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BIO-EFFICACY OF ACEPHATE 50% + IMIDACLOPRID 1.8% SP (LANCERGOLD) AGAINST MAJOR INSECT PESTS OF SUGARCANE AND THEIR NATURAL ENEMIES

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ABSTRACT

A field experiment was carried out at Rajasthan college of Agriculture, MPUAT, Udaipur during the two consecutive years 2015-16 and 2016-17 in a randomized block design with seven treatments and three replications. Sugarcane variety COH 119 was planted for experiment purpose. Treatments of Acephate 50% + Imidacloprid 1.8% SP, Acephate 75% SP and Imidacloprid 17.5% SL were drenched in open furrow after planting whereas, phorate 10% G was broadcasted in open furrow at planting. The two-consecutive years of experimentation has shown that applications of Acephate 50% + Imidacloprid 1.8% SP @ 3000 and 2500 g per ha found to be most effective treatment to manage sugarcane insect pest complex (Termite, white grub, early shoot borer and pyrilla) and simultaneously significant higher yield was recorded. It was also found that Acephate 50% + Imidacloprid 1.8% SP did not significantly reduce the prevailing natural enemies' populations in sugarcane ecosystem as well as found non-phytotoxic to the sugarcane crop at recommended dose.

Keywords: Bio-efficacy, phytotoxicity, acephate 50% + imidacloprid 1.8% SP, natural enemies, sugarcane major pests

INTRODUCTION

The Sugarcane, *Saccharum officinarum* (L). is a tropical plant belonging to the family Poaceae. It is an important commercial crop and is one of most important high value cash and industrial crop cultivated in India which is a major source of white sugar and gur. Sugarcane being a long duration crop supports one of the largest agro-processing industries of India and more than 6 million farmers are engaged in its cultivation. Its production and productivity are affected by many factors *viz*, soil type, selections of variety, fertilizer management, irrigation management and damage caused by pests (Bhawar *et al.,* 2015). More than 1500 species of insects feed on sugarcane plant recorded throughout the world (Box, 1953). During entire cropping period it suffers the attack of a wide range of insect pests from planting to till harvesting, out of these the borer (Early shoot borer), soil dwelling insects Termite and White grub, and sucking pest Pyrilla cause heavy losses to the quality as well as quantity of the crop. A list of about 800 parasitoids, predators and pathogens of sugarcane pest in Asia and the Indian Ocean islands has been complied, with information on the host stage they attack, host plant or crop and country of record (Sallaman and Allosopp, 2005). Majority of the natural enemies are susceptible to a variety of pesticides used in sugarcane ecosystem, which results in the drastic reduction in natural enemies' populations. Adoption of modern agricultural practices *viz.*, introductionof high yielding and hybrid varieties of crops, and increased use of agro-chemicals *etc*. has resulted in more pest and disease problems necessitating increased usage of chemical pesticides. In the wake of growing concern about environmental pollution due to extensive and indiscriminate useof pesticide, a greater stress has been laid on integrated methods of pest control. Therefore, the efforts have been made to find out the effective new molecules for management of insect pests in sugarcane.

MATERIALS AND METHODS

Study site

The field experiment was carried out at Rajasthan

College of Agriculture, MPUAT, Udaipur (Rajasthan) during the two consecutive yearsof 2015-16 and 2016-17 in a randomized block design with seven treatments and three replications. Sugarcane variety COH 119 was planted for experiment. The insecticidal treatments *viz.,* Acephate 50% + Imidacloprid 1.8% SP, Acephate 75% SP and Imidacloprid 17.5% SL were drenched in open furrow after planting and furrow covered immediately with soil; whereas, Phorate 10% CG was broadcasted in open furrow at planting. The treatments were repeated as foliar sprays after the occurrence of targeted sucking pests at ETL. High volume knapsack sprayer fitted with hollow cone nozzle was used to spray @ 500 liter per hectare.

