borers on Cowpea ranged from 48.75 to 58.75%. *L. boeticus* is an important pest on legumes and its native habitat is Africa (Lohman *et al.*, 2008)

which causes a losses of 15.43%. Legume Pod borers causes damage to buds, flowers and pods. It was found in India that the insect appears during the last week of November to the beginning of March Cowpea, where females lay eggs individually or in groups of (2-3) eggs on flower buds, green pods and sometimes on some leaves and stalks and the eggs hatching during 4- 7 days for larvae fed on floral buds ,pods and transform to pupa after 9-27 days according to the ambient temperature (Bandey *et al.*, 2015) The seasonal incidence of *L. boeticus* in India has been studied by many researchers such as (Bandey *et al.*, 2015 and Kathore *et al.*, 2017). The results indicate that there is one peak of *L. boeticus* in India. Pea blue butterfly concedes as important pest on cowpea in Turkey (Nebeil *et al.*, 1991) ,losses have been estimated at 42.2 and 33% in 1985 and 1986 respectively. *L. boeticus* was first recorded as a pest in 2001 by (Shantibala *et al.*, 2001) with infestation rates of 26% and 24.38% for the period between 1999-2000. In India, Lagginayar *et al.* (1990) found that the lowest densities of pod borers, including *L. boeticus*, were found during the first week of October, with rates of infestation and damage to seeds and pods lower than other planting dates. Due to the importance of this insect and the absence of any previous studies in Iraq, This study was carried out to study the seasonal incidence and the impact of the date of sowing in the Population density and infestation of the insect and the possibility of using this information in the control programs for this pest in future.

II. MATERIALS AND METHODS

The experiment was conducted in two fields, the first one in field of Agriculture College / University of Baghdad, Al-Jadriya and the second field in Musayyib county (Babil governorate) with 1/8 ha area. Each All agricultural practices

carried out such as tillage, softening, fertilization, irrigation and crop service operations according to the recommendations for crop cultivation (Matlub,1997). Each field divided into rows of 3 m long in spacing of 1 m between rows and 40 cm between plants. All experiments were laid out according to the complete randomized block design (CRBD). The spring sowing date was on 15/3/2016 and the summer was on 15/6/2016. After germination, a random sampling program of five plants per replicate established, in order to estimate the number of eggs and larvae, during spring and summer planting on floral buds and pods. The infected plant parts were cut by pruning shears and then collected in polyethylene bags and transferred to the laboratory to perform the examination using a simple microscope and a magnifying lens (2X) and recording the number of eggs and larvae on them.

III. RESULTS AND DISCUSSION

3.1 Seasonal abundance of pea blue butterfly

L. boeticus

Fig. 1" indicates that the insect began to appear during the first week of June when the number of eggs and small larvae reached 4 and 3 per 5 plants when the minimum and maximum temperatures were 17 and 44 C°, respectively "Fig. 2" Then these numbers started to increase gradually due to the increasing in the size and number of pods on the plants, allowing a larger number of insect laying eggs, hatching and attacking the floral shoots and pods until it reached its peak in mid-July, where the number of eggs and larvae were 8 and 7 per 5 plants respectively, The minimum and maximum temperature is 28 and 48 C°. Then number of eggs and larvae began to decrease gradually during August, because of the high ambient temperature (more than 50 C°), which negatively affects the movement of adults and the growth of plants in the field as well as in the formation of new flower buds and non-fruits holding. The number of

eggs and larvae reached their lowest level as they reached in mid-August 3 and 2 per 5 plants, respectively. At the beginning of September, as the temperature decrease to 40 C°, new buds grow on the plants. The numbers began to increase gradually during September and October to reach the highest peak in mid-October, as the number of eggs and larvae were 12 and 9 per 5 plants. These numbers decreased gradually during November and December to reach the lowest level at the end of November, reaching 2 and 3 per 5 plants respectively, due to the low ambient temperatures and poor quality of plants during this period, which represents the end of the season. Where the eggs and larvae and bugs from the field disappeared with the first wave of cold temperatures reached to about zero centigrade, which led to the death of the plants and the absence of any of the stages of the insect in the field. It can be deduce from the study that insect adults began to appear in the field with the beginning of the formation of floral buds during the beginning of June, as well as the insect have two peaks during the season. The numbers during the second peak were higher than the first, this is reflected on the number of larvae that are formed during this generation, where the damage is expected to be higher and requires monitoring and taking the necessary control measures. In similar studies conducted by Rathore et al,(2017) in India on the seasonal incidence of *L. boeticus* on cowpea crop, it was found that the number of larvae began with 0.75 larvae per 5 plants at the end of September, and then started to increase gradually until reaching a peak of 2.25 larvae per 5 plants in mid-October, and there was no significant effect of ambient temperature and humidity in the insect population. Ameta and Bhardwaj (1995) found the same results, although ambient temperature had a positive and insignificant effect, while moisture had a reverse effect in the insect population.

