

Original Research Article

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Effect of Biorational Control on Predatory Pentatomid Bugs in Soybean

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ABSTRACT

Keywords

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(Sorghum)

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Bio-rational studies were carried out for predatory pentatomid bugs in soybean with eight treatments. The results found that significantly highest in pentatomid bugs population was found in experimental plots treated with Trap crop (Castor) compare to rest of treatments and at par with NSKE 5%, Neem oil 5% and Intercrop (Sorghum). Secondly better treatment is Pongamia oil 2% except mechanical control and Chlorpyrifos 20EC @2ml/lit.

Introduction

Soybean [*Glycine max* (L.) Merrill] is one of the most important leguminous crop belonging to family Leguminoceae, sub-family Papilionoceaе. It is the world's largest source of animal protein feed and the second largest source of vegetable oil. It is considered as pulse crop but due to high oil content, now it is placed in oilseeds category. It originated from China (Nagata, T. 1960) where it also called 'yellow jewel' and introduced in India during 1870-80 (Andole, 1984).

The Indian neem tree, *Azadirachta indica* (Meliaceae), is a promising source of botanical insecticides. Due to their relative selectivity, neem products can be recommended for many integrated pest management programs (Biswas *et al.*, 2002). Kambrekar (2015) reported that, the trap cropping is a useful strategy in the management of several pests in various cropping systems. It offers significant economic and environmental benefits and it can successfully integrated with cultural, biological and chemical control methods.

Parinesa Moshefi and Ata Bahojb-Almasi (2016) studied that, the trap crop provide many benefits, including attracting beneficial insects like predatory pentatomid bugs to control the defoliators and reducing insecticide use. The trap crops need to be sown at least 1 meter away from the main crop to avoid shading.

Materials and Methods

The present investigation will be carried out in field condition on the field of Department of Entomology, College of Agriculture, Badnapur during *Kharif* 2017.

The experiment will be laid out in Randomized Block Design (RBD) in three replications with a plot size of 5.0 × 3.0 m. leaving a gang way of 1meter around plots. The soybean variety MAUS-71 will be sown at a spacing of 45×5cm. Normal sowing will perform during *Kharif* 2017 by following recommended package of practices. The treatments as detailed it will imposed with Knapsack sprayer (Hydraulic sprayer) using a spray fluid of 500 lit/ha. The first spray will give at 30 days after germination (DAG) when crop had adequate population of insect and second spraying will be given at 45 days after germination (DAG). Observation on natural enemies' population of predatory bugs was recorded at three randomly selected spots on one meter row length crop in each treatment leaving the border rows. The population data were transformed to $\sqrt{x+0.5}$ value before analysis. To compare the efficacy of treatment both standards check as well as untreated check will be maintained.

The need based application of Neem oil 5% will be given as and when needed after second spraying. Treatments detail, NSKE 5%, Neem oil 5%, Pongamia oil 2%, Mechanical control, Trap crop (castor), Intercrop (sorghum), Chlorpyrifos 20EC @2ml/lit and untreated control.

Results and Discussion

Pentatomid bugs

The initial population of bugs 1day before imposing the treatment ranged from 1.4 to 2.0 bugs per mrl and 1 day after (1.3 to 2.1) differences were non-significant. At 1st, 3rd, 5th, 7th day after Ist spray slight reduction of bugs population in chlorpyrifos 20EC @2ml/lit. At fourteenth day after spray chlorpyrifos 20EC @2ml/lit recorded the least bugs population (1.3 bugs/mrl) which was statistically non-significant over control and highest (bugs 2.6/mrl) were recorded in trap crop (castor) which was significantly superior over control followed by NSKE 5%, Neem oil 5%, Pongamia oil 2% and mechanical control (2.3 bugs/mrl) and intercrop (sorghum) (2.1 bugs/mrl). However, all treatments were significantly superior over untreated control, but chlorpyrifos 20EC @2ml/lit treated plots recorded lowest bugs population of 1.3 bugs/mrl. The lowest bugs were recorded in mechanical control 1st, 3rd, 5th, and 7th day after Ist mechanical controls as shown in (Table 1 and Fig. 1).

