JOURNAL OF PURE AND APPLIED MICROBIOLOGY, Nov 2015. Vol. **9**(Spl. Edn. 2), p. 357-364

Field Screening and Evaluation of Long Duration Pigeonpea Genotypes against the Infestation of Pod Bug

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(Received: 26 July 2015; accepted: 03 October 2015)

Eighteen promising long duration pigeonpea genotypes were screened for their reaction against pod bug at Agriculture Research farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during kharif 2013-14 and 2014-15. The first incidence of pod bug, *Clavigralla gibbosa* was observed in 4th standard week during both the year in all genotype. The peak of population of pod bug was recorded from 12th to 13th standard week in different genotypes. The results revealed that the incidence of pod bug was significantly highest in IPA 7-10 *i.e.* (4.68 bug/plant) followed by MA-6 (4.44 bug/plant), NDA 13-1 (3.98 bug/plant), and lowest in genotype *i.e.* KA 12-2 (1.96 bug/plant), followed by KA 12-2 (2.06 bug/plant), BAHAR (2.17 bug/plant) during 2013-14 and during 2014-15, the mean population of Pod bug was recorded highest in IPA 7-10 *i.e.* (4.45 bug/plant) followed by NDA 13-1 (4.06 bug/plant), MA-6 (4.04 bug/plant), and lowest in genotype *i.e.* KA 12-2 (1.82 bug/plant), followed by KA 12-2 (1.95 bug/plant), BAHAR (2.06 bug/plant). The per cent pod damage caused by Pod bug on different genotypes observed significantly during both the year. During 2013-14, the highest pod damage by pod bug were seen in IPA 7-10 *i.e.* (39.67%) followed by MA 6 (37.33%), NDA 13-1 (36.67%) and lowest pod damage observed in KA 12-2 (19.67%) followed by KA 12-3 (22%), BAHAR (24.33%) and during 2014-15 the highest pod damage by pod bug were seen in IPA 7-10 *i.e.* (35%) followed by MA 6 (34%), NDA 13-1 (32.67%) and lowest pod damage observed in KA 12-2 (16.33%) followed by KA 12-3 (18%), BAHAR (18.33%). The per cent grain damage caused by Pod bug on different genotypes observed significantly during both the year. During 2013-14 the highest grain damage by pod bug were seen in IPA 7-10 *i.e.* (22.13%) followed by MA 6 (15.95%), NDA 13-1 (15.38%) and lowest grain damage observed in KA 12-2 (10.13%) followed by KA 12-3 (10.58%), BAHAR (19.20%) and during 2014-15 the highest grain damage by pod bug were seen in IPA 7-10 *i.e.* (20.63%) followed by MA 6 (14.45%), NDA 13-1 (13.43%) and lowest grain damage observed in KA 12-2 (6.98%) followed by KA 12-3 (6.98%), BAHAR (7.91%). The grain yield of different genotype differed significantly during both the year and ranged from 1027 kg/ha in the genotype IPA 7-10 to 1960 kg/ha in KA 12-2 during 2013-14 and 819 kg/ha in the genotype IPA 7-10 to 1785 kg/ha in the genotype KA 12-2 during 2014-15.

Key words: pigeonpea, pod damage, grain damage, pod bug.

Pigeonpea [*Cajanus cajan* (L) Millsp] is one of the most important grain legume crops of tropical and subtropical environments, cultivated on almost 4.8 million hectares worldwide covering 22 countries in Asia, Africa and the Caribbean. India has virtual monopoly in pigeonpea production accounting to 90 per cent of world's total production. In India, it occupies an area of 3.88 million ha with a production of 3.17 million tonnes (E-Pulses data book IIPR, 2015). It is often grown on marginal lands and is usually intercropped with other pulses. However, farmers are growing pigeonpea as sole crop and the crop is increasingly

