Journal of Crop and Weed, 5(1): 248-250 (2009)

Laboratory evaluation of LC_{90} values of three insecticides against whitefly *Dialeuropora decempuncta* (Quaintance and Baker) infesting mulberry

M. PATNAIK, M.V.SANTHAKUMAR, N.K.DAS, P.MITRA, K. MONDAL AND A.K. BAJPAI

Central Sericulture Research and Training Institute, Central Silk Board, Berhampur -742101, Murshidabad, West Bengal

ABSTRACT

Experiments were conducted to determine the effective concentration of three insecticides i.e thiamethoxam (Actara, 25%WG), diafenthiuron (Pegasus,50%WP) and clothianidin (Dantop,50% WDG) against nymphal stages of whitefly under laboratory condition. Probit analysis was done with the observed values of mortality against concentrations of insecticides. From the analysis LC_{90} values of these three insecticides were worked out as 0.0131% for thiamethoxam, 0.0635% for diafenthiuron and 0.0046% for clothianidin.

Key words: Insecticides, LC_{90}, nymphal stage, pest incidence and whitefly.

Mulberry, *Morus alba* L, is the sole food plant of silkworm, *Bombyx mori* L .Mulberry is prone to attack of varied pest complex of which whitefly, *Dialeuropora decempuncta* (Quaintance and Baker) (Homoptera : Aleyrodidae) has become a major pest status, infesting mulberry during July-November culminating loss in yield of leaf to the tune of 10-24% especially during major silkworm cocoon crop seasons (October-November) (Bandyopadhyay *et al*, 2001). They suck juice from tender leaves resulting chlorosis followed by leaf curl. The nymphs suck the juice and secrete honeydew, which in turn facilitates the growth of sooty mold which is visible as a black coating on the upper surface of the mulberry leaves affecting the photosynthetic activity of mulberry leaves, renders them unfit for feeding silkworm leading to high percentage of mortality. Though several insecticides (0.1% dichlorvos and 1% neem oil) were recommended earlier for the control of whitefly (Bandyopadhyay *et al.* ,2002) efforts have been made in this present study to evaluate the efficacy of some newer insecticides , because the whiteflies tend to develop resistance very fast against insecticides , if applied repeatedly, mainly belonging to same group. Hence, the present experiment was conducted with new insecticides viz., thiamethoxam (Actara 25% WG), diafenthiuron (Pegasus 50%WP) and clothianidin (Dantop 50% WDG) against the nymphal stages of whitefly to find out the effective lethal concentration. Ignacimuthu (2004) studied the efficacy of neem formulations in the control of sucking pests, he also cautioned regarding the sole efficacy of botanicals as the only management option. Diafenthiuron was found effective against various species of whitefly, *Bemisia tabaci* Gennadius, (Saradha and Nachiappan 2003) and *Aleurodicus disperses* Russell (Babu and David, 1999). Rohilla *et al.,* (2004) have worked out the efficacy of thiamethoxam against the mustard aphid. No report is available on the LC_{90} values of these insecticides on *Dialeuropora decempuncta*, hence it was felt necessary to evaluate the correct dose of imprposition of each insecticide, which in turn will cause no adverse effect on environment.

E mail : csrtiber@rediffmail.com

MATERIALS AND METHODS

Nymphs-infested mulberry leaves were collected randomly from the field of Central Sericultural Research and Training Institute, Berhampore, West Bengal during the period from July-December, 2007 with the sizable (Pest population above threshold level) pest incidence. Mulberry leaf petioles were plugged with wet cotton swab to retain the leaf moisture. Mulberry leaves were dipped in two concentrations (0.012% and 0.015% for thiamethoxam, 0.0633% and 0.0700% for diafenthiuron and 0.0047% and 0.005% for clothianidin) of each insecticide separately for six seconds and left to dry for one hour at laboratory ambient conditions. The mortality of the nymphs was recorded after 24 hrs at daily interval for a period of seven days continuously. The experiment was replicated thrice and percent mortality was worked out. (Abbot, 1925). The observed values of mortality against concentrations of insecticides were then subjected to Probit analysis (Finney 1952 and Finney and Steven 1948).

