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Original Research Article

Evaluation of Some Pigeonpea Genotypes against Pod Borer Complex

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A B S T R A C T

A set of 14 genotypes of pigeonpea was screened against pod borers ((*Helicoverpa armigera*, *Exelastis atomosa*, *Maruca testulalis*) at Research farm of Birsa agricultural University Kanke, Ranchi. The mean larval population of pod borers ranged from 0.40 to 2.00 larvae/plant. The experiment showed significantly lowest larval population in UPAS 120 and PA 374 as compared to other genotype. Among the 14 genotype PA374 recorded least pod damage of 1.7% followed by UPAS 120 (2%), PUSA 2011-2(6.44%), PA 382(9.22%) and was significantly better than other genotypes.

Keywords

Helicoverpa armigera, pigeonpea cultivars, screening

Introduction

Pigeonpea or red gram is an important pulse crop in India, where it is next in importance after chickpea among different pulses. It is mostly grown under rainfed areas, where drought condition is a common feature. 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). Pigeonpea yields have remained stagnant for the past 3 to 4 decades, largely due to insect pest damage (Basandrai *et al*.,2012). Although number of insect pests were reported to attack pigeonpea, the pod borer complex including the gram pod borer *(Helicoverpa armigera)*, plume moth (*Exelastis atomosa*), spotted pod borer (*Maruca testulalis*), pod fly (*Melanagromyza obtusa*), spiny pod borer (*Etiella zinckenella*) etc cause considerable losses in grain yield. Pod borers cause colossal losses in yield of crop. 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). Satpute and Barkhade (2012) 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.

Materials and Methods

Field trials were conducted to study the response of different entries/genotypes of pigeonpea against different pod borers. Seeds of pigeonpea entries/genotypes were received from the Pigeonpea Breeder, Department of Genetics and Plant Breeding, BAU, Kanke Ranchi. Seeds were sown in plots of 4m X 3m on 8th July during 2011 at

University farm Kanke, Ranchi. The experiment was laid out in randomized block design with three replications. Standard agronomical practices were followed for growing the crops.

Weakly observation on larval population of different pod borers viz., *M. testutalis, H.armigera* and *E.atomosa*, of pigeonpea were recorded per five plants from each plot by predetermined stratified random sampling method. At the time of harvest all the pods

from five 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 three groups to record the damage by *M.testulalis, H.armigera*, and *E. atomosa*. The per cent pod damage was recorded from five randomly selected plants per plot by counting total number of pods and the damaged pods. For determining the grain infestation damaged grain were separated from the damaged pods. The percentage of grain damage was calculated by the ratio of number of damaged grains and total number of grains multiplying by hundred.

Results and Discussion

Larval population

Under the present study, a total number of 14 entries/genotypes of both early and late maturity groups of pigeonpea sown at Pulses Research Plots of Birsa Agricultural University, Kanke, Ranchi were screened for resistance against pod borer complex during Kharif, 2011- 12. Out of the 14 entries, 10 were of early maturing (150-170 days) while the rest four entries were from late maturity (215-250 days) group.

Larval population of *M.testulalis H.armigera* and *E.atomosa* was recorded for fourteen successive weeks starting from 29th September, 2011 to 29th December, 2011 on five 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 complex, irrespective of species, was also recorded.

The mean larval population of pod borer complex in different entries ranged from 0.4 to 2.0 larvae per plant in Table 1.The entry UPAS 120 had the lowest larval count and it remained *at par* with PA 374(0.42 larvae/ plant); both of them were significantly superior to rest of the entries tested. The entry PUSA 2011-1 (0.62 larvae / plant) ranked next in order of merit but it remained *at par* with PUSA 992 (0.68 larvae/ plant) and PA 382 (0.71larvae/ plant).

Pod damage

For determining the pod damage due to pod borers, total pods per five 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 1.7 per cent was recorded in PA 374 followed by UPAS 120 (2.0%) and PUSA 2011-2(6.44%). However, the three genotypes remained *at par* with each other. The genotype PA 382 with 9.22 per cent pod damage ranked next in order of merit but was not better than PUSA 2011-2.Significantly highest (36.3%) pod damage was recorded in BRG11-01.

