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Interaction among genotypes and insecticides on seasonal incidence of pod borer complex and their management in pigeonpea

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Abstract
Efficacy of different insecticidal treatments against pod borer complex were studied and the present investigation reported that the sequential application of treatments T_1-Flubemdiamide 48 SC, Chlorantraniliprole 18.5 SC appeared to be the best treatment showing maximum reduction (80.30%) in larval population of pod borer complex with JKM-189 genotype and also showed highest cost benefit ratio *i.e.*, 1:14.48. The next best result was obtained in genotype BAU PP 16-38 with the spraying of T_3-Emamectin benzoate 5% SG giving 68.23% reduction in larval population of pod borer complex. Lowest result was obtained with spraying of T_2 - *Bacillus thuringiensis* var *kurstaki* 0.5% WP giving 49.84% reduction in larval population of pod borer complex over control. All the treatments were significantly superior over control.

Keywords: Genotype, insecticide, pod borer complex, management

Introduction
Pigeonpea (*Cajanus cajan*) is a perennial member of the family Fabaceae and it is named as Adhaki in Sanskrit, Arhar in Hindi, Pigeonpea in English and Tur in Bengali. It is also known as red gram, Congo pea, Gungo pea, and no-eye pea (Wu *et al.*, 2009) [1]. The pod borer complex involved lepidopteran borer's *viz*., *Helicoverpa armigera* and *Exelastis atomosa* is attributed for the maximum economic injury in the pigeonpea (Singh and Yadav, 2005) [2]. Among these two, *Helicoverpa armigera* (Hubner) is the most damaging pest worldwide. (Shanower *et al.*, 1999) [3]. the pest can cause complete crop loss (Reed and Lateef, 1990) [4]. In the present context it is essential to know the current status of field toxicity of some newly evolved insecticides. It is rather more important as there is continuous change occurring in the crop ecosystem. It is established fact that judicious use of insecticides would certainly prove to be a boon to the mankind therefore in the present investigation insecticidal pest management studies are included to know the bio-efficacy of prevalent and some new insecticides against changing based complex in pigeonpea.

Material and methods:
Four treatments *viz*., Flubendiamide 480 SC, Chlorantraniliprole 18.5% w/w SC, *Bacillus thuringiensis var kurstaki* 0.5% WP, Emamectin Benzoate 5% SG, and untreated control was imposed in all the three replications randomly. Total 36 plots of 3.5 m x 3 m size were sown with genotypes BAUPP 16-38, Birsa arhar-1, JKM-189 and spacing of 0.75 m x 0.2 m between rows and plants were maintained respectively. All the recommended agronomic practices *i.e.*, fertilizer application, thinning and weeding operations was practiced.

$$\text{Mean percent reduction in larval population} = \frac{\text{Mean larval population in control plots} - \text{Mean larval population in treated plots}}{\text{Mean larval population in control plots}} \times 100$$

Table 1: Efficacy of different insecticides against pod borer complex (*H. armigera M. testulalis,* and *E. atomosa)* in pigeonpea.

Interaction	PTC	1st Spray			2nd Spray			Mean of 2 sprays	Reduction over control
		3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS		
V_1	36.57 (6.09)	32.35 (5.73)	24.43 (4.99)	24.26 (4.98)	19.17 (4.44)	15.49 (4.00)	16.78 (4.16)	22.08	-
V_2	36.98 (6.12)	31.90 (5.69)	24.18 (4.97)	24.98 (5.05)	18.77 (4.39)	15.53 (4.00)	16.17(4.08)	21.92	-
V_3	34.25 (5.89)	29.78 (5.50)	23.10 (4.86)	23.95 (4.94)	18.16 (4.32)	15.21 (3.96)	16.75 (4.15)	21.16	-
SEm (±)	0.634	0.55	0.42	0.75	0.68	0.34	0.22	-	-
CD (P=0.05)	2.49	2.18	1.65	2.96	2.67	1.33	0.87	-	-
T_1	33.44 (5.83)	16.87 (4.17)	9.57 (3.17)	11.32 (3.44)	6.14 (2.58)	3.90 (2.10)	4.61 (2.26)	8.74	79.35
T_2	36.91 (6.12)	35.74 (6.02)	27.12 (5.26)	28.03 (5.34)	16.58 (4.13)	10.10 (3.26)	11.50 (3.46)	21.51	49.16
T_3	32.09 (5.71)	26.69 (5.21)	17.11 (4.20)	18.22 (4.33)	9.73 (3.20)	6.54 (2.65)	7.69 (2.86)	14.33	66.13
T_4	41.29 (6.46)	46.07 (6.82)	41.83 (6.51)	40.02 (6.37)	42.33(6.54)	41.11 (6.45)	42.49 (6.56)	42.31	-
SEm (±)	0.99	0.74	0.69	0.73	0.51	0.50	0.46	-	-
CD (P=0.05)	2.96	2.20	2.04	2.16	1.51	1.49	1.37	-	-
V_1T_1	35.17 (5.97)	19.9 (4.52)	9.87 (3.22)	11.26 (3.43)	6.16 (2.58)	3.57 (2.02)	4.9 (2.32)	9.28	78.65
V_1T_2	37.03 (6.13)	36.2 (6.06)	27.2 (5.26)	28.53 (5.39)	16.77 (4.16)	10.4 (3.30)	11.67 (3.49)	21.80	49.84
V_1T_3	32.67 (5.76)	24.6 (5.01)	16.64 (4.14)	18.13 (4.32)	9.8 (3.21)	6.23 (2.59)	7.43 (2.82)	13.81	68.23
V_1T_4	41.4 (6.47)	48.7 (7.01)	44.06 (6.68)	39.13 (6.30)	43.93 (6.67)	41.77 (6.50)	43.13 (6.61)	43.45	-
V_2T_1	34.77 (5.94)	17.33 (4.22)	9.87 (3.22)	11.2 (3.42)	6.47 (2.64)	3.87 (2.09)	4.27 (2.18)	8.84	79.14
V_2T_2	38.03 (6.21)	35.43 (5.99)	27.2 (5.26)	28.17 (5.35)	16.33 (4.10)	10.27 (3.28)	11.23 (3.42)	21.44	49.39
V_2T_3	32.7 (5.76)	28.16 (5.35)	17.93 (4.29)	18.8 (4.39)	9.93 (3.23)	7.37 (2.81)	8.2 (2.95)	15.07	64.44
V_2T_4	42.43 (6.55)	46.7 (6.87)	41.73 (6.50)	41.77 (6.50)	42.33 (6.54)	40.63 (6.41)	41 (6.44)	42.36	-
V_3T_1	30.4 (5.56)	13.36 (3.72)	9(3.08)	11.5 (3.46)	5.8 (2.51)	4.27 (2.18)	4.67 (2.27)	8.10	80.30
V_3T_2	35.67 (6.01)	35.6 (6.01)	26.97(5.24)	27.4 (5.28)	16.63 (4.14)	9.63 (3.18)	11.6 (3.48)	21.31	48.18
V_3T_3	30.9 (5.60)	27.3 (5.27)	16.77 (4.16)	17.73 (4.27)	9.47 (3.16)	6.03 (2.56)	7.43 (2.82)	14.12	65.65
V_3T_4	40.03 (6.37)	42.83 (6.58)	39.7 (6.34)	39.17 (6.30)	40.73 (6.42)	40.93 (6.44)	43.33 (6.62)	41.12	-
SEm (±)	1.62	1.25	1.11	1.32	1.02	0.82	0.73	--	-
CD (P=0.05)	5.06	3.94	3.46	4.35	3.46	2.59	2.23	-	-
CV. (%)	8.33	7.11	8.63	8.93	8.16	9.76	8.38	-	-

