Interaction

In all the population levels, increased N levels increased the DH incidence; however 150 and 200 kg N/ha were on par. Though there was steady increase in DH incidence due to higher plant population in all the N levels, the variation was narrow and not signifcant. However, it could be recorded that combination of higher plant population coupled with N resulted in increased DH and yield was also reduced. This might be due to the conductive microclimate prevailed as well as migration of the stem borer larvae for feeding in the early stage of the crop. A similar trend was noticed with WE incidence in both the seasons. But increased plant population in combination with N levels significantly increased the incidence particularly during rabi due to cloudy weather and intermittant rainfall.

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BIO-EFFICACY OF NEEM OIL AND DELTAMETHRIN AGAINST SPOTTED BOLL WORM *Earias vittella* (Fab.) (*Noctuidae : Lepidoptera*) ON COTTON (MCU 5)

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ABSTRACT

A study was carried out to test the bio-efficacy of neem oil at 0.10 to 0.50 per cent concentrations alone and in combination with the pyrethroid deltamethrin (0.09%) on cotton CMCN 5) under field condition during winter 1986-1987. Deltamethrin (0.09%) was the most effiective treatment in minimising shoot, square, bolls, kapas and loculi infestation due to E. vittella. The next best treatments were neem oil at 0.5% alone and combinations of neem oil 0.30, 0.40 and 0.50% with deltamethrin 0.09%. Deltamethrin 0.09% spray recorded the maximum yield. Deltamethrin in combination with neem oil recorded higher yield than neem oil alone. Yield loss was

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minimum in detalmethrin 0.09% alone. Deltamethrin 0.09% alone can be used for effective control of bollworms and realising appreciably high yield of kapas. Addition of neem oil and deltamethrin spray fluid has not conferred any additional benefits.

KEY WORKDS: COTTON, SPOTTED BOLLWORM, NEEM OIL, DELTMETHRIN

The spotted bollworm *Earias vittella* (Fab.) is one of the serious pests of cotton all over India. A study was undertaken to evaluate the effect of the plant product neem oil alone and in combination with the pyrethroid deltamethrin against the spotted bollworm on cotton (MCU 5) under field conditions.

MATERIALS AND METHODS

A field study was carried out in the research farm at the Fredrick Institute of Plant Protection and Toxicology, Padappai, Tamil Nadu during October 86-May 87.

Neem oil was obtained from Khadhi Craft, Tambaram, and Teepol at 2 ml/l was used as surface acting agent to ensure spreading of neem oil on the treated plants. The experiment was laid in a randomised block design replicated thrice, the plot size being 20 sq.m. Eight sprays were given using knapsack sprayer at 10 day interval commencing 30 DAS using 500 l spray fluid per hactare. There were 10 treatments including an untreated control. Neem oil was applied alone at 0.10, 0.20, 0.30, 0.40 and 0.50% concentrations, deltamethrin at 0.09% and deltamethrin 0.09% in combination with neem oil at concentrations 0.30, 0.40 and 0.50%.

The incidence of the spotted bollworm *E.vittella* was assessed on the basis of infestation of shoots, squares and bolls. The per cent infestation of shoot was calculated at 35 DAS by counting the total number of shoots and infested shoots in each plot separately. The fallen squares were sorted out into infested and uninfested and counted at 5 day interval from 40 DAS in each plot, and the percentage infestation was calculated. There was no incidence of *Heliothis armigera* and *Pectinophora gossypiella*.. Total number of shed bolls and the number infested by *E.vittella* were recorded separately at 5 day interval from 50 DAS onwards and the per cent infestation was calculated. Total number of healthy and damaged squares and bolls were recorded separately at each picking. Open kapas were harvested from 130 DAS at 10 day interval. The healthy burst bolls and healthy lints were sorted out and weighed separately.

Total yield was calculated on the basis of good lint sorted out from infested (due to *E.vittella)* and uninfested in each plot separately. Total yield loss was worked out as per the method followed by Thimmaiah (1974).

RESULTS AND DISCUSSION

The results on the efficacy of neem oil at 0.10, 0.20, 0.30, 0.40 and 0.50% alone and in combination with the pyrethroid deltamethrin at 0.09% against E.vittella on cotton (MCU 5) are presented in Table 1.

The per cent infestation of shoots by *E.vittella* in the different treatments ranged from 2.32 to 6.01% but the difference between the treatment was not significant. The minimum incidence of 2.32% was noticed in deltamethrin 0.09% spray and the maximum of 6.01% in control. Neem oil with increase in concentration level showed decreases in infestation of *E.vittella*. Deltamethrin at 0.9% and its combination with neem

able 1. EFFECT OF NEEM OIL AND DELTAMETHRIN ON THE INCIDENCE OF **E. VITTELLA** IN SHOOT, SQUARES, BOLLS AND YIELD ON COTTON (VAR. MCU5).