Table.1 Response of different entries/genotypes of pigeonpea against pod borer complex (*M.testulalis, H.armigera* and *E.atomosa*) during *kharif* session of 2011-12

Treatment	Mean larval population/plant														
	29 SEPT	6 OCT	13 OCT	20 OCT	27 OCT	3 NOV	10 NOV	17 NOV	24 NOV	1 DEC	8DEC	15DEC	22 DEC	29 DEC	Mean
T1 AKT 9913	0.0a (0.70)	0.0a (0.70)	0.13a (0.78)	0.66a (1.07)	1.20ab (1.29)	1.86b (1.53)	2.20d (1.63)	2.93f (1.84)	3.46e (1.98)	3.60c (2.02)	3.60c (2.02)	2.40b (1.69)	1.30c (1.27)	0.80b (1.12)	1.72 e
T2 H05-42	0.20b (0.83)	0.66de (1.06)	0.86e (1.16)	1.53c (1.41)	2.80f (1.81)	3.06ef (1.88)	2.53ef (1.74)	1.66e (1.46)	1.00d (1.21)	0.20b (0.82)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	1.03 d
T3 BRG 11-01	0.0a (0.70)	0.06ab (0.74)	0.33ab (0.90)	1.06b (1.23)	1.53c (1.41)	2.40c (1.68)	2.80g (1.80)	3.60h (2.01)	3.66f (2.03)	3.93d (2.10)	3.80d (2.07)	2.60c (1.75)	1.26c (1.31)	1.06c (1.24)	2.00 g
T4 AL 1779	0.46c (0.97)	0.80e (1.13)	0.73de (1.10)	2.40g (1.7)	2.53e (1.73)	3.33f (1.95)	2.66f (1.77)	1.40d (1.36)	0.13a (0.78)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	1.03 d
T5 PUSA 2011-2	0.13ab (0.78)	0.53d (1.00)	0.73de (1.10)	2.00ef (1.57)	2.20d (1.64)	2.73d (1.79)	2.20d (1.63)	1.40d (1.36)	0.66c (1.07)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.89 c
T6 PA-374	0.0a (0.70)	0.20abc (0.82)	0.40b (0.93)	0.93b (1.17)	1.13ab (1.25)	1.40a (1.35)	1.06a (1.24)	0.66a (1.07)	0.13a (0.78)	0.0a (0.7)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.42 a
T7 UPAS 120	0.0a (0.70)	0.26bc (0.85)	0.46bc (0.96)	0.66a (1.06)	1.06a (1.23)	1.40a (1.36)	1.13ab (1.27)	0.53a (1.00)	0.13a (0.78)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.40 a
T8 SKNP 0803	0.0a (0.70)	0.0a (0.70)	0.26ab (0.85)	1.06b (1.22)	1.46c (1.39)	2.40c (1.70)	2.80g (1.81)	3.20g (1.92)	3.33e (1.95)	3.66c (2.03)	3.40b (1.96)	2.46b (1.71)	1.06b (1.24)	0.86b (1.16)	1.85 f
T9 PUSA 2011-1	0.06ab (0.74)	0.40c (0.92)	0.66cde (1.06)	1.13b (1.27)	1.46c (1.39)	1.80b (1.50)	1.60c (1.45)	1.00b (1.22)	0.53c (1.00)	0.13b (0.78)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.62 b
T10 SKNP 0808	0.0a (0.70)	0.0a (0.70	0.26ab (0.86)	0.66a (1.06)	1.33b (1.34)	1.80b (1.50)	2.46ef (1.71)	2.80f (1.81)	3.46e (1.98)	3.66c (2.03)	3.53c (1.99)	2.46b (1.72)	1.13b (1.27)	0.86b (1.16)	1.74 e
T11 PUSA 992	0.13ab (0.78)	0.53d (1.00)	0.60cd (1.03)	1.53c (1.41)	2.00d (1.56)	2.20c (1.63)	1.66c (1.46)	0.93b (1.17)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.68 b
T12 AL 1770	0.33c (0.89)	0.73de (1.10)	0.86e (1.16)	1.86de (1.53)	2.20d (1.63)	3.00de (1.86)	2.20d (1.64)	1.33cd (1.34)	0.33b (0.90)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.91 c
T13 PA 382	0.06ab (0.74)	0.40c (0.93)	0.73de (1.09)	1.66cd (1.46)	2.00d (1.57)	1.93bc (1.55)	1.33b (1.34)	1.13bc (1.22)	0.60c (1.04)	0.13b (0.78)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.71 b
T14 H05-38	0.20b (0.82)	0.66de (1.06)	0.73de (1.09)	2.13f (1.61)	(2.53e (1.74)	2.93de (1.84)	2.33de (1.68)	1.46d (1.39)	0.04a (0.74)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.0a (0.70)	0.92 c
SEm(±)	0.05	0.07	0.08	0.07	0.07	0.09	0.08	0.07	0.06	0.04	0.03	0.03	0.03	0.03	0.03
CD (5%)	0.15	0.22	0.23	0.22	0.22	0.28	0.24	0.22	0.17	0.11	0.11	0.09	0.09	0.10	0.09
CV (%)	11.71	14.54	13.86	9.98	9.00	10.30	9.06	9.29	8.74	6.36	6.35	5.40	6.22	7.19	4.48