Observations

Observations on per cent plant mortality due to infestation of termite and white grub were recorded separately at 1, 2, 3, 4 and 5 months after planting (MAP). Dead heart infestation caused by early shoot borer was recorded at 1, 2 and 4 MAP. Observations on sugarcane pyrilla and natural enemies were recorded from randomly selected five plants at pre-treatment and 3, 7 and 10 days after spray (DAS). All the data were transformed to square root for statistical analysis.

RESULTS AND DISCUSSION

Bio-efficacy evaluation

Termite and White grub

Sugarcane plant damage due to termite and white grub infestations were recorded for both seasons and the data presented in Table 1 and 2, respectively. It was observed that, Acephate 50% + Imidacloprid 1.8% SP @ 3000 g/ha was found most effective treatment in term of minimum per cent plant damage caused by termite and white grub. It was followed by Acephate 50% + Imidacloprid 1.8% SP @ 2500 g/ha and was statistically at par with Acephate 50% + Imidacloprid 1.8% SP @ 3000 g/ha. Imidacloprid 17.8% SL @ 350 ml/ha and Phorate 10% CG @ 25000 g/ha were found good enough but poorer than Acephate 50% + Imidacloprid 1.8% SP for both the underground pests during both the experimental years. All the treatments were found superior over untreated control.

Early shoot borer

The incidence of early shoot borer was recorded in term of dead heart at 1, 2 and 4 months after planting of sugarcane during both the year of experiments and are presented in Table 3. The minimum dead heart was recorded in the treatment, Acephate 50% + Imidacloprid 1.8% SP @ 3000 g/ha and it was statistically on par to treatment Acephate 50% + Imidacloprid 1.8% SP @ 2500 g/ha. Acephate 75% SP, Phorate 10% CG and Acephate 50% + Imidacloprid 1.8% SP @ 2000 g/ha were next effective treatments against early shoot borer during both the season. All other treatments were significant by superior over untreated control.

Sugarcane Pyrilla

The population of Pyrilla was recorded at pre-treatment and 3, 7 and 10 days after each spray and mean population of pooled sprays are presented under Table 4. It reveals that, all the treatments significantly reduced population of the Pyrilla as compared to untreated plots. The minimum Pyrilla population was recorded in Acephate 50% + Imidacloprid 1.8% SP @ 3000 g/ha and it was proceeded by Acephate 50% + Imidacloprid 1.8% SP @ 2500 g/ha. Both of these treatments were at par with each other. It was followed by Acephate 75% SP @ 1666.66 g/ha, Imidacloprid 17.8% SL @ 350 ml/ha and Acephate 50% + Imidacloprid 1.8% SP @ 2000 g/ha. Standard check, Phorate 10% CG @ 25000 g/ha was found to be less effective treatment for the control of Pyrilla, however, it was superior over untreated control.

Impact on natural enemies

The natural enemies' population of Coccinellids and Chrysopids larvae in sugarcane ecosystem were recorded at pre-treatment and 3, 7, 10 days after sowing and presented in Table 6 and 7 for both seasons. The natural enemies' populations were not significantly different among the treatments during both the year of experiments. It indicated that, none of the treatments caused negative effect on natural enemies' activity in the said period of observation.

The present findings corroborate the findings of Sudhansu *et al.* (2017) who reported that the combination of Acephate 50% + Imidacloprid 1.8% SP was found superior in controlling sugarcane termites as compared to their alone applications.The investigations are also in conformity with that of Pradnya and Pandurang (2014) in reporting of Imidacloprid 40%+ Fipronil 40% 80 WG combination was most effective in sugarcane crop for control of white grub.However, Jeer *et al.* (2017) in their study experiments on Acephate 50% + Imidacloprid 1.8% SP combination against major rice pests like yellow stem borer, rice leaf folder, green leaf hopper, brown plant hopper and concluded that Acephate 50% + Imidacloprid 1.8% SP was best treatment in controlling these pests. Consequently, they found that the combination of Acephate 50% + Imidacloprid 1.8% SP was safer for the natural enemies *viz., Cyrtorhinus lividipennis* and spider in rice ecosystem. Furthermore, Khan *et al.* (2013) concluded that due to the enhanced toxicity of insecticidal mixtures of Acephate 50% + Imidacloprid 1.8% SP, they could also be used as a

