Indian Journal of Applied Entomology **23**(1) : 27-29 (2009)

EFFICACY OF SOME IPM MODULES AGAINST DIAMOND BACK MOTH (*PLUTELLA XYLOSTELLA* LINN.) INFESTING CAULIFLOWER

G.M. BANSODE AND M.S. PUROHIT

Department of Entomology, N.M. College of Agriculture Navsari Agricultural University, Navsari – 396 450, Gujarat, India

ABSTRACT

A field experiment was conducted to investigate the efficacy of some IPM modules against diamond back moth, (DBM) *P. xylostella* in cauliflower. The module (M1) that comprised pheromone trap, application of *B. thuringiensis* and neem based insecticides, recorded significantly lower DBM population and higher yield as compared to other two modules comprising botanicals and chemicals.

Key words: IPM Module, DBM, *Plutella xylostella* Linn.

INTRODUCTION

Cauliflower (*Brassica oleracea* var. *botrytis* L.) is an important vegetable crop widely grown all over the country. Among the insect pest complex of cauliflower diamond back moth (DBM), *Plutella xylostella* (Linn.) is the most destructive and dreaded pest. The yield loss in cauliflower due to the pest attack was 38.4 per cent in Madras (Abraham and Padmanabhan, 1968); while, under South Gujarat conditions DBM infestation of cabbage head was reported to be 17.5 to 44.5 per cent (Vadodaria, 1993). Wide scale and indiscriminate application of conventional insecticides in pest control programmes leads to the problems like development of resistance and resurgences of pest; besides, leaving excessive residues on edible portions. The present study therefore, was undertaken to test the efficacy of some IPM modules against DBM infesting cauliflower.

MATERIAL AND METHODS

The experiment was laid out at College Farm, N.M. College of Agriculture, N.A.U., Navsari during *rabi* 2001-2002. The experiment was laid out in RBD with four treatments and five replications. Each treatment was considered as a separate module and each module consisted of 576 m^2 area. The different IPM modules were as follows:

M-1 Pheromone trap, application of *B. thuringiensis* and neem based pesticides.

M-2 Sole botanical pesticides consisted of alternate application of NSKE 3 per cent and Econeem 10,000 ppm.

M-3 Sole chemical pesticides consisted of sequential spraying of quinalphos 0.05 per cent, profenophos 0.07 per cent, malathion, 0.05 per cent and endosulfan 0.07 per cent.

M-4 Untreated control.

All the treatments were applied at 10 days interval from the initiation of pests.

The observation on larval population and leaf damage by DBM were recorded at weekly intervals from ten randomly selected plants. The yield in different modules were recorded separately and economics was also worked out.

RESULTS AND DISCUSSION

The effect of different modules on mean population of DBM revealed that all the three modules were found to be effective in reducing larval population of DBM as compared to untreated control. Among different modules, IPM module M1 exhibited comparatively lower larval population (1.50/10 plants) and it was at par with M2 botanical pesticides (1.7/10 plants) and sole chemical pesticides (1.87/10 plants).

IPM module M-1 showed its effectiveness as compared to rest of the modules, which is evident from the lower number of larval population observed throughout the observation period. IPM module M-1 *i.e.*, comprising of physical control, use of pheromone trap, played important role in reducing male DBM population. The number of moths caught in pheromone trap were 18, 19, 23, 21 and 20 in 1st, 2nd, 3rd, 4th, 5th and 6th standard week,

Table 1: Effect of different IPM modules on larval population of *P. xylostella* on cauliflower (pooled of 14th to 19th week after transplanting)

Modules	Mean No. of DBM larvae per 10 plants	Mean per cent of leaf infested by DBM
M-1	1.37[a] (1.50)	16.00[a] (7.66)
M-2	1.48[a] (1.87)	16.75[a] (8.39)
M-3	1.44[a] (1.70)	15.93[a] (7.58)
M-4 Control	2.92[b] (8.30)	20.86[b] (12.90)
S.Em. ± (T)	0.09	0.30
C.D. at 5% (T)	0.28	0.84
C.V. %	14.67	9.60

Figures in parenthesis are original value and those outside are $\sqrt{x+0.5}$ transformed value

respectively. Removal of large number of male population reduces the chances of mating. This has resulted into reduction in subsequent occurrence of DBM larval population. The present results are more or less similar to the findings of Mclaughlin *et al.* (1994), who reported that mating disruption can be used to protect cabbage from *P. xylostella* with pheromone trap and application of some supplementary application of insecticides. The other component of IPM module (M-1) *i.e.*, application of microbial insecticide *Bacillus thuringiensis* also helped in reducing the larval population of DBM. Justin *et al.* (1990) reported the *B.t* (Bactospeine) effectively reduced the larval population of DBM. The third component, neem based insecticides Econim 10,000 ppm and N.S.K.E. 3 per cent applied at peak period of diamond back moth activity, also helped in reducing the larval population effectively. Patel *et al.* (1996) reported that N.S.K.E. 3 per cent effectively reduced the larval population of DBM.

