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Efficacy of Seedling and Seedling root Dip in Insecticides on the Control of the Brown Planthopper

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Six different methods viz., 12, 6, 3, 1 hour and 1 minute seedling root dipping versus 1 minute whole plant dipping were evaluated in the bioassay studies against brown planthopper adults (BPH). Two commercial insecticides i. e., chlorpyrifos and endrin at 0.05 and 0.10% a. i. were tested. One minute whole plant dipping in chlorpyrifos 0.1% a. i. was more persistent and remained toxic for about 15 to 20 days for the adults of BPH in the pot studies. The whole seedling dip in chlorpyrifos 0.10% a. i. concentration for one minute was the most effective treatment and was outstandingly superior to all other treatments.

Though seedling root dips as a method was effective, adoption of the method was difficult for practice on large scale under farmer's field conditions as the seedlings had to be immersed for 12 hours in insecticidal solutions, prior to transplanting. It was therefore felt necessary to find out if the dipping for shorter duration than 12 hours and simple dipping of whole seedling for just about a minute would be equally effective. With this objective in view, in this paper a study was carried out to evaluate the effectiveness of chlorpyrifos and endrin at two concentrations viz., 0.05 and 0.10% a i with 6 different treatments against the adults of BPH.

MATERIAL AND METHODS

Two commercial insecticides viz., chlorpyrifos and endrin at 0.05 and 0.10% a.i concentration were tested against adults of BPH in bioassay studies. After pruning the tops, 30 day old seedlings of *Jaya* were kept in beakers containing insecticidal solutions. Only the root portions of the seedlings were dipped taking adequate precautions for 1 minute, 1 hour, 3 hours, 6 hours and 12 hours, while seedlings were dipped entirely for only one minute. After treatment, 4 seedlings were transplanted in the centre of each pot as one hill. Ten healthy brown plant hopper adults were released in each pot. The insects were confined on the potted plants by keeping a chimney over the plant, the open end is tied with a muslin cloth. The treatments were replicated thrice including control. BPH adults were released at 5, 10, 15, 20 and 25 days after transplanting (DAT). Fresh lot of BPH adults were released at each time. Mortality counts were recorded at the

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end of 24 hours of exposure. Mortality in control was adjusted by using Abbot (1925) formula. Moribund individuals were counted as dead.

RESULTS AND DISCUSSION

The data on mortality of insects confined for 24 hours on treated plants on 5th, 10th, 15th, 20th and 25th day after treatment are presented in Table 1. On the 5th day after treatment, the highest insect mortalities ranging from 66.6 to 100.0% with chlorpyrifos and from 33.3 to 73.3% with endrin were recorded. The different methods and durations of dipping treatments gradually lost their toxicity, endrin at 0.05 and 0.10% concentration loosing almost all toxicity by the 10th and 15th day respectively and chlorpyrifos loosing toxicity completely by 25th day. The data was analysed by applying 'PT' values (Saini, 1959) any by complete randmized block design. Either by 'PT' values or by statistical analysis, the data reveals that one minute dipping of whole seedlings dip in any of the concentrations of chlorpyrifos or endrin is significantly superior over other treatments followed by 12 hours root dipping. Between these two insecticides, chlorpyrifos was most toxic and persistant over endrin, Dipping at different lengths of time (1 hour, 3 hours and 6 hours in any concentration of chlorpyrifos and endrin had recorded a minimum of 40.0% mortality to a maximum of 100.0% on 5 day old residues (Table 1) However, the toxicity and persistence of these treatment lost completely by 10th day after treatment. Statistically significant differences were obtained between insecticides, insecticides concentrations, between concentrations between treatments and insecticides X treatments.

It was significant that whole plant dipping for one minute and their transplanting was more effective then even the 12 hour root dipping alone. Here also, whole dipping either in endrin or chlorpyrifos at 0. 10% a.i concentration was much toxic and persistent than dipping in lower concentration. The whole plant dip for one minute in chlorpyrifos even in 0. 05% a.i. concentrations was on par with the root dips in chlorpyrifos at 0.10% a.i. concentrations for 12 hours

It was significant from these studies that even one minute whole seedling dip is effective. Insecticidal solutions like chlorpyrifos would substitute for the most laborious and time consuming method of seedling root dip for 12 hours prior to planting in view of the greater effectiveness easiness of adoption under farmer's conditions.

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TABLE 1. Relative Effectiveness and Persistence of Chlorpyrifos and Endrin as seedling Root Dips Versus Seedling Dip against the Adults of BPH (20-9-76 to 15-10-76)*

Insecticide	Concentration % a. i.	Treatment Duration of root dipping	% corrected mortality Age of residues in days					'PT' values/mean angular values
			5	10	15	20	25	
1	2	3	4	5	6	7	8	9
Chlorpyrifos	0.05	1 Minute whole plant	93.3	63.3	23.3	13.3	0	706/44.04
		1 Minute root only	66.6	16.6	0	0	0	283/26.69
		1 hour root only	100.0	40.0	0	0	0	387/36.26
		3 hours root only	100.0	40.0	0	0	0	286/36.26
		6 hours root only	100.0	46.6	20.0	0	0	383/40.19
		12 hours root only	100.0	60.6	26.6	0	0	490/43.09
Chlorpyrifos	0.10	1 Minute whole plant	100.0	56.6	33.3	33.3	0	866/48.36
		1 Minute root only	80.0	16.6	3.3	0	0	339/29.92
		1 hour root only	100.0	20.0	13.3	10.0	0	617/36.73
		3 hours root only	100.0	36.6	10.0	0	0	533/39.22
		6 hours root only	100.0	33.3	20.0	0	0	567/38.26
		12 hours root only	100.6	40.0	23.3	26.6	0	750/43.56
Endrin	0.05	1 Minute whole plant	66.6	3.3	0	0		482/24.18
		1 Minute root only	36.6	0	0	0		255/17.49
		1 hour root only	43.3	3.3	0	0		276/19.69

Table-1. Contd.

1	2	3	4	5	6	7	8
		3 hours root only	40.0	0	0	0	280/18.44
		6 hours root only	40.0	0	0	0	280/18.19
		12 hours root only	43.0	0	0	0	303/19.19
Endrin	0.10	1 Minute whole plant	73.3	60.0	0	0	313/34 24
		1 Minute root only	33.3	20 0	0	0	133/18,34
		1 hour root only	60 0	26.6	0	0	553/27.58
		3 hours root only	50.0	16.6	0	0	432/23 99
		6 hours root only	50.0	23.3	0	0	467/25 28
		12 hours root only	60.0	33.3	0	0	587/28.25
% range in control			0	0	0	0	

C. D. to compare Insecticides	(0.05) =	1.57	C. D. to compare concentration		(0.05) = 1.57
	(0.01) =	2.10			(0 01) = 2.10
C. D. to compare between	(0.05) =	2.23	C. D. to compare treatments		(0.05) = 2.73
Insecticides X concentrations	(0.01) =	2.97			(0 01) = 3.64
			C. D. to compare insecticides X treatments *		(0.05) = 3.86
	* Max. temp =	36 7°C	Mean Max. Temp. =		32.4°C
	Min. temp =	22.6°C	Mean Min. Temp. =		24.8°C
			Mean RH =		73%