The Pharma Innovation Journal 2022; 11(12): 2414-2416

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 2414-2416

www.thepharmajournal.com
Received: 09-10-2022
Accepted: 12-11-2022

Rashmi Vishwakarma
Department of Entomology, RVSKVV, Gwalior, Madhya Pradesh, India

Sundar Borkar
Department of Entomology, RVSKVV, Gwalior, Madhya Pradesh, India

M Sharma
Department of Entomology, RVSKVV, Gwalior, Madhya Pradesh, India

Corresponding Author:
Rashmi Vishwakarma
Department of Entomology, RVSKVV, Gwalior, Madhya Pradesh, India

Evaluation of various doses of emamectin benzoate 3.7%+ diafenthiuron 46.3% WP against *Bemisia tabaci* on chilli

Rashmi Vishwakarma, Sundar Borkar and M Sharma

Abstract
The biological effectiveness of certain insecticides against whitefly was tested in a field experiment in 2014-15 at the College of Agriculture Indore, Madhya Pradesh. Among the treatments, emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} (0.48 whitefly/leaf) showed lowest whitefly population while it was highest in untreated control (4.88 whitefly/leaf). Highest green chilli yield was obtained from plot treated with emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} (171.11q ha^{-1}) followed by emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 gm ha^{-1} (166.29 q ha^{-1}).

Keywords: Whitefly, emamectin benzoate, bioefficacy

Introduction
The important commercial vegetable crop chilli (*Capsicum annum* Linnaeus) a member of the solanaceae family, is native to tropical America (Sreeramulu, 1976) [11]. Paste, powder or whole forms of chilli are used in cooking. A wide range of varieties are developed for pickles, sauce, ketchup, vegetables and condiments, among other things. It is a major source of vitamin A, C and E. For tonsillitis, its paste is applied topically as a rubefacient and a local stimulant. Another benefit of chilli is that it widens blood arteries, which lower the risk of heart attack (www.ikisan.com).

The low productivity of chilli has been attributable to a number of limiting factors. Among these, the prevalence of viral illnesses and the havoc brought on by insect pests are important ones (Anon.1987 and Dey *et al.* 2001) [2, 5]. Almost 25 different species of insect pests, including thrips, aphids, whiteflies, fruit borer, cutworms, plant bugs, mites, and other minor pests, can be found on chilli. Whitefly is the most common pest among all the sucking insects (Sangle *et al.* 2017) [13]. Whitefly harms plants in three ways: first, by causing chlorosis, leaf withering, premature leaf fall, and wilting; second, by excreting honey dew, which promotes the growth of sooty mold and decreases the effective leaf area for photosynthesis; and third, and perhaps most significantly, by transmitting the disease (Priyadarshini *et al.* 2019) [10]. In the case of a severe infestation, economic yield loss from sucking pests can range from 11–75% quantitatively to 60–80% qualitatively (Ghosh *et al.* 2009) [6].

Currently, there is a significant buildup of these sucking pests in chilli, which has led to a rise in spray applications over time. On the other hand, the cost of cultivation has increased, making chilli cultivation extremely risky. Additionally, pesticide applications posed a hazard to the ecosystem of chilli by producing issues with pesticide resistance, a resurgence of pests, pesticide residue, and a threat to natural enemy fauna (David 1986) [4]. In order to prevent the development of pesticide resistance, it is advantageous to use insecticides from various classes in rotation. Insecticide efficacy is currently increased by the use of combination formulations. Taking into account all of these considerations, the following objectives were established in order to examine the efficacy of combination products and insecticides individually with respect to their spray schedule:

Material and Method
The field experiment was conducted during *Rabi* 2014-15 at college of Agriculture Indore, Madhya Pradesh. The bio efficacy of some insecticides (emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250, 200 and 150 gm ha^{-1}, emamectin benzoate 5% SG @ 200 gm

ha^{-1}, diafenthiuron 50% WP @ 600 gm ha^{-1}, lambda cyhalothrin 5% EC @ 300 ml ha^{-1} and untreated control) were evaluated in Randomized Block Design with three replications**.** The seedlings of chilli cv. Aakansha (hybrid) were transplanted in 3×2.7 m plot size with 60×45 cm spacing. In all, three sprays were given for managing the whitefly population at 15 days interval. The population of whitefly was recorded 1 day before each spray and at 3, 7 and 14 days after spray. Insecticides were applied thrice at 15 days interval. The yield of chilli received from different treatment (kg/plot) were recorded during each picking. The yield data were converted to hectares and statistical analysis was done on the received yield data (kg/plot). The formula below was used to calculate the percentage of yield that increased over control and avoidable loss.

$$\text{Yield increase (\%)} = 100 \text{ x } \left(\frac{T-C}{C}\right)$$

$$\text{Avoidable yield loss (\%)} = 100 \text{ x } \left(\frac{T-C}{T}\right)$$

Where,
T = Yield from treated (Protected) plots (kg/ha).
C = Yield from control (Untreated) plots (kg/ha).