Further, the data on per cent leaf damaged by DBM larvae indicated that all the three modules significantly reduced leaf infestation as compared to untreated control (12.90 per cent). The module M-2 which comprised sole botanical pesticides recorded comparatively lower leaf infestation (7.5 per cent) and it was at par with M-1 (7.66 per cent) as well as with M-3 (8.39 per cent). Occurrence of lower damage of DBM might be due to the antifeedant effect exhibited by the sole use of neem based pesticides in the module M-2. Such effectiveness of N.S.K. methanol extract, NSK petroleum extract and NSK water extract on leaf damage due to DBM was demonstrated by Bandara and Kudagmae (1993). Rajareddy and Krishnamohan (2001) who also showed similar effect of Fortune Aza in reducing leaf damage by *P. xylostella.*

The effectiveness of different modules was also judged on the basis of yield data, which revealed that all the three modules proved their superiority in increasing yield of cauliflower by recording significantly higher yield as compared to untreated control (14722.28 kg/ha). Among all the modules, M-1 recorded higher yield (18786.86 kg/ha) and it was at par with M-2 (18359.27 kg/ha) and M-3 (17605.68 kg/ha). All the components integrated in M-1 suppressed the pest population effectively, which ultimately resulted in higher cauliflower curd production. As far as the net gain over control is concerned, highest net gain was obtained from M-1 (37642.8 kg/ha) followed by M-2 (33523.9 Rs/ha) and M-3 (27365.04 Rs/ha). Furthermore, the highest I.C.B.R. was obtained in M-3 (1:18.63) and it was followed by M-1 (1:12.53) and M-2 (1:11.78). However, adverse effects of synthetic pesticide use on beneficial fauna, polluting environment and causing residual problem should not be overlooked. Hence, for the management of DBM and getting profitable yield, more emphasis should be given to eco-friendly approach integrating maximum possible components of IPM.

Table 2: Yield and economics of the different treatment modules

Treatment/	Yield (kg/ha)	Increased yield over control (kg/ha)	Gross realization over control (Rs./ha)	*Cost of treatments (Rs./ha)	Net gain over Control (Rs./ha)	module I.C.B.R.
M-1	18786.86[a]	4064.58	40645.8	3003.00	37642.8	1:12.53
M-2	17605.68[a]	2883.4	28834.0	1468.96	27365.04	1:18.63
M-3	18359.27[a]	3636.99	36369.9	2846.00	33523.9	1:11.78
M-4 Control	14722.28[b]					
S.Em±	643.861					
C.D. at 5%	1984.10					
C.V. %	8.29					

* Market price of cauliflower 10 Rs./kg

ACKNOWLEDGE

Authors are grateful to the Principal, N.M. College of Agriculture, N.A.U., Navsari for providing necessary facilities.

REFERENCES

Abraham and Padmanabhan (1968). Bio-nomics and control of the diamondback moth, *Plutella maculipennis* Curt. *Indian Journal of Agricultural Science*, **38**: 513-519.

Bandara, K.A.N.P. and Kudagmae, C. (1993). Potential of neem for controlling leaf eating caterpillar complex on cabbage. *World Neem Conference*, Feb 24-28 Bangalore, India, pp. 547-557.

Justin, G.C.L., Rabindra, R.J. and Jayaraj, S. (1990). *Bacillus thuringiensis* and some insecticides against the diamond back moth, *Plutella xylostella* on cauliflower. *Journal of Bio-control*, **4**: 40-43.

Mclaughin, J.R., Mitchell, E.R., Kirsch, P. (1994). Mating disruption of diamond back moth in cabbage, reduction of mating and suppression of larval population. *Journal of Economic Entomology,* **87**: 118-1204.

Patel, J.J., Patel, N.C., Jayanti, D.B. and Patel, J.R. (1996). Bio-efficacy of synthetic and botanical insecticides against Aphid *Lipaphis erysimi* Kaet and diamond back moth *Plutella xylostella* infesting cabbage. *Gujarat Agricultural University Research Journal,* **22**: 67.71.

Rajareddy and Krishnamohan K. (2001). Evaluation of azadirachtin (Fortune Aza) and monocrotophos against diamond back moth (*Plutella xylostella*) in cauliflower *Pestology,* **25**: 39-40.

Vadodaria, M.P. (1993). Studies on population dynamics, Bionomics and control of diamond back moth *Plutella xylostella* on cabbage in south Gujarat. Ph.D. thesis submitted (Unpublished) to Gujarat Agricultural University, S.K. Nagar, pp. 120.