International Journal of Theoretical & Applied Sciences, 8(2): 29-32(2016)

ISSN No. (Print): 0975-1718
ISSN No. (Online): 2249-3247

A Study on Larval Population and Pod Damage due to *Helicoverpa armigera* in Pigeon pea under Eastern Uttar Pradesh Conditions

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(Received 11 May, 2016 accepted 20 July, 2016)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: A study was conducted to survey the incidence and extent of pod damage due to gram pod borer *(Helicoverpa armigera)* in eastern Uttar Pradesh conditions for two consecutive years, 2012-13 and 2013-14. Two districts, Gorakhpur and Siddharthnagar were considered for survey work. Larval incidence were recorded 45th S.W. (Standard Week) onwards, while pod damage per cent at harvesting stage of the crop. The pooled data for both the districts and years exhibited a population fluctuation of 0.42 Larvae/10 plants (3rd S.W.) to 8.82 Larvae/10 plants (10th S.W.). Peak population (>7 Larvae/10 plants/week) were noticed between 8th to 10th S.W., the vulnerable podding stage of the crop. The extent of infestation was much variable between the villages and blocks of both the districts. Average pod infestation was 47.80% and 48.78% recorded in district Gorakhpur and Siddharthnagar respectively. Pooled data of the investigation regarding the extent of pod damage due to *H. armigera* in pod samples collected from farmer's fields of different villages, blocks and districts showed an average of 48.29% pod infestation.

Key words: Gram pod borer (*Helicoverpa armigera*), Pigeonpea, Survey, Incidence, Infestation.

I. INTRODUCTION

The gram pod borer (*Helicoverpa armigera*) is one of the major limiting factor in successful cultivation of pigeonpea. It is the present throughout the year completing up to seven generations by feeding on 181 cultivated and wild plants species from 45 families in India [1] and now estimated to cross over 200 hosts [2] *Helicoverpa* causes heavy losses up to 60 per cent with an annual loss estimated to be US $ 400 Million in pigeonpea. Lingappa and Yelshetty, [3] also caused incurred a loss of more than Rs. 400 crores. Sometimes their infestation level is so high that farmers don't get return even whatever they spend on seeds. The key pest status of *H. armigera* is due to the larval preference for feeding on plant parts rich in nitrogen such as reproductive structure and growing tips [4]. It is estimated that the infestation of one larva per plant on pigeon pea can cause yield loss of 1015 kg/ha [5]. The extent of losses due to *H. armigera* on pigeon pea are often highly variable across the localities. Since, cropping system play an important role in population build-up of proper insect-pest. Hence, proper survey of *H. armigera* on their incidence, peak period of infestation and extent of damage is needed for devising suitable management strategies in this part of eastern Uttar Pradesh.

II. MATERIALS AND METHODS

A study was conducted to survey the incidence and extent of pod damage due to gram pod borer *H. armigera* in eastern Uttar Pradesh conditions in pigeon pea in two consecutive years. 2012-13 and 2013-14. Two districts "Gorakhpur" and "Siddharthnagar" were considered for survey work. Three blocks of each district Sahajanva, Khajani & Brahampur (Gorakhpur) and blocks Mithwal, Bansi & Khesraha (Siddharthnagar) and three villages of each block were selected where pigeon pea grown extensively. 3-4 farmers' field from each village were used for sampling. Thus, observations were recorded from 72 farmer's field of 18 villages.

Larval populations were recorded from very beginning right from vegetative growth up to near harvest the crop. Randomly 10 plants from each field of selected villages of different blocks were observed at weekly interval. The collected data on larval population from each block/week were pooled as weekly population (Av. no. of larvae/10 plants/week).

Observations on pod damage per cent were recorded at the time of maturity of pigeon pea. About 300-500 pigeon pea pods were collected from each farmer field by striping 3-4 twigs of 8-10 plants randomly from five different places of crop field.

The healthy pods and pods damaged by *H. armigera* larvae were separated and counted. The per cent damage of pod were calculated on the basis of healthy and damaged pod counted earlier. The data obtained on pod damage percentage from farmer's field of each village of particular block of respective districts were pooled thereafter. Finally, the precise data on pod damage per cent due to *H. armigera* of each district was pooled to know the extent of damage.

III. RESULTS AND DISCUSSION

It is evident from pooled data for both the districts and years (Table 1) exhibited a population fluctuation of 0.20 larvae/10 plants (4th S.W.) to 8.82 larvae/10 plants (10th S.W.). At incidence 0.92 larvae/10 plants was noticed, thereafter declined gradually in subsequent weeks and reached its minimum (0.20 larva/10 plants) during 4thS.W. A sudden increase in larval population (2.28 larvae/10 plants) was recorded in 5th S.W. which increased subsequently and reached its peak (7.08 larvae/10 plants) during 10th S.W., followed by decreased gradually near harvest. The incidence pattern of larvae showed as it was minimum during cooler weeks coincided with the pre-flowering stage, while it was maximum during warmth weeks (March) coincided with complete podding stage. Similar to present study, Kumar *et al.* [6] also reported larval population of *H. armigera* per plant gradually increased from February (7th S.W.) till first half of April (13th S.W.).

Table 1: Larval population of *Helicoverpa armigera* during 2012-13 and 2013-14 (Pooled).

