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EFFICACY OF SOME ACARICIDES AGAINST SUGARCANE WEB MITE SCHIZOTETRANYCHUS ANDROPOGONI HIRST

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ABSTRACT

The field experiment to evaluate insecticides against sugarcane web mite Schizotetranychus andropogoni Hirst was conducted at a farmer's holding at Alanganallur village (Alanganallur block, Madurai District) on sugarcane (variety Co 86032) during May 2016- April 2017 in a randomized block design (RBD) with nine treatments. The treatments include: spiromesifen 240 SC @ 168 g a.i./ ha, etoxazole 10 SC @ 33 g a.i./ ha, fenazaquin 10 EC @ 125 g a.i./ ha, ethion 50 EC @ 625 g a.i./ ha, fenpyroximate 5 EC 12.5 g a.i./ ha, hexythiazox 5.45 EC @ 10.86 g a.i./ ha, chlorfenapyr 10 SC @ 100 g a.i./ ha, propargite 57 EC @ 712.5 g a.i./ ha with an untreated check with three replications. Reduction of web mites was maximum in spiromesifen 240 SC @ 168 g a.i./ ha (3.88 / 2 cm² area of leaves) followed by fenpyroximate 5 EC @ 12.5 g a.i./ ha (4.00/ 2 cm² area of leaves) and the lowest in fenazaquin 10 EC @ 125 g a.i./ ha (7.84/ 2 cm² area of leaves). Similarly, higher cane yield was recorded in spiromesifen 240 SC @ 168 g a.i./ ha (109.61 t/ ha) followed by fenpyroximate 5 EC @ 12.5 g a.i./ ha (109.42 t/ ha) as compared to the untreated check (101.05 t/ ha). The cost benefit ratio was also higher in spiromesifen 240 SC @ 168 g a.i./ ha (1: 2.98) followed by fenpyroximate 5 EC @ 12.5 g a.i./ ha (1: 2.87).

Key words: Schizotetranychus andropogoni, sugarcane, acaricides, field efficacy, spiromesifen, fenpyroximate, cane yield, cost benefit ratio

Plant inhabiting mites have diverse feeding habits including phytophagous, predatory, mycophagous and saprophytic ones. Around 7000 species of phytophagous mites are known which fall under five families viz., Tetranychidae, Tenuipalpidae, Eriophyidae, Tarsonemidae and Tuckerillidae (Chhillar et al., 2007). The incidence of *S. andropogoni* Hirst as pest was first recorded by Hirst (1926). Banerjee (1988) reported *S. andropogoni* (Hirst) or web mite or sugarcane leaf mite as a serious pest of sugarcane in India. Apart from insect pests, mites cause considerable yield loss (up to 20-30 %) on sugarcane (Ghoshal and Barman, 2012). The feeding activity by mites on leaves cause appearance of white blotches, covered by webs and turn brownish and finally the leaves turn blown off. The colonies appear greyish due to webbing, cast skins and soil particles caught in the webbings on the under surface of the leaf. Webs protect mites and the entire colonies being blown off by winds and wet by rains (Singh and Raghuraman, 2011). The present study evaluates certain insecticides against this mite under field conditions.

MATERIALS AND METHODS

The field experiment was conducted during May 2016- April 2017 in a farmer holding, using the most popular variety Co 86032 at Alanganallur village (Alanganallur block, Madurai District). The experiment

was laid out in a randomized block design (RBD) with nine treatments. The treatments were spiromesifen 240 SC @ 168 g a.i./ ha, etoxazole 10 SC @ 33 g a.i./ ha, fenazaquin 10 EC @ 125 g a.i./ ha, ethion 50 EC @ 625 g a.i./ ha, fenpyroximate 5 EC 12.5 g a.i./ ha, hexythiazox 5.45 EC @ 10.86 g a.i./ ha, chlorfenapyr 10 SC @ 100 g a.i./ ha, propargite 57 EC @ 712.5 g a.i./ ha and an untreated check with three replication. The spacing of 90x 90 cm between plants was adopted and the crop was cultivated with recommended package of practices as recommended by TNAU. Three foliar sprays of acaricides were applied at 15 days interval starting from the initiation of infestation, using pneumatic knapsack sprayer (ASPEE). Pretreatment count was recorded before first spray. Three leaves were randomly selected/ cane in treated and untreated plots, to record the mite population, under stereozoom microscope and the post treatment counts were recorded on 1, 3, 7 and 14 days after each spray, besides pretreatment count and the observations were recorded in 2cm^2 area/ leaf. The data on population were transformed into square root transformed values and analysed with DMRT and the means were separated by LSD (Gomez and Gomez, 1984) using AGRES statistical software package.