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gaining the status of cash crop.Pigeonpea production is affected by several biotic and abiotic stresses. Among biotic factors,the seeds and other parts of the plant are fed upon by many insects, with over 200 species having been recorded in India alone. Some of these insects cause sufficient crop losses to be regarded as major pests, but the majority of them seldom abundant enough to cause much damage, or are of sporadic or localized importance, and regarded as minor pests.Besides pod fly and other insects, the damage caused by pod sucking bugs is showing an increasing trend in recent years on pigeonpea. Among pod sucking bugs, *Clavigralla gibbosa* (Spinola) is predominant in eastern U.P. and the total grain loss due to pod sucking bugs damage has been worked out to the tune of 50,000 tonnes annually for U.P. alone. Several species and genera of pod sucking bugs *Clavigralla gibbosa* (Hemiptera: Coreidae) attack pigeonpea and other legumes in Asia. The adults and nymphs of all of these bugs use their piercing mouthparts to penetrate the pod wall and suck the liquid from developing seeds. Damaged seeds become shrivelled, and develop dark patches. The injury being similar to that of drought stress and the impact of these pests has been underestimated in the past. Seeds spoiled by pod sucking bugs neither germinate nor acceptable as human food.Much effort has been made to identify sources of resistant to the major pests, particularly to pod sucking bugs*Clavigralla gibbosa* and to incorporate these resistances in to agronomically suitable cultivars. Pradhan (1971) had very rightly advocated the concept that in agriculture the production technology is inextricably interwoven in the protection technology and therefore, the production technology cannot succeed unless there is adequate progress in protection technology.Keeping in view the above facts and in order to minimize the losses caused by pod bug in long duration pigeonpea genotypes, the following investigation was carried out in the *Kharif* season of long duration pigeonpea during 2013-14 and 2014-15.

MATERIALS AND METHODS

The studies were carried out under field conditions at the Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during *kharif*, 2013-2014 and 2014-2015. The Eighteen long duration pigeonpea genotypes/varieties were grown in plots of 5 rows of 4 meters following row to row and plant to plant spacing of 75 cm and 15 cm respectively. The crop was grown following the normal agronomic practices in "Randomized Block Design" with three replications and eighteen treatments. The crop was shown on 26th July during 2013-14 & 1st August during 2014-15 and harvested on 7th April 2014 & 10th April 2015 respectively. The whole plot was exposed to natural infestation and no insecticides applied.For recording the seasonal incidence of insect pest, five plants were randomly selected in each treatment and tagged. The immature as well as the mature stage of pod bug present on them were counted at weekly intervals, from 24th January to 28st march during 2013-14 and 2014-15. The number of insect count recorded from all the three replication for all the genotypes were average separately for each genotype on standard week basis.For determining the damage caused by pod pest complex, the per cent pod and grain damage by pod sucking bugs*Clavigralla gibbosa*, were considered and observed in the samples collected from all the replication of 18 genotypes/varieties of pigeon pea.

Pod Damage

The observation on pod damage was made by counting total number of pods taken for observation which is harvested from five plants and number of pods damaged based on holes made by the pod pests during feeding or at the time of emergence. Later, the per cent damage was worked out using the formula.

$$\text{Per cent pod damage} = \frac{\text{Number of damaged pod}}{\text{Total number of pods taken for observation}} \times 100$$

Grain Damage

The seed damage was identified based on number of seeds affected in pods which is taken for observation. It was worked out by using the formula.

$$\text{Per cent grain damage} = \frac{\text{Number of damaged grains}}{\text{Total number of grains taken for observation}}$$

Statistical analysis

All the data recorded were subjected to statistical analysis as per the Randomized Block Design procedure and insect population data were

transformed with square root transformed "x+0.5 method & damage assessment data were transformed by arc sin ($q = \sin^{-1}x$) transformed method.