Table 1. Bio-efficacy of Acephate 50% + Imidacloprid 1.8% SP against termite in sugarcane

No.	Treatment Details	Product g or ml/ha	Mean per cent plant damage due to Termite									
			Season 1					Season 2				
			1 MAP	2 MAP	3 MAP	4 MAP	5 MAP	1 MAP	2 MAP	3 MAP	4 MAP	5 MAP
T1	Acephate 50% + Imidacloprid 1.8% SP	2000	4.67 (2.27)	7.67 (2.86)	6.67 (2.68)	6.00 (2.55)	6.33 (2.61)	5.67 (2.48)	5.00 (2.35)	4.67 (2.27)	5.67 (2.48)	6.00 (2.55)
T2	Acephate 50% + Imidacloprid 1.8% SP	2500	3.67 (2.04)	4.67 (2.27)	3.67 (2.04)	2.67 (1.78)	3.67 (2.04)	3.33 (1.96)	2.67 (1.78)	3.33 (1.96)	2.67 (1.78)	3.33 (1.96)
T3	Acephate 50% + Imidacloprid 1.8% SP	3000	3.33 (1.96)	4.33 (2.20)	3.00 (1.87)	2.33 (1.68)	3.00 (1.87)	3.00 (1.87)	2.33 (1.68)	3.00 (1.87)	2.67 (1.78)	2.67 (1.78)
T4	Acephate 75% SP	1666.66	8.00 (2.92)	8.67 (3.03)	10.67 (3.34)	9.67 (3.19)	8.00 (2.92)	7.00 (2.74)	6.67 (2.68)	7.00 (2.74)	8.33 (2.97)	8.67 (3.03)
T5	Imidacloprid 17.8% SL	350	6.00 (2.55)	4.67 (2.27)	4.00 (2.12)	4.00 (2.12)	4.33 (2.20)	5.33 (2.41)	3.67 (2.04)	3.67 (2.04)	3.33 (1.96)	4.33 (2.20)
T6	Phorate 10% CG	25000	6.67 (2.68)	5.67 (2.48)	5.67 (2.48)	4.67 (2.27)	5.33 (2.41)	4.67 (2.27)	4.33 (2.20)	3.67 (2.04)	4.33 (2.20)	4.67 (2.27)
T7	Untreated control	-	12.67 (3.63)	12.33 (3.58)	12.00 (3.54)	10.67 (3.34)	9.33 (3.14)	9.67 (3.19)	8.67 (3.03)	9.67 (3.19)	11.33 (3.44)	11.67 (3.49)
	CD @ 5%	-	0.28	0.15	0.27	0.42	0.41	0.33	0.42	0.30	0.52	0.26

Note: values in the parenthesis are square root transformed value for statistical analysis.

Table 2. Bio-efficacy of Acephate 50% + Imidacloprid 1.8% SP against white grub in sugarcane