Figures in parentheses are square root transformed values

Table.2 Impact of different entries/genotypes of pigeonpea on pod and grain damage due to pod borer complex (*M.testulalis*, *H.armigera* and *E.atomosa*) during *kharif* session of 2011-12

Treatment	Total no. of pod/plant*	Mean pod damage(%) /plant**	Total no. of grain/plant*	Mean grain damage (%) /plant **	Grain yield (q/ha)
T1 AKT 9913	63.60 (7.87)	23.26 fgh (28.74)	251.00 (15.82)	16.15 e (23.58)	6.35 ed
T2 H05-42	58.06 (7.60)	29.45 ij (32.74)	220.00 (14.80)	19.15 ef (25.83)	6.25 ed
T3 BRG 1101	53.46 (7.60)	36.30 k (36.99)	211.30 (14.53)	28.56 g (32.23)	5.71 e
T4 AL 1779	48.86 (6.98)	30.53 j (33.42)	190.00 (13.79)	22.93 f (28.40)	5.99 ed
T5 PUSA2011-2	197.93 (14.06)	6.44 ab (14.64)	773.30 (27.80)	5.19 a (13.15)	7.91 abc
T6 PA-374	218.60 (14.77)	1.70 a (7.50)	851.30 (29.15)	1.29 a (6.41)	8.94 a
T7 UPAS 120	205.60 (14.32)	2.00 a (8.02)	812.60 (28.34)	1.44 a (6.77)	8.57 ab
T8 SKNP 0803	63.73 (7.97)	26.28 hij (30.75)	238.30 (15.42)	20.29 e (26.70)	6.05 ed
T9 PUSA 2011-1	56.26 (7.49)	18.23 def (25.13)	217.30 (14.73)	12.15 cd (20.20)	6.75 cde
T10 SKNP 0808	64.93 (8.04)	25.20 gi (30.13)	249.33 (15.76)	18.95 ef (25.73)	6.26 ed
T11 PUSA 992	65.13 (8.05)	12.70 cd (20.66)	250.33 (15.80)	10.79 c (18.95)	6.56 cde
T12 AL 1770	65.60 (8.08)	17.34 de (24.28)	256.33 (15.99)	10.15 bc (18.49)	5.70 e
T13 PA382	78.13 (8.82)	9.22 bc (17.61)	304.33 (17.43)	5.23 ab (13.17)	7.21 bcd
T14 H05-38	62.20 (7.96)	20.48eg (26.71)	239.30 (15.43)	16.80 e (24.05)	6.54 cde
SEm(±)	0.26	1.95	0.49	1.81	0.48
CD at5%)	0.78	5.71	1.45	5.29	1.42
CV (%)	5.00	14.05	4.73	15.49	12.46

*Figures in parentheses are square root transformed values. **Figures in parentheses are arc √ sin transformed values

Grain damage

Genotype PA 374 recorded lowest (1.29%) grain damage followed by UPAS 120(1.44%), PUSA 2011-2 (5.19%) and PA 382(5.23%). However, the two last mentioned entries were not better than AL 1770 (10.15%) which in its turn was at par with PUSA 992 (10.79%) and PUSA 2011-1 (12.15%). The highest (28.56%) grain damage was recorded in BRG11-01.

Grain yield

Grain yield of pigeonpea of different entries/genotypes presented in Table 2 revealed that the yield of entry PA 374 was significantly higher (8.94q/ha) in comparison to other entries except entries UPAS 120 (8.57q/ha) and PUSA 2011-2.On the basis of merit next best entries was PA 382 (7.21 q/ha).Lowest yield was obtained from the entries BRG 11-01(5.71) and AL 1770 (5.70q/ha).

Similarly Bhosale and Nawale (1985), Chavan *et al*., 2009 reported that UPAS 120 is less susceptible against pod borers and pod fly. Malathi (2006) and Kalariya *et al*., (1998) reported BDN 2 promising against pod borer and pod fly.

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