RESULTS AND DISCUSSION

The mean population of mite ranged from 5.05 to 13.16 / 2 cm^2 area of leaves, 4.13 to 14.79 / 2 cm^2 area of leaves and 2.45 to 16.36 / 2 cm^2 area of leaves after first, second and third rounds of foliar application of acaricides (Table 1). The cumulative mean of three rounds of foliar application of acaricides and the mean population of mite ranged from 3.88 to 14.77/ 2 cm^2 area of leaves. The maximum reduction of mite population was recorded in spiromesifen 240 SC @ 168 g a.i./ ha (3.88 / 2 cm^2 area of leaves) which was on par with fenpyroximate 5 EC @ 12.5 g a.i./ ha (4.00 / 2 cm^2 area of leaves) and propargite 57 EC @ 712.50 g a.i./ ha (4.06 / 2 cm^2 area of leaves) and the least in fenazaquin 10 EC @ 125 g a.i./ ha (7.84 / 2 cm^2 area of leaves).

The yield and cost benefit ratio ranged from 101.05 to 109.61 t/ ha coupled with 1:1.25 to 1: 2.98 respectively (Table 1). The maximum yield was recorded in spiromesifen 240 SC @ 168 g a.i./ ha (109.61 t/ha) followed by fenpyroximate 5 EC @ 12.5 g a.i./ ha (109.42 t/ha) and the lowest in untreated check (101.05 t/ha). The cost benefit ratio was higher in spiromesifen 240 SC @ 168 g a.i./ ha (1: 2.98) followed by fenpyroximate 5 EC @ 12.5 g a.i./ ha (1: 2.87) compared to other treatments.

The present findings are in conformity with Reddy and Latha (2013) who observed that fenazaquin 10 EC @ 100 g a.i. / ha as effective against mite incidence during the two consecutive seasons (97.66 and 98.10 %) followed by spiromesifen 240 SC @ 96 g a.i. / ha (95.86 and 89.34%) compared to the standard check dicofol 18.5 EC @ 250 g a.i./ ha (34.33 and 22.94). Dekeyser (2005) reported that spiromesifen inhibited the lipid biosynthesis in mites and found very promising against the egg and juvenile stages of spider mites. Radhakrishnan and Ramaraju (2009) stated that fenazaquin 10 EC @ 1ml/ l was more effective against eggs of *Oligonychus oryzae* with the cumulative mean reduction of 98.01 and 97.95% followed by profenfos 50 EC (94.89 and 96.05 %) during 2005 and 2006, respectively. Abamectin 1.8 EC @ 0.5 ml/ lit. was observed to be effective in suppressing the mite population (89.03 and 90.22 %) followed by fenazaquin 10 EC @ 1 ml / lit. (86.58 and 85.31 %) against nymphs and adults.

Arbabi et al. (2015) found that two rounds of water spray followed by one round of water spray coupled with foliar application of abamectin within 48 hr, and one round of fenpyroximate 5% SC against sugarcane spider mite, *O. sacchari* on two susceptible varieties (CP 48 and CP 57), the lowest population was noticed on CP 48. Radhakrishnan et al. (2015) reported that the reduction of *O. coffeae* was more in pyridaben 20 WP @ 500 and 625 g a.i./ ha (73.13 % and 77.68 %) followed by fenpyroximate 5 EC @ 400 g a.i./ ha (56.65 %) and propargite 57 EC @ 1000 g a.i./ ha. The ovicidal activity was higher in ethion followed by fenpyroximate and dicofol (64.8, 57.93 and 21.30 % respectively) in the laboratory. An increased larval and nymphal mortality were recorded in fenpyroximate (93%), dicofol (83%), ethion (80 %), and sulphur (53 %) compared to untreated check (Sarmah et al., 2016) and fenpyroximate 5 EC @ 500 ml/ ha recorded maximum mean mortality (88.44%) followed by abamectin 1.9 EC @ 125 ml/ ha and the lowest mortality in NSKE 5% (Pathipati et al., 2012). It is concluded that for effective control of sugarcane leaf mite, spiromesifen 240 SC @ 168 g a.i./ ha can be used.