No.	Treatment Details	Product g or ml/ha	Mean per cent plant damage due to White grub									
			Season 1					Season 2				
			1 MAP	2 MAP	3 MAP	4 MAP	5 MAP	1 MAP	2 MAP	3 MAP	4 MAP	5 MAP
T1	Acephate 50% + Imidacloprid 1.8% SP	2000	4.67 (2.27)	6.33 (2.61)	6.00 (2.55)	5.67 (2.48)	7.33 (2.80)	6.33 (2.61)	5.67 (2.48)	5.67 (2.48)	6.00 (2.55)	6.63 (2.67)
T2	Acephate 50% + Imidacloprid 1.8% SP	2500	3.67 (2.04)	4.33 (2.20)	3.33 (1.96)	3.67 (2.04)	4.67 (2.27)	4.33 (2.20)	4.00 (2.12)	4.33 (2.20)	3.67 (2.04)	4.33 (2.20)
T3	Acephate 50% + Imidacloprid 1.8% SP	3000	3.67 (2.04)	3.33 (1.96)	2.67 (1.78)	3.33 (1.96)	4.33 (2.20)	4.00 (2.12)	4.00 (2.12)	3.67 (2.04)	2.67 (1.78)	3.67 (2.04)
T4	Acephate 75% SP	1666.66	5.67 (2.48)	6.33 (2.61)	8.33 (2.97)	7.67 (2.86)	9.33 (3.14)	8.67 (3.03)	8.33 (2.97)	6.67 (2.68)	7.67 (2.86)	9.33 (3.14)
T5	Imidacloprid 17.8% SL	350	4.33 (2.20)	5.33 (2.41)	5.33 (2.41)	5.67 (2.48)	5.67 (2.48)	6.33 (2.61)	5.33 (2.41)	5.33 (2.41)	5.67 (2.48)	5.67 (2.48)
T6	Phorate 10% CG	25000	2.67 (1.78)	2.67 (1.78)	4.67 (2.27)	5.33 (2.41)	6.67 (2.68)	5.67 (2.48)	6.33 (2.61)	6.33 (2.61)	4.67 (2.27)	4.67 (2.27)
T7	Untreated control	-	9.67 (3.19)	10.33 (3.29)	11.33 (3.44)	15.67 (4.02)	22.67 (4.81)	12.67 (3.63)	12.67 (3.63)	18.67 (4.38)	21.33 (4.67)	26.33 (5.18)
	CD @ 5%	-	0.19	0.36	0.37	0.44	0.46	0.27	0.23	0.30	0.38	0.34

Note: values in the parenthesis are square root transformed value for statistical analysis.

Table 3. Bio-efficacy of Acephate 50% + Imidacloprid 1.8% SP against early shoot borer in sugarcane

No.	Treatment Details	Product g or ml/ha	Mean per cent plant damage due to Early shoot borer					
			Season 1			Season 2		
			1 MAP	2 MAP	4 MAP	1 MAP	2 MAP	4 MAP
T1	Acephate 50% + Imidacloprid 1.8% SP	2000	6.67 (2.68)	7.67 (2.86)	6.33 (2.61)	8.67 (3.03)	9.00 (3.08)	10.33 (3.29)
T2	Acephate 50% + Imidacloprid 1.8% SP	2500	3.67 (2.04)	4.00 (2.12)	3.67 (2.04)	6.67 (2.68)	5.00 (2.35)	5.67 (2.48)
T3	Acephate 50% + Imidacloprid 1.8% SP	3000	3.33 (1.96)	3.33 (1.96)	3.00 (1.87)	6.33 (2.61)	4.67 (2.27)	5.33 (2.41)
T4	Acephate 75% SP	1666.66	4.33 (2.20)	5.67 (2.48)	4.67 (2.27)	7.00 (2.74)	7.00 (2.74)	7.33 (2.80)
T5	Imidacloprid 17.8% SL	350	7.67 (2.86)	10.33 (3.29)	11.67 (3.49)	9.33 (3.14)	14.00 (3.81)	16.67 (4.14)
T6	Phorate 10% CG	25000	5.67 (2.48)	4.67 (2.27)	4.67 (2.27)	7.67 (2.86)	7.33 (2.80)	6.67 (2.68)
T7	Untreated control	-	10.33 (3.29)	14.33 (3.85)	13.67 (3.76)	15.67 (4.02)	18.67 (4.38)	20.67 (4.60)
	CD @ 5%	-	0.32	0.57	0.63	0.35	0.38	0.55

Note: values in the parenthesis are square root transformed value for statistical analysis.

