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SHORT NOTE

EVALUATION OF INSECTICIDES AND BIOPESTICIDES AGAINST DIAMOND BACK MOTH, *Plutella xylostella* (L.) ON BROCCOLI

T. BOOPATHI[1], K. A. PATHAK[1], S. V. NGACHAN[2] and NABAJYOTI DAS[1]

[1]ICAR Research Complex for NEH Region, Mizoram Centre, Kolasib - 796 081, Mizoram, India
E-mail : boopathiars@gmail.com
[2]ICAR Research Complex for NEH Region, Umroi Road, Umiam - 793 103, Meghalaya, India

Broccoli is an important vegetable crop and grown extensively throughout India for its nutritional value. Broccoli is attacked by many insect pests. Among them, diamond back moth (DBM), *Plutella xylostella* (L.) is an important and economic pest. It is a well distributed, cosmopolitan pest occuring in different climatic conditions of India (Sarfraz *et al.*, 2005). Diamond back moth is more serious when they damage the crowns or growing points of young plants. The larvae feed on buds and other growing points of plants, thereby reducing growth and production.

Various tools of management are advocated to manage this pest and use of insecticides is the most-widely followed one. In tropical and subtropical areas, there are reports on populations that have developed resistance to a wide range of insecticides. New chemicals along with conventional insecticides, if used judiciously and in rotation, can help in preventing the insecticide resistance in this pest. Keeping this in view, the present studies were conducted to evaluate different insecticides and biopesticides with diversified modes of action against this pest under field conditions to develop suitable strategy for its management.

An experiment was conducted to study the efficacy of biopesticides and insecticides against *P. xylostella* under field conditions during 2008-09 at ICAR Research Complex for NEH Region, Mizoram Centre, Kolasib, Mizoram. The experiment was laid out in a randomized block design (RBD) with eighteen treatments including untreated control and replicated twice. One month old seedlings were transplanted in 4 x 5 m plots with a spacing of 45 x 30 cm. All the recommended agronomic practices were followed for raising the crop. The treatments used are given in Table 1. Larvae of *P. xylostella* were counted before the treatment application and 1, 4, 7 and 15 days after treatment on five randomly selected plants in each plot. The application of insecticides was done with the help of pneumatic knapsck sprayer. Care was taken to obtain uniform coverage of insecticides on each plant. The data were analyed statistically using IRRISTAT and AGRES statistical software.

The perusal of data (Table 1) clearly indicate that all the biopesticides and insecticides were effective in suppressing the incidence of *P. xylostella* compared to control. One day after spraying, chlorpyriphos 20% EC, chlorpyriphos 50% EC + cypermethrin 5% EC and permethrin 25% EC recorded hundred per cent mortality of *P. xylostella* followed by malathion 50% EC (0.50 larva per plant). Among the biopesticides, neem

Table 1. Effect of different biopesticides and chemical insecticides on the population of *P. xylostella*

Treatment	Dose (per ha)	Mean number of DBM larvae per plant*					
		Before Spray	1 DAS	4 DAS	7 DAS	15 DAS	Mean
Neem oil 0.03% EC	2000 ml	5.25	5.50 (2.35)	3.00 (1.73)	7.50 (2.74)	0.00 (0.00)	4.00
Neem oil 0.3% EC	1000 ml	11.00	10.50 (3.24)	3.00 (1.73)	7.50 (2.74)	0.00 (0.00)	5.25
Neem oil 1% EC	1000 ml	21.75	3.00 (1.73)	4.50 (2.12)	5.00 (2.24)	0.00 (0.00)	3.13
Bacillus thuringiensis var. *kurtosis* (Dipel)	100 g	14.00	3.75 (1.94)	0.75 (0.87)	1.25 (1.12)	0.00 (0.00)	1.44
Malathion 50% EC	1000 ml	13.00	0.50 (0.71)	1.25 (1.12)	0.00 (0.00)	0.00 (0.00)	0.44
Endosulphan 35% EC	1000 ml	5.75	3.50 (1.87)	2.50 (1.58)	0.00 (0.00)	0.00 (0.00)	1.50
Monocrotophos 36% SL	750 ml	15.50	2.00 (1.41)	2.25 (1.50)	2.50 (1.58)	0.00 (0.00)	1.69
Chlorpyriphos 20% EC	1000 ml	12.50	0.00 (0.00)	0.00 (0.00)	0.75 (0.87)	1.25 (1.12)	0.50
Cypermethrin 5% EC	125 ml	5.50	5.25 (2.29)	2.25 (1.50)	5.00 (2.24)	0.00 (0.00)	3.13
Chlopyriphos 50% EC + Cypermethrin 5% EC	675 ml	8.75	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00
Fenvalerate 20% EC	375 ml	8.75	1.50 (1.22)	1.75 (1.32)	1.25 (1.12)	0.00 (0.00	1.13
Permethrin 25% EC	125 ml	10.00	0.00 (0.00)	0.75 (0.87)	1.25 (1.12)	0.00 (0.00)	0.50
Dichlorvos 76% EC	675 ml	22.25	2.50 (1.58)	4.25 (2.06)	0.50 (0.71)	1.25 (1.12)	2.13
Phosphamidon 40% SL	675 ml	3.75	1.50 (1.22)	1.75 (1.32)	1.25 (1.12)	0.00 (0.00)	1.13
Dimethoate 30% EC	675 ml	2.00	2.75 (1.66)	3.00 (1.73)	1.25 (1.12)	0.00 (0.00	1.75
Deltamethrin 2.8% EC	125 ml	3.25	4.25 (2.06)	0.50 (0.71)	1.25 (1.12)	0.00 (0.00)	1.50
Imidacloprid 17.8% SL	125 ml	3.25	3.50 (1.87)	2.50 (1.58)	0.00 (0.00)	0.00 (0.00	
Untreated control	-	8.75	15.00 (3.87)	9.75 (3.12)	19.50 (4.42)	5.00 (2.24)	12.31
SE(d)		**4.14**	**1.69**	**1.83**	**0.82**	**0.32**	**1.16**
CD (P = 0.05)		**8.74**	**3.55**	**3.83**	**1.72**	**0.68**	**2.44**
CV (%)		**42.65**	**47.47**	**65.37**	**27.09**	**87.06**	**56.75**

