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Relative Bio-Efficacy of Different Acaricides against Brinjal Mite, *Tetranychus urticae* Koch

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A B S T R A C T

A field experiment was conducted at Main Vegetable Research Station,Anand Agricultural University, Anand (Gujarat) during *kharif-rabi* seasons of the year 2014-15 and 2015-16 to assess the efficacy of different nine acaricides against brinjal mite*viz.*, fenazaquin 0.01%, diafenthiuron 0.05%, spiromesifen 0.02%, dicofol 0.05%, ethion 0.05%, chlorfenapyr 0.01%, propargite0.06%, fenpyroximate 0.005% as well as wettable sulphur 0.16% compared with control. Of these, fenazaquin 0.01% and spiromesifen 0.02% found most effective against mite. The treatment of spiromesifen 0.02% (37.91 tonnes/ha) recorded higher fruit yield followed by fenazaquin 0.01% (36.95 tonnes/ha). The minimum per cent avoidable losses was recorded in fenazaquin 0.01% (2.52%) followed by diafenthiuron 0.05% (11.76%). The highest (1,01,240`/ha) net realization was obtained in the treatment of spiromesifen 0.02% followed by fenazaquin 0.01% (97,140`/ha) and diafenthiuron 0.05% (78,540`/ha).

Introduction

Brinjal (*Solanum melongena* Linnaeus) is considered as a "King of vegetables" originated from India where a wide range of wild types and land races occur (Thompson and Kelly, 1957) and is now grown as a vegetable throughout the tropical, sub-tropical and warm temperate areas of the world. In Gujarat, the total area under brinjal is about 0.76 lakh hectares with annual production of 14.77 lakh metric tonnes (Anonymous, 2015).

Brinjal crop is subjected to attack by a number of insect-pests right from nursery stage till harvesting which affects crop cultivation and acts as a limiting factor in the profitable cultivation. Butani andVerma (1976) listed 36 insects, whereas Nayar *et al.*, (1995) recorded 53insects attacking on brinjal. Of which shoot and fruit borer, *Leucinodes orbonalis* Guenee; jassid, *Amrasca biguttula biguttula* (Ishida); whitefly, *Bemisia tabaci* Gennadius; aphid, *Aphis gossypii* Glover and non-insect pests like mites especially two spotted spider mite, *Tetranychus urticae* Koch are the main bottle necks in brinjal productivity (Rizvi, 1996).Among non-insect pests, mites are considerable notorious pests and gaining tremendous importance in recent years owing to their devastating nature and damage

potential. An average yield reduction was estimated 13.64 and 31.09 per cent due to red spider mite, *T. urticae* at Bangalore and Varanasi, respectively (Anonymous, 1998).

Now-a-days, number of new molecules are available in the market for pest management in different crops and they are also less toxic to natural enemies as well as human being. So by using these type of molecules, we can manage brinjal mites.Therefore, the present study was carried out to insight the knowledge on this aspect.

Materials and Methods

Field experiment was conducted during *kharif-rabi* seasons of 2014-15 and 2015-16to assess the bio-efficacy of different acaricides in a Randomized Block Design (RBD) at Main Vegetable Research Station, Anand Agricultural University, Anand (Gujarat).For the purpose, brinjal variety Doli-5 was transplanted in 2nd week of September at a spacing of 90 x 60 cm having plot size 4.5 x 3.6 m. All the recommended agronomical practices were followed for raising the crop. There were total tentreatments replicated three times. The treatments included fenazaquin 0.01%, diafenthiuron 0.05%, spiromesifen 0.02%, dicofol 0.05%, ethion 0.05%, chlorfenapyr 0.01%, propargite0.06%, fenpyroximate 0.005% as well as wettable sulphur 0.16% along with untreated control. The acaricidal treatments were applied with the help of Knapsack sprayer. The first spray of respective acaricides was applied on the appearance of mite and second spray after 15 days of first spray. For recording observations on mites, three leaves (upper, middle and lower) were selected from randomly selected plants. The mite population was recorded in 4.0 cm^2 (2.0 × 2.0 cm) area per leaf. The observations on mite were made before first spray as well as at 3, 7, 10 and 15 days after each spray. Considering the activity of mite, two sprays were given during the crop period.

