The Journal of Plant Protection Sciences, **3**(1) : 57 - 60, June, 2011 **Short Communication**

Potential efficacy of new pesticides for the control of mulberry whitefly and its impact on silkworm rearing

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The mulberry whitefly, *Dialeupora decempuncta* Quaintance & Baker (Homoptera: Aleyrodidae) has been found on mulberry from 1994 causing a severe damage to the foliage, which is the sole food plant for the silkworm, *Bombyx* mori L. They suck leaf sap causing chlorosis, dryness of leaves, leaf curl and sooty mould disease and results a culminating loss in leaf yield to the tune of 10-24% especially during major silkworm cocoon crop seasons. The advantage of pesticides are that it is easy to use, get a convincing control effect, applicable in an emergency, can be selected according to the circumstances, cost effective, both eliminating labour and being of low cost, also easily biodegradable, non toxic products are potentially suitable for use in Integrated Pest Management systems by Alkafahl *et al* (1). Thus development of specific management practices based on botanicals or new group of insecticides has become imperative. Though several insecticides were recommended earlier for the control of whitefly in mulberry, but the continuous reliance on chemical insecticides for control of whitefly in other agricultural crops has resulted several problems like development of pesticide resistance and environmental pollution leading to health hazards also. So efforts were made to avoid the environmental pollution by adopting some newer insecticides which are less toxic, economic, biodegradable and easily available i.e. thiamethoxam (Actara 25% WG), diafenthiuron (Pegasus 50%WP) and clothianidin (Dantap 50% WDG). The LC90 values of these three insecticides were worked out as 0.0131%, 0.0635% and 0.0047% respectively by Patnaik *et al.* (4). Hence it was felt necessary to study the field efficacy of these three insecticides which in turn will cause minimum adverse effect on environment and also to find out its optimum period in becoming free from toxicity after spraying these insecticides on mulberry for silkworm's consumption.

The experiment was conducted at peak incidence of pest population in the mulberry field of Central Sericultural Research & Training Institute, Berhampore, West Bengal. The field efficacy was studied in 27 sub- plots of mulberry at Institute field by using Randomized Block Design with the onset of whitefly infestation. Out of 27, 18 plots were considered as treatment with two doses of three insecticides i.e thiamethoxam (0.015%, 0.020%), diafenthiuron (0.0633%, 0.070%), clothianidin (0.0047%, 0.005%) and remaining three plots were unsprayed, three were sprayed with water and three with dichlorvos respectively. Pre-treatment and post- treatment pest incidence data were recorded 1 day prior to spray and 1, 3, 5, 7 days after spray from 10 randomly selected plants of each plot following the standard method of Nileson (3). The comparative efficacy of all treatments were tested with Analysis of Co-variance (Snedecor and Cochran) (6) depicted in Table1. The percent reduction of the pest population was worked out by using the following formula:

Percent reduction in pest population = [(Pest population in control plot - pest population in treated plot)/pest population in control plot]×100

To determine the safe period for silkworm mulberry leaves from the treated plots were fed to silkworm after 7, 14 and 21 days after spraying from date of hatching in three replications. Economic parameters like stage-wise mortality, larval weight, cocoon weight, shell weight, Shell%, Effective rate of rearing (ERR) and single filament length were studied and analyzed to evaluate the bio- safety of these insecticides. The data were statistically analyzed to determine the safe period for silkworm rearing.

The incidence of whitefly population against different concentrations of insecticides at different days after spray is depicted in (Table1). The reduction percent of pest population for each of the 8 treatments is shown in (Table 2). From the data it is revealed that thiamethoxam at 0.015% reduced 99.81% of the population followed by diafenthiuron at 0.0633% (99.62%) followed by clothinidin at 0.0047% (99.07%) with in 24 hrs after spray. In 3rd day after spray thiamethoxam supressed 99.81% of the population followed by diafenthiuron (99.19%) and clothianidin (99.02%). The 7th day data showed that diafenthiuron reduced the pest incidence to the tune of 97.47% followed by clothianidin (96.93%) and thiamethoxam (96.81%) which was evident when compared with unsprayed control. Field efficacy of diafenthiuron 50% WP was evaluated against whitefly, *Bemicia tabaci* on brinjal by Saradha & Nachiappan (7). They showed that diafenthiuron at 800 g.a.i./ha reduced the whitefly population maximum. Bhaskaran *et al*. (2) showed the efficacy of diafenthiuron (300 g.a.i./ha) against spiraling whitefly (*Aleurodicus disperses* Russell) on guava plants.

