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RESEARCH **P**APER

Effect of newer insecticides to natural enemies in the coastal rice ecosystem of Karaikal district, Union Territory of Puducherry

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To study the effect of newer insecticides *viz.*, flubendiamide 39.35 M/M SC, chlorantraniliprole 18.5 SC, thiamethoxam 25 WG, bifenthrin 10 EC, cartap hydrochloride 50 SP, indoxacarb 14.5 SC, emamectin benzoate 5 SG and phosphamidon 40 SL to natural enemies of rice pests, a field experiment was conducted at the Eastern farm of Pandit Jawaharlal Nehru College of Agriculture and Research Institute (PAJANCOA and RI), Karaikal during late *Rabi* 2013 (Nov.- Feb.). Two foliar applications were carried out at an interval of fifteen days after leaf folder larvae reached economic threshold level (10 %). The results showed that the overall mean population of coccinellids was found to be more in the untreated check (1.31 and 1.65 / hill) followed by indoxacarb 14.5 SC at 72.50 g a.i. / ha (0.92 and 1.16 / hill) in the first and second foliar application. The overall mean population of spiders was high in the untreated check (1.32 and 1.55 / hill), followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (1.07 and 1.15 / hill) over the other treatments.

Key words : Newer insecticides, Predatory coccinellids, Spiders, Costal rice ecosystem

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INTRODUCTION

Rice, *Oryza sativa* L. 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 plant hopper in Karaikal, but their effects over natural enemies of rice pests were not evident. Hence, the present investigation was taken up to know the effect of some insecticides against predatory coccinellids and spiders.

RESEARCH METHODOLOGY

A field experiment was carried out during late *Rabi* 2013 at the Eastern farm of Pandit Jawaharlal Nehru,

College of Agriculture and Research Institute (PAJANCOA and 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: P_2O_5: K_2O was applied, respectively. About 25 per cent N and K_2O and 100 per cent P_2O_5 were applied as basal and rest of N and K_2O were applied in three equal split doses at tillering, panicle initiation and flowering stages.

The details of the treatments were T_1- Flubendiamide (Fame) 39.35 M / M SC at 19.68 g a. i. / ha; T_2- Chlorantraniliprole (Coragen) 18.5 SC at 27.75 g a. i. / ha; T_3- Thiamethoxam (Actara) 25 WG at 25.00 g a. i. / ha; T_4- Bifenthrin (Markar) 10 EC at 50.00 g a. i. / ha; T_5- Cartap hydrochloride (Dartiz) 50 SP at 500.00 g a. i. / ha; T_6- Indoxacarb (Indox) 14.5 SC at 72.50 g a. i. / ha; T_7- Emamectin benzoate (Proclaim) 5 SG at 12.50 g a. i. / ha; T_8- Phosphamidon (Sicomidon) 40 SL; T_9- 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. Since the population of natural enemies were recorded, square root transformation ($\sqrt{x+0.5}$) was used for RBD analysis. The analyzed data were sorted out based on