RESULTS AND DISCUSSION

The findings revealed that thiamethoxam was found to suppress the nymphal stages of whitefly up to an extent of 86.66% and 90% with the concentrations of 0.012% and 0. 015% respectively. Similar results were observed by Rohilla *et al.,* (2004) in case of mustard aphid. They have recorded that 50 g *a.i.* / ha gave significantly higher mortality (98.4%). Thiamethoxam @ 50 a.i. / ha at an interval of 15 days

effectively prevented the population build up of hoper on flowering of mango (Kumar *et al* , 1985). Seed dressing with thiamethoxam 70 WS @ 5.g.a.i./kg seeds was best for the management of shoot fly and afforded highest protection at 89.4 % over control (Karibasavaraja *et al*. , 2005)

Two concentrations of diafenthiuron, viz, 0.0633% and 0.0700 % were found to suppress the nymphal stages to the tune of 93.33% and 96.66%. Field efficacy of diafenthiuron 50% WP was evaluated against whitefly, *B. tabaci* on brinjal by Saradha and Nachiappan (2003). Bhaskaran et al (2003) also reported the efficacy of diafenthiuron (300g.a.i./ha) against spiraling whitefly (*Aleurodicus disperses* Russell) on guava plants. Pandey and Raju (2003) studied the bio-efficacy of diafenthiuron against diamond black moth, *Plutella xylostella* .

The efficacy of clothianidin, at 0.0047% and 0.005% were found to suppress the whitefly population up to a maximum extent of 96.66% and 97% respectively. LC_{90} values of these insecticides were worked out as 0.0131% for thiamethoxam, 0.0635% for diafenthiuron and 0.0046% for clothianidin. Based on this study the doses of the above insecticides will be assessed and their relative field efficacy will be evaluated along with their bio-safety by conducting silkworm rearing and exposing natural enemies for finally adopting them at farmers' level for effective management of whitefly.

REFERENCES

Abbott, W.S. 1925:. A method of computing the effectiveness of an insecticide .*J. Econ. Ento.,* **18** : 265-67.

Babu, B.G. and David, P.M.M. 1990 : Effect of pesticides on spiraling whitefly (*Aleurodicus disperses Russell*) *Pestology* **26** : 61-65

Bandyopadhyay, U.K. ,Santha Kumar, M.V. ,Das, K.K., and Saratchandra, B 2001. Yield loss in mulberry due to sucking pest whitefly, *Dialeuropora decempuncta* Quaintance and Baker (Homoptera: Aleyrodidae), *Int. J. Indust. Ento.*, **2**: 75-78

Bandyopadhyay,U.K., Santha Kumar, M.V. ,Das, K.K. and Saratchandra, B. 2002. Efficacy of neem oil in controlling whitefly and its impact on silkworm rearing. Bull. Ind. Acad. Seric. **6** : 77-84.

Bhaskaran, V. Reddy, D. J., Subbratnam, G.V. Reddy, S.A. Nath, V.V.N. and Kumar, V.D.V.N.H. 2003. Efficacy of newer insecticides against spiraling whitefly (*Aleurodicus disperses Russell*). *Pestology* **27** : 16-19

Finney, D.J., Ed. 1952. *Probit Analysis*. Cambridge, England, Cambridge University Press. Cambridge.

Finney, D. J. and Stevens, W.L. 1948. A table for the calculation of working probits and weights in probit analysis. *Biometrika* **35**: 191-20

Karibasavaraja , L.R. , Balikai , R.A. and Deshpanda , V.P. 2005. Thiamethoxam 70 WS, a new promising seed dress for the suppression of sorghum shhotfly , *Ann. Pl. Protect. Sci.* **13**: 81-84

.Rohilla, H.R., Bhatnagar, P and Yadav, P.R. 2004. Chemical control of mustard aphid with newer and conventional insecticides. *Ind. J. Entol*. **66** : 36-37.