Standard week	Average no. of larvae/10 plants/week		Average
	District Gorakhpur	District Siddharthnagar	
46	1.08	0.76	0.92
47	0.96	0.92	0.94
48	1.20	0.10	0.65
49	0.74	0.46	0.60
50	0.92	0.22	0.57
51	0.82	0.02	0.42
52	0.62	0.16	0.39
1	0.46	0.38	0.42
2	0.36	0.22	0.29
3	0.36	0.48	0.42
4	0.32	0.08	0.20
5	2.16	2.40	2.28
6	2.14	3.60	2.87
7	4.92	4.72	4.82
8	5.74	5.38	5.56
9	7.74	7.36	7.55
10	8.78	8.86	8.82
11	7.58	6.84	7.21
12	3.70	2.50	3.10
13	0.88	0.62	0.75

Table 2: Extent of damage in pigeon pea due to *H. armigera* in different blocks of district Gorakhpur during 2012-13 and 2013-14 (Pooled).

Different plots	Percent pod damage in different blocks		
	Sahajanva	Khajani	Brahampur
P1	25.88	48.20	52.08
P2	16.18	72.60	25.40
P3	70.20	30.28	42.80
P4	29.40	48.40	36.21
P5	65.40	30.86	48.43
P6	39.40	28.80	60.41
P7	42.20	65.74	37.43
P8	60.80	40.20	48.70
P9	58.20	26.40	19.20
P10	89.20	65.60	38.24
Av.	49.68	45.70	40.89

Pooled data related to pod damage per cent presented in Table 2 and 3, the pigeon pea growing villages of different blocks of district Gorakhpur and Siddharthnagar showed variable extent of infestation due to *H. armigera*. Among the three blocks of district Gorakhpur under investigation the maximum pod damage due to *H. armigera* was recorded in Sahajanva block (49.68%), followed by Khajani (45.70%), and Brahampur (40.89%). Different blocks of district Siddharthnagar under investigation the pod damage in pigeon pea was recorded maximum from Mithwal (53.15%), followed by Khesraha (52.04%), and Bansi (48.26%). Yelshetty and Siddegowda [7] reported that pod borer incidence 90-100%.

Table 3: Extent of damage in pigeon pea due to *H. armigera* in different blocks of district Siddharthnagar during 2012-13 and 2013-14 (Pooled).

Different plots	Percent pod damage in different blocks		
	Mithwal	Bansi	Khesraha
P1	53.19	62.44	58.85
P2	70.20	56.20	45.37
P3	38.34	30.34	80.24
P4	60.13	38.39	42.25
P5	60.20	60.01	60.38
P6	81.21	27.37	41.40
P7	50.34	60.20	55.60
P8	48.43	64.80	40.30
P9	32.42	39.40	45.30
P10	37.11	43.49	50.80
Av.	53.15	48.26	52.04

Table 4: Extent of Pod damage in pigeon pea due to *H. armigera* in eastern U.P.: (A Summary).

District	Year	Pod damage (%)
Gorakhpur	2012-13, 2013-14 (Pooled)	45.42
Siddharthnagar	2012-13, 2013-14 (Pooled)	51.15
Grand Mean		48.28

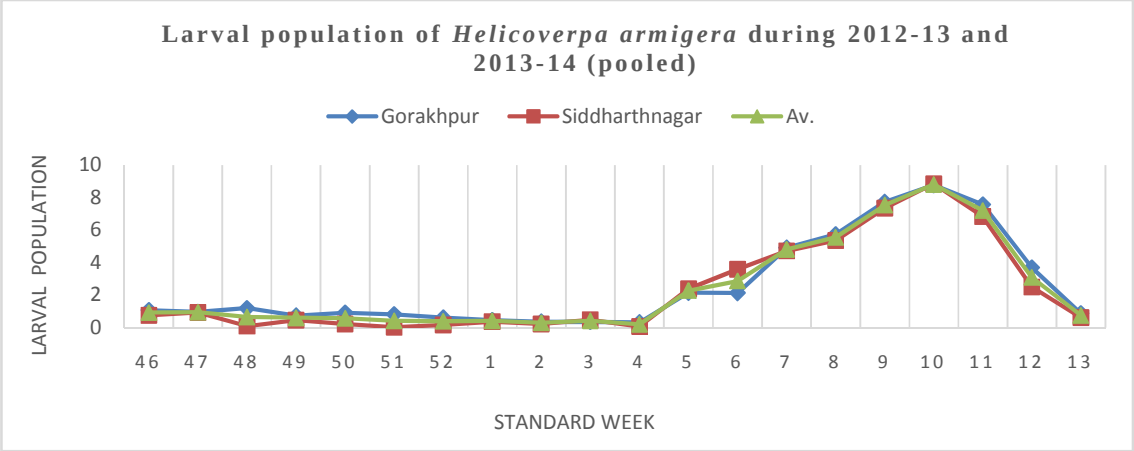

Fig. 1.

To get desired results, data on extent of pod damage due to *H. armigera* under different blocks of both the districts were pooled (Table 4). The table indicated 45.42% pod damage in district Gorakhpur, while it was 51.15% in district Siddharthnagar. Overall, investigation for two consecutive years regarding the extent of pod damage due to *H. armigera* in pod samples collected from farmer's fields of different villages, blocks and districts showed an average of 48.28% in this part of eastern Uttar Pradesh in pigeon pea.

It is apparent from data that none of the pigeon pea field in different villages, blocks and districts was found free from pod infestation due to *H. armigera*. It indicates the severity of *H. armigera* in this part of eastern U.P. in pigeon pea. The extent of infestation was much variable within the villages and between the blocks of both the districts. Present findings are in accordance with the findings of Ahmad and Rai [8] who reported a maximum of 48% pod damage in Sumerpur block of district Hamirpur, 88.89% in Satara block of Kanpur Dehat district with 56.20% average pod damage and 98.1% in Jahanabad block of district Fatehpur with an average of 30.49% pod damage.

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