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BIOEFFICACY OF SOME PESTICIDES AGAINST YELLOW MITE, *Polyphagotarsonemus latus* (Banks) INFESTING SESAMUM (*Sesamum indicum* L.)

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Abstract: *An experiment was carried out during kharif2014 to 2016 to evaluate the efficacy of some pesticides against yellow mite, Polyphagotarsonemus latus (Banks) infesting sesamum. Among the various pesticides tested one spray of the fenpyroximate 5 SC@ 0.06% was found most effective in reducing the yellow mite population. However, the maximum mite population was recorded in case of control. The highest sesamum yield was recorded in the treatment fenpyroximate 5 SC@ 0.06% with highest CBR.*

Keywords: *Yellow mite, Polyphagotarsonemus latus (Banks), sesamum, pesticides.*

Introduction

Sesame (*Sesamum indicum* L.) known as the *'queen of oil seeds'* is one of oldest oilseed crop grown in India. India ranks first in area under cultivation representing 30% of the world production and Rajasthan, Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka, Uttar Pradesh, West Bengal, Orissa, Punjab and Tamil Nadu are the major states of sesame cultivation. Among the various production constrains in profitable sesamum cultivation insect pests and mites are prime important. Among the mite pests yellow mite, *Polyphagotarsonemus latus* Banks which belongs to the family Tarsonemidae is considered as one of the important limiting factor. The yellow mite attack starts during the mid-monsoon (Last week of July to Mid-August) where there is a long dry spells with high temperature and high humidity. This condition proliferate the sudden increase in the population of yellow mite. The yellow mite attack young leaves and suck the plant sap by its mouth parts *i.e.* chelicerae. Due to this the photosynthetic activities of the plant is affected and ultimately reduces the crop yield. Therefore, there is a need of timely control of this mite pest which is a new emerging pest of sesame. The present study was therefore carried out to evaluate the effectiveness of different pesticides against yellow mite, *P. latus*infesting sesamum.

Materialsand Methods

The experiment was laid out at experimental farm of N.M. College of Agriculture, Navsari Agricultural University, Navsari during *Kharif*season of the year 2014, 2015and 2016 in randomized block design with seven treatments and each treatment were replicated three times. The sesame variety Gujarat Til-2 was sown through drilling in well prepared plots having the gross size of 2.25 x 1.50 m and net size of 1.35 x 1.20 m with the spacing of 45cm x 15 cm. All the recommended agronomic practices were followed to grow sesame crop. The pesticidal treatments were applied at the time of 50% flowering, where the population level of yellow mite, *P. latus* was found maximum. The yellow mite populations were recorded from top, middle and bottom leaves of top 50 cm. length of main shoot of five plants selected randomly from net plot area of each treatment.The yellow mite observations were recorded one day before the application of the treatment and 1, 3,7,10 and 14 days after the spraying. The treatment wise final yield per plot were recorded (kg per ha).The data thus obtained were subjected to $\sqrt{X+0.5}$ transformation and analyzed statistically for comparing treatments following analysis of variance technique and the results were interpreted at 5% level of significance.

Results and Discussion

The three year data on the efficacy of various treatments were presented year wise as well as pooled under different heading given as below:

