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E-mail: bjisir07@gmail.com

Incidence and Damage Severity of Pod Borer, *Helicoverpa armigera* (Hubner) in Chickpea (*Cicer Arietinum* L.)

M. Altaf Hossain^a, M. Azizul Haque^b and M. Z. H. Prodhan^a

^aRegional Agricultural Research Station, Bangladesh Agricultural Research Institute, Ishurdi, Pabna, Bangladesh and ^bDepartment of Entomology, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Abstract

Incidence, population fluctuations and damage severity of pod borer, *Helicoverpa armigera* (Hubner) chickpea was studied at Regional Agricultural Research Station, Ishurdi, Pabna, Bangladesh during rabi crop seasons of 2003-04 and 2004-05. The incidence started in 2nd to 4th week of January irrespective of sowing dates. The borer population fluctuated depending on the dates of sowing. Pod borer population was higher in the early sown crops (October 15 to November 01) and with delayed the dates of sowing from November 01 to 30 population was decreased and then increased again. It was observed that both the early (October 15 to November 01) and late sown (December and onward) crops received higher pod borer damage and produced lower yield. But mid sown (November 08 to 30) crops received less pod borer damage and produced higher yield. Hence, for ensuring higher yield with less pod borer damage, chickpea should be sown within the range of November 08 to 30 and the best date of sowing seems to be November 15.

Key words: Chickpea, Pod borer, Population fluctuation, Damage severity, Yield.

Introduction

Chickpea (*Cicer arietinum* L.) also known as gram, is one of the important pulse crops in Bangladesh. It is generally grown under rain-fed or residual soil moisture conditions in rabi season. Chickpea is attacked by eleven species of insect pests (Rahman *et al.*, 1982). Among these pests, the pod borer, *Helicoverpa* (= *Heliothis*) *armigera* (Hubner) is a major and most serious one in most of the chickpea growing areas of the country (Begum *et al.* 1992). Pod borer has become the major threat in chickpea production. Rahman (1990) reported that average 30 to 40 per cent pods were found to be damaged by pod borer and caused average of 400 kg/ha grain loss. In favourable condition to pod borer, pod damage goes 90-95 per cent (Shengal and Ujagir 1990; Sachan and Katti 1994). A single caterpillar of this pest can damage 25-40 pods (Sanap and Deshmukh 1987).

Farmers have become reluctant to cultivate chickpea due to his susceptibility to pod borer. Information on the incidence, population fluctuation and damage severity of *H. armigera* are not available in Bangladesh. But it is essential to find out the incidence, population fluctuation and damage severity of the pest for developing an IPM approach. So, the work was conducted to study the seasonal incidence, population fluctuation

and damage severity of chickpea pod borer for developing its management package.

Materials and Methods

Experiments were conducted at Regional Agricultural Research Station, Ishurdi, Pabna, Bangladesh during rabi seasons of 2003-04 taking 6 sowing dates interval of 15 days within October 15 to January 15. To fine tune optimum period of sowing in relation to minimum pod borer damage with higher yield the experiment was repeated in 2004-05 with taking 6 sowing dates interval of 7 days within October 25 to November 30.

The experiments were laid out in randomized complete block design (RCBD) with three replications. The treatments were randomly allotted in each block. The unit plot size was 3m x 4m with a distance of 100 cm between the plots and 150 cm between the replications. The seeds of BARI-chola 5 of chickpea were sown in rows with the spacing of 50 cm. The populations of the plants were maintained constant by keeping plant to plant distance of 10 cm.

*Corresponding Author, Email: kamal_asm@yahoo.com

The chickpea plants of different sowing dates were closely examined at regular intervals commencing from germination to harvest. The data on the first appearance of pod borer in the field were recorded. Pod borer population per plant was recorded at weekly intervals from the randomly tagged 16 plants in central rows of each plot starting from flowering to pod maturity.