The yield of marketable brinjal fruits from each treatment was recorded at each picking separately. The yield obtained per plot was converted into tonnes per hectare. On the basis of fruit yield from various treatments under study, the avoidable loss due to mite was calculated by applying formula of Poul (1976) which is as under.

$$\text{Per cent avoidable loss in yield} = \frac{\text{Yield in treatment which gave the highest yield} - \text{Yield in any other treatment plot}}{\text{Yield in treatment which gave the highest yield}} \times 100$$

Results and Discussion

Kharfi-rabi, 2014-15

Mite population recorded in different treatment of acaricides during *kharif-rabi*, 2014-15 are presented in table 1. Data indicated non-significant differences in mite population before imposing of sprays indicating the homogenous distribution of the pest in experimental plots. The data of pooled over periods for the first spray revealed significant reduction in mites population in all the treated plots compared to untreated control. The reduction in mite population was significantly higher in plots treated with fenazaquin 0.01% (2.22 mites/ 4 cm^2 leaf) than rest of the treated plots except spiromesifen 0.02% (2.49 mites/ 4 cm^2 leaf). On the other hand, wettable sulphur 0.16% (8.44 mites/ 4 cm^2 leaf), dicofol 0.05% (8.32 mites/ 4 cm^2 leaf) and ethion 0.05% (8.20 mites/ 4 cm^2 leaf) proved least effective against mites, however, these acaricides exhibited significantly lower incidence of mites than untreated control (14.55 mites/ 4 cm^2 leaf).

Pooled data computed for the second spray indicated significantly less number of mites (1.49 to 1.54 mites/4 cm^2 leaf) in the plots sprayed with fenazaquin 0.01% and spiromesifen 0.02% over other acaricides. Diafenthiuron 0.05% (2.63 mites/ 4 cm^2 leaf) and fenpyroximate 0.005% (2.96 mites/ 4 cm^2 leaf) also found better for mites control and stood next to fenazaquin 0.01% and spiromesifen 0.02%. Amongst the acaricides, wettable sulphur 0.16%, ethion 0.05% and dicofol 0.05% proved inferior in suppressing the mites in brinjal, however these acaricides exhibited relatively less number of mites in comparison to unsprayed plots (17.22 mites/ 4 cm^2 leaf).

The pooled over periods and sprays data for *kharif-rabi*, 2014-15 indicated that significantly least numbers of mites (1.84 mites/4 cm^2 leaf) were observed in plots treated with fenazaquin 0.01% followed by spiromesifen 0.02% (2.00 mites/4 cm^2 leaf). Amongst the acaricides, maximum (8.32 mites/4 cm^2 leaf) incidence of the pest was observed in plots sprayed with wettable sulphur 0.16% followed by ethion 0.05% (7.97 mites/4 cm^2 leaf) and dicofol 0.05% (7.74 mites/ 4 cm^2 leaf).

Kharfi-rabi, 2015-16

Data on mite, *T. urticae*population recorded prior and 3, 7, 10 and 15 days after each spray in different treatments during *kharif-rabi*, 2015-16 are presented in table 2. Data indicated that the mites population was uniformly distributed in all the experimental plots as it evident from the observations recorded before imposing of acaricidal spray. Pooled over periods data worked out for the first spray indicated that spiromesifen 0.02% and fenazaquin 0.01% proved equally effective against mites as these acaricides registered significantly least (2.42 mites/4 cm^2 leaf) number of mites as compared to remaining acaricides. The acaricides diafenthiuron 0.05% (3.42 mites/ 4 cm^2 leaf) and fenpyroximate0.005% (3.74 mites/ 4 cm^2 leaf) also proved better in controlling the pest and stood next to spiromesifen 0.02% and fenazaquin 0.01%. On the other hand, wettable sulphur 0.16%, ethion 0.05% and dicofol 0.05% proved least effective against mites, however, these acaricides exhibited significantly lower incidence of mite than the untreated control (15.34 mites/ 4 cm^2 leaf).

