

Safety of newer insecticides to natural enemies in the coastal rice ecosystem of Karaikal, U.T. of Puducherry.

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ABSTRACT

A field experiment was conducted at the Eastern farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA and RI), Karaikal during *Rabi* 2013 to study the effect of newer insecticides to natural enemies of rice pests. Two foliar applications were carried out at an interval of fifteen days after leaf folder larvae reached economic threshold level. The results showed that the overall mean population of coccinellids was found to be more in the untreated check (1.28 and 1.55/hill) followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (0.99 and 1.12/ hill) in the first and second foliar application. The overall mean population of spiders was high in the untreated check (1.40 and 1.59/ hill), followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (1.07 and 1.07/ hill) over the other treatments.

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Key words: Newer insecticides, predatory coccinellids, spiders, costal rice ecosystem.

INTRODUCTION

Rice, *Oryza sativa* Linn is cultivated extensively in the most diverse ecosystems of tropical and subtropical regions of the world. It is the most important crop grown in 117 countries in the world. Over 800 species of pests and numerous species of natural enemies occupy the rice crop during vegetative and reproductive stages (Hafeez *et al.*, 2010). The natural enemies, predators and parasitoids will impart the effect over the population of rice pests under favourable environmental conditions. Jafar *et al.* (2013) evaluated the effect of newer insecticides, chlorantraniliprole 20 SC at 0.4 l / ha, cartap hydrochloride 50 SP at 500 g a. i. / ha and fipronil 5 SC at 0.3 l / ha against spiders, predatory coccinellids, *Microvelia* sp., *Paederus* sp., *Cyrtorhinus* sp., in a rice crop.

Several newer insecticides were evaluated in rice crop to control stem borer, leaf folder and brown planthopper in Karaikal, but their effects over natural enemies of rice pests were not evident. In the coastal rice ecosystem of Karaikal, newer insecticides were not evaluated against the major pests of rice and their performance was not studied on the natural enemies of the leaf folder, *Cnaphalocrocis medinalis* (Guenee). Hence, the

present investigation was taken up to know the effect of newer insecticides against predatory coccinellids and spiders.

MATERIALS AND METHODS

A field experiment was carried out during *Rabi* 2013 at the Eastern farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA & RI), Karaikal to evaluate the effect of newer insecticides over natural enemies of rice pests. The experiment was laid out in a Randomized Block Design (RBD) with nine treatments replicated thrice. The ruling rice variety ADT 39 was transplanted in 7 × 3 m square meter plots with a spacing of 20 × 15 cm. The recommended dose of fertilizer of 120:40:40 kg / ha as N: P₂O₅: K₂O was applied, respectively. About 25 per cent N and K₂O and 100 per cent P₂O₅ were applied as basal and rest of N and K₂O were applied in three equal split doses at tillering, panicle initiation and flowering stages. The details of the treatments were T₁- Flubendiamide (Fame) 39.35 M / M SC at 19.68 g a. i. / ha; T₂- Chlorantraniliprole (Coragen) 18.5 SC at 27.75 g a. i. / ha; T₃- Thiamethoxam (Actara) 25 WG at 25.00 g a. i. / ha; T₄- Bifenthrin (Markar) 10 EC at 50.00 g a. i. / ha; T₅- Cartap hydrochloride (Dartiz) 50 SP at 500.00 g a. i.

/ ha; T₆- Indoxacarb (Indox) 14.5 SC at 72.50 g a. i. / ha; T₇- Emamectin benzoate (Proclaim) 5 SG at 12.50 g a. i. / ha; T₈- Phosphamidon (Sicomidon) 40 SL; T₉- Control. Two sprayings were given at an interval of fifteen days with a high volume sprayer (Hand operated knapsack sprayer). The population of natural enemies mostly predatory coccinellids and spiders were recorded. The observation was recorded at ten randomly selected hills leaving the border rows. The total number of natural enemies were counted and expressed as number per hill.

