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Assessment of Bioefficacy with Different Dose of Emamectin Benzoate 3.7% + Diafenthiuron 46.3%WP against Chilli Thrips

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A B S T R A C T

A field experiment was conducted during Rabi season of 2015-16 in Horticulture nursery, College of Agriculture, Indore to tested efficacy by using different doses of emamectin benzoate 3.7% + diafenthiuron 46.3% WP against chilli thrips. Among different treatments, T3 (Emamectin benzoate 3.7%+diafenthiuron 46.3%WP @ 250 g/ha) has proved as the best treatment for controlling thrips population and found superior over other treatment followed by T2 (Emamectin benzoate 3.7%+diafenthiuron 46.3%WP @ 200 g/ha). Highest green chilli yield of 171.11 q/ha was registered in T3 (Emamectin benzoate 3.7%+diafenthiuron 46.3%WP @ 250 g/ha), which was statistically at par with T2 (Emamectin benzoate 3.7%+diafenthiuron 46.3%WP @ 200 g/ha) 166.29 q/ha. The highest cost-benefit ratio (1:4.40) and net profit (211626Rs.) was obtained in T3. No effect of phytotoxicity was noticed on the plant.

Introduction

Chilli, *Capsicum annum* Linnaeus belong Solanaceae is one of the important commercial vegetable crop grown in all over India. Chilli is used as a paste, powder or in whole form. A number of varieties are grown for vegetables, spices, condiments, sauce, ketchup and pickles etc. It is one of the chief sources of vitamin A, C and E. Pungency in chillies is due to the active constituent "Capsaicin". Capsaicin, an alkaloid, is extracted from chillies and is used in medicine (Das, 2001) India is the world's largest producer of chilli and the crop is grown all over the country, occupies an area of 775 thousand ha with a production of 1492 thousand tonnes of chilli in 2014 -15. India contributes about 36% to the total world production. In Madhya Pradesh, chilli occupies an area of 54410 ha with a production of 93570 MT of chilli (Anon. 2014 -15).

Although the crop has got great export potential besides huge domestic requirement, a number of limiting factors have been attributed for low productivity. Among them,

occurrence of viral diseases as well as ravages caused by insect pests is significant ones. The pest spectrum of chilli crop is complex with more than 293 insects and mite species debilitating the crop in the field as well as in storage (Anon.1987 and Dey *et al.*, 2001). The major insects that attacked chilli are mites *Polyphagotarsonemus latus* (Banks), thrips *Scirtothrips dorsalis* (Hood), aphids (*Myzus persicae* (Sulzer) and *Aphis gossypii* (Glover) and Fruit borer *Helicoverpa armigera* etc. Among the above insects, due to chilli thrips and mites only the estimated loss tuned up to 50 per cent (Ahmed, 1987 and Kandasamy, 1990). Chilli thrips is considered as one of the most destructive pest of this crop.

Nowadays build-up of this sucking pest in chilli are extensively and for that insecticidal sprays have increased over the years, but on the contrary, cost of cultivation has increased enormously making cultivation of chilli highly risky.

In addition to this, pesticidal sprays became a threat to chilli ecosystem causing problems of resistance, a resurgence of pests, pesticidal residue and menace to natural enemies fauna (David 1986).

Therefore, the present investigation was carried out to generate information on the efficacy of different doses of emamectin benzoate 3.7% + diafenthiuron 46.3% WP against chilli thrips.

Materials and Methods

The present investigation was undertaken to study the efficacy of treatments under the irrigated condition against chilli thrips during the *rabi* season of 2015-16 at Horticulture nursery College of Agriculture, Indore. The experiment was laid out in the randomized block design with 7 treatments including untreated control comprising of different doses of insecticides used alternatively on chilli variety Aakansha with 3 replications. Pre-treatment observations on the infestation of thrips were taken before spraying and all infested leaves were removed manually. Three rounds of application were made (14 days interval) using knapsack sprayer. All spray applications were made during early morning.