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Table 1. Efficacy of acaricides against *S. andropogoni* (Alanganullur, Madurai)

Treatments	No. of mites / 2 cm² area of leaf											
	I Spray						II Spray					
	PTC	1 DAT	3 DAT	7 DAT	14 DAT	Mean	PTC	1 DAT	3 DAT	7 DAT	14 DAT	Mean
T_1 – Spiromesifen 240 SC @ 168 g a.i./ ha	11.72 (3.42)	5.36 (2.32)[a]	5.08 (2.25)[a]	4.72 (2.17)[a]	5.03 (2.24)[a]	5.05 (2.25)[a]	5.32 (2.31)	4.66 (2.16)[a]	4.12 (2.03)[a]	3.72 (1.93)[a]	4.03 (2.01)[a]	4.13 (2.03)[a]
T_2 – Etoxazole 10 SC @ 33 g a.i./ ha	12.12 (3.48)	7.94 (2.82)[e]	7.72 (2.78)[e]	7.53 (2.74)[e]	7.93 (2.82)[e]	7.78 (2.79)[e]	8.16 (2.86)	7.68 (2.77)[e]	7.26 (2.69)[e]	6.73 (2.59)[e]	7.23 (2.69)[e]	7.23 (2.69)[e]
T_3 – Fenazaquin 10EC @ 125 g a.i./ ha	11.95 (3.46)	8.58 (2.93)[f]	8.34 (2.89)[f]	8.18 (2.86)[f]	8.55 (2.92)[f]	8.41 (2.90)[f]	8.85 (2.97)	8.26 (2.87)[f]	7.84 (2.80)[f]	7.38 (2.72)[f]	7.84 (2.80)[f]	7.83 (2.80)[f]
T_4 –Ethion 50 EC @ 625 g a.i./ ha	11.88 (3.45)	6.15 (2.48)[b]	5.91 (2.43)[b]	5.56 (2.36)[b]	5.86 (2.42)[b]	5.87 (2.42)[b]	6.16 (2.48)	5.63 (2.37)[b]	5.29 (2.30)[b]	4.82 (2.20)[b]	5.07 (2.25)[b]	5.20 (2.28)[b]
T_5 – Fenpyroximate 5 EC @ 12.5 g a.i./ ha	11.83 (3.44)	5.52 (2.35)[a]	5.26 (2.29)[a]	4.85 (2.20)[a]	5.11 (2.26)[a]	5.19 (2.28)[a]	5.54 (2.35)	4.82 (2.20)[a]	4.28 (2.07)[a]	3.84 (1.96)[a]	4.15 (2.04)[a]	4.27 (2.07)[a]
T_6 – Hexythiazox 5.43 EC @ 10.86 g a.i./ ha	11.94 (3.46)	6.73 (2.59)[c]	6.55 (2.56)[c]	6.21 (2.49)[c]	6.58 (2.57)[c]	6.52 (2.55)[c]	6.77 (2.60)	6.19 (2.49)[c]	5.88 (2.42)[c]	5.46 (2.34)[c]	5.93 (2.44)[c]	5.87 (2.42)[c]
T_7 – Chlorfenpyr 10 SC @ 100 g a.i./ ha	12.07 (3.47)	7.38 (2.72)[d]	7.13 (2.67)[d]	6.86 (2.62)[d]	7.32 (2.71)[d]	7.17 (2.68)[d]	7.55 (2.75)	7.07 (2.66)[d]	6.54 (2.56)[d]	6.03 (2.46)[d]	6.52 (2.55)[d]	6.54 (2.56)[d]
T_8 – Propargite 57 EC @ 712.5 g a.i./ ha	12.15 (3.49)	5.58 (2.36)[a]	5.34 (2.31)[a]	4.93 (2.22)[a]	5.17 (2.27)[a]	5.26 (2.29)[a]	5.68 (2.38)	4.87 (2.21)[a]	4.35 (2.09)[a]	3.90 (1.97)[a]	4.21 (2.05)[a]	4.33 (2.08)[a]
T_9 – Untreated check	11.80 (3.44)	12.33 (3.51)[g]	12.88 (3.59)[g]	13.48 (3.67)[g]	13.93 (3.73)[g]	13.16 (3.63)[g]	14.06 (3.75)	14.33 (3.79)[g]	14.61 (3.82)[g]	14.94 (3.87)[g]	15.26 (3.91)[g]	14.79 (3.85)[g]
SEd	NS	0.0272	0.0295	0.0246	0.0220	0.0246	NS	0.0328	0.0274	0.0267	0.0331	0.0309
CV (%)	-	1.25	1.37	1.16	1.01	1.14	-	1.54	1.33	1.33	1.60	1.50

