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*SCREENING OF INSECTICIDES AGAINST THE ADULTS AND NYMPHS OF *NILAPARVATA LUGENS* STAL, THE RICE BROWN PLANTHOPPER

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Twelve commercial insecticides in EC and WP forms at 0.025, 0 05, 0.075 and 0.10% a. i. were evaluated against adults and nymphs of BPH separately using diazinon 0.05% as standard. Considering the overall persistent toxicity against adults and nymphs based on 'PT' values and overall mean persistent toxicity, chlorpyrifos and carbofuran 0 05% a. i as foliar sprays followed by quinalphos and monocrotophos are the most effective in the control of BPH in the field.

The brown plant hopper (BPH), since 1970, has become a major pest in several parts of Indian sub-Continent, as also in other rice -growing countries of Asia. *N. lugens* caused direct damage to plants by sucking sap as well as transmitting 'grassy stunt' virus disease. In this paper, results obtained from trials conducted to screen out effective and persistent insecticides for controlling the pest are presented.

MATERIAL AND METHODS

Two experiment, expt. 1 against adults and expt. II against nymphs during the years 1976-1977 were done using one month old paddy plants (var. *Jaya*). Twelve commercial insecticides in EC and WP forms at 0.025. 0.05, 0.075 and 0.10% a.i (Table 1) were evaluated separately against adults and nymphs. The plants were sprayed with an atomizer upto run-off stage taking adequate precautions to prevent fall off on the soil surface. Ten fresh and healthy adults of BPH or ten healthy 3rd instar nymphs of BPH as the case may be were caged separately on the treated plants, at 1, 3, 5, 8, 11, 14, 17 and 20 days after treatment (DAT). The experiment was replicated thrice. Apparently moribund insects were counted as dead. Mortality observed at the end of 24 hr was corrected using Abbot's (1925) formula.

RESULTS AND DISCUSSION

The data on mortality of adult and nymphs for 24 hr on the treated plants were presented in Table 1.

Against BPH adults:

Diazinon, chlorpyrifos and monocrotophos at 0.05 % a.i and above and endrin chlorfenvinphos, carbaryl, quinalphos and phosphamidon at all concentrations effected 100% kill one day

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after treatment. Out of all the insecticides, only chlorpyrifos effected more than 70% of kill at all 4 concentrations eight days after treatment. However, chlorpyrifos lost its persistent toxicity between 14 to 17 days after treatment at all 4 concentrations, while carbofuran recorded more than 60% of kill at 0.05% concentration and above at 11th day and the toxicity was noticed upto 14th day. Diazinon, endrin, chlorfenvinphos, carbaryl, quinalphos and monocrotophos gave more than 50% of kill of the test insect five days after treatment. However, all these insecticides lost their toxicity completely within 11 to 14 days. Endosulfan and mephosfolan are ineffective.

The data was analysed through 'PT' values (Saini, 1959) and by CRD method for both adults and nymphs. As per 'PT' values carbofuran chlorpyrifos, quinalphos, carbaryl, monocrotophos and phosphamidon were grouped as superior to 0.05%of diazinon, while lindane, endrin, mephosfolan and endosulfan were in effective. Chlorfenvinphos was on par in persistency to that of 0.05% of diazinon. A perusal of statistical analysis showed that insecticides found significantly superior, or on par or inferior to diazinon followed exactly the same order as reflected by 'PT' values. The difference in treatment means were statistically significant in respect of insecticides, dose and insecticides x doses. Increasing doses resulted in highly significant increase in persistent toxicity. Interaction between insecticides and doses was highly significant.

Though many insecticidal treatments were significantly superior at lower doses as compared to either 0.05% a.i or 0.10% a.i diazinon, it was significant that chlorpyrifos at 0.025% a.i and above, carbofuran at 0.05% a.i and above and quinalphos at 0.075% a.i and above were superior to diazinon 0.10% a.i. Carbaryl, quinalphos and monocrotophos at 0.05% a.i were also on par with 0.10% a.i diazinon. Based on these results, chlorpyrifos 0.025 to 0.05% a.i carbofuran quinalphos, carbaryl and monocrotophos 0.05% a i as foliar sprays are identified as the most effective treatments against adults.