* Figures in parentheses are square root transformed values, DAS : Days after spray

oil 1% EC (3.00 larvae per plant) was the most effective treatment followed by Bt. formulation. (3.75 larvae per plant), while in control maximum population (15.00 larvae per plant) was recorded.

On fourth day after spraying, chlorpyriphos 20% EC and chlorpyriphos 50% EC + cypermethrin 5% EC were most effective resulting cent per cent mortality of *P. xylostella* followed by deltamethrin 28% EC (0.50 larva per plant). The biopesticides dipel recorded minimum population (0.75 larva per plant) as compared to untreated control (9.75 larvae per plant).

On seventh day after spraying, malathion 50% EC, endosulphon 25% EC, chlorpyriphos 50% EC + cypermethrin 5% EC and imidac10 prid 200% SL recorded hundred per cent reduction of *P. xylostella* population. However, cypermethrin 10% EC was observed maximum population (5.00 larvae per plant). Among the biopesticides tested, dipel was most effective in reducing *P. xylostella* population (1.25 larvae per plant), while maximum population (19.50 larvae per plant) was recorded in control.

On fifteenth day after spraying, all the biopesticides gave cent per cent mortality of the *P. xylostella*. Among the insecticides tested, malathion 50% EC, endosulphon 25% EC, monocrotophos 36% EC,cypermethrin 10% EC, chlorpyriphos 50% EC + cypermethrin 5% EC, fenvalerate 20% EC, permethrin 25% EC, phosphamidon 40% EC, dimethoate 30% EC, deltamethrin 28% EC and imidacloprid 200% SL registered hundred per cent mortality, whereas untreated control had maximum *P. xylostella* population (5.00 larvae per plant). The findings are in accordance with the those of Sreekanth *et al*. (2000) who reported that application of imidacloprid 0.02% most effective against *P. xylostella.*

The pooled data indicated that all the insecticides and biopesticides were significantly superior over control. The population of *P. xylostella* ranged from 0 to 5.25 larvae per plant, while control had 12.31 larvae per plant. Spraying of chlorpyriphos 50% EC + cypermethrin 5% EC recorded hundred per cent reduction of *P. xylostella* population followed by malathion 50% EC (0.44 larva per plant) chlorpyriphos 20% EC (0.50 larva per plant) and permethrin 25% EC (0.50 larva per plant). But, cypermethrin 10% EC was least effective in reducing *P. xylostella* population (3.13 larvae per plant). Spray of malathion or carbaryl or endosulphon or deltamethrin or cartap hydrochloride were recorded as more effective against diamond back moth, (Rao and Lal, 2001). Among the biopesticides, dipel recorded minimum *P. xylostella* population (1.44 larvae per plant) followed by neem oil 1% EC (3.13 larvae per plant), Use of *Bacillus thuringiensis* var. *kurstaki* was effective in reducing the population of diamond back moth. (Gujar and Kalia, 1999; Sharma *et al.,* 2000 and Raheja *et al.,* 2006). Moorthy and Kumar (2000) reported that spraying of 0.5% neem extract or 4% NSKE was effective against diamond back moth, *P. xylostella.*

REFERENCES

Gujar, G. T. and Kalia, V. 1999. Bioactivity of *Bacillus thuringiensis* subsp. *kurstaki* and possible development of tolerance in some populations of the diamond back moth, *Plutella xylostella*. *Indian Journal of Entomology,* **61**(1) : 22-27.

Moorthy, P. N. K. and Kumar, N. K. K. 2000. Efficacy of neem seed kernel powder extracts on cabbage pests. *Pest Management in Horticultural Ecosystems,* **6**(1) : 27-31.

Raheja, A. K., Poo, S. N. and Trivedi, T. P. 2006. Insect pests and their management. In *Handbook of Agriculture* (5th Edition). Indian Council of Agriculture Research, New Delhi. pp. 553-586.

Rao, S. R. K. and Lal, O. P. 2001. Efficacy of different insecticides against diamondback moth, *Plutella xylostella* L. on cabbage. *Journal of Entomological Research*, **25**(2) : 161-164.

Sarfraz, M., Keddie, A. B. and Dosdall, L. M. 2005. Biological control of the diamondback moth, *Plutella xylostella:* A review. *Biocontrol Science and Technology*, **15**(8) : 763-789.

Sharma, S. S., Kalra, V. K. and Mrig, K. K. 2000. Evaluation of different formulations of *Bacillus thuringiensis* var. *kurstaki* against *Plutella xylostella* (L.). *Annals of Agri Bio Research*, **5**(1) : 67-70.

Sreekanth, M., Babu, T. R., Sultan, M. A. and Rao, B. N. 2000. Evaluation of certain new insecticides against lepidopteran pests of cabbage. *International Pest Control*, **42**(4) : 134-137.