Pooled data computed for second spray indicated significantly lower population of mites in plots sprayed with fenazaquin 0.01% (2.26 mites/ 4 cm^2 leaf) and spiromesifen 0.02% (2.32 mites/ 4 cm^2 leaf) over rest of the treatments. Diafenthiuron 0.05% (3.30 mites/ 4 cm^2 leaf) and fenpyroximate 0.005% (3.95 mites/ 4 cm^2 leaf) also found relatively better acaricides and registered mites population significantly lower than chlorfenapyr 0.01%, propargite 0.06%, ethion 0.05%, dicofol 0.05% and wettable sulphur 0.16%. Amongst the acaricides evaluated, wettable sulphur 0.16% (10.13 mites/ 4 cm^2 leaf) and dicofol 0.05% (9.68 mites/ 4 cm^2 leaf) proved less effective against mites infesting brinjal.

Pooled over periods and sprays data for *kharif-rabi*, 2015-16 indicated that the treatment of fenazaquin 0.01% registered significantly least (2.32 mites/4 cm^2 leaf) number of mites compared to rest of the treatments except spiromesifen (2.36 mites/4 cm^2 leaf). Both these acaricides found significantly superior to rest of the acaricides. Amongst the acaricides, maximum (9.55 mites/4 cm^2 leaf) incidence of the pest was observed in plots sprayed with wettable sulphur 0.16% followed by dicofol 0.05% (9.30 mites/4 cm^2 leaf) showing lower efficacy against mites.

Pooled over years

Overall pooled data (Table 3 and Fig. 1) worked out for both the years indicated that

fenazaquin 0.01% and spiromesifen 0.02 % were significantly superior to rest of the treatments in checking the mite, *T. urticae* population. These treatments exhibited significantly lowest incidence (2.09 to 2.19 mites/4 cm^2 leaf) of the pest. However, treatment of diafenthiuron0.05% and fenpyroximate 0.005% were also found next best treatments. The treatment of chlorfenapyr 0.01% found moderately effective against brinjal mite and registered lower (4.70 mites/4 cm^2 leaf) mites. The plots treated with wettable sulphur 0.16%, dicofol 0.05% and ethion 0.05% proved inferior in mitigating the mite population in brinjal as these treatments recorded significantly higher (8.44 to 8.92 mites/4 cm^2 leaf) population of the pest.

From the results, it can be concluded that among the various acaricides evaluated against brinjal mite, *T. urticae,* the fenazaquin 0.01% evolved as one of the best miticide followed by spiromesifen 0.02%. Excellent performance of fenazaquin against brinjal mite noticed in the present study is in conformity with the earlier report of Patel *et al.,* (2011). Further, the effectiveness of fenazaquin 0.017% in managing mite infestation in cucumber (Reddy *et al.,* 2014) and gerbera (Shah and Shukla, 2014) has also been reported in past. All these reports are in accordance with the present findings.

Spiromesifen 0.02% also proved effective acaricide in controlling mite, *T. urticae* population in present investigation which is in conformity with the findings of Roopa (2005), Reddy *et al.,* (2014), Varghese and Mathew (2013) and Kavitha *et al.,* (2006). Roopa (2005) revealed that spiromesifen at 0.024% and diafenthiuron 0.075% were found more effective against brinjal mite. According to Reddy *et al.,* (2014), acaricide spiromesifen 0.02% registered higher mortality of cucumber mite, *T. urticae* under laboratory and green house condition. As per the report of Varghese and Mathew (2013), spiromesifen 45 SC @ 100 g a.i./ha found to be effective in reducing chilli mite population. Kavitha *et al.,* (2006) reported that the spiromesifen at 120 g a.i./ha was found superior in controlling the chilli mite.

Fruit yield

The yield of brinjal fruits (Table 4) computed for two years revealed that significantly maximum (37.91 tonnes/ha) yield was harvested from the plots treated with spiromesifen 0.02% however, it was at par with fenazaquin 0.01% (36.95 tonnes/ha). The plots sprayed with diafenthiuron 0.05% and fenpyroximate 0.005% produced higher (33.45 and 30.10 tonnes/ha, respectively) yield over rest of the treatments. The treatment of chlorfenapyr 0.01% (27.00 tonnes/ha), dicofol 0.05% (26.91 tonnes/ha) and propargite 0.06% (26.67 tonnes/ha) registered higher fruit yield over untreated control (16.77 tonnes/ha). This finding is in conformity with the earlier report of Roopa (2005), who reported that maximum fruit yield was recorded in spiromesifen 0.02% and diafenthiuron 0.05% gave 240.74 and 248.97 q/ha during second and 176.33 and 163.99 q/ha during third season trial, respectively.