***Kharif*-2014:** During the first year, the pre-treatment population of yellow mite ranging between 23.66 to 26.00 /leaf (Table 1) One days after the spray the yellow mite population was recorded lowest in case of the treatment T_5 (Fenpyroximate 5 SC@0.006%) (17.00 mites /leaf) and it was statistically superior over rest of the treatments. The maximum yellow mite population was recorded in the treatment T_7 (Control) (24.35 mites /leaf). Three days after the spray the lowest yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (10.00 mites /leaf), however it was statistically at par with T_3 (Profenofos 50 EC@0.05%)(10.68 mites /leaf). The maximum yellow mite population was recorded in T_7 (Control) *i.e.*24.33 mites /leaf. Seven days after the spray the maximum yellow mite population was recorded in the treatment control (23.67 mites /leaf). However, the lowest yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (0.06%) (1.33 mites /leaf) and was followed by treatments T_6 (Propargite 57 EC@0.057%) (4.34 mites /leaf), T_4 (Ethion 50 EC@0.05%) (5.34 mites/leaf) and T_3 (Profenofos 50 EC@0.05%)(5.00 mites/leaf). Ten days after the application of various treatments, the yellow mite population was zero in the treatment T_5 (Fenpyroximate 5 SC@0.006%) and it was statistically superior over rest of the treatments. The maximum yellow mite population was recorded in control (25.34 mites /leaf), while 14 days after the application of various treatments the yellow mite population remained zero in the treatment T_5 (Fenpyroximate 5 SC@0.006%) and was statistically superior over rest of the treatments. However, it was followed by treatments like T_1 (Imidacloprid 17.8SL@0.005%), T_3 (Profenofos 50 EC@0.05%) and T_6 (Propargite 57 EC@0.057%) in terms of reduction in the yellow mite population. The maximum yellow mite population was recorded in case of control. The data on overall mean of yellow mite population showed that the lowest number of mite population was noticed in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (6.66 mites /leaf) and was statistically superior over rest of the treatments. In terms of efficacy the next best treatment was T_3 (Profenofos 50 EC@0.05%)(4.34 mites/leaf). The maximum yellow mite population was recorded in control (24.20 mites /leaf). In terms of per cent reduction in yellow mite population over the control, the highest reduction of 72.47 % was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%). The maximum sesamum seed yield was recorded in case of treatment T_5 (Fenpyroximate 5 SC@0.006%) (740.00 kg/ha), while lowest seed yield was recorded in case of control (280.00 kg/ha).

***Kharif*-2015:** The data present in the Table 2 showed the effectiveness of various pesticides against yellow mite infesting sesamum. The pretreatment population of yellow mite was ranging between 42.66 to 46.00 mites /leaf. After one day of the spray, the maximum reduction in the yellow mite population was observed in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (33.33 mites /leaf) and was statistically superior over rest of the treatments. The maximum yellow mite population was recorded in case of control (43.00 mites /leaf). Three days after the spray, the maximum reduction in the yellow mite population was noticed in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (10.66 mites /leaf) and it was statistically superior over rest of the treatments. Seven days after the application of various treatments, the maximum reduction was observed in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (6.67 mites /leaf) and lowest in case of control (41.00 mites/leaf). Ten days after spray the treatment T_5 (Fenpyroximate 5 SC@0.006%) maintains its superiority over rest of the treatments in terms of reduction in yellow mite population (0.33 mite /leaf), while the maximum population of yellow mite was recorded in control *i.e.* 39.33 mites /leaf.

The data on overall mean on reduction of yellow mite population showed that the treatment T_5 (Fenpyroximate 5 SC@0.006%) was found statistically superior over rest of the treatments. In

terms of per cent reduction of yellow mite population over control, the maximum 72.27 % reduction was noticed in the treatment T_5 (Fenpyroximate 5 SC@0.006%). The maximum sesamum seed yield was also recorded from the treatment T_5 (Fenpyroximate 5 SC@0.006%) (792.00 kg/ha) which was 72.07 per cent higher than control.