Treatment Details

S. No.	Treatments	Doses g a.i./ha
1	T1-Emamectin benzoate 3.7%+diafenthiuron 46.3%WP	150 gm
2	T2-Emamectin benzoate 3.7%+diafenthiuron 46.3%WP	200 gm
3	T3-Emamectin benzoate 3.7%+diafenthiuron 46.3%WP	250 gm
4	T4-Emamectin benzoate 5%SG	200 gm
5	T5-Diafenthiuron 50%WP	600 gm
6	T6-Lambda- cyhalothrin 5%EC	300 gm
7	T7-Untreated control	

Method of observation

Five plants of chilli were randomly selected from each plot and tagged. The total number of thrips and whitefly were counted on five tagged plant from each plot with five leaves each two from top, middle and one from bottom canopy of plant with the help of magnifying lens at one day prior to each spray and after 3,7 and 14th days of sprays and converted into per plant. The data obtained from a set of observations for each character were tabulated and analyzed by the method of

"Analysis of variance" as suggested by Fisher and Yates, 1963.

The yield of green chilli received from different treatment (kg/plot) was recorded during each picking. The yield data obtained (kg/plot) were transformed on hectare basis and subjected to statistical analysis.

Economics of different were worked out based on yield and cost of treatments. The value of insecticides cost-benefit ratio obtained for different treatments.

Results and Discussion

The field experiment conducted at the experimental site of horticulture nursery, College of Agriculture, Indore during the *Rabi* 2015-16 showed significant differences among seven insecticides in the extent of their Efficacy (Table 1).

Efficacy of different insecticide treatment against chilli thrips

It was noticed that almost all insecticides reduced the thrips infestation at 14 days after 3rd spray (Table 1). The overall reduction in thrips population after three applications of treatments over pre-treatment population of first application to the last count of third spray was calculated. The result revealed that the maximum reduction in population was noticed in T3 -Emamectin benzoate 3.7 % + diafenthiuron 46.3 % WP 250 gm ha-1 (89.55%). The next best treatment was T2- emamectin benzoate 3.7%+ diafenthiuron 46.3% WP @ 200 gm ha-1 (83.68%) followed by T1-emamectin benzoate 3.7%+ diafenthiuron 46.3% @ 150 gm ha^{-1} (77.16%) and T5- diafenthiuron 50 % WP @ 600 gm ha^{-1} (76.36%). Similar finding was reported by various workers. Ranjith and Krishnamoorthy (2016) found that difenthiuron 50 WP (NS) @ 800 gai ha^{-1} gave maximum reduction of Sciothrips cardamoni (85.81%) population. Sarkar *et al.,* (2016) noticed highest per cent reduction of thrips population with difenthiuron 50% WP @ 1600 g ha-1 recorded (76.92%).

Effectiveness of emamectin benzoate reported by various workers. Sahu *et al.,* (2015) concluded that among 10 insecticides tested, emamectin benzoate 5 SG @ 250 gm and fipronil 5% SC @1000 were equally found to be most effective against *Scirtothrips dorsalis*. Sarkar *et al.,* (2015) noticed minimum thrips count with high dosages of emamectin benzoate 5% + fipronil 15%WDG. Ranjith and Krishnamoorthy (2016) found that diafenthiuron 50 WP (NS) @ 800 gai ha^{-1} gave maximum reduction of Sciothrips cardamoni (85.81%) population.

Cost benefit ratio

The data on yield and economics were presented in (Table 2). The highest green chilli yield was obtained in T3- emamectin benzoate 3.7%+ diafenthiuron 46.3% WP @ 250 gm ha^{-1} (171.11 q ha^{-1} and) and exhibited non-significant difference with T2- emamectin benzoate 3.7% + diafenthiuron 46.3% WP @ 200 gm ha^{-1}, (166.29 q ha^{-1}) and T1- emamectin benzoate 3.7%+ diafenthiuron 46.3% WP @ 150 gm ha^{-1} (147.03 q ha^{-1}). Similarly the highest cost benefit ratio was in T3-, (1:4.40) followed by T2- (1:4.30) and T1- (1:3.82). Ravikumar *et al.,* (2016) recorded the highest dry chilli yield of 1509 kg ha^{-1} was registered in spinosad 45 SC @ 0.4ml $litre^{-1}$, which was on par with emamectin benzoate 5 SG @ 0.4g $liter^{-1}$ (1525 kg ha^{-1}) with respective additional income of Rs. 30,300 and Rs. 26,400. The highest cost benefit ratio (1:4.30) was obtained in spinosad 45 SC @ 0.4ml $litre^{-1}$ followed by 1:4.30 in emamectin 5 SG @ 0.4g l^{-1}.