Avoidable losses

In respect to avoidable losses of brinjal yield, it varied from 2.52 to 56.03 per cent in different treatments (Table 5). The minimum per cent avoidable losses was recorded in fenazaquin 0.01% (2.52%) followed by diafenthiuron 0.05% (11.76%). However, the maximum per cent avoidable losses were recorded in control (56.03%) plots followed by plots treated with wettable sulphur 0.16% (34.80%).

Table.1 Effectiveness of different acaricides against brinjal mite, *T. urticae* during kharif-rabi, 2014-15

Treatments	Number of mites/ leaf											
	Before spray	1st spray (DAS)				Pooled	2nd spray (DAS)				Pooled	Pooled over periods and sprays
		3	7	10	15		3	7	10	15		
Fenazaquin 10 EC @ 0.01%	2.65* (6.52)	1.22a (0.99)	1.43a (1.54)	1.99ab (3.46)	1.97a (3.38)	1.65a (2.22)	1.07a (0.64)	1.29a (1.16)	1.43a (1.54)	1.87a (3.00)	1.41a (1.49)	1.53a (1.84)
Diafenthiuron 50 WP @ 0.05%	2.53 (5.90)	1.72b (2.46)	1.82a (2.81)	2.02ab (3.58)	1.98a (3.42)	1.89b (3.07)	1.51b (1.78)	1.78b (2.67)	1.71ab (2.42)	2.09ab (3.87)	1.77b (2.63)	1.83b (2.85)
Spiromesifen 240 SC@ 0.02%	2.61 (6.31)	1.74b (2.53)	1.64a (2.19)	1.69a (2.36)	1.86a (2.96)	1.73ab (2.49)	1.12a (0.75)	1.42ab (1.52)	1.38a (1.40)	1.79a (2.70)	1.43a (1.54)	1.58a (2.00)
Dicofol 18.5 EC @ 0.05%	2.72 (6.90)	2.78d (7.23)	2.97d (8.32)	3.08e (8.99)	3.03d (8.68)	2.97e (8.32)	2.67cd (6.63)	2.63c (6.42)	2.79c (7.28)	2.99c (8.44)	2.77de (7.17)	2.87de (7.74)
Ethion 50 EC @ 0.05%	2.83 (7.51)	2.73d (6.95)	2.92d (8.03)	3.09e (9.05)	3.04d (8.74)	2.95e (8.20)	2.81d (7.40)	2.73c (6.95)	2.86c (7.68)	3.09c (9.05)	2.87e (7.74)	2.91de (7.97)
Chlorfenapyr 10 SC@ 0.01%	2.71 (6.84)	2.22c (4.43)	2.27b (4.65)	2.51cd (5.80)	2.50bc (5.75)	2.38c (5.16)	1.87b (3.00)	1.82b (2.81)	2.10b (3.91)	2.33b (4.93)	2.03c (3.62)	2.20c (4.34)
Propargite 57 EC@ 0.06%	2.82 (7.45)	2.55cd (6.00)	2.71cd (6.84)	2.83de (7.51)	2.92cd (8.03)	2.75d (7.06)	2.38c (5.16)	2.44c (5.45)	2.74c (7.01)	2.91c (7.97)	2.62d (6.36)	2.68d (6.68)
Fenpyroximate 5 EC@ 0.005%	2.95 (8.20)	2.35c (5.02)	2.30bc (4.79)	2.23bc (4.47)	2.26ab (4.61)	2.28c (4.70)	1.67b (2.29)	1.74b (2.53)	1.89b (3.07)	2.15ab (4.12)	1.86bc (2.96)	2.07bc (3.78)
Wettable sulphur 80 WP@ 0.16%	2.86 (7.68)	2.84d (7.57)	2.97d (8.32)	3.04e (8.74)	3.09d (9.05)	2.99e (8.44)	2.76cd (7.12)	2.86c (7.68)	3.02c (8.62)	3.19c (9.68)	2.96e (8.26)	2.97e (8.32)
Untreated Control	3.07 (8.92)	3.58e (12.32)	4.03e (15.74)	3.86f (14.40)	4.07e (16.06)	3.88f (14.55)	3.98e (15.34)	4.07d (16.06)	4.28d (17.82)	4.53d (20.02)	4.21f (17.22)	4.05f (15.90)
S.Em. ± T	0.18	0.12	0.13	0.13	0.13	0.06	0.12	0.13	0.14	0.13	0.06	0.08
P	-	-	-	-	-	0.04	-	-	-	-	0.04	0.02
S	-	-	-	-	-	-	-	-	-	-	-	0.02
T x P	-	-	-	-	-	0.13	-	-	-	-	0.13	0.06
T x S	-	-	-	-	-	-	-	-	-	-	-	0.04
S x P	-	-	-	-	-	-	-	-	-	-	-	0.08
T x S x P	-	-	-	-	-	-	-	-	-	-	-	0.11
C. V. (%)	11.48	9.00	9.21	8.57	8.34	8.77	9.58	9.62	10.33	8.31	9.44	7.80