***Kharif*-2016:** The yellow mite population before application of the treatments ranging between 30.34 to 33.00 mites /leaf (Table 3). One days after the application of various treatments the maximum reduction in the yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (20.68 mites /leaf) and it was statistically superior over rest of the treatments. Three days after the spray, the maximum reduction in the yellow mite population was observed in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (9.0 mites /leaf) and was found statistically superior over rest of the treatments, whileseven days after the spray, the maximum reduction in yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) and minimum in case of control. Ten days after the spray the treatment T_5 (Fenpyroximate 5 SC@0.006%) maintains its superiority over rest of the treatments. The maximum reduction in yellow mite population was recorded in case of fenpyroximate 5 SC@0.006% (3.68 mites /leaf) and was found statistically superior over rest of the treatments. Further, 14days after spray, the maximum reduction in the yellow mite population was observed in T_5 (Fenpyroximate 5 SC@0.006%) (0.33 mite /leaf) and was statistically superior over rest of the pesticidal treatments. The maximum yellow mite population was recorded in the control *i.e.* 34.67 mites/leaf. The data on overall mean of efficacy of various pesticidal treatments showed that maximum reduction in yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (7.94 mites /leaf) in comparison with the maximum yellow mite population in the T_7 (34.60 mite /leaf). The maximum per cent reduction in yellow mite population over the control was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (77.06 %). The maximum sesamum seed yield was also recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (755.00 kg per ha, whereas it was lowest in case of control (379.33 kg/ha).

Pooled: The pooled over data of the three years were presented in the Table 4. The pre-treatment population of yellow mite ranging between 32.89 to 34.00 mites/leaf. One day after the application of the treatments, the maximum reduction in the yellow mite population was recorded in treatment T_5 (Fenpyroximate 5 SC@0.006%) (25.34 /leaf) and it was found statistically superior over rest of the treatments. Three days after the spray, the maximum reduction was noticed in T_5 (Fenpyroximate 5 SC@0.006%) (9.89 mites/leaf) and maximum yellow mite population was observed in the control. Seven days after the application of pesticides the treatment T_5 (Fenpyroximate 5 SC@0.006%) (4.66 mites /leaf) was statistically superior over rest of the treatments. However,ten days after the application of various pesticidal treatments same trends were observed where treatment T_5 maintains its superiority over rest of the treatment in terms of reduction of yellow mite population (1.34 mites /leaf). Further, 14days after the application of pesticidal treatments, the maximum reduction in the yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (0.56 mites /leaf) and it was found statistically superior over the rest of the treatments while, the maximum yellow mite population was recorded in the Control (32.45 mites/leaf). The data on overall mean of efficacy of various treatments showed that maximum reduction in yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (8.35 mites /leaf) and minimum in the control (32.18 mites/leaf). The maximum per cent reduction in the yellow mite population was recorded in the treatment T_5 (Fenpyroximate 5 SC@0.006%) (74.75%). The maximum sesamum seed yield was also recorded in case of the treatment T_5 (Fenpyroximate 5 SC@0.006%) (752.33 kg/ha).The present study was

comparable with Tomar and Singh (2011) observed that application of propargite 57% EC @1000 ml./ha and fenpyroximate 5% EC @500 ml./ha was significantly more effective in reducing *T. urticae* population and also obtaining higher fruit yield of okra. Further, the results on the reduction in spider mite population in the present studies are also in agreement to those of Shah and Shukla(2014) and Pokle and Shukla (2015) who also found fenpyroximate 5% EC and propargite (0.05%) to be effective in managing the spider mite, *T. urticae* infesting gerbera and polyhouse tomato at Navsari, south Gujarat. In the present investigation imidaclopridalso showed medium level of effectiveness against *P. latus* which is closely supported by Naga *et al.* (2017) who also reported less population of *Tetranychus cinnabarinus* (Bois.) on okra when sprayed by imidacloprid 0.006%. Pathipati*et al.* (2002) reported that the fenpyroximate 5 EC @ 500 ml/ha recorded maximum mean mortality of yellow mite. Likewise, these findings are in accordance with those of Srinivasan*et al.* (2003), Sarkar*et al.*(2005), Reddy *et al.*(2006), Sarkar*et al.* (2008) and Negi and Gupta (2007) on different crops infested with yellow mite and spider mite pests.

The economics of various treatments are presented in the Table 4. The highest CBR was recorded in case of treatment T_5 (fenpyroximate 5 SC@0.006%) (12.32), while it was lowest in case of T_1 (Imidacloprid 17.8 SL@0.05%) (3.69). On the basis of the present study it can be concluded that for the effective control of yellow mite, *P. latus* infesting sesamum, one spray of fenpyroximate 5 SC@ 0.006% at one spray of at the time of 50 per cent flowering was found most effective with maximum seed yield and highest CBR.