RESULTS AND DISCUSSION

Incidence pattern of pod bugon pigeonpea

During 2013-14 the first incidence of Pod bug, *Clavigralla gibbosa* (spinola) was observed in 4th standard week in all genotype. The bug was recorded from 4th to 13th standard week in all genotypes. The different peak of population of pod bug was recorded from 12th to 13th standard week in different genotypes. The peak population of Pod bug was found in 12th standard weeks in KA 12-2, MAL 13, IPA 7-10, BAUPP 09-22, KA 12-4, KA 12-3, NDA 2 and in 13th standard week in rest genotypes.

Among the eighteen genotypes/varieties the mean population of Pod bug was recorded highest in IPA 7-10 *i.e.* (4.68 bug/plant) followed by MA-6 (4.44 bug/plant), NDA 13-1 (3.98 bug/plant), and lowest in genotype *i.e.* KA 12-2 (1.96 bug/plant), followed by KA 12-2 (2.06 bug/plant), BAHAR (2.17 bug/plant).

During 2014-15 the first incidence of Pod bug, *Clavigralla gibbosa* (spinola) was observed in 4th standard week in all genotype. The bug was recorded from 4th to 13th standard week in all genotypes. The different peak of population of pod bug was recorded from 12th to 13th standard week in different genotypes. The peak population of Pod bug was found in 12th standard weeks in DA 13-2, MAL 40, IPA 11-1, IPA 7-10, NDA 13-2, MAL 39, KA 12-4, KA 12-3, NDA 2 and in 13th standard week in rest of genotypes.

Among the eighteen genotypes/varieties the mean population of Pod bug was recorded highest in IPA 7-10 *i.e.* (4.45 bug/plant) followed by NDA 13-1 (4.06 bug/plant), MA-6 (4.04 bug/plant), and lowest in genotype *i.e.* KA 12-2 (1.82 bug/plant), followed by KA 12-2 (1.95 bug/plant), BAHAR (2.06 bug/plant).

Extent of damage caused by pod bug on pigeonpea

The per cent pod damage caused by Pod bug on different genotypes observed significantly during 2013-14. It ranged from 19.67 per cent in genotype KA 12-2 to 39.67 per cent in genotype IPA 7-10.The highest pod damage by pod bug were seen in IPA 7-10 *i.e.* (39.67%) followed by MA 6 (37.33%), NDA 13-1 (36.67%) and lowest pod damage observed in KA 12-2 (19.67%) followed by KA 12-3 (22%), BAHAR (24.33%).

The per cent pod damage caused by Pod bug on different genotypes observed significantly during 2014-15. It ranged from 16.33 per cent in genotype KA 12-2 to 35 per cent in genotype IPA 7-10.The highest pod damage by pod bug were seen in IPA 7-10 *i.e.* (35%) followed by MA 6 (34%), NDA 13-1 (32.67%) and lowest pod damage observed in KA 12-2 (16.33%) followed by KA 12-3 (18%), BAHAR (18.33%).

The per cent grain damage caused by Pod bug on different genotypes observed significantly during 2013-14. It ranged from 10.13 per cent in genotype KA 12-2 to 22.13 per cent in genotype IPA 7-10.The highest grain damage by pod bug were seen in IPA 7-10 *i.e.* (22.13%) followed by MA 6 (15.95%), NDA 13-1 (15.38%) and lowest grain damage observed in KA 12-2 (10.13%) followed by KA 12-3 (10.58%), BAHAR (19.20%).

The per cent grain damage caused by Pod bug on different genotypes observed significantly during 2014-15. It ranged from 6.98 per cent in genotype KA 12-2 to 20.63 per cent in genotype IPA 7-10.The highest grain damage by pod bug were seen in IPA 7-10 *i.e.* (20.63%) followed by MA 6 (14.45%), NDA 13-1 (13.43%) and lowest grain damage observed in KA 12-2 (6.98%) followed by KA 12-3 (6.98%), BAHAR (7.91%).