However, the findings of the study have indicated that amongst these three insecticides tested, the consumption of leaves by silkworm sprayed with thiamethoxam (0.015%), diafenthiuron (0.0633%) and clothianidin (0.0047%) after 7 days of spray resulted maximum mortality [worms of the untreated lots (control) were not considered], but there was no mortality after 14 and 21 days of spray respectively. The feeding of sprayed leaves after 14 and 21 days of spray showed no significant difference in all economic parameters when compared to control (Table 3). The study revealed that thiamethoxam at 0.015% reduced maximum (99.82%) pest incidence and can safely be used for the control of whitefly, *Dialeuropora decempuncta* as it does not have deleterious effects on silkworm rearing after consumption of 14 days sprayed leaves.

Literature Cited

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Table 1.
Efficacy of different concentrations of thiamethoxam,diafenthiuron and clothianidin solution against whitefly population in the mulberry field.

Treatment	1 DAS	3 DAS	5 DAS	7 DAS
T0 (Control)	60.93	62.89	67.40	65.52
T1 (0.015% Thiamethoxam)	3.03	2.52	2.63	1.85
T2 (0.020% Thiamethoxam)	0.76	0.29	1.60	1.73
T3 (0.0633% Diafenthiuron)	0.00	0.00	1.20	1.08
T4 (0.070% Diafenthiuron)	2.95	3.02	2.52	2.42
T5 (0.0047% Clothianidin)	0.00	0.00	1.71	1.47
T6 (0.005% Clothianidin)	3.01	1.64	0.00	1.30
T7 (Water)	3.15	4.18	4.96	2.30
T8 (0.01%) Dichlorvos	1.99	3.38	4.42	2.46
CD at 5%	14.21	9.39	7.90	3.75

DAS = Days after spray

Table 2.
Population reduction percentage of pest incidence by the different concentrations of insecticides

Treatment	1 DAS	3 DAS	5 DAS	7 DAS
T1	99.81	99.81	96.82	96.82
T2	97.05	98.43	95.31	95.23
T3	99.62	99.19	96.50	97.47
T4	98.77	97.35	96.70	95.07
T5	99.07	99.02	96.00	96.93
T6	92.31	95.04	98.59	96.33
T7	70.30	72.47	70.08	75.45
T8	96.43	93.51	91.28	95.13

DAS= Days after spray

Table 3.

Effect of feeding pesticides-sprayed leaves on economic traits of silkworm *Bombyx mori* L.

Treatment	Days	Mortality %	Larval Wt (g)	SCW(g)	SSWt. (g)	Shell %	ERR (No.)	ERR (Wt)	FL (m)	Fecundity	Hatching %
Untreated	7	-	-	-	-	-	-	-	-	-	-
	14	11	2.51	1.15	0.18	16.01	8966	10.28	525	426	95.14
	21	12	2.61	1.19	0.12	17.65	8833	10.51	569	411	94.33
Thiamethoxam (0.015%)	7	100	-	-	-	-	-	-	-	-	-
	14	12	2.49	1.15	0.19	16.8	8833	10.15	581	388	98.11
	21	11	2.51	1.21	0.21	17.35	8900	10.76	546	430	96.13
Diafenthiuron (0.0633%)	7	100	-	-	-	-	-	-	-	-	-
	14	8	2.55	1.14	0.19	16.61	8310	10.55	529	394	96.28
	21	12	2.48	1.2	0.2	17	8800	10.53	514	412	96.33
Clothianidin (0.0047%)	7	100	-	-	-	-	-	-	-	-	-
	14	11	2.56	1.15	0.19	16.45	8966	10.34	600	387	96.64
	21	11	2.63	1.21	0.21	17.67	8933	10.77	603	433	97.46
CD (5%)	NS	NS	0.55	NS	NS	NS	NS	NS	433	NS	NS

SCW: Silkworm Cocoon Wt.; SSWt : Silkworm Shell Wt.; FL(m): Filament Length (Mt.)
ERR (no): Effective Rate of Rearing (in Number); ERR (wt): Effective Rate of Rearing (in Wt.)