Table 4. Bio-efficacy of Acephate 50% + Imidacloprid 1.8% SP against sugarcane Pyrilla in sugarcane

No.	Treatment Details	Product g or ml/ha	Mean Pyrilla population							
			Season 1				Season 2			
			PTC	3 DAS	7 DAS	10 DAS	PTC	3 DAS	7 DAS	10 DAS
T1	Acephate 50% + Imidacloprid 1.8% SP	2000	8.33 (2.97)	6.67 (2.68)	6.67 (2.68)	4.33 (2.20)	10.00 (3.24)	7.00 (2.74)	8.00 (2.92)	8.33 (2.97)
T2	Acephate 50% + Imidacloprid 1.8% SP	2500	7.67 (2.86)	4.67 (2.27)	4.00 (2.12)	3.67 (2.04)	9.33 (3.14)	5.33 (2.41)	4.67 (2.27)	5.33 (2.41)
T3	Acephate 50% + Imidacloprid 1.8% SP	3000	8.00 (2.92)	4.00 (2.12)	3.67 (2.04)	3.33 (1.96)	10.00 (3.24)	4.67 (2.27)	3.67 (2.04)	4.00 (2.12)
T4	Acephate 75% SP	1666.66	7.67 (2.86)	6.67 (2.68)	6.67 (2.68)	8.33 (2.97)	10.33 (3.29)	8.33 (2.97)	7.67 (2.86)	7.67 (2.86)
T5	Imidacloprid 17.8% SL	350	7.33 (2.80)	6.33 (2.61)	5.67 (2.48)	6.67 (2.68)	10.33 (3.29)	6.67 (2.68)	6.67 (2.68)	6.67 (2.68)
T6	Phorate 10% CG	25000	8.67 (3.03)	8.67 (3.03)	8.33 (2.97)	14.33 (3.85)	9.67 (3.19)	10.33 (3.29)	15.67 (4.02)	15.33 (3.98)
T7	Untreated control	-	8.00 (2.92)	10.33 (3.29)	13.67 (3.76)	15.67 (4.02)	10.33 (3.29)	15.67 (4.02)	19.33 (4.45)	20.67 (4.60)
	CD @ 5%	-	NS	0.31	0.35	0.20	NS	0.33	0.35	0.53

Note: values in the parenthesis are square root transformed value for statistical analysis.

Table 5. Effect of Acephate 50% + Imidacloprid 1.8% SP on natural enemies in sugarcane ecosystem

No.	Treatment Details	Product g or ml/ha	Mean Coccinellid population							
			Season 1				Season 2			
			PTC	3 DAS	7 DAS	10 DAS	PTC	3 DAS	7 DAS	10 DAS
T1	Acephate 50% + Imidacloprid 1.8% SP	2000	6.00 (2.55)	6.33 (2.61)	7.00 (2.74)	6.00 (2.55)	4.00 (2.12)	5.67 (2.48)	6.00 (2.55)	4.67 (2.27)
T2	Acephate 50% + Imidacloprid 1.8% SP	2500	6.33 (2.61)	5.00 (2.35)	7.00 (2.74)	6.00 (2.55)	4.00 (2.12)	5.33 (2.41)	5.67 (2.48)	5.00 (2.35)
T3	Acephate 50% + Imidacloprid 1.8% SP	3000	6.33 (2.61)	5.67 (2.48)	6.67 (2.68)	5.33 (2.41)	3.67 (2.04)	5.33 (2.41)	6.00 (2.55)	5.00 (2.35)
T4	Acephate 75% SP	1666.66	6.00 (2.55)	5.67 (2.48)	5.33 (2.41)	5.00 (2.35)	4.33 (2.20)	4.67 (2.27)	5.67 (2.48)	4.00 (2.12)
T5	Imidacloprid 17.8% SL	350	7.67 (2.86)	4.00 (2.12)	6.00 (2.55)	5.67 (2.48)	3.67 (2.04)	4.33 (2.20)	5.00 (2.35)	4.00 (2.12)
T6	Phorate 10% CG	25000	7.00 (2.74)	5.67 (2.48)	5.33 (2.41)	5.00 (2.35)	4.00 (2.12)	4.33 (2.20)	4.67 (2.27)	4.00 (2.12)
T7	Untreated control	-	6.33 (2.61)	6.33 (2.61)	7.33 (2.80)	6.00 (2.55)	4.67 (2.27)	5.67 (2.48)	6.00 (2.55)	4.67 (2.27)
	CD @ 5%	-	NS	NS	NS	NS	NS	NS	NS	NS