Jaisal*et al.*, (2010)reported that the incidence of Pod fly *(Melanagromyza obtusa)*, Pod bug and lepidopterous pod borer (LBP) on long duration pigeonpea genotypes (MA-20, MAL-13, Bahar, MAL-24 and MA-3) Pod damage by Pod fly, Pod bug and LPB was greatest on MA-20 (50.3%), MAL-24 (31.0%) and MAL-6 (14.1%), respectively. Subharani and Singh (2007) reported that the damage commenced in the pod filling stage (1.23 and 2.0%) in the third week of January in both years.

Srujana and Ram Keval (2014) was observed that average adult population peak of Pod bug, Clavigralla gibbosa was recorded on 9th standard week 6.4 bugs, followed by 8th standard week 5.8 bugs and lowest population of 0.2 adults was recorded in the 1st standard week.Minja *et al.*, (2000) the insect pests that caused damage on the Pigeonpea (*Cajanus cajan*) lines were pod fly

Table 1. Pod bug (*Clavigrella gibbosa* Spinola) population on long duration pigeonpea genotypes during *Kharif* 2013-14.

Genotypes	Population per plant										
	22thJan	29thJan	5thFeb	12thFeb	19thFeb	26thFeb	5thMarch	12thMarch	19thMarch	26thMarch	Average
DA 13-2	0.71(1.31)	0.61(1.27)	0.93(1.39)	1.16(1.47)	1.83(1.68)	2.85(1.96)	4.07(2.24)	5.57(2.56)	7.27(2.87)	7.76(1.96)	3.28
MAL 40	0.52(1.23)	0.41(1.19)	0.77(1.33)	0.98(1.41)	1.39(1.55)	2.37(1.83)	5.51(2.55)	5.08(2.47)	6.23(2.69)	6.42(2.04)	2.97
BAHAR(ch)	0.28(1.13)	0.29(1.14)	0.32(1.15)	0.71(1.31)	1.12(1.46)	1.9(1.70)	2.98(1.99)	3.93(2.22)	5.08(2.47)	5.12(1.83)	2.17
MA 6 (ch)	1.04(1.43)	0.97(1.40)	1.14(1.46)	1.69(1.64)	2.19(1.79)	4.05(2.25)	5.91(2.63)	7.9(2.98)	9.6(3.26)	9.92(2.25)	4.44
IPA 11-1	0.68(1.29)	0.58(1.26)	0.94(1.39)	1.09(1.45)	1.73(1.65)	2.77(1.93)	3.82(2.19)	5.15(2.48)	7.06(2.84)	7.22(1.84)	3.10