Table.1 Efficacy of insecticidal treatments against chilli thrips (*Scirtothrips dorsalis*) during Rabi 2015-16

Tr.	Treatment details	Dose s/ha	Mean of thrips population/5 leaf				
			Mean of three sprayings				
			Day after spraying				
			Pre-treatment	3	7	14	Overall mean
T1	Emamectin benzoate 3.7 % + diafenthiuron 46.3 % WP	150 gm	5.78 (2.51)	0.78 (1.12)	1.20 (1.32)	1.53 (1.42)	1.17 (1.29)
T2	Emamectin benzoate 3.7 % + diafenthiuron 46.3 % WP	200 gm	5.76 (2.50)	0.54 (1.01)	0.99 (1.22)	1.29 (1.33)	0.94 (1.19)
T3	Emamectin benzoate 3.7 % + diafenthiuron 46.3 % WP	250 gm	5.84 (2.52)	0.36 (0.92)	0.68 (1.08)	0.92 (1.18)	0.65 (1.07)
T4	Emamectin benzoate 5% SG	200 gm	5.69 (2.49)	1.32 (1.34)	1.74 (1.49)	2.17 (1.63)	1.74 (1.49)
T5	Diafenthiuron 50 % WP	600 gm	5.76 (2.50)	1.06 (1.24)	1.39 (1.37)	1.59 (1.45)	1.35 (1.36)
T6	Lambda cyhalothirn 5 % EC	300 ml	5.74 (2.50)	1.60 (1.45)	2.05 (1.59)	2.38 (1.69)	2.01 (1.58)
T7	Untreated control	---	5.91 (2.53)	7.07 (2.75)	7.40 (2.81)	7.82 (2.88)	7.43 (2.81)
	S.Em. ±	-	0.04	0.07	0.06	0.06	0.04
	CD at 5%	-	NS	0.21	0.19	0.17	0.13

Table.2 Economic assessment of various insecticides

S.No.	Treatments	Cost of cultivation Rs/ha	Quantity of insecticide used for 3 sprays gm/ha	Cost of Insecticide Rs/ha	Labour cost	Total cost Rs/ha	Yield q/ha	Gross income Rs/ha	Net income Rs/ha	Cost benefit ratio
1	Emamectin benzoate 3.7% +diafenthiuron 46.3%WP	55,000	450	990	5500	61490	147.03	235248	173758	1:3.82
2	Emamectin benzoate 3.7% +diafenthiuron 46.3%WP	55,000	600	1320	5500	61820	166.29	266064	204244	1:4.30
3	Emamectin benzoate 3.7% +diafenthiuron 46.3%WP	55,000	750	1650	5500	62150	171.11	273776	211626	1:4.40
4	Emamectin benzoate 5%SG	55,000	600	3726	5500	64226	134.93	215888	151662	1:3.36
5	Diafenthiuron 50%WP	55,000	1800	7020	5500	67520	137.40	219840	152320	1:3.25
6	Lambda cyhalothrin 5%EC	55,000	900	855	5500	61355	128.14	205024	143669	1:3.34
7	Untreated control	55,000				59000	88.39	141424	82424	1:1.39

Sujay *et al.,* (2015) noted significantly highest yield (4.65 q ha^{-1}) in diafenthiuron 50 WP @ 0.75gm $litre^{-1}$ with higher net returns (Rs 22,661ha^{-1}) in chilli. These researchers supported the present study as they found highest yield of chilli with higher return with emamectin benzoate and diafenthiuron.

On the basis of above results the following trend impact of insecticide found lowest thrips population was observed in emamectin benzoate 3.7%+ difenthiuron 46.3% WP @ 250 gm ha^{-1}. The next effective insecticides were emamectin benzoate 3.7%+ difenthiuron 46.3% WP @ 200 gm ha^{-1} followed by emamectin benzoate 3.7%+ diafenthiuron 46.3% @ 150 gm ha^{-1}.

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