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# Evaluation of promising genotype against pod borer, *Helicoverpa armigera* in pigeon pea

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### Abstract
A field experiment was conducted during *Kharif*, 2012-13 to screen ten pigeon pea genotypes against gram pod borer, *Helicoverpa armigera*, at instructional farm Sant Kabir College of Agriculture and Research station, Kawardha, IGKV. The mean larval population of pod borers ranged from 0.63 to 1.29 larvae/plant. The experiment showed significantly lowest larval population in BDN-2 and UPAS-120 as compared to other genotype. Among the 10 genotype BDN-2 recorded least pod damage of 6.86% followed by UPAS 120 (8.74%), RPS-2007-63 (9.00%), Asha (9.59%), and PA 382 (9.22%) and was significantly better than other genotypes. The results showed that the genotypes maximum seed yield was recorded in BDN-2 (940.97 kg ha), followed by UPAS 120 (915.51 kg ha), RPS-2007-63 (885.41 kg ha) and Asha (775.46 kg ha), while minimum seed yield was recorded in RPS-2007-109 (486.11kg ha).

**Keywords:** Genotypes against *Helicoverpa armigera,* in pigeonpea

### Introduction
Pulses are referred as poor man's meat since they provide a concentrated source of valuable, digestible and high quality vegetarian protein. They are well known as cheap source of dietary proteins of food, feed and fodder for animals. Pulses are grown in semi-arid regions under a wide variety of agro climatic conditions. It is mostly grown under rainfed areas, where drought condition is a common feature. Pigeonpea yields have remained stagnant for the past 3 to 4 decades, largely due to insect pest damage (Basandrai *et al*., 2011) [1]. India is the largest producer and consumer of pulses accounting for 30-35 per cent of world area and 25 per cent of the production (Singh and Singh, 2006) [11] India is the major pulse growing country in the world of which pigeonpea *Cajanus cajan* (L.) ranks second in area and production and contribute about 90% in the world's pulse production The production of pigeonpea is very low even in the era of green revolution. In recent years, there has been significant decline in the pigeonpea production in India, leading to price increase and reduction in per capita availability. The relatively low crop yields may be attributed to non-availability of improved cultivars, poor crop husbandry and exposure to a number of biotic and abiotic stresses in pigeonpea growing regions. Among the various constraints, insect pests are one of the major and important ones affecting the productivity of pigeonpea apart from ecological and biological constraints. It is attacked by more than 300 species of insects of which gram pod borer, *Helicoverpa armigera* (Hubner) is the most important pests causing heavy yield loss (Sachan *et al*., 1994) [9]. The damage caused by *H. armigera* alone, was reported to be 13.2 to 36.4 per cent in different zones in India (Lateef and Reed, 1981) [6]. Satpute and Barkhade (2012) [10] noticed that *H. armigera*, *E. atomosa* and *M. obtusa* caused considerable losses in grain yield ranging 30 to 100 per cent by attacking the reproductive parts of the plant. A single larva can damage 25-30 pods of gram in its life time. It feeds on tender shoots and young seeds. It makes holes in pods and insert its half body inside the pod to eat developing seeds (Ojha *et al.*, 2011) [8]. The yield loss due to *H. armigera* was estimated to be more than 60% (Vishakantaiah and Babu, 1980) [12]. The annual monitory loss was estimated globally as US $ 400 million (ICRISAT, 2007) [4]. Farmers depend heavily on the use of synthetic insecticides to combat these insect pests. Extensive use of synthetic insecticides has resulted in disturbances of the environment, pest resurgence, pest resistance to pesticides and lethal effect to non-target organisms in the agro-ecosystem in addition to direct toxicity to users. Therefore, it has now become necessary to search for the alternative means of pest control, which can minimize the use of synthetic pesticides. Out of several approaches available for the management, identification and use of resistant varieties is viable and cost effective option. Keeping all these in view, the present studies on screening of pigeonpea genotypes against *H. armigera* was conducted at Sant Kabir College of Agriculture and Research station, Kawardha, IGKV, during 2012-13.

## Materials and Methods

Field trials were conducted to study the response of different entries/genotypes of pigeon pea against pod borer *H. armigera*, Seeds of pigeonpea entries/genotypes were received from the Pigeonpea Breeder, Department of Genetics and Plant Breeding, IGKV, Raipur. Seeds were sown in plots of 4m X 3m on 20th June during 2012 Sant Kabir College of Agriculture and Research station, Kawardha, IGKV. The experiment was laid out in randomized block design with three replications. Standard agronomical practices were followed for growing the crops. Weakly observations on larval population of pod borer *H. armigera* of pigeonpea were recorded from flowering to pod maturation stage at per ten plants from each plot by predetermined stratified random sampling method. At the time of harvest all the pods from ten randomly selected plants from each plot were plucked, counted and examined separately as externally and internally. On the basis of damaged symptoms, the pods were sorted out to record the damage by *H. armigera.* The per cent pod damage was recorded from ten randomly selected plants per plot by counting total number of pods and the damaged pods. The percentage of pod damage was calculated by the ratio of number of damaged pod and total number of pod multiplying by hundred.