NDA 13-1	0.99(1.41)	0.89(1.38)	0.57(1.25)	1.46(1.57)	2.08(1.75)	3.44(2.11)	4.41(2.32)	7.24(2.87)	9.31(3.21)	9.45(2.11)	3.98
KA 12-2	0.17(1.08)	0.25(1.12)	0.26(1.12)	0.58(1.26)	0.86(1.36)	1.49(1.58)	2.97(1.99)	3.69(2.17)	4.9(2.43)	4.41(1.58)	1.96
NDA 1 (ch)	0.59(1.26)	0.52(1.23)	0.89(1.37)	0.91(1.38)	1.62(1.62)	2.37(1.83)	3.73(2.17)	5.14(2.48)	6.27(2.70)	6.42(1.93)	2.85
MAL 13(ch)	0.95(1.39)	0.88(1.37)	0.51(1.23)	1.38(1.54)	1.99(1.73)	3.14(2.04)	4.27(2.30)	5.89(2.62)	8.42(3.07)	5.12(1.97)	3.26
IPA 7-10	1.1(1.45)	0.99(1.41)	1.31(1.52)	1.88(1.70)	2.35(1.83)	4.07(2.25)	5.96(2.64)	8.22(3.04)	10.53(3.39)	10.37(2.48)	4.68
DA 13-1	0.85(1.36)	0.66(1.29)	0.97(1.40)	1.23(1.49)	1.81(1.68)	2.88(1.97)	4.08(2.25)	5.75(2.60)	7.39(2.89)	8.05(2.03)	3.37
NDA 13-2	0.48(1.22)	0.43(1.19)	0.75(1.32)	0.96(1.40)	1.48(1.57)	2.35(1.83)	3.42(2.10)	4.89(2.43)	5.99(2.65)	6.2(1.70)	2.70
BAUPP 09-22	0.34(1.16)	0.27(113)	0.33(1.15)	0.75(1.32)	1.16(1.47)	2.07(1.75)	3.05(2.01)	4.09(2.24)	5.16(2.48)	5.16(1.62)	2.24
MAL 39	0.37(1.17)	0.33(1.15)	0.7(1.30)	0.89(1.38)	1.49(1.58)	2.23(1.80)	3.55(2.13)	4.65(2.38)	5.89(2.63)	5.98(1.80)	2.61
KA 12-4	0.17(1.08)	0.29(1.14)	0.44(1.20)	0.79(1.34)	1.21(1.49)	2.08(1.75)	3.02(2.00)	4.19(2.28)	5.77(2.60)	0.32(1.75)	1.83
KA 12-3	0.17(1.08)	0.26(1.12)	0.29(1.14)	0.68(1.29)	0.97(1.40)	1.62(1.62)	2.97(1.99)	3.96(2.22)	4.95(2.44)	4.76(1.76)	2.06
NDA 2 (ch)	0.39(1.18)	0.29(1.14)	0.46(1.21)	0.85(1.36)	1.46(1.57)	2.08(1.75)	3.23(2.06)	4.32(2.31)	5.82(2.61)	5.33(1.75)	2.42
BHUA 189	0.88(1.37)	0.87(1.37)	1.04(1.43)	1.18(1.48)	1.98(1.73)	3.13(2.03)	4.13(2.26)	5.75(2.60)	7.6(2.93)	8.49(1.84)	3.51
Average	0.59	0.54	0.701	1.06	1.59	2.61	3.95	5.23	6.85	6.75	-
SEM±	0.020	0.018	0.036	0.040	0.037	0.043	0.068	0.065	0.059	0.043	-
CD at 5%	0.057	0.052	0.103	0.115	0.107	0.125	0.195	0.188	0.171	0.125	-

