Journal of Entomology

ISSN 1812-5670

Academic Journals Inc.

www.academicjournals.com

Journal of Entomology 4 (1): 60-63, 2007
ISSN 1812-5670

Field Performance of Pyridalyl 10 EC (S1812) Against Diamond Back Moth, *Plutella xylostella* L. (Lepidoptera; Yponomeutidae) on Cabbage

[1]A. Suganthi, [2]R. Jayakumar and [1]S. Kuttalam
[1]Department of Agricultural Entomology
[2]Department of Soil Science and Agricultural Chemistry, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu, India

Abstract: Pyridalyl 10 EC was tested at the rate of 50, 75 and 100 g a.i. ha^{-1} against diamond back moth, *Plutella xylostella* on cabbage. Endosulfan 35EC at the rate of 700 g a.i. ha^{-1} and Indoxacarb 14.5 SC at the rate of 30 g a.i. ha^{-1} were kept as standard check for comparison. All the treated plots showed significant reduction of pest population. After three sprays, the mean larval population was significantly lower in plots treated with pyridalyl at 75 (1.60 and 1.67 larvae $plant^{-1}$) and 100 (1.50 and 1.53 larvae $plant^{-1}$) g a.i ha^{-1}, during first and second season, respectively. Yields obtained from the pyridalyl plots compared favorably with the indoxacarb and endosulfan plots. During both the season trials, pyridalyl at the rate of 75 g a.i ha^{-1} (77.2 and 76.24 t ha^{-1}) and 100 g a.i ha^{-1} (79.0 and 78.20 t ha^{-1}) registered significantly higher yields when compared to other treatments.

Key words: Pyridalyl, bioefficacy, cabbage, *Plutella xylostella*

Introduction

Diamond Back Moth (DBM), *Plutella xylostella* L. (Lepidoptera: Yponomeutidae), is the most severe pest on cabbage in the tropics. India has not escaped the devastation of this pest. Efforts to control this pest solely through conventional insecticides led to resistance development to most insecticides available in India (Chawla and Joia, 1991; Vastard *et al*., 2004). Research is needed to evaluate the potential of new classes of insecticides in controlling DBM on cabbage. Pyridalyl (S-1812; 2, 6-dichloro-4-(3, 3-dichloroallyloxy) phenyl 3- (5-(trifluoromethyl)-2-pyridyloxyl propyl ether], is a novel insecticide that has a phenoxy-pyridaloxy derivative structure, introduced in 2002 by Sumitomo. The compound was reported effective on the pests of order lepidoptera and thysanoptera on cotton and vegetables, without any phytotoxicity. Its efficacy was also reported against populations of tobacco budworm, *Heliothis virescens*, cotton bollworm, *Helicoverpa zea* (Johnson *et al*., 2000) and *Plutella xylostella* (Umela and Strickland, 1999) which are resistant to various currently used insecticides. The present study was undertaken to study the bioefficacy of the newer insecticide pyridalyl against DBM under Indian conditions.

Materials and Methods

Field experiments were conducted in farmers holding at Kothagiri, Nilgris. The cabbage variety utilized was Quisto. The experiment was established in a randomized complete block design with four replicates. The plot size was 4×5 m. The treatments (g a.i ha^{-1}) evaluated were an untreated control, pyridalyl 10 EC (50, 75 and 100), endosulfan 35EC (700) and indoxacarb 14.5 SC (30). Application dates in 2004 were 10, 20 and 30th August and in 2005, the dates were 2, 12 and 22nd June. Three sprayings were given at 15 days interval with hand operated knapsack sprayer, using spray fluid of 500 L ha^{-1}.

Corresponding Author: Dr. A. Suganthi, 6/297 F, Ganeshpuram, Sirumugai - 641302, Coimbatore (Dt) Tamil Nadu State, India Tel: 0422-5511295, 04254-254783 Fax: 091-0422-5511437/2431672

Five plants were selected randomly per each replication and No. of larvae/plant were counted at 0, 3, 5 and 10 days after treatment and transformed into percentage. Ten randomly selected plants of 60 days old were sprayed with the chemical by a knapsack sprayer to observe phytotoxicity as per Central Insecticides Board - Registration Committee protocols. Incidence of natural enemy, *Cotesia plutellae* was found to be very less. Hence observation could not be taken. The cumulative yield data was collected plot wise, mean yield per hectare was calculated. The data on larval population and cabbage yield were subjected to analysis of variance.