At maturity, all the pods were collected from 10 randomly selected plants from middle rows of each plot and examined. The damaged (bored) and total numbers of pods were counted and the per cent pod damage was determined using the following formula:

$$\% \text{ Pod damage} = \frac{\text{Number of damaged pods}}{\text{Total number of pods}} \times 100$$

The crops of middle four rows, avoiding border rows, of each plot comprising 8m² (2m x 4m) area was harvested. The pods were then threshed; grains were cleaned and dried in the bright sunshine. The grain yield obtained from each plot was converted into per hectare.

The experimental data were analyzed by MSTAT-C software. The percent data were transformed by square root transformation for statistical analysis. Mean comparisons for treatment parameters were compared using Duncan's Multiple Range Test (Steel and Torrie, 1960) at 5% level of significance.

Results and Discussion

Effect of sowing dates on the incidence pod borer population

Pod borer incidence and its population fluctuated depending on the dates of sowing. In 2003-04 cropping season, first incidence of pod borer was observed both on October 15 and November 01 sown crops in second week of January. The highest pod borer population was observed on October 15 sown crop then it decreased gradually with delaying dates of sowing upto November 30. Afterwards, pod borer population increased again gradually (Fig. 1).

During cropping season of 2003-04, first incidence of pod borer was observed on both of October 25 and November 01 sown crops in last week of January. The highest pod borer population was observed on October 25 sown crop then it decreased gradually with delaying dates of sowing upto November 15. Afterwards, pod borer population increased again slightly (Fig. 2).

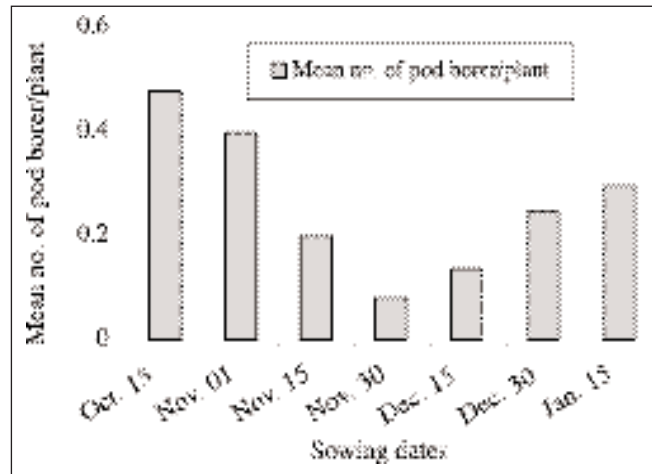


Fig. 1 Incidence of pod borer in chickpea during rabi 2003-04 at RARS farm, Ishurdi, Pabna Bangladesh.

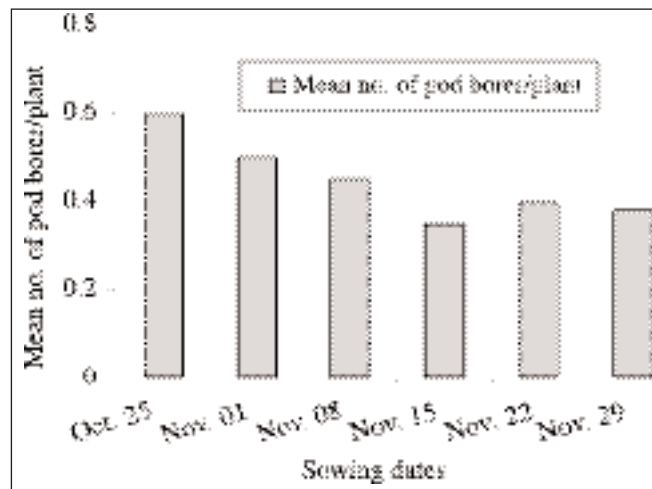


Fig. 2. Incidence of pod borer in chickpea during rabi 2004-05 at RARS farm, Ishurdi, Pabna Bangladesh

Therefore, it was seen from both of the fig. 1 and 2 that pod borer population was higher in October 15 to November 01 (early) sown crops. But with the delayed the dates of sowing from November 01 and onward, pod borer population was decreased upto November 15, then slightly increased upto November 30. After that, borer population increased sharply.