* Figures in parentheses are retransformed values; those outside are $\sqrt{X+0.5}$ transformed values; Treatment means with the letter(s) in common are not significant by DNMRT at 5 % level of significance
NS = Not Significant; DAS = Days after spraying

Table.2 Effectiveness of different acaricides against brinjal mite, *T. urticae* during kharif-rabi, 2015-16

Treatments	Number of mites/ leaf											
	Before spray	1st spray (DAS)				Pooled	2nd spray (DAS)				Pooled	Pooled over periods and sprays
		3	7	10	15		3	7	10	15		
Fenazaquin 10 EC @ 0.01%	2.93* (8.08)	1.87a (3.00)	1.64a (2.19)	1.49a (1.72)	1.84ab (2.89)	1.71a (2.42)	1.22a (0.99)	1.46ab (1.63)	1.92a (3.19)	2.03a (3.62)	1.66a (2.26)	1.68a (2.32)
Diafenthiuron 50 WP @ 0.05%	3.06 (8.86)	2.01ab (3.54)	1.83ab (2.85)	1.92b (3.19)	2.16bc (4.17)	1.98b (3.42)	1.71b (2.42)	1.85bc (2.92)	2.12ab (3.99)	2.10ab (3.91)	1.95b (3.30)	1.96b (3.34)
Spiromesifen 240 SC@ 0.02%	3.01 (8.56)	1.80a (2.74)	1.67a (2.29)	1.62ab (2.12)	1.74a (2.53)	1.71a (2.42)	1.43ab (1.54)	1.35a (1.32)	1.94a (3.26)	2.02a (3.58)	1.68a (2.32)	1.69a (2.36)
Dicofol 18.5 EC @ 0.05%	2.98 (8.38)	2.85e (7.62)	3.02c (8.62)	3.11d (9.17)	3.28d (10.26)	3.07d (8.92)	3.06e (8.86)	3.11de (9.17)	3.37c (10.86)	3.23d (9.93)	3.19ef (9.68)	3.13e (9.30)
Ethion 50 EC @ 0.05%	3.15 (9.42)	2.99e (8.44)	3.10c (9.11)	3.37d (10.86)	3.31d (10.46)	3.19d (9.68)	2.92de (8.03)	2.76d (7.12)	3.13c (9.30)	3.07cd (8.92)	2.97de (8.32)	3.08de (8.99)
Chlorfenapyr 10 SC@ 0.01%	3.04 (8.74)	2.41cd (5.31)	2.25b (4.56)	2.41c (5.31)	2.47c (5.60)	2.38c (5.16)	2.13c (4.04)	2.20c (4.34)	2.44b (5.45)	2.60bc (6.26)	2.34c (4.98)	2.36c (5.07)
Propargite 57 EC@ 0.06%	3.05 (8.80)	2.78de (7.23)	2.86c (7.68)	2.93d (8.08)	3.01d (8.56)	2.90d (7.91)	2.59d (6.21)	2.77de (7.17)	2.93c (8.08)	3.06cd (8.86)	2.84d (7.57)	2.87d (7.74)
Fenpyroximate 5 EC@ 0.005%	3.14 (9.36)	2.34bc (4.98)	2.08ab (3.83)	1.83ab (2.85)	1.98ab (3.42)	2.06b (3.74)	2.15c (4.12)	1.76b (2.60)	2.16ab (4.17)	2.35ab (5.02)	2.11b (3.95)	2.08b (3.83)
Wettable sulphur 80 WP@ 0.16%	2.96 (8.26)	2.77de (7.17)	2.95c (8.20)	3.26d (10.13)	3.36d (10.79)	3.09d (9.05)	3.09e (9.05)	3.21e (9.80)	3.30c (10.39)	3.45d (11.40)	3.26f (10.13)	3.17e (9.55)
Untreated Control	3.06 (8.86)	3.57f (12.24)	3.93d (14.94)	4.24e (17.48)	4.17e (16.89)	3.98e (15.34)	3.87f (14.48)	4.37f (18.60)	4.30d (17.99)	4.45e (19.30)	4.25g (17.56)	4.11f (16.39)
S.Em. ± T	0.18	0.12	0.14	0.13	0.13	0.09	0.13	0.13	0.14	0.17	0.07	0.08
P	-	-	-	-	-	0.04	-	-	-	-	0.05	0.03
S	-	-	-	-	-	-	-	-	-	-	-	0.02
T x P	-	-	-	-	-	0.13	-	-	-	-	0.14	0.06
T x S	-	-	-	-	-	-	-	-	-	-	-	0.04
S x P	-	-	-	-	-	-	-	-	-	-	-	0.09
T x S x P	-	-	-	-	-	-	-	-	-	-	-	0.12
C. V. (%)	10.36	8.47	9.53	8.78	8.31	8.77	8.99	9.00	8.68	10.19	9.30	8.27