Note: values in the parenthesis are square root transformed value for statistical analysis.

Table 6. Effect of Acephate 50% + Imidacloprid 1.8% SP on natural enemies in sugarcane ecosystem

No.	Treatment Details	Product g or ml/ha	Mean Chrysopid population							
			Season 1				Season 2			
			PTC	3 DAS	7 DAS	10 DAS	PTC	3 DAS	7 DAS	10 DAS
T1	Acephate 50% + Imidacloprid 1.8% SP	2000	5.67 (2.48)	5.33 (2.41)	5.67 (2.48)	5.67 (2.48)	5.00 (2.35)	4.67 (2.27)	4.67 (2.27)	4.67 (2.27)
T2	Acephate 50% + Imidacloprid 1.8% SP	2500	4.67 (2.27)	5.33 (2.41)	5.00 (2.35)	5.00 (2.35)	5.33 (2.41)	4.00 (2.12)	5.00 (2.35)	5.00 (2.35)
T3	Acephate 50% + Imidacloprid 1.8% SP	3000	5.33 (2.41)	4.67 (2.27)	5.00 (2.35)	5.33 (2.41)	5.00 (2.35)	4.67 (2.27)	4.33 (2.20)	4.00 (2.12)
T4	Acephate 75% SP	1666.66	4.00 (2.12)	5.00 (2.35)	5.00 (2.35)	5.33 (2.41)	5.00 (2.35)	4.00 (2.12)	4.67 (2.27)	5.00 (2.35)
T5	Imidacloprid 17.8% SL	350	5.67 (2.48)	5.33 (2.41)	5.33 (2.41)	5.33 (2.41)	4.67 (2.27)	5.00 (2.35)	4.67 (2.27)	5.00 (2.35)
T6	Phorate 10% CG	25000	5.00 (2.35)	4.67 (2.27)	5.00 (2.35)	4.67 (2.27)	5.33 (2.41)	5.00 (2.35)	4.00 (2.12)	5.00 (2.35)
T7	Untreated control	-	5.00 (2.35)	5.67 (2.48)	5.67 (2.48)	5.00 (2.35)	5.00 (2.35)	5.33 (2.41)	5.67 (2.48)	5.00 (2.35)
	CD @ 5%	-	NS	NS	NS	NS	NS	NS	NS	NS

Note: values in the parenthesis are square root transformed value for statistical analysis.

Table 7. Sugarcane yield and economic benefit after application of different insecticidal control measure during Season 1

Sr. No.	Treatment Details	Cost of Product per L or kg	Dose g or ml/ ha	No. of spray	Cost of chemical (Rs/ha)	Average Yield (q/ ha)	Total income (Rs*/ha)	Total cost of cultivation (Rs/ha)	Net benefit (Rs/ ha)	Cost benefit ratio
T1	Acephate 50% + Imidacloprid 1.8% SP	700	2000	3	4200	765.00	214200	99200	115000	1:2.16
T2	Acephate 50% + Imidacloprid 1.8% SP	700	2500	3	5250	880.83	246633	100250	146383	1:2.46
T3	Acephate 50% + Imidacloprid 1.8% SP	700	3000	3	6300	906.67	253867	101300	152567	1:2.51
T4	Acephate 75% SP	500	1666.66	3	2500	710.83	199033	97500	101533	1:2.04
T5	Imidacloprid 17.8% SL	1000	350	3	1050	691.67	193667	96050	97616.7	1:2.02
T6	Phorate 10% CG	65	25000	2	3250	641.67	179667	98250	81416.7	1:1.83
T7	Untreated control	-	-	-	0	422.50	118300	95000	23300	1:1.25
	CD @ 5%					131.2				