Effect of sowing dates on pod borer damage and yield

Sowing dates had shown a significant effect on pod borer damage and yield in chickpea. In 2003-04 cropping season, the highest pod damage (22.82%) was observed in October 15 sown crops. The lowest pod damage (11.76%) was found in November 30 sowing which was statistically identical to

November 15 and December 15 sown crops. Moderate pod borer damage (15.16-17.93%) was observed in November 01, December 30 and January 15 sown crops (Table I).

Table I. Effect of sowing dates on pod borer damage and yield of chickpea (*C. arietinum* L.) during rabi season 2003-04 at Ishurdi Bangladesh

Sowing dates	Pod damage (%)	Yield (kg/ha)
Oct. 15	22.82 a (4.77)	1210 c
Nov. 01	17.93 b (4.22)	1350 b
Nov. 15	13.39 cd (3.65)	1612 a
Nov. 30	11.76 d (3.42)	1542 a
Dec. 15	12.68 cd (3.55)	1105 d
Dec. 30	15.16 bcd (3.89)	774 e
Jan. 15	16.52 bc (4.06)	440 f

Treatment means in a column having the same letter(s) are not significantly different by DMRT at 5% level.

Figures in the parentheses are the square root transformed mean values.

The highest yield (1612 kg/ha) was obtained from November 15 sowing which was statistically identical to November 30 followed by November 01 and October 15. the delayed sowings (after November 30) provided a yield of 440-1105 kg/ha which were very poor. The lowest yield (440 kg/ha) was recorded in January 15 sowing crops.

During 2004-05, pod borer infestation was in significant among the sowing dates although there was a variation (Table II). The highest pod borer damage (27.36%) was observed in October 25 and the lowest (20.16%) was in November 15, Significantly the higher yield (1310 kg/ha) was obtained from November 15 which was statistically identical to November 08, November 22 and November 29 sown crops. Lowest yield (1044 kg/ha) was recorded from October 25 sowing (Table II).

It was observed that both the early (October 15 to November 01) and late sown (December and onward) crops received

Table II. Effect of sowing dates on pod borer damage and yield of chickpea (*C. arietinum* L.) during rabi season 2004-05 at Ishurdi Bangladesh

Sowing dates	Pod damage (%)	Yield (kg/ha)
Oct. 25	27.36 (5.23)	1044 c
Nov. 01	23.51 (4.83)	1171 b
Nov. 08	22.33 (4.69)	1248 ab
Nov. 15	20.16 (4.49)	1310 a
Nov. 22	22.12 (4.70)	1246 ab
Nov. 29	21.54 (4.63)	1215 ab
	NS	

Treatment means in a column having the same letter(s) are not significantly different by DMRT at 5% level.

Figures in the parentheses are the square root transformed mean values.

higher pod borer damage and produced lower yield. But mid sown (November 08 to November 30) crops received less pod borer damage and produced higher yield. In early sown crops, adequate stored soil moisture made the plants bushy. The bushiness influenced less pod setting and provided better shelter to dark loving pod borer caused higher pod damage. However, in mid sown crops optimum soil moisture favoured the optimum growth of the plant with higher pod setting and disfavoured comfortable shelter to pod borer with less pod damage. In case of late sowings, inadequate stored soil moisture with dry weather retarded plant growth with less pod setting and consequently provided poor yield. The present findings are in agreement with the findings of Prasad *et al.* (1985) and Begum *et al.* (1992) who reported that November sown crops suffered less pod damage than those sown on December. Prasad and Singh (1997) also reported that last sowing of chickpea is risky under rainfed condition due to inadequate stored soil moisture and the incidence of *H. armigera*.

Conclusion

It is concluded from both the years study that the incidence of chickpea pod borer started in 2nd to 4th week of January irrespective of sowing dates and its population increase was very much dependent on the time of sowing of the cropping season. The early and late sown crops received higher pod borer damage than mid sown crops of the cropping season. Hence, for ensuring higher yield with less pod borer damage, chickpea should be sown within the period of November 08 to November 30 and the best date of sowing should be November 15.

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