RESULTS AND DISCUSSION

The results of the present study showed that before the first foliar application, the population ranged from 1.00 to 1.23 / hill at 62 DAS and there was no significant difference in the population of predatory coccinellids among the treatments (Table 1). After the first foliar application, there was a decline in the

population of predatory coccinellids from 3 DAT and continued upto 7 DAT. It was found that the highest population of predatory coccinellids was recorded in the untreated check followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha, and a low population was registered in the other insecticidal treatments which ranged from 0.17 to 0.80 / hill. At 14 DAT, there was an increasing trend in the population of predatory coccinellids, which ranged from 0.90 to 1.40 / hill. A high population was recorded in the untreated check than by indoxacarb 14.5 SC at 72.50 g a. i. / ha. The overall mean population of predatory coccinellids ranged from 0.43 to 1.28 / hill. Among the treatments, the highest population was observed in untreated check followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha, and a low population was recorded in the other insecticidal treatments. In the second foliar application similar trend was observed.

Table 1. Effect of newer insecticides on the population of predatory coccinellids in ADT 39 rice during *Rabi* 2013

Treatments	Number of predatory Coccinellids / hill # I Foliar spray					Number of predatory Coccinellids / hill # II Foliar spray			
	Pre treatment count (62 DAS)	3DAT	7DAT	14DAT (77 DAS)	Overall mean	3DAT	7DAT	14DAT (92 DAS)	Overall mean
T ₁	1.00	0.27 ^g	0.20 ^g	0.93	0.47	0.30 ^g	0.23 ^g	0.97	0.50
T ₂	1.13	0.80 ^{bc}	0.70 ^{bc}	1.13	0.88	0.93 ^{bc}	0.70 ^{bc}	1.23	0.95
T ₃	1.17	0.57 ^{de}	0.47 ^{de}	1.03	0.69	0.63 ^{de}	0.47 ^{de}	1.10	0.73
T ₄	1.07	0.43 ^{ef}	0.40 ^{ef}	1.00	0.61	0.50 ^{ef}	0.37 ^{ef}	1.07	0.65
T ₅	1.03	0.70 ^{cd}	0.57 ^{cd}	1.07	0.78	0.77 ^{cd}	0.57 ^{cd}	1.17	0.84
T ₆	1.23	0.97 ^{ab}	0.80 ^{ab}	1.20	0.99	1.07 ^{ab}	0.87 ^{ab}	1.43	1.12
T ₇	1.03	0.37 ^{fg}	0.27 ^{fg}	0.97	0.54	0.40 ^{fg}	0.30 ^{fg}	1.00	0.57
T ₈	1.10	0.23 ^g	0.17 ^g	0.90	0.43	0.27 ^g	0.20 ^g	0.93	0.47
T ₉	1.00	1.17 ^a	1.27 ^a	1.40	1.28	1.47 ^a	1.50 ^a	1.67	1.55
SEd	-	0.05	0.06	0.09	-	0.07	0.07	-	-
CD (P = 0.01)	NS	0.15**	0.18**	NS	-	0.18**	0.15**	NS	-
CV (%)	-	8.80	10.21	11.39	-	8.80	10.21	-	-

In a column mean followed by a common letter are not significantly different by LSD (P=0.05); ** - Significance at P = 0.01; NS – Non significant; DAT – Days after treatment; DAS – Days after sowing; # - Mean of three replications.

Table 2. Effect of newer insecticides on the population of spiders in ADT 39 rice during *Rabi* 2013.