After second spray the bugs population significantly varied among the treatments, chlorpyrifos 20EC @2ml/lit recorded the lowest larval population where highest bugs population was recorded in trap crop (castor) and at par with NSKE 5%, Neem oil 5%, Pongamia oil 2% and intercrop (sorghum). However, all treatments were significantly superior over untreated control, but chlorpyrifos 20EC @2ml/lit treated plots recorded lowest bugs population at fourteenth day after spray.

The lowest bugs were recorded in mechanical control 1st, 3rd, 5th, and 7th day after IInd mechanical controls as shown in (Table 1 and Fig. 2).

Table.1 Effect of biorational control on predatory pentatomid bugs in soybean

Tr. No	Treatments	Average bugs/mrl													
		First spray							Second spray						
		1DBS	1DAS	3DAS	5DAS	7DAS	10DAS	14DAS	1DBS	1DAS	3DAS	5DAS	7DAS	10DAS	14DAS
T₁	NSKE 5%	2.0 (1.58)	2.0 (1.58)	2.0 (1.58)	2.0 (1.58)	2.0 (1.58)	2.1 (1.61)	2.3 (1.68)	2.3 (1.68)	2.3 (1.68)	2.3 (1.68)	2.3 (1.68)	2.4 (1.71)	2.6 (1.74)	
T₂	Neem oil 5%	2.0 (1.58)	2.0 (1.58)	2.0 (1.58)	1.9 (1.54)	1.8 (1.51)	2.1 (1.61)	2.3 (1.68)	2.3 (1.68)	2.3 (1.68)	2.2 (1.65)	2.1 (1.61)	2.4 (1.71)	2.6 (1.74)	
T₃	Pongamia oil 2%	2.0 (1.58)	2.0 (1.58)	1.8 (1.51)	1.6 (1.41)	1.3 (1.34)	1.6 (1.41)	2.3 (1.68)	2.3 (1.68)	2.1 (1.61)	1.9 (1.54)	1.6 (1.43)	1.9 (1.54)	2.2 (1.65)	
T₄	Mechanical control.	2.0 (1.58)	1.3 (1.32)	1.0 (1.22)	1.3 (1.34)	1.4 (1.39)	1.8 (1.51)	2.3 (1.68)	1.7 (1.46)	1.2 (1.31)	1.3 (1.34)	1.4 (1.38)	2.2 (1.65)	2.6 (1.74)	
T₅	Use of trap crop, castor.	2.0 (1.58)	2.0 (1.58)	2.1 (1.61)	2.2 (1.65)	2.3 (1.68)	2.4 (1.71)	2.6 (1.75)	2.6 (1.75)	2.7 (1.78)	2.9 (1.84)	3.0 (1.87)	3.3 (1.96)	3.6 (2.01)	
T₆	Intercrop (4 rows of soybean x 2 rows of sorghum).	1.4 (1.38)	1.4 (1.39)	1.6 (1.43)	1.7 (1.46)	1.8 (1.51)	1.9 (1.54)	2.1 (1.61)	2.1 (1.61)	2.3 (1.68)	2.3 (1.68)	2.4 (1.71)	2.6 (1.73)	2.8 (1.81)	
T₇	Chlorpyriphos 20EC @2ml/lit.	2.0 (1.58)	1.9 (1.54)	1.6 (1.41)	0.8 (1.13)	0.3 (0.91)	0.7 (1.08)	1.3 (1.34)	1.2 (1.31)	0.9 (1.18)	0.5 (0.97)	0.3 (0.91)	0.8 (1.13)	1.6 (1.43)	
T₈	Untreated control.	2.0 (1.55)	2.1 (1.60)	2.1 (1.57)	2.2 (1.62)	2.2 (1.62)	2.3 (1.66)	2.2 (1.62)	2.2 (1.62)	2.2 (1.59)	2.4 (1.68)	2.6 (1.73)	2.3 (1.64)	2.0 (1.52)	
	SE(m) ±	0.10	0.10	0.13	0.10	0.10	0.10	0.10	0.10	0.12	0.10	0.11	0.13	0.12	
	C.D. at 5%	NS	NS	0.39	0.30	0.30	0.30	0.30	0.30	0.36	0.30	0.33	0.39	0.36	
	C.V.	11.09	11.33	14.84	11.73	11.99	11.41	10.61	10.60	13.05	11.10	12.38	13.86	12.06	