Sarada, C. and Nachiappan, R.M. 2003. Evaluation of Diafenthiuron 50% WP (POLO) against whitefly, *Bemisia tabaci Genn.* (Aleyrodidae: Homoptera) on brinjal (*Solanum melongena*). *Pestology* **27**: 12- 14.

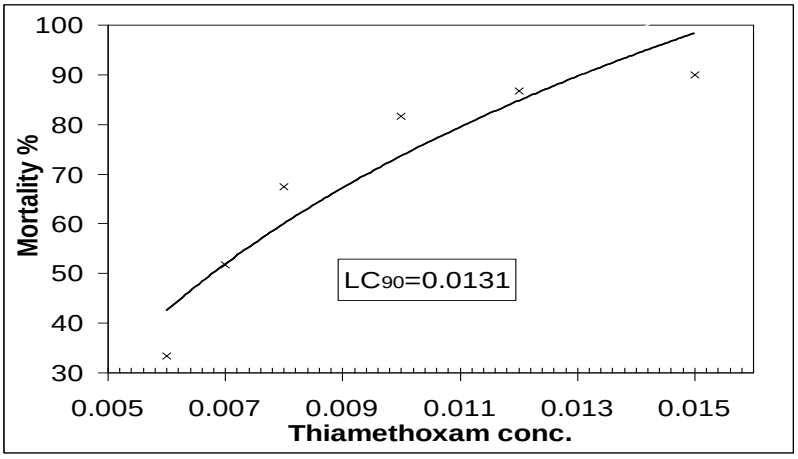

Fig-1 : LC_{90} value of thiamethoxam

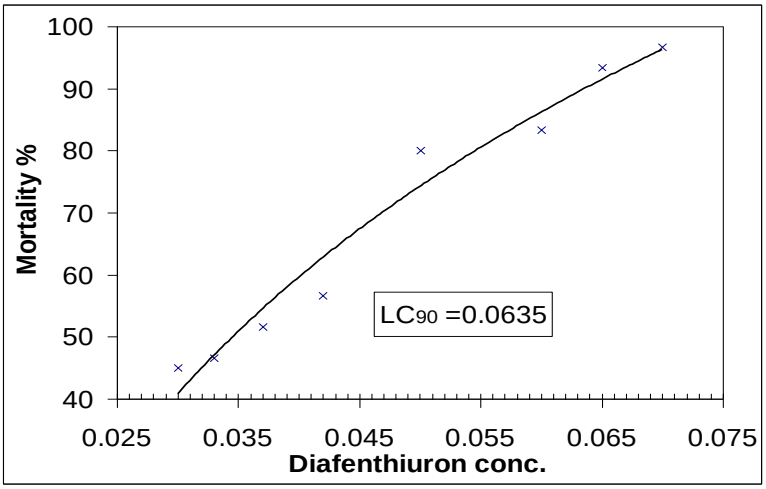

Fig 2: LC_{90} value of diafenthiuron

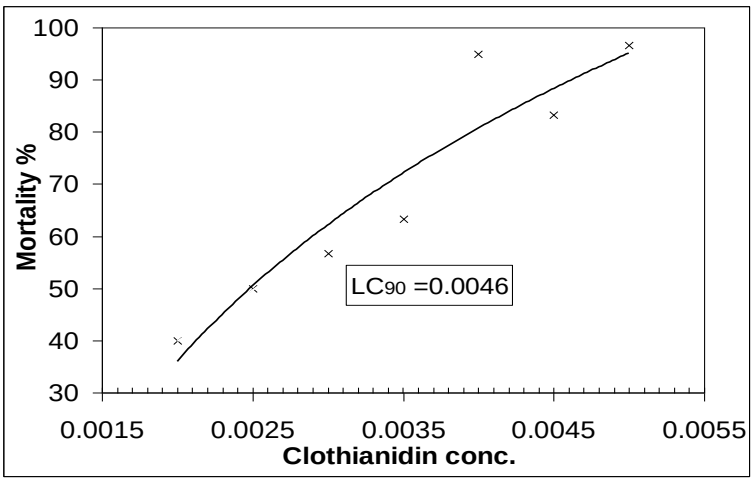

Fig 3: LC_{90} values of clothianidin