

Evaluation of Some Neem Formulations Against Insect Pests of Paddy

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Paddy crop is attacked by several insect pests right from nursery stage to harvesting. Although, synthetic insecticides are generally effective in controlling the insect pests, but widespread use of broad-spectrum chemicals has caused problems of their resistance and pest resurgence. The complexities in their control has promoted the evaluation of such chemical means which are eco-friendly, selective and fit into IPM strategy. Neem (*Azadirachta indica* A. Juss) has received world-wide attention now-a-days for its pesticidal activity. Centuries before commercial insecticides were available, neem derivatives were being used in India to protect agricultural crops from ravage of insect pests. Neem products especially neem oil and cake are widely acknowledged for their diverse activity like antifeedant, repellent and insecticidal property (Krishnaiah and Kalode, 1984, Rajasekaran *et al.* 1987, Lamb and Saxena, 1988).

Recently, large number of neem based formulations are available in market under different trade names and being tested for their efficacy against wide range of insect pests. Informations about its bio-efficacy was completely lacking on paddy for Gujarat. With this in view, the present study was aimed to evaluate the effectiveness of some commercial neem derivatives against major insect pests attacking paddy in middle Gujarat region.

A field experiment was laid-out during three successive wet seasons (1995 to 1997) at Main Rice Research Station, Gujarat Agricultural University, Nawagam (Gujarat). Randomized Block Design with eight treatments repeated four times was used for the purpose. Six neem formulations were evaluated at different concentrations depending on azadirachtin content (Table 1) alongwith standard insecticide chlorpyrifos 20 EC (0.05%) and untreated check. Gross and net plot size were 5.0 x 4.95 m. and 3.8 x 3.75 m. respectively. Seedlings of susceptible paddy cultivar (GR-11) were transplanted during first week of August with a spacing of 20 x 15 cm. Insecticides were applied based on the insect damage/population level. Two sprays i.e. first at 40 days after transplanting (DAT) and second at 55 DAT were given

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TABLE 1
Details of neem derivatives evaluated in the trial.

Sr. No.	Neem based formulation	Form	Azadirachtin (PPM)	Conc. (%)
1.	Nimbecidine	Liquid	300	2
2.	Neemax	Solid	300	2
3.	Neem gold	Liquid	300	2
4.	Econeem	Liquid	3,000	0.5
5.	Neem Azal T/S	Liquid	10,000	0.3
6.	Fortune Aza.	Liquid	1,500	0.5

during 1995 and 1997 seasons, whereas single spray (50 DAT) was given during 1996 season.

Leaf folder (LF), *Cnaphalocrocis medinalis* Guen. damage was assessed by counting total and LF damaged leaves on 10 hills selected randomly from net plot area. Similarly, white backed planthopper (WBPH), *Sogatella furcifera* (Horv.) incidence was recorded on 10 hills from net plot. Its population was found during *kharif* 1996 season only. Stem borer, *Scirpophaga incertulas* (Walker) attack appeared at heading stage and was assessed by counting total number of white earheads (WE) per plot. Incidence of leaf folder and stem borer was considerably suppressed during 1996 due to severe attack of WBPH. At harvest, grain yield was weighed separately from individual plots. The data thus obtained were analysed statistically.

Pooled data (Table 2) clearly indicated that the plots treated with neem formulations and chlorpyrifos showed significant reduction of leaf folder incidence. All the neem formulations except Nimbecidine recorded moderately less infestations (5.10 to 5.61%) of the pest comparable to standard check

insecticide chlorpyrifos (4.59%) as against 8.52% in untreated control. Among the neem formulations evaluated, nimbecidine proved least effective in suppressing leaf folder damage and differed significantly from chlorpyrifos.

White backed planthopper populations was more or less same level in all the neem formulations and exhibited significantly higher numbers than chlorpyrifos suggested that its incidence could not be lowered by neem derivatives. All the neem formulations registered 25.98 to 27.93 hoppers/hill as compared to 28.85 hoppers/hill in control plots, while chlorpyrifos exhibited 16.90 hoppers/hill.

Similarly, pooled results on stem borer incidence (Table 2) revealed that the plots treated with neem formulations moderately lowered (110.63 to 138.63 WE/Plot) the borer damage as compared to untreated control (157.25 WE/Plot). But were inferior to chlorpyrifos (82.0 WE/Plot). Among neem derivatives, least (110.63 WE/Plot) incidence was registered in econeem, which differed significantly from unsprayed plots (157.25 WE/Plot).