* Figures in parentheses are retransformed values; those outside are $\sqrt{x+0.5}$ transformed values; Treatment means with the letter(s) in common are not significant by DNMRT at 5 % level of significance
NS = Not Significant; DAS = Days after spraying

Table.3 Effect of different acaricides against brinjal mite, *T. urticae*

Treatments	Number of mites/ leaf*		
	2014-15	2015-16	Pooled
Fenazaquin 10 EC @ 0.01%	1.53a (1.84)*	1.68a (2.32)	1.61a (2.09)
Diafenthiuron 50 WP @ 0.05%	1.83b (2.85)	1.96b (3.34)	1.90b (3.11)
Spiromesifen 240 SC @ 0.02%	1.58a (2.00)	1.69a (2.36)	1.64a (2.19)
Dicofol 18.5 EC @ 0.05%	2.87de (7.74)	3.13e (9.30)	3.00e (8.50)
Ethion 50 EC @ 0.05%	2.91de (7.97)	3.08de (8.99)	2.99e (8.44)
Chlorfenapyr 10 SC @ 0.01%	2.20c (4.34)	2.36c (5.07)	2.28c (4.70)
Propargite 57 EC@ 0.06%	2.68d (6.68)	2.87d (7.74)	2.78d (7.23)
Fenpyroximate 5 EC @ 0.005%	2.07bc (3.78)	2.08b (3.83)	2.08b (3.83)
Wettable sulphur 80 WP @ 0.16%	2.97e (8.32)	3.17e (9.55)	3.07e (8.92)
Untreated Control	4.05f (15.90)	4.11f (16.39)	4.08f (16.15)
S.Em.± Treatment (T)	0.08	0.08	0.06
Period (P)	0.02	0.03	0.02
Spray (S)	0.02	0.02	0.06
Year (Y)	-	-	0.03
T x P	0.06	0.06	0.06
T x S	0.04	0.04	0.07
T x Y	-	-	0.08
P x S	0.08	0.09	0.05
P x Y	-	-	0.02
S x Y	-	-	0.02
T x P x S	0.11	0.12	0.08
T x P x Y	-	-	0.08
T x S x Y	-	-	0.06
P x S x Y	-	-	0.04
T x P x S x Y	-	-	0.12
C. V. %	7.80	8.27	8.06

* Figures in parentheses are retransformed values; those outside are $\sqrt{X+0.5}$ transformed values; NS = Not significant; Treatment means with the letter(s) in common are not significant by DNMRT at 5 % level of significance