TREATMENTS (%)	INFESTATION IN					SHEDDING OF		SHEDDING OF SQUARES DUE TO E. VITTELLA (%)	SHEDDING OF BOLLS DUE TO E. VITTELLA (%)	CALCULATED YIELD Kg/ha.	CALCULATED YIELD LOSS DUE TO E.VITTELLA (Kg/ha.)
	SHOOTS (%)	SQUARES (%)	BOLLS (%)	KAPAS (%)	LOCULES (%)	SQUARES (%)	BOLLS (%)				
Neem Oil 0.10%	4.80	4.11	3.64	15.86	10.99	9.05	21.83	53.34	17.77	822.20	529.60
Neem Oil 0.20%	3.00	2.45	1.97	15.29	9.36	6.46	19.49	48.11	12.66	828.00	310.16
Neam Oil 0.30%	2.62	1.90	1.96	14.34	9.11	6.39	15.08	39.11	12.07	965.50	257.00
Neem Oil 0.40%	2.83	3.26	1.97	9.92	5.65	9.67	48.41	25.61	10.41	960.00	146.16
Neem Oil 0.50%	2.62	1.35	1.24	10.69	3.65	6.69	23.29	25.98	6.66	990.50	143.66
Deltamethrin 0.09%	2.32	0.58	0.57	5.40	3.32	6.23	21.38	22.87	3.05	1109.50	121.33
Neem Oil 0.10% + Deltamethrin 0.09%	4.96	0.74	1.36	6.41	5.67	7.00	18.70	39.31	9.70	1050.50	272.66
Neem Oil 0.30% + Deltamethrin 0.09%	4.75	1.11	1.59	10.04	4.47	7.28	21.44	41.55	9.74	1007.50	207.50
Neem Oil 0.50% + Deltamethrin 0.09%	4.69	0.61	1.66	7.55	2.72	6.92	26.37	43.85	11.79	1085.00	124.80
Control	6.01	6.06	5.50	25.72	23.77	13.24	32.38	72.38	49.64	405.00	878.50
C.D.(P=0.05)	N.S	1.80	1.98	9.54	6.53	3.33	N.S	N.S	11.30	N.S	N.S

oil and neem oil alone at 0.50% concentration recorded significantly less incidence of *E.vittella* in squares and it ranged from 0.58 to 1.35% as against the maximum infestation of 6.06% in control. The boll infestation was maximum (5.50%) in control followed by 3.64% in neem oil 0.10%. Deltamethrin 0.09% recorded the lowest boll incidence of 0.57% but was on par with neem oil combination and neem oil alone at 0.20 to 0.50%. The minimum kapas infestation (5.40%) was recorded by deltamethrin which was on par with its combinations with neem oil and neem oil at 0.30, 0.40 and 0.50%. The combinations recorded lower level of infestation compared with neem oil alone. The maximum level of kapas infestation (25.72%) was noticed in control. In case of locule damage, the treatment deltamethrin 0.09% + neem oil 0.50% recorded the lowest damage of 2.72%, but was on par with all other treatments (3.32–9.11%) excepting neem oil 0.10% and 0.20%.

Though there has been no significant difference in the mean number of fruiting bodies formed per plants, shedding of squares exhibited significant difference. However, the least shedding of squares was noticed in deltamethrin 0.09%. No significant difference in shedding of bolls was noticeable between the various treatments though control recorded the higher level. When incidence of *E.vittella* in shed squares is considered the higher infestation level of 72.38% was noticed in control plot and the lowest (22.87%) in deltamethrin. However, the difference has not been statistically significant between the different treatments. Infestation in shed bolls showed significant difference between the treatments. Higher level (49.64%) was noticed in control. The lowest level of 3.05% was observed in deltamethrin which was on par with all other treatments excepting neem oil 0.10%.

The lowest yield of kapas (405 kg/ha) was recorded in control plot as against the higher yield of 1109.50 kg/ha in deltamethrin 0.09%. Deltamethrin in combination with neem oil also recorded higher yield than neem oil alone. The yield showed an increasing trend with increase in neem oil concentrations. However, the difference between the different treatments has not been significant. This may be due to the poor crop growth condition in the different treatments due to drought condition prevailed during the experimental period.

The apparent higher yield loss due to *E.vittella* has been worked out to 878.50 kg/ha in control as against the lowest yield loss of 121.33 kg/ha in deltamethrin. Deltamethrin - neem oil combinations recorded appreciably low yield loss apart from neem oil 0.40 and 0.50% concentrations.

The various aspects presented above reveal that deltamethrin 0.09% spray has always recorded the minimum or appreciably very low incidence of *E.vittella* in shoots, squares, green bolls, locules and shed materials. This has reflected in terms of recording very high yield of kapas and minimum yield loss. In this connection it may be of interest to know that deltamethrin has been highly efficacious against cotton bollworms including *E.vittella* and realisation of high yield of kapas (Jayaraj, 1985; Jayaraj and Ragupathi, 1986, Rote *et al.*, 1987). Among the different concentrations of neem oil tested, 0.40 and 0.50% proved to be better over 0.10, 0.20 and 0.30% concentrations. Earlier reports on other crops indicate that neem oil spray at

3.0% has been found effective against rice stem borer *(Scirpophaga incertulas* (Wlk.) (Sellammal Murugesan *et al.*, 1987), rice gall midge *Orseolia oryzae* (Wood - Mazon) (Schin Foon - Chiu *et al.*, 1984) and *Heliothis armigera* (Hb.) on black gram *(Vigna mungo)* (Rao *et al.*, 1985). It is inferred that deltamethrin alone at 0.09% can be used for the control of cotton bollworms and addition of neem oil has not offered any additional benefit in terms of efficacy and higher yield of kapas.

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CHANGES PREFERRED BY FISH FARMERS IN THE TRAINING PROGRAMME OFFERED BY FISH FARMERS' DEVELOPMENT AGENCY

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ABSTRACT

Changes were preferred by the three groups of respondents with respect to the season, duration and subject content of the training, and the amount of stipend awarded to the trainess.

KEY WORDS : Training, Fish farmers, Adoption behaviour.

Training plays an important role in imparting knowledge and skills. The Fish Farmers Develoment Agency (FFDA) gives preliminary training to the fish farmers on fish culture and fish breeding aspects. The FFDA further helps them to take up fish culture in their own villages by arranging for the supply of fingerlings and credit facilities through lead banks.