Result and Discussion

Efficacy of some insecticides on whitefly (*B. tabaci*) population

First spray: Minimum whitefly population was observed on emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} (0.64/leaf) treated plots and was statistically superior over all the other treatments (Table 1). Emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 and 150 gm ha^{-1} were found to be next effective treatments by recording (0.88, 1.15 whitefly/leaf, respectively). Whereas it was highest in untreated plot (4.20 whitefly/leaf).

Second spray: The whitefly population followed the same trend as that in first spraying, where emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 and 200 gm ha^{-1} were the treatments which recorded the lowest whitefly population 0.47 and 0.64 whitefly/leaf, respectively. While, the highest whitefly population was noticed in lambda cyhalothrin 5% EC @ 300 ml ha^{-1} (1.35 whitefly/leaf), but was significantly superior over untreated control (4.88/leaf) (Table 1).

Third spray: Among the treatments, emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} stood first in recording the lowest whitefly population (0.33/leaf), which was followed by emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 and 150 gm ha^{-1} (0.45 and 0.68 whitefly/leaf). Plant treated with lambda cyhalothrin 5% EC @ 300 ml ha^{-1} had the highest whitefly population (1.07 whitefly/leaf) but was statistically lower than untreated control (5.57 whitefly/leaf) (Table 1).

Pooled of three sprays: The pooled data after third sprays indicated that the whitefly population reduced drastically in emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} (0.48/leaf) treated plots (Table 1). The next best treatments in terms of their performance were emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 and 150 gm ha^{-1} (0.66 and 0.89 whitefly/leaf, respectively). Lambda cyhalothrin 5% EC @ 300 ml ha^{-1} (1.43 whitefly/leaf) was the least effective insecticides against whitefly but was significantly superior to the untreated control which recorded 4.88 whitefly/leaf.

Table 1: Bio effectiveness of various insecticides against whitefly on chilli

Treatments	Dosage ha^{-1}	Mean number of whitefly/5 leaves				
		Before Spray	Pooled			Mean of three spray
			I	II	III	
Emamectin benzoate 3.7% + diafenthiuron 46.3%WP	150 gm	3.55 (2.01)	1.15 (1.28)	0.84 (1.15)	0.68 (1.08)	0.89 (1.18)
Emamectin benzoate 3.7% + diafenthiuron 46.3%WP	200 gm	3.59 (2.02)	0.88 (1.17)	0.64 (1.06)	0.45 (0.97)	0.66 (1.07)
Emamectin benzoate 3.7% + diafenthiuron 46.3%WP	250 gm	3.61 (2.03)	0.64 (1.06)	0.47 (0.98)	0.33 (0.91)	0.48 (0.99)
Emamectin benzoate 5%SG	200 gm	3.55 (2.01)	1.56 (1.43)	1.18 (1.29)	0.93 (1.19)	1.23 (1.31)
Diafenthiuron 50%WP	600 gm	3.56 (2.01)	1.37 (1.36)	0.98 (1.21)	0.80 (1.13)	1.05 (1.24)
Lambda cyhalothrin 5% EC	300 ml	3.59 (2.02)	1.88 (1.54)	1.35 (1.35)	1.07 (1.25)	1.43 (1.39)
Untreated control	-	3.73 (2.06)	4.20 (2.17)	4.88 (2.32)	5.57 (2.46)	4.88 (2.32)
S.Em±	-		0.01	0.02	0.01	0.05
CD at 5%	-	NS	0.03	0.06	0.05	0.17

Effectiveness of emamectin benzoate against whitefly (*Bemisia tabaci)* was reported by various workers. Ali *et al.*, (2005), Muhammad *et al.*, (2005), Bharpoda *et al.*, (2014) and Patel *et al.*, (2015) reported that foliar spray of emamectin benzoate 5% SG and diafenthiuron 50% WP in reducing the whitefly population (2.27 and 3.00/ 6 leaves) in brinjal. Thumar *et al.*, (2018) noticed minimum whitefly () count with high dosages of diafenthiuron 25% + pyriproxyfen 5% SE @ 1250 ml/ha. Based on the aforementioned findings, application of emamectin benzoate and diafenthiuron individually had the maximum efficacy against whitefly when compared to other insecticides. Therefore, the combined product made of these two pesticides might be the most effective against whitefly, which is also in line with the findings of earlier researchers.