Fig. in parenthesis are $\sqrt{x+0.5}$ transformed values. DBS-day before spraying DAS-day after spraying

Table.2 Effect of biorational control on predatory pentatomid bugs in soybean

Tr. No	Treatments	Average bugs/mrl												
		Third spray						Simple pooled mean of three sprayings						
		1DAS	3DAS	5DAS	7DAS	10DAS	14DAS	1DBS	1DAS	3DAS	5DAS	7DAS	10DAS	14DAS
T ₁	NSKE 5%	2.6 (1.74)	2.4 (1.71)	2.2 (1.65)	1.8 (1.51)	1.3 (1.34)	0.8 (1.12)	2.0 (1.58)	2.3 (1.67)	2.2 (1.65)	2.2 (1.63)	2.0 (1.59)	1.9 (1.55)	1.9 (1.52)
T ₂	Neem oil 5%	2.6 (1.74)	2.4 (1.71)	2.2 (1.65)	1.8 (1.51)	1.3 (1.34)	0.8 (1.12)	2.0 (1.58)	2.3 (1.67)	2.2 (1.65)	2.1 (1.61)	1.9 (1.55)	1.9 (1.55)	1.9 (1.52)
T ₃	Pongamia oil 2%	2.2 (1.65)	1.9 (1.53)	1.6 (1.41)	1.4 (1.39)	1.0 (1.22)	0.7 (1.07)	2.0 (1.58)	2.2 (1.63)	1.9 (1.56)	1.7 (1.48)	1.4 (1.39)	1.5 (1.41)	1.7 (1.47)
T ₄	Mechanical control.	1.6 (1.43)	1.3 (1.34)	1.4 (1.39)	1.4 (1.39)	1.3 (1.34)	0.8 (1.12)	2.0 (1.58)	1.5 (1.42)	1.2 (1.29)	1.3 (1.35)	1.4 (1.38)	1.8 (1.50)	1.9 (1.52)
T ₅	Use of trap crop, castor.	3.6 (2.01)	3.8 (2.07)	3.7 (2.04)	3.3 (1.95)	2.7 (1.77)	2.2 (1.65)	2.0 (1.58)	2.7 (1.79)	2.9 (1.82)	2.9 (1.85)	2.9 (1.83)	2.8 (1.81)	2.8 (1.81)
T ₆	Intercrop (4 rows of soybean x 2 rows of sorghum).	2.8 (1.81)	2.9 (1.84)	2.7 (1.77)	2.2 (1.65)	1.7 (1.46)	1.2 (1.31)	1.4 (1.38)	2.1 (1.60)	2.3 (1.66)	2.2 (1.65)	2.1 (1.62)	2.1 (1.60)	2.0 (1.58)
T ₇	Chlorpyrifos 20EC @2ml/lit.	1.1 (1.24)	0.8 (1.13)	0.7 (1.08)	0.3 (0.91)	0.3 (0.91)	0.3 (0.91)	2.0 (1.58)	1.4 (1.37)	1.1 (1.26)	0.7 (1.08)	0.3 (0.89)	0.6 (1.04)	1.1 (1.23)
T ₈	Untreated control.	1.9 (1.50)	1.7 (1.45)	1.4 (1.38)	1.2 (1.24)	0.8 (1.12)	0.8 (1.12)	2.0 (1.55)	2.1 (1.60)	2.0 (1.58)	2.0 (1.57)	2.0 (1.57)	1.8 (1.50)	1.7 (1.45)
	SE(m) ±	0.13	0.11	0.10	0.10	0.09	0.08	0.10	0.07	0.07	0.06	0.06	0.05	0.05
	C.D. at 5%	0.39	0.33	0.30	0.30	0.27	0.24	NS	0.22	0.23	0.20	0.18	0.16	0.15
	C.V.	13.57	11.78	11.13	12.01	11.80	11.56	11.09	7.93	8.45	7.59	6.89	6.10	5.64