Results and Discussion

The pre treatment DBM larval population varied from 3.08 to 3.23 plant^{-1} (Table 1). All the treated plots showed significant reduction of pest population. At 10 days after first spray, pyridalyl at 75 and 100 g a.i. ha^{-1} (1.8 larvae plant^{-1}) recorded significantly lesser population when compared to other treatments. However, after 10 days of third spray, all the three doses of pyridalyl tested, recorded significantly lesser larval population (0.93, 1.06 and 1.16 larvae plant^{-1}). The mean larval population was significantly lower in plots treated with pyridalyl at 75 (1.60 larvae plant^{-1}) and 100 (1.50 larvae plant^{-1}) g a.i ha^{-1}. Pyridalyl at 50 g a.i ha^{-1} (1.81 larvae plant^{-1}) was found on par with the standard, indoxacarb at the rate of 30 (1.84 larvae plant^{-1}) and endosulfan at the rate of 700 (1.90 larvae plant^{-1}) g a.i ha^{-1}. During the second season, the pretreatment larval population varied from 3.80 to 4.0 plant^{-1} (Table 2). After third spray, pyridalyl at the rate of 100 g a.i ha^{-1} resulted in significantly lower larval population (0.25 plant^{-1}) followed by pyridalyl at the rate of 75 g a.i ha^{-1}

Table 1: Effect of pyridalyl against DBM on cabbage-I Season trial (Mean of four replications)

Treatments	g a.i ha^{-1}	Precount larvae/plant)	I spraying (No. of larvae/plant)			II spraying (No. of larvae/plant)		
			3 DAS	5 DAS	10 DAS	3 DAS	5 DAS	10 DAS
Pyridalyl (S1812) 10EC	50	3.13	2.27b	1.8ab	2.27bc	1.93c	1.67b	1.93c
Pyridalyl (S1812) 10EC	75	3.21	1.67a	1.67a	1.8ab	1.63ab	1.47ab	1.53ab
Pyridalyl (S1812) 10EC	100	3.23	1.67a	1.67a	1.8a	1.47a	1.26a	1.27a
Endosulfan 35 EC	700	3.21	2.27b	2.07b	2.30c	2.07c	1.68b	1.93c
Indoxacarb 14.5 SC	30	3.08	2.27b	1.93b	2.33c	1.93bc	1.68b	1.88bc
Control	-	3.22	3.27c	3.27c	3.4d	3.43d	3.47c	3.51d
CD (= 0.05)		NS	0.30	0.30	0.37	0.36	0.26	0.38

Treatments	III spraying (No. of larvae/plant)			Mean (No. of larvae/plant)	Yield (t ha^{-1})
	3 DAS	5 DAS	10 DAS		
Pyridalyl (S1812) 10EC	1.26a	1.16ab	1.26ab	1.81b	70.8bc
Pyridalyl (S1812) 10EC	1.20a	1.06ab	1.06a	1.60a	77.2ab
Pyridalyl (S1812) 10EC	1.06a	0.93a	0.93a	1.50a	79.0a
Endosulfan 35 EC	1.27a	1.27b	1.47b	1.90b	66.6cd
Indoxacarb 14.5 SC	1.27a	1.21ab	1.47b	1.84b	69.6c
Control	3.51b	3.53c	3.53c	3.43c	60.9d
CD (= 0.05)	0.36	0.28	0.36	0.18	5.94

Means followed by same letter (s) in a column are not significantly different by DMRT (p = 0.05)

Table 2: Effect of pyridalyl against DBM on cabbage – II Season trial (Mean of four replications)

Treatments	g a.i ha^{-1}	Precount (No. of larvae/plant)	I spraying (No. of larvae/plant)			II spraying (No. of larvae/plant)		
			3 DAS	5 DAS	10 DAS	3 DAS	5 DAS	10 DAS
Pyridalyl (S1812) 10EC	50	3.89	3.10bc	2.16a	2.50bc	1.87b	1.61c	1.72cd
Pyridalyl (S1812) 10EC	75	3.82	2.87ab	1.87a	2.16a	1.55a	1.26ab	1.34b
Pyridalyl (S1812) 10EC	100	3.80	2.80a	1.87a	2.26ab	1.37a	1.12a	1.02a
Endosulfan 35 EC	700	4.00	3.20c	2.58d	2.79c	2.04b	1.87bc	1.94c
Indoxacarb 14.5 SC	30	3.94	3.00a-c	2.13a	2.67c	1.95b	1.56c	1.65d
Control	-	3.98	3.85d	3.85c	4.00d	4.10c	4.24d	4.34e
CD (= 0.05)		NS	0.28	0.38	0.34	0.30	0.34	0.27

