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BIOEFFICACY OF SOME INSECTICIDES AGAINST POD PEST COMPLEX ON PIGEONPEA [*CAJANUS CAJAN* (L.) MILL SP.]

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ABSTRACT : The present study was conducted to evaluate the comparative efficacy and economics of different insecticides against *Melanagromyza obtusa*, *Clavigralla gibbosa* and *Helicoverpa armigera* infesting pigeonpea variety Bahar during *Kharif* 2020-21. Among all the treatments, Thiamethoxam 25 WG @ 75g a.i./ ha provided better control of *M. obtusa* and *C. gibbosa* in terms of higher percent reduction in population over control, lower pod and grain damage and higher grain yield. Spinosad 45 SC @ 73g a.i./ ha was found to be most effective against *H. armigera* with minimum mean larval population (1.14 larvae/ plant), pod damage (5.20%) and grain damage (1.72%). All the treatments were statistically significant in increasing grain yield (i.e. 986.89 kg/ha to 1039.49 kg/ha) over untreated control (803.02 kg/ha). Thiamethoxam 25 WG @ 75g a.i./ ha treatment was also most economical with maximum cost: benefit ratio of 1: 5.61.

Key words : Pigeonpea, insect pests, bioefficacy, insecticides, pod damage, grain yield.

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INTRODUCTION

Pigeonpea [*Cajanus cajan* (L.) Millsp.] is a valuable grain legume grown in semi-arid tropical and sub-tropical areas of the world (Srivastava and Joshi, 2011). It is cultivated as a sole crop, intercrop, mixed crop and in sequential cropping systems for the purpose of grains, green manuring, fodder and/ or forage (Shanower *et al*, 1999). It is the second most important pulse crop grown in India after chickpea (Patange and Chiranjeevi, 2017). It is cultivated in an area of about 4.43 million hectares with 4.25 million tones production and 960 kg/ha productivity (Pawar and Das, 2020). Though, India contributes for nearly 90% of world's total pigeonpea production, the yield of this crop has remained stagnant over the past few decades largely due to its vulnerability to several biotic and abiotic stresses (Chakravarty and Agnihotri, 2016). Nearly 250 species of insect pests are known to infest pigeonpea crop at its various growth stages in India but the damage caused by gram pod borer [*Helicoverpa armigera* (Hübner)], tur pod fly [*Melanagromyza obtusa* (Malloch)] and tur pod bug [*Clavigralla gibbosa* Spinola] results in major reduction in grain yield (Nithish and Rana, 2019). Considerable loss in grain yield is inflicted on account of their association with fruiting bodies (Srivastava *et al*, 2010).

H. armigera and *M. obtusa* cause adequate economic damage in pigeonpea leading to very low yield levels of 500 to 800 kg ha^{-1} as against the potential yield of 1800 to 2000 kg ha^{-1} (Khamoriya *et al*, 2017). Similarly, feeding by nymphs and adults of *C. gibbosa* causes deformation of pods and shriveling of grains (Purohit *et al*, 2017) resulting in predominant grain yield loss that has been worked out to the tune of 50,000 tonnes annually for Uttar Pradesh alone (Keval *et al*, 2017). For management of insect pests in a crop with high remunerative prices like pigeonpea, insecticides are still the first choice of farmers. Farmers use them indiscriminately, which lead to increased cost of plant protection and reduced profitability. On these grounds, newer insecticides with novel mode of action are needed to be evaluated to find out an effective and economical insecticide for the management of pigeonpea pod pest complex (Ramteke *et al*, 2020). Keeping these views in mind, present study was conducted to evaluate the efficacy of some insecticides against pod borers and pod bug in pigeonpea ecosystem.

Table 4 : Effect of some insecticides on pigeonpea pod and grain damage by pod pest complex during *Kharif* 2020-21.

Treatments	Dose (a.i./ha)	% Damage by pod fly		% Damage by pod bug		% Damage by pod borer	
		Pod	Grain	Pod	Grain	Pod	Grain
Profenophos 50 EC	500g	34.00(35.65)	22.06(28.02)	17.24(24.52)	6.50(14.75)	5.70(13.87)	2.21(8.54)
Fenvalerate 20 EC	75g	24.66(29.76)	15.10(22.85)	13.10(21.20)	5.58(13.65)	7.20(15.58)	2.50(9.09)
Fipronil 80 WG	50g	27.00(31.29)	17.01(24.35)	14.33(22.23)	6.07(14.24)	6.16(14.26)	2.40(8.90)
Thiamethoxam 25 WG	75g	23.33(28.87)	12.76(2.92)	12.66(20.83)	5.01(12.90)	8.03(16.45)	2.96(9.91)
Spinosad 45 SC	73g	31.00(33.81)	20.50(26.91)	16.66(24.08)	6.48(14.74)	5.20(13.14)	1.72(7.19)
Indoxacarb 15.8 EC	50g	28.33(32.14)	19.62(26.28)	15.66(23.30)	6.37(14.59)	5.50(13.55)	1.81(7.71)
Untreated control	-	35.66(36.65)	27.33(31.49)	19.36(26.09)	7.21(15.57)	9.66(18.10)	3.05(10.04)
S.E(m)±		**0.66**	**0.38**	**0.29**	**0.46**	**0.50**	**0.60**
C.D. at 5%		**2.06**	**1.20**	**2.18**	**1.43**	**1.56**	**1.87**

Figures in parentheses are angular transformed values.

Table 5 : The cost-benefit ratio of insecticidal treatments against pod pest complex on pigeonpea during *Kharif* 2020-21

Treatments	Dose (a.i./ ha)	Grain yield (Kg/ ha)	Incremental yield over control (Kg/ ha)	Value of incremental yield (Rs)	Cost of treatment (Rs/ha)	Profit due to treatment (Rs/ ha)	Cost benefit ratio
Profenophos 50 EC	500g	989.32	186.30	11178.00	2942.00	8176.00	1: 2.77
Fenvalerate 20 EC	75g	986.89	183.87	11032.20	2147.50	8884.70	1: 4.13
Fipronil 80 WG	50g	996.56	193.54	11612.40	3155.56	8456.84	1: 2.67
Thiamethoxam 25 WG	75g	1039.49	236.47	14188.20	2144.00	12044.20	1: 5.61
Spinosad 45 SC	73g	1031.57	228.55	13713.00	5144.40	8586.60	1: 1.66
Indoxacarb 15.8 EC	50g	1016.26	213.24	12794.40	2254.42	10539.98	1: 4.67
Untreated control	-	803.02	–	–	–	–	–

also found Imidacloprid 17.8 SL (0.005%), Clothianidin 50 WDG (0.025%) and Thiamethoxam 25 WG (0.008%) highly effective against pod pest complex of pigeonpea in terms of significantly higher increase in yield over control and protection cost benefit ratio.

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