Fig.1 Population of pentatomid bugs after first spray

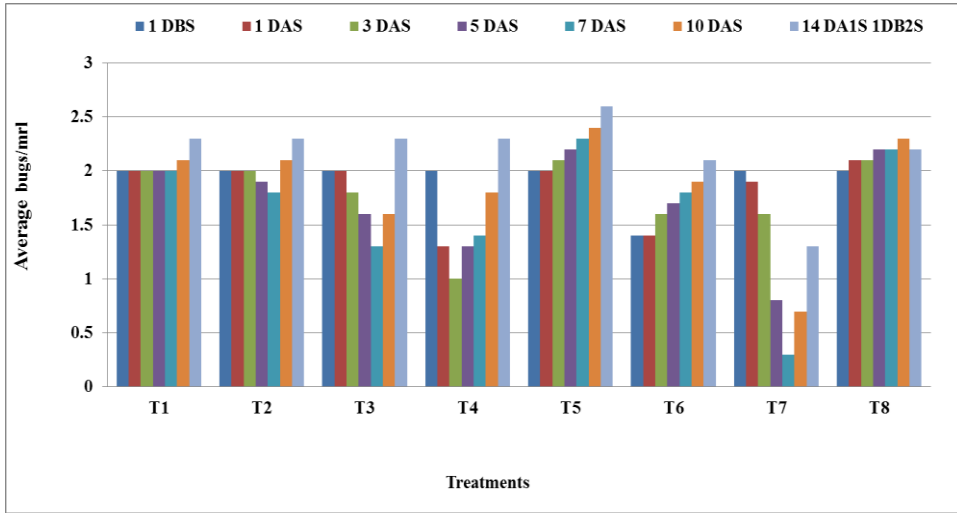


Fig.2 Population of pentatomid bugs after second spray

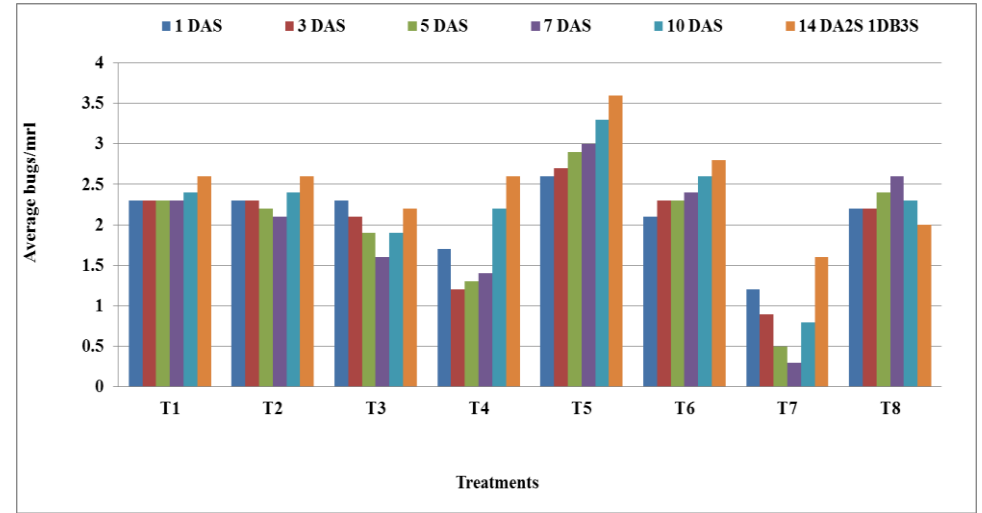


Fig.3 Population of pentatomid bugs after third spray

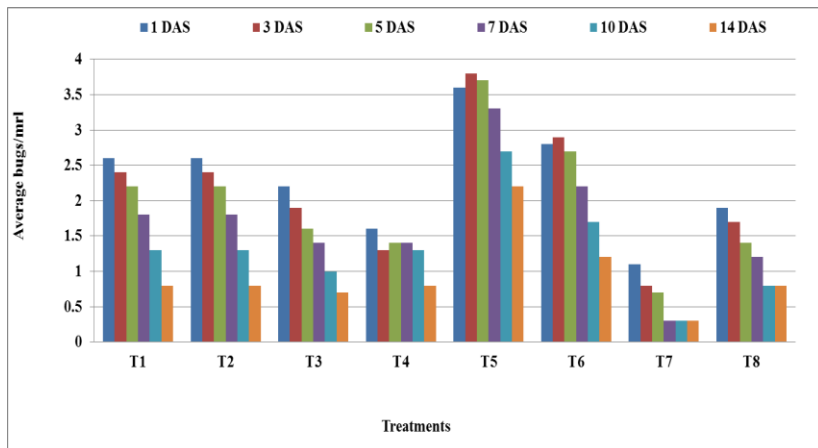
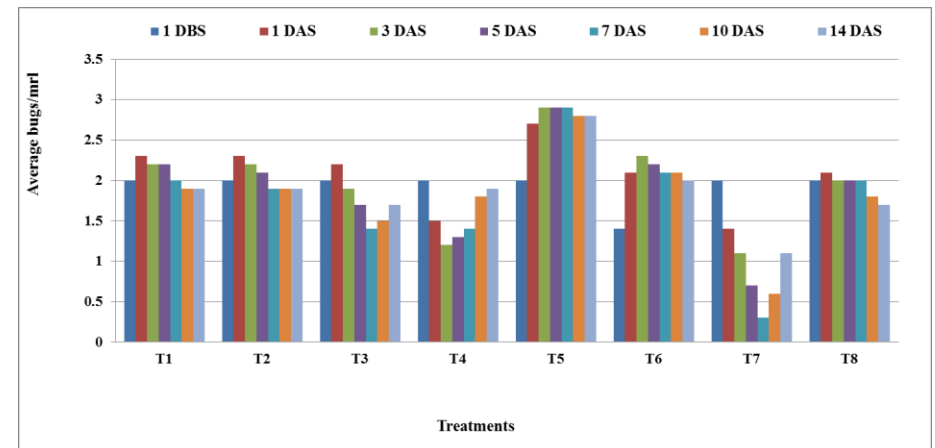


Fig.4 Population of pentatomid bugs (Simple pooled mean of three sprayings)



After third spray the bugs population significantly varied among the treatments, chlorpyrifos 20EC @2ml/lit recorded the lowest larval population where highest bugs population was recorded in trap crop (castor) and at par with NSKE 5%, Neem oil 5%, Pongamia oil 2% and intercrop (sorghum). However, all treatments were significantly superior over untreated control, but chlorpyrifos 20EC @2ml/lit treated plots recorded lowest bugs population at fourteenth day after spray. The lowest bugs were recorded in mechanical control 1st, 3rd, 5th, and 7th day after IIIrd mechanical control as shown in (Table 2 and Fig.3).

The pooled data of three sprayings presented in (Table 2 and Fig. 4) revealed that the bugs' population was uniformly distributed in all the plots one day before spray. The highest bugs' population was recorded in trap crop (castor) and at par with NSKE 5%, Neem oil 5%, Pongamia oil 2% and intercrop (sorghum). However significant reduction in the bugs population was recorded 1st, 3rd, 5th and 7th days after treatment in mechanical control while lowest bugs population was registered with the treatment of chlorpyrifos 20EC @2ml/lit after 5th, 7th and 7th day after spray.

Sarode and Sonalkar (1999) reported that, the insecticides products for insecticides were found to be safe to the predator. However Neem seed kernel extract proved comparatively safe followed by phosalone, chlorpyrifos, deltamethrin and cypermethrin were found to be highly toxic in soybean

crop. Dhawan (2000) studied that, the impact of new insecticides on natural enemies' complex in cotton ecosystem, chlorpyrifos and quinalphos were more toxic among all the insecticides resulting in 100% mortality. Parinesa Moshefi and Ata Bahojb-Almasi (2016) studied that. The trap crops attracted high numbers of predatory pentatomid bugs at the flowering and seed-formation stage to control the pests and reduce insecticide use.

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