Treatments	III spraying (No. of larvae/plant)			Mean (No. of larvae/plant)	Yield (t ha^{-1})
	3 DAS	5 DAS	10 DAS		
Pyridalyl (S1812) 10EC	0.96b	0.76b	0.87c	1.94bc	71.59b
Pyridalyl (S1812) 10EC	0.78ab	0.50a	0.50b	1.67ab	76.24a
Pyridalyl (S1812) 10EC	0.54a	0.30a	0.25a	1.53a	78.20a
Endosulfan EC	1.26bc	1.12b	1.24c	2.20c	69.64b
Indoxacarb SC	1.02c	0.84c	0.84d	1.96c	70.20b
Control	4.34d	4.36d	4.40e	4.15d	62.45c
CD (= 0.05)	0.24	0.21	0.19	0.28	3.81

Means followed by same letter (s) in a column are not significantly different by DMRT (p = 0.05)

(0.50 plant^{-1}). Significantly lesser mean larval population was observed in plots treated with pyridalyl at the rate of 75 (1.67 larvae plant^{-1}) and 100 g a.i ha^{-1} (1.53 larvae plant^{-1}). Earlier, the efficacy of pyridalyl at a higher dose of 0.15 lbs ai acre^{-1} was reported against DBM on cabbage (Kerns and Tellz, 1999) and broccoli (Sakamoto *et al*., 2004).

During both the season trials, pyridalyl at the rare of 75 g a.i ha^{-1} (77.2 and 76.24 t ha^{-1}) and 100 g a.i ha^{-1} (79.0 and 78.20 t ha^{-1}) registered significantly higher yields when compared to other treatments. No phytotoxic symptom like wilting, leaf burning, epinasty, hyponasty, vein clearing and necrosis were recorded in any of the treated plots.

It is concluded from the study that pyridalyl (S1812) 10EC at the rate of 75 g a.i ha^{-1} is effective in controlling DBM larval population on cabbage and increasing the yield. Yields obtained from the pyridalyl plots compared favorably with the indoxacarb and endosulfan plots. Pyridalyl with its novel mode of action shows promise as an effective control measure for DBM. So it should provide an important tool in IPM and insecticidal management programmes for the control of DBM on cabbage.

Acknowledgment

The authors would like to thank M/S. Sumitomo Chemical India Pvt. Ltd., Mumbai, India for providing financial assistance to carry out the investigation.

References

Chawla, R.P. and B.S. Joia, 1991. Toxicity of some synthetic pyrethroids against *Plutella xylostella* L. and development of insecticide resistance in the pest. Ind. J. Entomol., 18: 134-138.

Johnson, D.R., G.M. Lorenz, J.D. Hopkins and L.M. Page, 2000. In: Proceedings of the 2000 Cotton Research Meeting and Summaries of Cotton Research in Progress. Derrick, M. Oosterhuis (Eds.). Arkansas Agricultural Experiment Station Fayetteville, Arkansas 72701, pp: 260-265.

Kerns, D.L. and T. Tellez, 1999. Efficacy of insecticides to diamondback moth in cabbage in Yuma County. 1999 Vegetable Report, College of Agriculture, University of Arizona, index at http://ag.arizona.edu/pubs/crops/az1143/.

Sakamoto, N., S. Saito, T. Hirose, M. Suzuki and S. Matsuo *et al*., 2004. The discovery of pyridalyl: A novel insecticidal agent for controlling lepidopterous pests. Pest Manage. Sci., 60: 25-34.

Umeda, K. and B. Strickland, 1999. S-1812 Lepidopterous Insect Pest Control in Broccoli Study. 1999 Vegetable Report, College of Agriculture, University of Arizona, index at http://ag.arizona.edu/pubs/crops/az1143/.

Vastrad, A.S., S. Lingappa and K. Basavanagoud, 2004. Monitoring insecticide resistance in diamond back moth, *Plutella xylostella* (L.) in Karnataka, India. Resistant Pest Manage. Newslett., 13: 22-23.