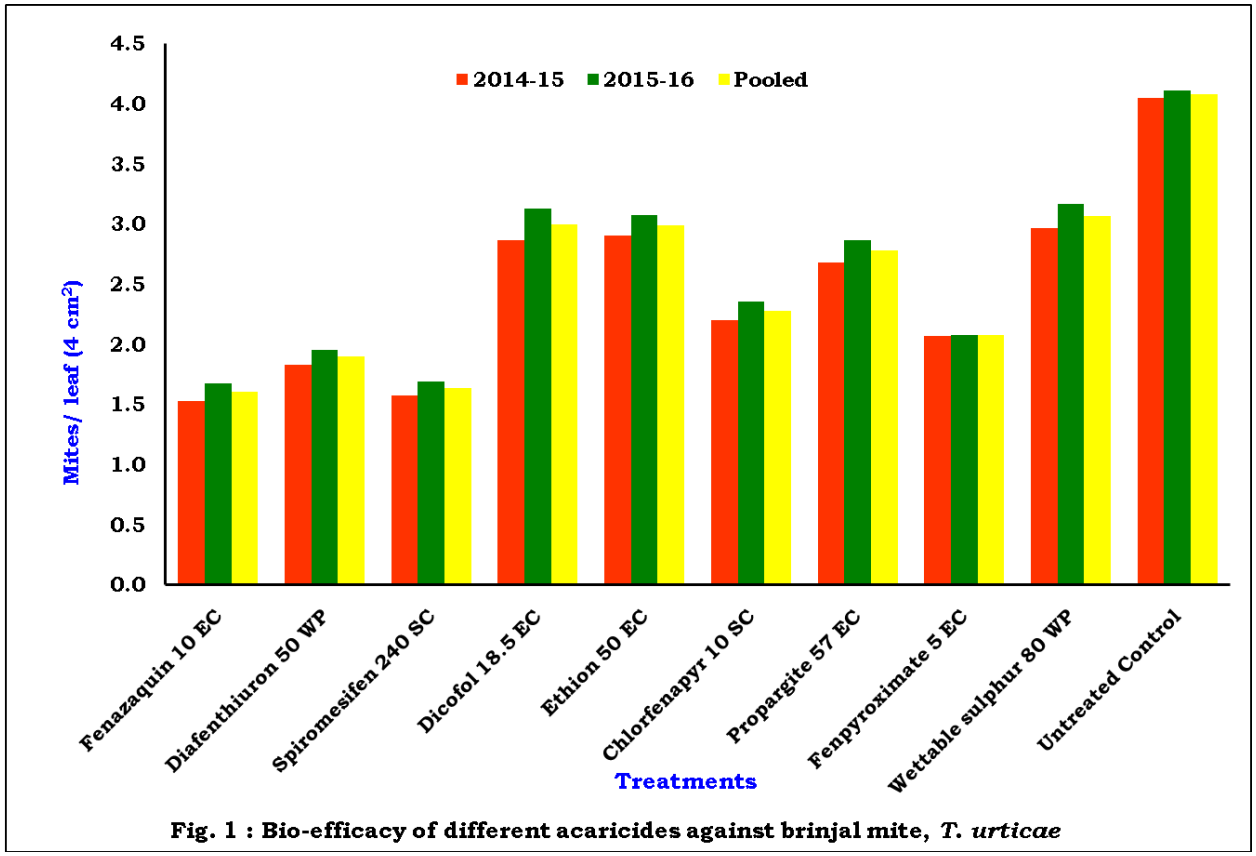

Fig. 1 : Bio-efficacy of different acaricides against brinjal mite, *T. urticae*

Table.4 Effect of different acaricides on yield of brinjal

Treatments	Yield (tonnes/ ha)		
	2014-15	2015-16	Pooled
Fenazaquin 10 EC @ 0.01%	40.25a	33.65ab	36.95ab
Diafenthiuron 50 WP @ 0.05%	32.65b	34.25a	33.45bc
Spiromesifen 240 SC @ 0.02%	42.67a	33.15ab	37.91a
Dicofol 18.5 EC @ 0.05%	28.17bc	25.65cd	26.91de
Ethion 50 EC @ 0.05%	27.35bc	22.12d	24.73e
Chlorfenapyr 10 SC @ 0.01%	28.67bc	25.33cd	27.00de
Propargite 57 EC @ 0.06%	27.33bc	26.00cd	26.67de
Fenpyroximate 5 EC @ 0.005%	31.60b	28.60bc	30.10cd
Wettable sulphur 80 WP@ 0.16%	25.33c	24.10cd	24.72e
Untreated Control	18.32d	15.22e	16.77f
S. Em.± T	1.76	1.65	1.28
Y	-	-	0.54
T x Y	-	-	1.70
C.V. (%)	10.07	10.66	10.35