Effect of insecticides in green chilli yield

The green chilli yield obtained from the experimental plots ranged from 88.39 q/ha (untreated plot) to 171.11 q/ha (emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1}) (Table 2). Among the insecticides, plot treated with emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} provide maximum yield followed by emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 and 150 gm ha^{-1} (166.29 and 147.03 q/ha, respectively). The percent increase in yield over control was maximum in emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} (93.58%) followed by emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 and 150 gm ha^{-1} (88.13 and 66.34%, respectively). Similar finding has been reported by Ravikumar *et al.* (2016) as they also reported highest green chilli yield was registered in emamectin benzoate 5 SG @ 0.4gm lit^{-1} (1525 kg ha^{-1}) with highest net profit (Rs. 26400).

Table 2: Effect of insecticidal spray on green chilli yield

Treatment	Dosage /ha	Yield of green chilli (q/ha)	Increase in yield over control (%)	Avoidable yield loss (%)
Emamectin benzoate 3.7% + diafenthiuron 46.3%WP	150 gm	147.03	66.34	39.88
Emamectin benzoate 3.7% + diafenthiuron 46.3%WP	200 gm	166.29	88.13	46.84
Emamectin benzoate 3.7% + diafenthiuron 46.3%WP	250 gm	171.11	93.58	48.34
Emamectin benzoate 5%SG	200 gm	134.93	52.65	34.49
Diafenthiuron 50%WP	600 gm	137.40	55.44	35.66
Lambda cyhalothrin 5%EC	300 ml	128.14	44.97	31.02
Untreated control	-	88.39	-	-
S.Em±	-	11.05	-	-
CD at 5%	-	24.08	-	-
CV %	-	9.56	-	-

Conclusion

The above experiment revealed that, among the treatments emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1} was superior in recording lowest population of whitefly in three sprays with higher green chilli yield. From the comparative study it was clearly concluded that, the decrease in whitefly population causes significant increase in yield over control. They showed a positive co-relation with each other and the greater increase in fruit yield was recorded in case of crops treated with emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 250 gm ha^{-1}.

References

1. Ali MA, Rehman R, Tatla YH, Ali Z. Evaluation of different insecticides for the control of whitefly on cotton crop. Pak. Entomol. 2005;27**(**1):5-8.
2. Anonymous. Asian Vegetable Research and Development Center. Progress Report; c1987. p. 77-79.
3. Bharpoda TM, Patel NB, Thumar RK, Bhatt NA, Ghetiya LV, Patel HC, *et al*. Ealuation of insecticides against sucking insect pests infesting bt cotton BG-ll. An international quarterly journal of life sciences**.** 2014;9(3):977-980.
4. David PMM. Influence of insecticidal spray on the resurgence of yellow mite, *Polyphagotarsonemus latus* Bank on chillies. Resurgence of sucking pest. In Proceeding of National Symposium (Ed.). TNAU, Coimbatore; c1986. p. 65-72.
5. Dey PK, Sarkar PK, Somchoudhury AK. Efficacy of different treatment schedules of profenofos against major pest of chilli. Pestol. 2001;25(11):26-29.
6. Ghosh A, Chatterjee ML, Chakraborti K, Samanta, A. Field evaluation of insecticides against chilli thrips (*Scirtothrips dorsalis* Hood). Ann. Pl. Protec. Sci. 2009;17:69-71.
7. Kumawat M, Sharma US, Lal J. Bio-efficacy of some insecticides against insect pests of chilli. Indian Journal of Applied Entomology. 2015;29(2):132-137.
8. Muhammad R, Anjum S, Muhammad A, Arif MJ, Saleem, Khan MH. Evaluation of neonicotinoids an conventional insecticides against cotton jassid, *Amrasca devastans* (dist.) and cotton whitefly, *Bemisia tabaci* (Genn) on cotton. Pak. Entomol. 2005;27(1):75-78.
9. Patel S, Mandloi R, Prajapati S, Saxena AK, Parmar R, Singh OP. The efficacy and economic of insecticides and bio-pesticides against major insect pest combination of brinjal (*Solanum melongena* linn.) cv. JB-64. Plant Archives. 2015;15(2):923-930.
10. Priyadarshini S, Nayak AK, Thakur P. Bio efficacy of some insecticides and acaricides against different insect and non-insect pests of chilli and their effect on natural enemies in chilli ecosystem. Journal of Pharmacognosy and Phytochemistry. 2019;8(4):462-467.
11. Sreeramulu C. Inproved varieties of chilli. Arecanut and Spices Bull. 1976;7:65-68.
12. Thumar RK, Borad PK, Pathan NP, Bharpoda TM, Saiyad MM, Chaudhary HK. Bio-efficacy of diafenthiuron 25% + pyriproxyfen 5% SE against sucking insect pests of Bt cotton. Journal of Entomology and Zoology Studies. 2018;6(5):1024-1029.
13. Gandevivala A, Sangle A, Shah D, Tejnani A, Sayyed A, Khutwad G, Patel AA. Autologous platelet-rich plasma after third molar surgery. Annals of Maxillofacial Surgery. 2017 Jul;7(2):245.
14. www.ikisan.com