Figures in parentheses are “x+0.5 transformed value

Table 2. Pod bug (*Clavigrella gibbosa* Spinola) population on long duration pigeonpea genotypes during *Kharif* 2014-15

Genotypes	Population per plant										
	22thJan	29thJan	5thFeb	12thFeb	19thFeb	26thFeb	5thMarch	12thMarch	19thMarch	26thMarch	Average
DA 13-2	0.66(1.29)	0.51(1.23)	0.67(1.27)	1.04(1.43)	1.51(1.58)	2.75(1.93)	4.03(2.24)	5.08(2.46)	7.20(2.86)	7.11(2.85)	3.06
MAL 40	0.45(1.20)	0.34(1.04)	0.78(1.31)	0.88(1.37)	1.12(1.46)	2.23(1.79)	3.79(2.19)	4.78(2.40)	6.11(2.66)	6.01(2.65)	2.65
BAHAR(ch)	0.14(1.07)	0.09(1.04)	0.21(1.09)	0.65(1.28)	0.91(1.38)	1.75(165)	2.97(1.99)	3.89(2.21)	4.99(2.42)	5.01(2.44)	2.06
MA 6 (ch)	0.97(1.40)	0.88(1.37)	1.11(1.42)	1.45(1.56)	2.07(1.72)	3.88(2.20)	2.88(1.96)	7.79(2.96)	9.45(3.29)	9.89(3.29)	4.04
IPA 11-1	0.61(1.26)	0.5(1.22)	0.59(1.24)	0.97(1.40)	1.29(1.51)	2.65(1.91)	3.98(2.23)	5.04(2.46)	6.98(2.81)	6.34(2.70)	2.90
NDA 13-1	0.91(1.38)	0.81(1.35)	0.94(1.36)	1.39(1.54)	1.98(1.70)	3.28(2.07)	5.76(2.59)	7.11(2.85)	9.11(3.18)	9.31(3.21)	4.06
KA 12-2	0.09(1.04)	0.05(1.03)	0.15(1.07)	0.55(1.25)	0.75(1.31)	1.29(1.50)	2.76(1.88)	3.57(2.14)	4.79(2.39)	4.34(2.31)	1.83
NDA 1 (ch)	0.55(1.24)	0.45(1.20)	0.51(1.22)	0.95(1.40)	1.26(1.50)	2.29(1.81)	3.97(2.23)	4.98(2.45)	6.11(2.66)	6.33(2.70)	2.74
MAL 13(ch)	0.89(1.37)	0.79(1.33)	0.88(1.34)	1.27(1.51)	1.88(1.70)	3.18(2.04)	5.32(2.51)	5.77(2.60)	8.23(3.04)	8.45(3.07)	3.67
IPA 7-10	1.03(1.41)	0.89(1.37)	1.09(1.42)	1.78(1.66)	2.15(1.78)	3.97(2.23)	5.89(2.62)	8.01(3.00)	10.41(3.38)	10.23(3.35)	4.55
DA 13-1	0.78(1.32)	0.61(1.27)	0.85(1.33)	1.09(1.44)	1.64(1.62)	2.79(1.95)	4.13(2.26)	5.45(2.54)	7.23(2.87)	7.65(2.94)	3.22
NDA 13-2	0.45(1.20)	0.31(1.14)	0.68(1.28)	0.85(1.36)	1.09(1.44)	2.17(1.78)	3.58(2.14)	4.45(2.33)	5.89(2.61)	5.88(2.61)	2.54
BAUPP 09-22	0.23(1.11)	0.16(1.08)	0.28(1.13)	0.69(1.30)	0.97(1.40)	1.88(1.69)	2.98(1.99)	3.99(2.23)	5.01(2.45)	5.05(4.46)	2.12
MAL 39	0.34(1.15)	0.3(1.14)	0.35(1.16)	0.81(1.35)	1.04(1.42)	2.11(1.76)	3.49(2.12)	4.29(2.30)	5.68(2.57)	5.23(2.49)	2.36
KA 12-4	0.29(1.13)	0.21(1.10)	0.38(1.17)	0.71(1.31)	0.99(1.41)	1.88(1.70)	3.11(2.03)	4.01(2.24)	5.61(2.56)	5.02(2.45)	2.22
KA 12-3	0.11(1.05)	0.06(1.03)	0.16(1.07)	0.59(1.26)	0.88(1.37)	1.45(1.55)	2.87(1.97)	3.87(2.21)	4.89(2.40)	4.66(2.37)	1.95
NDA 2 (ch)	0.33(1.15)	0.22(1.10)	0.43(1.09)	0.79(1.34)	1.02(1.39)	1.97(1.72)	3.23(2.05)	4.23(2.83)	5.67(2.56)	5.11(2.46)	2.30
BHUA 189	0.81(1.33)	0.75(1.32)	0.88(1.34)	1.12(1.45)	1.78(1.67)	3.02(1.99)	4.33(2.30)	5.67(258)	7.49(2.91)	7.95(2.99)	3.38
Average	0.54	0.44	0.61	0.98	1.35	2.47	3.84	5.11	6.71	6.64	-
SEM±	0.071	0.036	0.060	0.053	0.101	0.063	0.099	0.047	0.173	0.102	-
CD at 5%	0.205	0.105	0.173	0.154	0.293	0.181	0.286	0.134	0.499	0.294	-

Figures in parentheses are ?x+0.5 transformed value

Table 3. Extent of damage caused by pod bug on long duration pigeonpea genotypes during *kharif* 2013-14.