NS: Non significant; PTC: Pretreatment count; *Each value mean of three replications; Figures in parentheses square root transformed values; In a column, means followed by common letter(s) not significantly different by LSD at p= 0.05 %

Table 1 Continued…

Treatments	Number of mites / 2cm² area of leaf						Cumulative mean	#Cane yield (t/ha)	Cost benefit ratio(CBR)
	III Spray								
	PTC	1 DAT	3 DAT	7 DAT	14 DAT	Mean			
T_1 – Spiromesifen 240 SC @ 168 g a.i./ ha	4.29 (2.07)	3.05 (1.75)[a]	2.41 (1.55)[a]	1.98 (1.41)[a]	2.35 (1.53)[a]	2.45 (1.56)[a]	3.88 (1.97)[a]	109.61 (2.04)[a]	1: 2.98
T_2 – Etoxazole 10 SC @ 33 g a.i./ ha	7.56 (2.75)	6.92 (2.63)[e]	6.56 (2.56)[e]	6.13 (2.48)[e]	6.78 (2.60)[e]	6.60 (2.57)[e]	7.20 (2.68)[e]	103.04 (2.01)[e]	1: 1.49
T_3 – Fenazaquin 10EC @ 125 g a.i./ ha	8.15 (2.85)	7.62 (2.76)[f]	7.18 (2.68)[f]	6.82 (2.61)[f]	7.48 (2.73)[f]	7.28 (2.70)[f]	7.84 (2.80)[f]	102.10 (2.01)[f]	1: 1.40
T_4 – Ethion 50 EC @ 625 g a.i./ ha	5.35 (2.31)	4.74 (2.18)[b]	4.31 (2.08)[b]	3.92 (1.98)[b]	4.35 (2.09)[b]	4.33 (2.08)[b]	5.13 (2.27)[b]	106.41 (2.03)[b]	1: 2.28
T_5 – Fenpyroximate 5 EC @ 12.5 g a.i./ ha	4.38 (2.09)	3.13 (1.77)[a]	2.54 (1.59)[a]	2.06 (1.44)[a]	2.41 (1.55)[a]	2.54 (1.59)[a]	4.00 (2.00)[a]	109.42 (2.04)[a]	1: 2.87
T_6 – Hexythiazox 5.43 EC @ 10.86 g a.i./ ha	6.23 (2.50)	5.45 (2.33)[c]	4.92 (2.22)[c]	4.56 (2.14)[c]	5.14 (2.27)[c]	5.02 (2.24)[c]	5.80 (2.41)[c]	105.35 (2.02)[c]	1: 2.06
T_7 – Chlorfenpyr 10 SC @ 100 g a.i./ ha	6.86 (2.62)	6.02 (2.45)[d]	5.67 (2.38)[d]	5.07 (2.25)[d]	5.65 (2.38)[d]	5.60 (2.37)[d]	6.44 (2.54)[d]	104.25 (2.02)[d]	1: 1.66
T_8 – Propargite 57 EC @ 712.5 g a.i./ ha	4.46 (2.11)	3.21 (1.79)[a]	2.59 (1.61)[a]	2.10 (1.45)[a]	2.45 (1.57)[a]	2.59 (1.61)[a]	4.06 (2.01)[a]	109.29 (2.04)[a]	1: 2.60
T_9 – Untreated check	15.48 (3.93)	15.98 (4.00)[g]	16.20 (4.02)[g]	16.48 (4.06)[g]	16.78 (4.10)[g]	16.36 (4.04)[g]	14.77 (3.84)[g]	101.05 (2.00)[g]	1: 1.25
SEd	NS	0.0262	0.0285	0.0288	0.0183	0.0210	0.0262	0.0008	-
CV (%)	-	1.33	1.52	1.60	0.97	1.12	1.28	0.05	

NS: Non significant; PTC: Pre – treatment count; *Each value mean of three replications; Figures in parentheses square root transformed values; In a column, means followed by common letter(s) not significantly different by LSD at p= 0.05 %; #Yield data are mean of three replications and log transformed values; Cost Cane/ quintal is (Rs. 315)

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