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

Sr. No.	Treatments	Dose (g a. i. /ha)	Number of predatory coccinellids / hill # I foliar spray					Number of predatory coccinellids / hill # II foliar spray			
			Pre treatment count (57 DAS)	3DAT	7DAT	14DAT (72 DAS)	Overall mean	3DAT	7DAT	14DAT (87 DAS)	Overall mean
T_1	Flubendiamide	19.68	1.03	0.30	0.20	1.03	0.28	0.30	0.20	0.90	0.47
	39.35 M / M. SC.		(1.02)	(0.55) ^{g}	(0.45) ^{g}	(1.02)		(0.55) ^{g}	(0.45) ^{g}	(0.95)	
T_2	Chlorantraniliprole	27.75	1.17	0.83	0.67	1.33	0.79	0.90	0.70	1.33	0.98
	18.5 SC		(1.08)	(0.91) ^{bc}	(0.82) ^{bc}	(1.15)		(0.95) ^{bc}	(0.84) ^{bc}	(1.15)	
T_3	Thiamethoxam 25	25.00	1.07	0.53	0.43	1.17	0.53	0.60	0.47	1.17	0.75
	WG		(1.03)	(0.73) ^{de}	(0.66) ^{de}	(1.08)		(0.78) ^{de}	(0.69) ^{de}	(1.08)	
T_4	Bifenthrin 10 EC	50.00	1.10	0.43	0.33	1.13	0.42	0.50	0.37	1.10	0.66
			(1.05)	(0.66) ^{ef}	(0.58) ^{ef}	(1.06)		(0.71) ^{ef}	(0.61) ^{ef}	(1.05)	
T_5	Cartap	500.00	1.03	0.70	0.50	1.23	0.66	0.73	0.60	1.20	0.84
	hydrochloride 50		(1.02)	(0.84) ^{cd}	(0.71) ^{cd}	(1.11)		(0.85) ^{cd}	(0.78) ^{cd}	(1.10)	
	SP										
T_6	Indoxacarb 14.5 SC	72.50	1.27	1.00	0.77	1.40	0.92	1.03	0.83	1.63	1.16
			(1.13)	(1.00) ^{ab}	(0.88) ^{ab}	(1.18)		(1.02) ^{ab}	(0.91) ^{ab}	(1.28)	
T_7	Emamectin	12.50	0.97	0.37	0.27	1.10	0.36	0.40	0.27	1.07	0.58
	benzoate 5 SG		(0.99)	(0.61) ^{fg}	(0.52) ^{fg}	(1.05)		(0.63) ^{fg}	(0.52) ^{fg}	(1.03)	
T_8	Phosphamidon 40	500.00	1.00	0.27	0.17	0.97	0.25	0.27	0.13	0.83	0.41
	SL		(1.00)	(0.52) ^{g}	(0.41) ^{g}	(0.99)		(0.52) ^{g}	(0.36) ^{g}	(0.91)	
T_9	Untreated check	–	1.20	1.27	1.33	1.47	1.31	1.53	1.63	1.80	1.65
			(1.10)	(1.13) ^{a}	(1.15) ^{a}	(1.21)		(1.24) ^{a}	(1.28) ^{a}	(1.34)	
	S.E. ±		0.10	0.07	0.05	0.11	–	0.07	0.06	0.09	–
	C.D. (P=0.01)		NS	0.18**	0.15**	NS		0.16**	0.14**	NS	
	C.V. (%)		13.56	9.75	8.09	11.45		7.52	9.15	12.09	

In a column mean followed by a common letter are not significantly different by LSD (P=0.01)

Values in parentheses are square root transformed values $\sqrt{x+0.5}$ ** indicate significance of value at P=0.01

NS=Non-significant, DAT=Days after treatment

DAS – Days after sowing # - Mean of three replications

least significant difference (LSD). The data were analyzed statistically (Panse and Sukhatme, 1989); Chandel (1978) and Karl (1978).

RESEARCH FINDINGS AND ANALYSIS

The results of the present study showed that before the first foliar application, the population ranged from 0.97 to 1.27/ hill at 57 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 (1.33 / hill) followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (1.00 / hill), and a low population was registered in the other insecticidal treatments which ranged from 0.17 to 0.83 / hill. At 14 DAT, there was an increasing trend in the population of predatory coccinellids, which ranged from 0.97 to 1.47 / hill. A high population was recorded in the untreated check (1.47 / hill) followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (1.40 / hill). The overall mean population of predatory coccinellids ranged from 0.25 to 1.31 / hill. Among the treatments, the highest population was observed in untreated check (1.31 / hill) followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (0.92 / hill), and a low population was recorded in the other insecticidal treatments. In the second foliar application similar trend was observed.

The population of spiders before the first foliar application ranged from 0.80 to 1.07 / 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