V_1- BAU PP 16-38, V_2- Birsa Arhar-1, V_3- JKM 189, T_1-Istspray Flubemdiamide- 2nd spray chlorantraniliprole, T_2-*Bacillus thuringiensis,* T_3-Emamectin benzoate, T_4-Untreated control, PTC- Pre-treatment count, DAS- Days after spray, Figures in parenthesis are square root transformed values

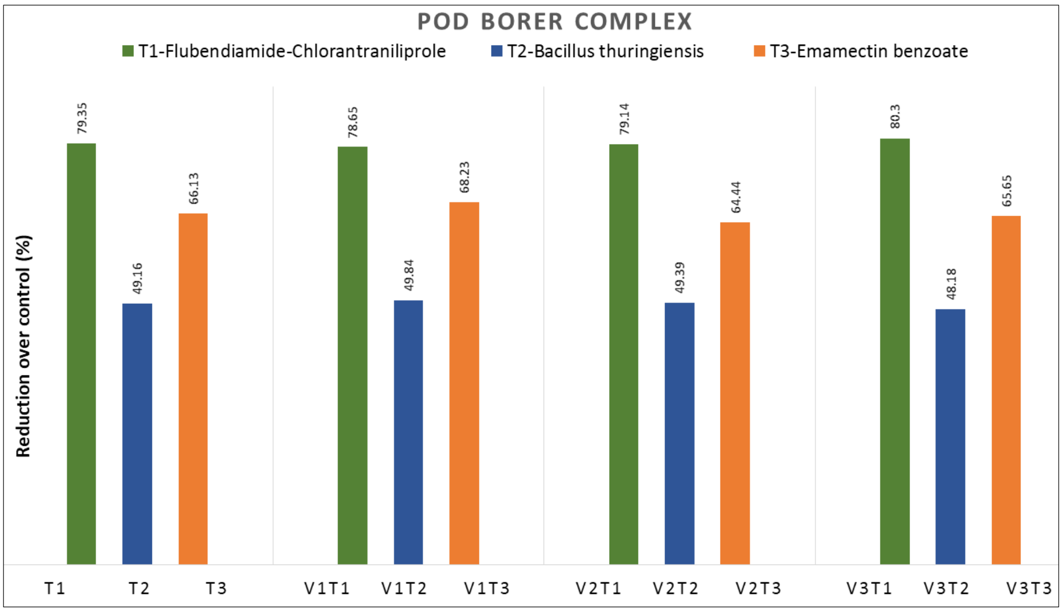

Fig 1: Reduction over control (%) of Pod borer complex in different insecticidal treatments

Result

The results on% reduction over control indicated that the T_1-flubendiamide-chlorantraniliprole had the highest (79.35%) reduction over control followed by T_3- Emamectin benzoate (66.13%), T_2- *Bacillus thuringiensis* (49.16%). In the interaction of treatment (T_1-, flubendiamide in 1st spray, chlorantraniliprole in 2nd spray) with genotype (JKM-189) V_3T_1 had highest (80.30%) reduction over control, followed by treatment (T_3-Emamectin benzoate) with genotype (BAU PP 16-38) V_1T_3 (68.23%) and treatment (T_2- *Bacillus thuringiensis*) with genotype (BAU PP 16-38) V_1T_2 (49.84%).

Conclusions

Efficacy of different insecticidal treatments against pod borer complex were studied and the present investigation reported that the sequential application of treatments T_1- Flubendiamide 480 SC, Chlorantraniliprole 18.5 SC is found out best one among the treatment showing maximum reduction (80.30%) in larval population of pod borer complex and among all genotype BAU PP 18-36 gave best result.

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