Treatments	Number of spiders / hill# I Foliar spray					Number of spiders / hill # II Foliar spray			
	Pre treatment count (62 DAS)	3DAT	7DAT	14DAT (77 DAS)	Overall mean	3DAT	7DAT	14DAT (92 DAS)	Overall mean
T ₁	1.03	0.33 ^g	0.23 ^g	0.90	0.49	0.33 ^g	0.27 ^g	0.83	0.48
T ₂	1.03	0.87 ^{bc}	0.70 ^{bc}	1.30	0.96	0.87 ^{bc}	0.73 ^{bc}	1.20	0.93
T ₃	1.27	0.63 ^{de}	0.50 ^{de}	1.17	0.77	0.63 ^{de}	0.50 ^{de}	1.03	0.72
T ₄	1.00	0.50 ^{ef}	0.40 ^{ef}	1.00	0.63	0.53 ^{ef}	0.43 ^{ef}	0.97	0.64
T ₅	1.13	0.73 ^{cd}	0.57 ^{cd}	1.23	0.84	0.73 ^{cd}	0.60 ^{cd}	1.10	0.81
T ₆	1.17	1.00 ^{ab}	0.83 ^{ab}	1.37	1.07	1.00 ^{ab}	0.87 ^{ab}	1.33	1.07
T ₇	1.23	0.43 ^{fg}	0.33 ^{fg}	0.97	0.58	0.40 ^{fg}	0.33 ^{fg}	0.93	0.55
T ₈	0.90	0.30 ^g	0.23 ^g	0.83	0.45	0.27 ^g	0.20 ^g	0.73	0.40
T ₉	1.20	1.33 ^a	1.40 ^a	1.47	1.40	1.53 ^a	1.57 ^a	1.67	1.59
SEd	0.10	0.06	0.06	1.12	-	0.06	0.05	1.10	-
CD (P = 0.01)	NS	0.15**	0.18**	NS	-	0.15**	0.19**	NS	-
CV (%)	12.05	8.09	9.26	12.68	-	8.98	10.05	13.50	-

In a column mean followed by a common letter are not significantly different by LSD (P=0.05);** - Significance at P = 0.01; NS – Non significant; DAT – Days after treatment; DAS – Days after sowing; # - Mean of three replications .

The population of spiders before the first foliar application ranged from 0.90 to 1.27 / hill and there was no significant difference in the population of spiders among the treatments (Table 2). After the first foliar application, there was a decline in the population of spiders from 3 DAT and continued upto 7 DAT irrespective of the treatments. The population of spiders was high in untreated check (1.33 and 1.40/ hill followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (1.00 and 0.83/hill) at 3 and 7 DAT respectively. The other insecticidal treatments recorded a low population of spiders ranged from 0.30 to 0.87 and 0.23 to 0.70 / hill. At 14 DAT all the treatments recorded a high population of spiders and there was no significant difference in the population among the treatment. The overall mean population indicated that the population of spiders was found to be high in the untreated check (1.40/hill) followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (1.07/hill). Similar results were also

recorded in the second foliar application. It was concluded that among the insecticidal treatments indoxacarb 14.5 SC at 72.50 g a. i. / ha recorded the high population of predatory coccinellids and spiders next to untreated check.

All the above findings are in accordance with the reports of Mukherjee *et al.* (2011) who reported that the predatory fauna namely, ground beetle and spiders were not significantly affected at different dosage 10, 20, 30, 40 and 60 g a. i. / ha of indoxacarb 15 EC compared to the monocrotophos 36 SL. Jafar *et al.* (2013) also reported that newer insecticides *viz.*, indoxacarb 15.8 EC at 30 g a. i. / ha, chlorantraniliprole 18.5 SC at 30 g a. i. / ha, cartap hydrochloride 50 SP at 500 g a. i. / ha and fipronil 5 SC 625 mL / ha were found to be safe to natural enemies in the rice ecosystem. Misra (2008) reported that the newer insecticides like rynaxpyr 20 EC at 40 g a. i. / ha and flubendiamide 480 SC at 30

g a. i. / ha were found to be safe to natural enemies. Shanwei *et al.* (2009) evaluated the newer insecticide, chlorantraniliprole 20 SC at 40 g a. i. / ha was highly safe to beneficial arthropods in the fields. The newer insecticide used in the study did not have lethal effects over the population of predatory coccinellids and spiders.

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