* Sugarcane price per quintal: 280 Rs.

Table 8. Sugarcane yield and economic benefit after application of different insecticidal control measure during Season 2

Sr. No.	Treatment Details	Cost of Product per L or kg	Dose g or ml/ ha	No. of spray	Cost of chemical (Rs/ha)	Average Yield (q/ ha)	Total income (Rs*/ha)	Total cost of cultivation (Rs/ha)	Net benefit (Rs/ ha)	Cost benefit ratio
T1	Acephate 50% + Imidacloprid 1.8% SP	700	2000	3	4200	705.83	218808	99200	119608	1:2.21
T2	Acephate 50% + Imidacloprid 1.8% SP	700	2500	3	5250	844.17	261692	100250	161442	1:2.61
T3	Acephate 50% + Imidacloprid 1.8% SP	700	3000	3	6300	861.67	267117	101300	165817	1:2.64
T4	Acephate 75% SP	500	1666.66	3	2500	685.83	212608	97500	115108	1:2.18
T5	Imidacloprid 17.8% SL	1000	350	3	1050	605.83	187808	96050	91758.3	1:1.96
T6	Phorate 10% CG	65	25000	2	3250	561.67	174117	98250	75866.7	1:1.77
T7	Untreated control	-	-	-	0	392.50	121675	95000	26675	1:1.28
	CD @ 5%					125.3				

*Sugarcane price per quintal: 310 Rs.

potential insecticide resistance management tool.

Yield

At the time of harvest, cane yield was recorded for individual treatments and presented in Table 7 and 8. All the treatments reflected positive impact on cane yields and significant increase in cane yield over untreated control plot. The maximum cane yield was recorded in treatment, Acephate 50% + Imidacloprid 1.8% SP @ 3000 g/ha (906.67 and 861.67 q ha-1) with benefit: cost ratio of 1:2.51 and 1:2.64 followed by treatment, Acephate 50% + Imidacloprid 1.8% SP @ 2500 g/ha. Both these treatments were statistically at par. Third lower dose of Acephate 50% + Imidacloprid 1.8% SP @ 2000 g/ha was found to be next effective treatments and it was at par with the Acephate 75% SP @ 1666.66 g/ha, Imidacloprid 17.8% SL @ 350 ml/ha and Phorate 10% CG @ 25000 g/ha. On the other side, minimum cane yield was recorded in untreated control plot.

CONCLUSION

Integrated Pest Management practices invariably depend upon the applications of insecticides for the successful management of insect pests. Mostly in sugarcane ecosystem farmers always rely on more than one insecticide applications to save their crops from insect pests attack with diverse nature of damage. In the present investigations Acephate 50% + imidacloprid 1.8% SP was found a solution to manage sap sucking pests (Pyrilla), borer pest (Early shoot borer) and soil dwelling insect pests (Termites and White grubs). Effective and timely application of Acephate 50% + Imidacloprid 1.8% SP @ 3000 and 2500 g/ha was found excellent in controlling major insect pests of sugarcane. With significantly higher yield the treatments did not reduce the prevailing natural enemies' populations in sugarcane ecosystem. Visual observations during the course of studies were also found that, Acephate 50% + Imidacloprid 1.8% SP was significantly non-phytotoxic to the sugarcane crop at its recommended dose.

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