Genotypes	% Pod damage by pod bug	% graindamage by pod bug	Grain yield (kg/ha)
DA 13-2	28.67(32.15)	14.31(22.03)	1255
MAL 40	25.67(30.39)	12.79(20.77)	1382
BAHAR(ch)	24.33(29.46)	11.12(19.20)	1810
MA 6 (ch)	37.33(37.64)	15.95(23.52)	1052
IPA 11-1	27.33(31.28)	13.60(21.62)	1267
NDA 13-1	36.67(37.25)	15.38(22.95)	1129
KA 12-2	19.67(26.25)	10.13(18.41)	1960
NDA 1 (ch)	26.67(31.08)	13.54(21.26)	1278
MAL 13(ch)	33.00(27.85)	15.24(22.91)	1180
IPA 7-10	39.67(38.98)	22.13(28.04)	1027
DA 13-1	31.67(34.21)	14.51(22.33)	1250
NDA 13-2	25.33(30.20)	12.35(20.34)	1645
BAUPP 09-22	24.33(29.53)	11.34(19.50)	1806
MAL 39	25.33(30.18)	12.04(20.16)	1650
KA 12-4	24.67(29.75)	11.49(19.62)	1770
KA 12-3	22.00(27.85)	10.58(18.34)	1908
NDA 2 (ch)	25.00(29.87)	11.59(19.68)	1725
BHUA 189	32.00(34.41)	14.75(22.78)	1207
SEm±	1.906	1.373	
C.D at =0.05%	5.500	3.964	

() = Figure in parentheses are arc sin transformed values

Table 4. Extent of damage caused by pod bug on long duration pigeonpea genotypes during kharif 2014-15.

Genotypes	% Pod damage by pod bug	% graindamage by pod bug	Grain yield (kg/ha)
DA 13-2	24.00(29.00)	11.4(19.55)	1020
MAL 40	22.33(28.10)	10.44(18.82)	1159
BAHAR(ch)	18.33(25.15)	7.91(15.98)	1589
MA 6 (ch)	34.00(35.65)	14.45(22.18)	827
IPA 11-1	23.67(28.79)	10.91(18.97)	1017
NDA 13-1	32.67(34.83)	13.43(21.43)	916
KA 12-2	16.33(23.79)	6.98(14.99)	1785
NDA 1 (ch)	22.33(28.08)	10.79(18.94)	1045
MAL 13(ch)	30.00(33.18)	12.97(21.04)	965
IPA 7-10	35.00(36.21)	20.63(26.98)	819
DA 13-1	27.00(31.24)	11.48(19.52)	1032
NDA 13-2	22.33(28.07)	10.42(18.64)	1422
BAUPP 09-22	19.33(25.84)	8.05(16.19)	1591
MAL 39	22.00(27.95)	9.76(17.97)	1431
KA 12-4	20.00(26.54)	9.16(17.22)	1540
KA 12-3	18.00(24.97)	6.98(15.08)	1725
NDA 2 (ch)	20.67(27.01)	9.72(17.99)	1520
BHUA 189	28.00(31.83)	12.54(20.64)	991
SEm±	2.133	1.251	
C.D at =0.05%	6.158	3.611	

() = Figure in parentheses are arc sin transformed values

(*Melanagromyza obtusa*), pod borers (*Lampides boeticus* and *Helicoverpa armigera*) and Pod sucking bugs (*Clavigralla gibbosa*). In general, total seed damage was low and the percentage damage by pod fly was 2-7%. Pod fly accounted for 80% of the total seed damage, pod borers 12.7% and pod sucking bugs 6.3%.