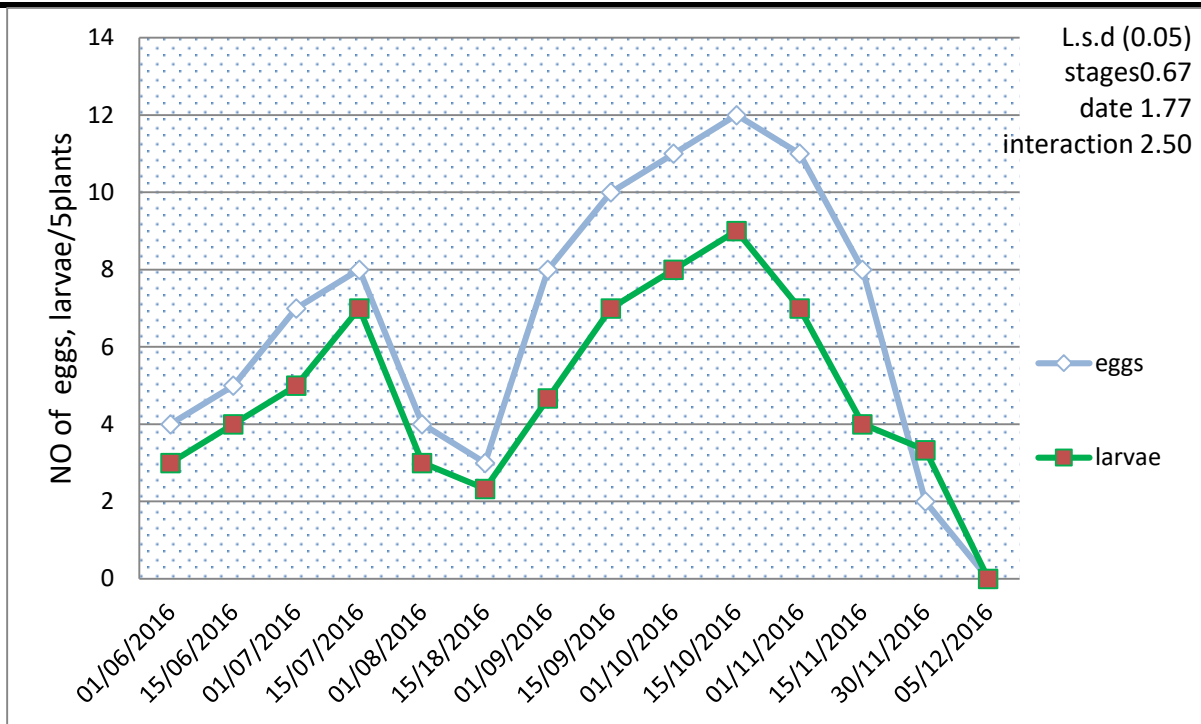


Fig.1: The seasonal abundance of blue pea butterfly, *L. boeticus* during the growing season/ 2016