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

Sr. No.	Treatments	Dose (g a. i. /ha)	Number of spiders / hill # I foliar spray					Number of spiders / hill # II foliar spray			
			Pre treatment count (57 DAS)	3DAT	7DAT	14DAT (72 DAS)	Overall mean	3DAT	7DAT	14DAT (87 DAS)	Overall mean
T_1	Flubendiamide 39.35 M / M. SC.	19.68	0.80 (0.89)	0.37 (0.61)^{g}	0.27 (0.48)^{g}	0.87 (0.93)	0.50	0.40 (0.63)^{g}	0.33 (0.58)^{g}	0.83 (0.91)	0.52
T_2	Chlorantraniliprole 18.5 SC	27.75	0.93 (0.96)	0.87 (0.93)^{bc}	0.77 (0.88)^{bc}	1.20 (1.10)	0.95	0.93 (0.96)^{bc}	0.80 (0.93)^{bc}	1.17 (1.08)	0.97
T_3	Thiamethoxam 25 WG	25.00	0.83 (0.91)	0.63 (0.79)^{de}	0.50 (0.71)^{de}	1.10 (1.05)	0.74	0.70 (0.84)^{de}	0.57 (0.76)^{de}	1.03 (1.02)	0.77
T_4	Bifenthrin 10 EC	50.00	0.87 (0.93)	0.50 (0.71)^{ef}	0.40 (0.63)^{ef}	1.03 (1.02)	0.64	0.57 (0.76)^{ef}	0.47 (0.69)^{ef}	0.97 (0.99)	0.67
T_5	Cartap hydrochloride 50 SP	500.00	0.90 (0.95)	0.77 (0.88)^{cd}	0.67 (0.82)^{cd}	1.17 (1.08)	0.87	0.80 (0.89)^{cd}	0.67 (0.82)^{cd}	1.07 (1.03)	0.85
T_6	Indoxacarb 14.5 SC	72.50	1.07 (1.03)	0.97 (0.99)^{ab}	0.90 (0.95)^{ab}	1.33 (1.15)	1.07	1.17 (1.08)^{ab}	0.97 (0.99)^{ab}	1.30 (1.14)	1.15
T_7	Emamectin benzoate 5 SG	12.50	0.97 (0.99)	0.43 (0.66)^{fg}	0.33 (0.58)^{fg}	0.97 (0.99)	0.58	0.50 (0.71)^{fg}	0.40 (0.63)^{fg}	0.90 (0.95)	0.60
T_8	Phosphamidon 40 SL	500.00	1.00 (1.00)	0.30 (0.55)^{g}	0.23 (0.48)^{g}	0.83 (0.91)	0.45	0.33 (0.58)^{g}	0.23 (0.52)^{g}	0.77 (0.88)	0.44
T_9	Untreated check	–	1.03 (1.02)	1.20 (1.10)^{a}	1.33 (1.15)^{a}	1.43 (1.20)	1.32	1.50 (1.23)^{a}	1.53 (1.24)^{a}	1.63 (1.28)	1.55
	S.E. ±		0.09	0.05	0.06	0.09	–	0.05	0.06	0.08	–
	C.D. (P=0.01)		NS	0.17**	0.15**	NS		0.16**	0.16**	NS	
	C.V. (%)		15.53	9.04	8.02	17.70		7.09	9.36	16.33	

In a column mean followed by a common letter are not significantly different by LSD (P=0.01)

Values in parentheses are square root transformed values $\sqrt{x+0.5}$ ** indicate significance of value at P=0.01

NS=Non significant, DAT=Days after treatment

DAS=Days after sowing # - Mean of three replications

DAT and continued upto 7 DAT irrespective of the treatments. The population of spiders was high in untreated check (1.20 and 1.33 / hill) followed by indoxacarb 14.5 SC at 72.50 g a. i. / ha (0.90 and 0.97 / 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 0.77 / 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 (1.32 / 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 present 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 insecticide *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.

It is concluded that there was a decline in the population of coccinellids and spiders at third and seventh day after treatment. The population increased at fourteenth day after treatment. This indicated that these insecticides had a little effect over the population of coccinellids and spiders by repellent or deterrent effect and allowed the population to reach in a static position. However, there was no complete elimination of coccinellids and spiders in the treated plots. Similar work related to the present study was also conducted by Kandibane *et al.* (2006).

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LITERATURE CITED

Chandel, R.S. (1978). *A handbook of agricultural statistics.* Achal Prakashan Mandir, KANPUR U.P. (India).

Hafeez, A., Khan, R.B., Sharma, D., Jamwal, V.V.S. and Gupta, S. (2010). Seasonal incidence, infestation and trap catches of *Cnaphalocrocis medinalis* (Guenee) in Rice. *Ann. Plant Protec. Sci.*, **18** (2): 380-383.

Jafar, W.N.W., Mazlan, N., Adam, N.A. and Omar, D. (2013). Evaluation on the effects of insecticides on biodiversity of arthropod in rice ecosystem. *Acta Biol. Malaysiana*, **2**(3) : 115-123.

Kandibane, M., Raguraman, S. and Mahadevan, N.R. (2006). Taxonomic composition and diversity of coccinellids in an irrigated rice ecosystem of Tamil Nadu, India. *Internat. J. agric. Sci.*, **2** (2): 433-435.

Karl, Pearson (1978). *Hand book of agricultural statistics*, pp.284-285.

Misra, H.P. (2008). Management of the rice leaf folder, *Cnaphalocrocis medinalis* (Guenee) by newer insecticides. *Oryza*, **45**(3) : 252-254.

Mukherjee, S.K., Mishra, P.R. and Dash, D. (2011). Studies of new insecticide molecule indoxacarb 15 EC against rice leaf folder *Cnaphalocrocis medinalis* Guenee and yield. *J. Plant. Protec. & Environ.*, **8**(2) : 35-38.

Panse,V.G. and Sukhatme,P.V. (1967). *Statistical methods for agricultural workers* (II Edn.),ICAR,New Delhi (India).

Shanwei, B., Bengui, X. and Fang, L. (2009). Control effectiveness of chlorantraniliprole on *Cnaphalocrocis medinalis* and evaluation of its safety to beneficial arthropods in the rice fields. *Oyrza*, **7** : 144-157.

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