Against BPH nymphs :

As in the case of adults, less than 50% mortality was recorded in 0.025 and 0.05%a.i. concentration of endosulfan and mephosfolan, while the two higher doses viz., 0.075 and 0.10% a.i. concentrations of these two insecticides and all four concentrations of the rest of the 10 candidate insecticides resulted in more than 50% mortality one day after. More than 50% mortality recorded even 11 days after treatment with carbofuron at 0.05 to 0.10% a.i concentrations followed by chlorpyrifos where in more than 50% mortality at 0.025 to 0.10% a.i concentration was recorded at 8 days after treatment. As in the case of adults, endosulfan and mephosfolan were ineffective and showed less than 50% mortality at all concentrations at 3 days after treatment. By and large the persistence of all the test insecticides were lost earlier in case of nymphs compared to adults. The mortality of adults was more than nymphs at diffe-

rent concentrations and at different days of test.

The 'PT' values and analysis of variance reveal that carbofuran, chlorpyrifos, quinalphos, monocrotophos and carbaryl were superior to 0.05% a.i concentration of diazinon, while chlorfenvinphos, lindane, endrin, endosulfan and mephosfolan were inferior whereas phosphamidon was on par with 0.05% a.i concentration of diazinon. The differences in treatment means were statistically significant in respect of insecticides, doses and insecticides x doses. Increasing doses resulted in highly significant increase in persistent toxicity. Interaction between insecticides and doses was highly significant. Chlorpyrifos and carbofurad 0.05% a.i were significantly superior and chlorpyrifos 0.025% a.i, quinalphos and monocrotophos at 0.05 a.i were on par with 0.10% a.i diazinon against nymphs.

Taking the persistent toxicity of the insecticides against both adults and nymphs together into consideration, endosulfan and mephosfolan were only 0.3 times as toxic as diazinon and hence considered as ineffective. Endrin, lindane, chlorfenvinphos, phosphamidon, monocrotophos and carbaryl were 0.8 to 1.2 times as toxic as diazinon while quinalphos was 1.4 times as toxic. Chlorpyrifos and carbofuran was outstanding with 1.8 and 2.0 times respectively as toxic as diazinon.

Carbaryl diazinon and endrin (Israel *et. al.*, 1968), from laboratory studies, phosphamidon and monocrotophos (Chelliah *et.al.*, 1972-73), endrin, quinalphos and monocrotophos (Jayaraj, 1976) and carbofuran and diazinon (Rao *et. al.*, 1976) from field studies were reported effective against BPH from India.

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Table 1 Relative persistence of different concentrations of some insecticides applied as foliar sprays against BBH.

Insecticides	Concentration % a. i.	P T values Adults	Nymphs	Insecticides	Concentration % a. i.	P T values Audits	Nymphs
Diazinon	0.025	351	318	Quinalphos	0.025	456	470
	0.05	522	496		0.05	730	750
	0.075	657	641		0.075	860	850
	0.10	682	677		0.10	917	880
Endrin	0.025	288	278	Monocrotophos	0.025	472	498
	0.05	338	317		0.05	645	612
	0 075	542	452		0.075	767	737
	0.10	668	561		0.10	817	775
Chlorfenvinphos	0.025	307	276	Phosphamidon	0.025	320	243
	0.05	567	398		0.05	533	521
	0.075	603	528		0.075	752	665
	0.10	732	631		0.10	870	930
Chlorpyrifos	0.025	833	805	Lindane	0.025	200	192
	0 05	1030	952		0.05	419	294
	0.075	1090	1011		0.075	635	578
	0.10	1150	1050		0.10	823	683
Carbofuran	0.025	578	496	Endosulfan	0.025	25	30
	0.05	1150	999		0.05	77	60
	0.075	1330	1273		0.075	225	218
	0.10	1520	1398		0.10	336	245
Carbaryl	0.025	398	327	Mephosfolan	0.025	45	75
	0.05	568	463		0.05	91	103
	0.075	792	705		0 075	243	145
	0.10	1020	1019		0.10	318	200