TABLE 2

Incidence of paddy pests in various treatments of neem derivatives.

Sr. No.	Treatments	Con. (%)	Mean (%) LF damage			Av. No. WBPH/ Hill			Av. No. WE/Plot		
			1995	1997	Pooled	1995	1997	Pooled	1995	1997	Pooled
1.	Nimbecidine	2	6.61	6.72	6.36 b	26.04 b			187.6 (13.64)	53.00 (7.25)	120.0 (10.45) ab
2.	Neemmax	2	6.50	4.51	5.61 bc	27.81 b			178.25 (13.23)	75.50 (8.67)	126.0 (10.95) ab
3.	Neem gold	2	6.16	4.50	5.33 bc	26.00 b			194.00 (18.02)	68.25 (8.02)	131.13 (10.92) ab
4.	Econeem	0.5	6.67	4.26	5.47 bc	27.93 b			152.75 (12.32)	68.50 (8.19)	110.63 (10.26) bc
5.	Neem Azal T/S	0.3	6.77	4.98	5.10 bc	25.38 b			100.00 (13.30)	57.00 (7.55)	118.50 (10.38) ab
6.	Fortune Aza	0.5	6.38	4.62	5.50 bc	25.90 b			210.25 (14.46)	67.00 (8.16)	138.63 (11.31) ab
7.	Chlorpyrifos	0.05	6.01	3.17	4.59 c	16.90 a			107.25 (10.24)	56.75 (7.25)	82.00 (8.74) c
8.	Control	—	9.11	7.92	8.52 a	28.85 b			236.50 (15.36)	78.00 (8.81)	157.25 (12.08) a
S. Em. ±			0.48	0.27	0.53	1.61			0.76	0.74	0.55
C. D. at 5 %			1.41	0.80	1.78	4.72			2.22	NS	1.55
C. V. (%)			14.31	10.65	13.21	18.17			11.37	10.43	14.02
T x Y			—	—	Sig.	—			—	—	NS

Treatments means with the letter/s in common are not significant by DNMRT at 5% level of significance.

TABLE 3

Paddy grain yield influenced by various treatments of neem derivatives.

Sr. No.	Treatments	Yield (kg/ha)			
		1995	1996	1997	Pooled
1.	Nimbicidine	1719	728	3254	1901 b
2.	Neemax	1684	1080	3272	2015 ab
3.	Neem gold	1614	1342	3404	2120 ab
4.	Econeem	2040	754	3310	2037 ab
5.	Neem Azal T/S	1956	1316	3632	2301 a
6.	Fortune Aza	1614	1360	3202	2061 ab
7.	Chlorpyrifos	2123	1254	3650	2345 a
8.	Control	1518	825	3132	1825 b
	S. Em. $\pm$	150.16	244.98	159.20	108.92
	C.D. at 5 %	NS	NS	NS	306.53
	C. V. (%)	16.84	45.17	9.48	18.27
	T x Y	—	—	—	NS

Treatment means with the letter/s in common are not significant by DNMRT at 5% level of significance.

NS = Non Significant.

Grain yield (Table 3) was much fluctuated and relatively low during 1996 season due to severe incidence of WBPH in later part of crop period. Pooled data indicated significantly highest (2345 kg/ha) grain yield in chlorpyrifos followed neem azal T/S (2301 kg/ha). Increase in grain yield over untreated check was moderate (4.16 to 26.8%) due to the spraying of neem formulations as against 28.5% in case of chlorpyrifos. Nimbicidine proved inferior for grain yield.

The overall results on efficacy of neem formulations against insect pests of paddy and increase in grain yield revealed that the neem

based insecticides were moderately efficient, but not comparable to standard insecticide chlorpyrifos. These findings are in agreement with the conclusion drawn based on the multilocation co-ordinated trials conducted during *kharif* 1993 to 1995 (Anonymous, 1994, 1995 and 1996). Further, the report of Bhatnagar and Pandey (1998) support the above results, who showed moderate control of leaf folder, *C. medinalis* and moderate increase of grain yield due to the application of neem formulations in rice field.

(Received on 30th July, 1999)

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