Raj Kumar and Ram Keval (2013) observed that the peak population of pod bug was observed from 8th SW to 12th SW. Kumar and Nath (2003) the activity of pod bug (*Clavigralla gibbosa*) infestation was observed from 23 January peaked on 7 February and remained until 24 March. Kumar and Nath (2005) conducted a study during

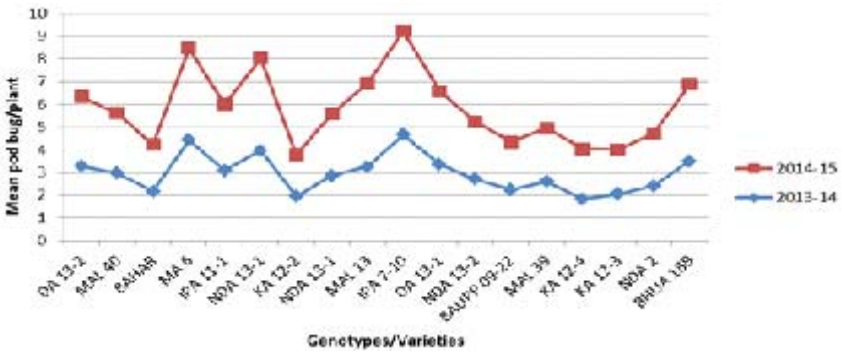

Fig. 1. Population fluctuation of Pod bug on different long duration pigeonpea genotypes/varieties

1994-96 observed the average population of *Clavigralla gibbosa* 1.67plants^{-5}.

Yields

The grain yield of different genotype differed significantly during both the year and ranged from 1027 kg/ha in the genotype IPA 7-10 to 1960 kg/ha in KA 12-2 during 2013-14 and 819 kg/ha in the genotype IPA 7-10 to 1785 kg/ha in the genotype KA 12-2 during 2014-15.

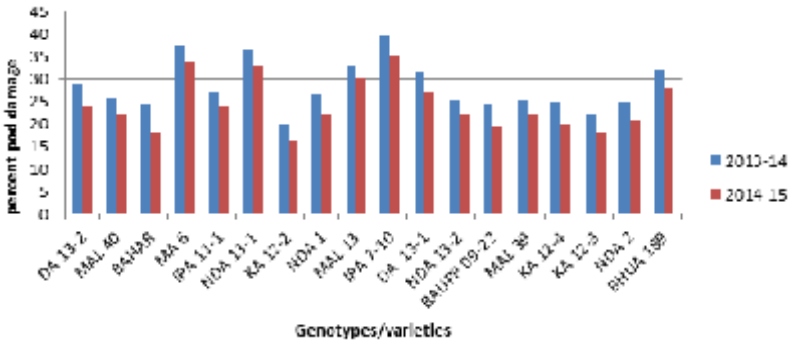

Fig. 2. Extent of percent pod damage caused by pod bug during 2013-14 and 2014-15

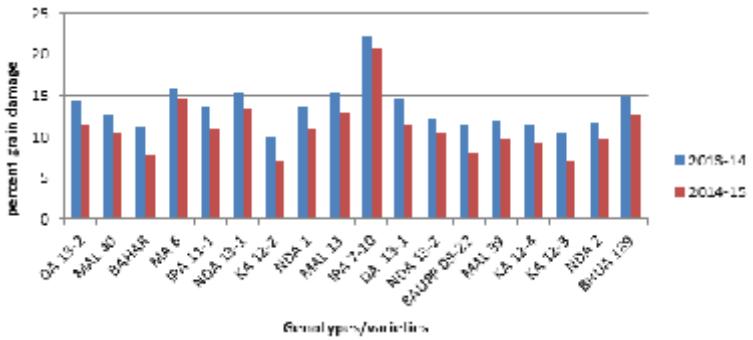

Fig. 3. Extent of percent grain damage caused by pod bug during 2013-14 and 2014-15

CONCLUSION

On the basis of above observation it may be concluded that incidence of pod bug is increased with the advancement of crop age and the actual damage to the economic produce take place after flowering of the crop. The pod bug directly influenced the grain yield of the crop. Although a number of insect-pests were noticed but it appeared that they hardly had any significant influence on crop yield. In general, the per cent pod and grain damage by pod bug was higher in all genotype. On the basis of above observation, it may be concluded that the pod bug is the major insect pests in this zone and genotype KA 12-2 and KA 12-3 is most tolerant to insect pest infestation and should be promoted.

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