## Results and Discussion

### Larval population

Under the present study, a total number of 10 entries/genotypes of both early and late maturity groups of pigeonpea sown at instructional farm Sant Kabir College of Agriculture and Research station, Kawardha, IGKV were screened for resistance against pod borer during Kharif, 2012-13. Larval population of *H.armigera* was recorded for seventeen successive weeks starting from 7th October, 2012 to 27th January, 2013 on ten randomly selected plants in each treatment from 50 per cent flowering till harvesting stage of the crop. The data thus obtained were averaged for statistical analysis. The mean larval population of pod borer was recorded. The mean larval population of pod borer different entries ranged from 0.63 to 1.29 larvae per plant in Table 1. The entry BDN-2 had the lowest larval count and it remained *at par* with UPAS-120 (1.03 larvae/ plant); both of them were significantly superior to rest of the entries tested. The entry RPS-2007-73 (1.15 larvae / plant) ranked next in order of merit but it remained *at par* with Asha (1.20 larvae/ plant) and RPS-2007-107 (1.20 larvae/ plant).

### Pod damage

For determining the pod damage due to pod borers, total pods per ten plants were plucked at the time of harvest from each plot separately. The pods thus plucked were observed critically for damage symptoms and finally healthy pods were separated out from the damaged ones. The data pertaining to the pod damage have been furnished in Table 2. It is clear from the table that significant differences were obtained among different entries with respect to pod damage. Significantly lowest damage of 6.86 per cent was recorded in BDN-2 followed by UPAS 120 (8.74%) and RPS-2007-63 (9.00%). However, the three genotypes remained *at par* with each other. The genotype, Asha with 9.59 per cent pod damage ranked next in order of merit but was not better than Rajeev lochan. Significantly highest (12.22%) pod damage was recorded in RPS-2007-109.

### Grain yield

Grain yield of pigeonpea of different entries/genotypes presented in Table 2 revealed that the yield of entry BDN-2 was significantly higher (940.97 kg/ha) in comparison to other entries except entries UPAS 120 (915.51 kg/ha) and RPS-2007-63 (885.41 kg/ha).On the basis of merit next best entries was Asha (775.46 kg/ha).Lowest yield was obtained from the entries RPS-2007-109 (486.11 kg/ha) and RPS-2007-15 (498.84kg/ha). Result agreement with Bhosale and Nawale (1985) [2], Chavan *et al*., 2009 [3] he reported that UPAS 120 is less susceptible against pod borers and pod fly. Malathi (2006) [7] and Kalariya *et al*., (1998) [5] reported BDN 2 promising against pod borer and pod fly.

**Table 1:** Response of different genotypes of pigeonpea against pod borer *H.armigera* during *kharif* session of 2012-13

| | | Mean larval population / plant | | | | |
|---|---|---|---|---|---|---|
| **S. No.** | **Genotype** | **RI** | **RII** | **RIII** | **Total** | **Over all mean** |
| 01 | BDN-2 | 0.67 | 0.61 | 0.62 | 1.90 | 0.63 |
| 02 | Asha | 1.24 | 1.23 | 1.15 | 3.62 | 1.20 |
| 03 | ICPL-87 | 1.17 | 1.23 | 1.20 | 3.60 | 1.20 |
| 04 | RPS-2007-109 | 1.24 | 1.29 | 1.36 | 3.89 | 1.29 |
| 05 | Rajeev lochan | 1.30 | 1.20 | 1.21 | 3.71 | 1.23 |
| 06 | RPS-2007-63 | 1.24 | 1.32 | 1.27 | 3.83 | 1.27 |
| 07 | UPAS-120 | 1.04 | 1.09 | 0.96 | 3.09 | 1.03 |
| 08 | RPS-2007-15 | 1.21 | 1.29 | 1.27 | 3.77 | 1.25 |
| 09 | RPS-2007-73 | 1.19 | 1.21 | 1.06 | 3.46 | 1.15 |
| 10 | RPS-2007-107 | 1.22 | 1.03 | 1.36 | 3.61 | 1.20 |

**Table 2:** Impact of different genotypes of pigeonpea on pod damage due to pod borer *H.armigera* during *kharif* session of 2012-13

| S.N. | Genotypes | Total mean No. of damage pod/plant | Total mean No. of pod/plant | Pod damage (%) | Seed yield Kg/ha |
|---|---|---|---|---|---|
| 01 | BDN-2 | 11.33 | 165.00 | 6.86 | 940.97 |
| 02 | Asha | 16.66 | 173.66 | 9.59 | 775.46 |
| 03 | ICPL-87 | 19.33 | 175.00 | 11.04 | 515.04 |
| 04 | RPS-2007-109 | 22.33 | 182.66 | 12.22 | 486.11 |
| 05 | RPS-2007-63 | 16.33 | 181.33 | 9.00 | 885.41 |
| 06 | UPAS-120 | 19.00 | 217.33 | 8.74 | 915.51 |
| 07 | RPS-2007-15 | 19.66 | 169.33 | 11.61 | 498.84 |
| 08 | RPS-2007-73 | 18.33 | 168.00 | 10.91 | 665.51 |
| 09 | RPS-2007-107 | 18.00 | 174.66 | 10.30 | 701.68 |
| 10 | Rajeev lochan | 18.00 | 177.33 | 10.15 | 706.02 |
| | S.E(m) | 0.903 | 1.215 | 0.098 | 0.883 |
| | C.D. | 2.705 | 3.638 | 0.295 | 2.643 |
| | C.V. | 8.741 | 1.180 | 1.698 | 0.216 |

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