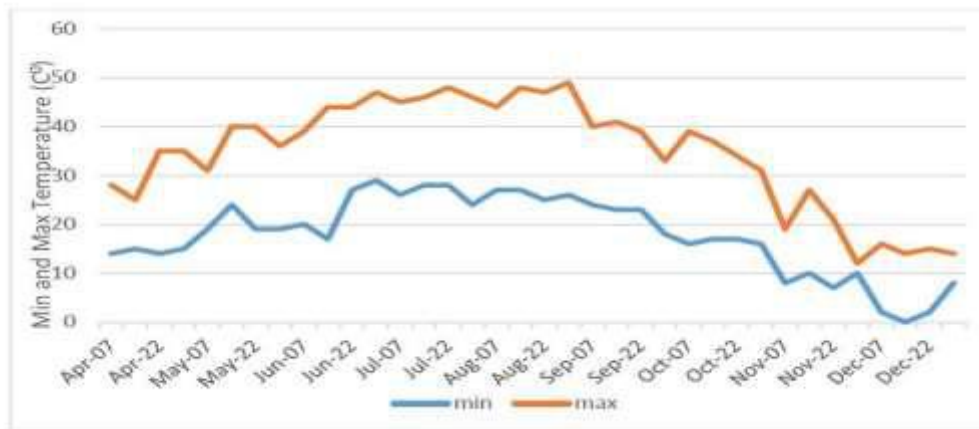


Fig. 2: Minimum and maximum (C°) recorded during April – December /2016

3.2 Effect of sowing dates on infestation by blue pea butterfly, *L. boeticus*.

The results shown in Table 1 indicate the percentage of *L. boeticus* infection during the spring and summer sowing dates of the 2016 season. The rate of infection during June was 10.93% after 45-50 days of germination, reached 24.83% during July, with a significant increase in the rate of June. Then began to decline by 50% during August because

of the high ambient temperatures during July and August. Its effects on the growth of the plants and may have an important impact on the process of pollination and holding fruits as well as their effects on the activity of the insect. The rate of infection increased gradually until it reached 27.83% due to the decrease in ambient temperature and the emergence of new growths on the cowpea plants. The infection continued to increase, reaching a peak of 36.83%

during October and then decreased to 30.50% in November, the general rates of infestation during the spring sowing date were 23.81%.

For the summer sowing date, the infection rate was slightly lower during August, at 13.11%. As in the spring season, the infection rates increased during September, October and November, reaching 27.83, 38.33 and 29.47%. Closest to the spring season, but the general rates were lower and differ

significantly from the spring date, reaching 18.04%. It can be concluded from this experiment that the overall rates of infection during the summer time are less and differ significantly from that for the spring time, and the highest rate of infestation occurred during October in the two sowing dates and the overall rates of infestation ranged between (18.04 - 23.81%).

Table.1: The effect of sowing dates on infestation by blue pea butterfly, *L. boeticus*.

Sowing season	Percentage of infestation						Overall average
	June	July	August	September	October	November	
Spring	10.93	24.83	12.43	27.83	36.83	30.50	23.81
Summer	----	----	13.11	27.33	38.33	29.47	18.04

L.s.d date 0.328

L.s.d Months 0.569

L.s.d Interaction 0.804

3.3 Effect of sowing dates of cowpea on the *L. boeticus* infestation and yield of cowpea

Table (2) shows the percentage of cowpea yield in the spring and summer seasons / 2016. The percentage of loss in the spring season in June was 27.58%, which is significantly different from the 37.59% loss during July, then it has decreased significantly to 16.66% during August, because of the high ambient temperature in this period and its effects on the growth of plants and insect activity. The percentage of losses increased in the following months: September, October and November reaching 35.24, 37.50 and 36.76%, respectively, with no significant differences between them. In general, the overall rate of loss during the spring season reached an average of

31.88%. While in the summer season, it was low during August, which reached 13.15%, and began to increase during September and October to 27.41 and 25.52% and then dropped to 21.80% in the end of the season and the overall rates (21.97%) differ significantly from that in the spring season.

The results in Tables 1 and 2 show that there is a correlation between the rate of infestation and the amount of loss caused by the insect. Based on these results, the losses caused by larvae are higher during the spring season than the summer season. The general rates of loss are 26.92%. Therefore, it can be considered as important insects on the crop. Measures should be taken to reduce the damage caused by this pest.

Table.2: Effect of sowing dates in the *L. boeticus* infestation on cowpea yield

Month	% Losses in spring season	% Losses in summer season	Qi square value
June	27.58	----	---
July	37.59	----	---
August	16.66	13.15	NS 0.783
September	35.24	27.41	NS 0.692
October	37.50	25.52	* 4.966
November	36.76	21.80	* 5.318
Overall average	31.88	21.97	* 4.257
Qi square value	** 9.271	** 6.085	---
.(P<0.01) **, (P<0.05) *			

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