Treatment means with the letter(s) in common are not significant by DNMRT at 5 % level of significance

Table.5 Effect of different acaricides on yield and avoidable loss due to infestation of brinjal mite, *T. urticae*

Treatments	Yield (tonnes/ha)	Avoidable loss (%)
Fenazaquin 10 EC @ 0.01%	36.95ab	2.52
Diafenthiuron 50 WP @ 0.05%	33.45bc	11.76
Spiromesifen 240 SC @ 0.02%	37.91a	0.00
Dicofol 18.5 EC @ 0.05%	26.91de	29.02
Ethion 50 EC @ 0.05%	24.73e	34.75
Chlorfenapyr 10 SC @ 0.01%	27.00de	28.78
Propargite 57 EC @ 0.06%	26.67de	29.66
Fenpyroximate 5 EC @ 0.005%	30.10cd	20.60
Wettable sulphur 80 WP @ 0.16%	24.72e	34.80
Untreated Control	16.77f	56.03
S. Em.± T	1.28	-
Y	0.54	-
T x Y	1.70	-
C.V. (%)	10.35	-

Table.6 Economics of different insecticides evaluated against brinjal mite, *T. urticae*

Treatments	Total quantity of insecticides required (Lit or Kg/ha)	Cost of insecticides (Rs/lit. or Kg)	Total cost of treatments including labour charges (Rs/ha)	Yield (Kg/ha)	Net gain over control (Kg/ha)	Realization over control (Rs/ha)	Net Realization (Rs/ha)	ICBR
Fenazaquin 10 EC@ 0.01%	0.500	2500	2510	36950	20180	100900	98390	1:41.20
Diafenthiuron 50 WP @ 0.05%	0.500	3600	3060	33450	16680	83400	80340	1:28.25
Spiromesifen 240 SC @ 0.02%	0.400	4000	2860	37910	21140	105700	102840	1:37.96
Dicofol 18.5 EC @ 0.05%	1.250	380	1735	26910	10140	50700	48965	1:30.22
Ethion 50 EC @ 0.05%	0.500	550	1535	24730	7960	39800	38265	1:26.93
Chlorfenapyr 10 SC @ 0.01%	0.500	1900	2210	27000	10230	51150	48940	1:24.14
Propargite 57 EC @ 0.06%	0.500	1200	1860	26670	9900	49500	47640	1:27.61
Fenpyroximate 5 EC @ 0.005%	0.500	1800	2160	30100	13330	66650	64490	1:31.86
Wettable sulphur 80 WP @ 0.16%	1.000	100	1360	24720	7950	39750	38390	1:30.23
Untreated Control	--	--	--	16770	--	--	--	--

1. Spray solution 500 lit. required for one spray per ha and two sprays were given during the cropping season
2. Labour charges @ Rs. 210/- per day x 3 labour = Rs 630 /ha/spray
3. Price of brinjal: Rs 5 per Kg

Economics

The economics of various insecticides (Table 6) showed that the highest (1,01,240/ha) net realization was obtained in the treatment of spiromesifen 0.02% followed by fenazaquin 0.01% (97,140`/ha) and diafenthiuron 0.05% (78,540`/ha). The highest (1:28.23) Incremental Cost Benefit Ratio (ICBR) was obtained from the plots treated with wettable sulphur 0.16% followed by fenazaquin 0.01% (1:27.84), spiromesifen 0.02% (1:24.70), dicofol 0.05% (1:23.94), ethion 0.05% (1:22.99), fenpyroximate 0.005% (1:22.78), propargite 0.06% (1:21.12), diafenthiuron 0.05% (1:18.16), and chlorfenapyr 0.01% (1:17.19). Though, the spiromesifen 0.02% emerged as most effective against *T. urticae* as well as also registered highest fruit yield with higher net realization, the ICBR was low as compared to wettable sulphur 0.16% and fenazaquin 0.01% might be due to very high market price of the insecticide. Though the treatment of wettable sulphur 0.16% exhibited higher ICBR but failed to prove its effectiveness in controlling mites. It can be concluded from the present investigation that fenazaquin 0.01% and spiromesifen 0.02% found most effective against mite, *T. urticae* for better crop protection in brinjal and resulted in higher fruit yield with higher net realization.

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