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Table 1: Efficacy of various acaricides against yellow mite, *P. latus* infesting sesamum (*Kharif*2014)

Treatments	Dose	Pre-treatment count	Yellow mite population at						% populaton reduction over control	Seed yield (kg/ha)
			1 DAS	3 DAS	7 DAS	10 DAS	14 DAS	Mean		
T_1:Imidacloprid 17.8 SL (0.05%)	0.05	4.91 (23.67) *	4.37 (17.67)	3.58 (12.33)	2.60 (6.33)	1.67 (2.34)	1.73 (2.67)	2.79 (8.27)	65.82	480.00
T_2: Wettable Sulphur 80 WP (0.25%)	0.25	5.04 (25.00)	4.56 (16.80)	4.14 (16.66)	3.23 (10.00)	2.91 (8.00)	2.54 (6.00)	3.48 (11.49)	52.09	328.33
T_3:Profenofos 50 EC	0.05	5.08 (25.33)	4.18 (17.00)	3.34 (10.68)	2.34 (5.00)	1.76 (2.67)	1.34 (1.37)	2.59 (7.34)	57.27	582.00
T_4: Ethion 50 EC	0.05	5.01 (24.67)	4.41 (20.96)	3.48 (11.66)	2.41 (5.34)	1.67 (2.34)	1.55 (2.00)	2.70 (8.46)	65.04	340.00
T_5: Fenpyroximate 5 SC (0.06%)	0.006	5.11 (25.67)	4.45 (22.00)	3.23 (10.00)	1.34 (1.33)	0.70 (0.00)	0.70 (0.00)	2.08 (6.66)	72.47	740.00
T_6: Propargite 57 EC (0.1%)	0.057	5.11 (25.67)	4.56 (20.00)	3.57 (12.33)	2.18 (4.34)	1.85 (3.00)	1.64 (2.34)	2.75 (8.40)	65.28	400.00
T_7: Control		5.12 (25.67)	5.05 (24.35)	4.98 (24.33)	23.67 (24.91)	5.08 (25.34)	4.87 (23.35)	4.97 (24.20)	--	280.00
SEm±		0.04	0.057	0.077	0.116	0.097	0.152	0.099	-	24.17
CD		NS	0.177	0.238	0.359	0.300	0.469	0.308	-	74.48
CV		1.64	2.21	3.56	7.43	7.53	12.82	6.71	-	9.30

DAS=days after spray * Figures outside the parenthesis are √x+0.5 transformed value while figures in the parenthesis are original values or re-transformed value.

Table 2: Efficacy of various acaricides against yellow mite, *P. latus* infesting sesamum (*Kharif*2015)

Treatments	Dose	Pre-treatment count	Yellow mite population at						% population reduction over control	Seed yield (kg/ha)
			1 DAS	3 DAS	7 DAS	10 DAS	14 DAS	Mean		
T_1:Imidacloprid 17.8 SL (0.05%)	0.05	6.66 (44.00)	5.81 (33.33)	5.11 (25.66)	4.37 (18.67)	1.67 (2.33)	3.02 (8.66)	3.99 (17.73)	53.00	498.87
T_2: Wettable Sulphur 80 WP (0.25%)	0.25	6.59 (43.00)	6.03 (36.00)	5.69 (32.00)	4.66 (21.33)	2.73 (7.00)	4.37 (18.67)	4.69 (23.00)	39.04	349.40
T_3:Profenofos 50 EC	0.05	6.80 (45.66)	5.92 (34.67)	4.66 (21.33)	3.42 (11.33)	1.55 (2.00)	1.78 (3.00)	3.46 (14.46)	61.67	592.00
T_4: Ethion 50 EC	0.05	6.60 (43.00)	6.17 (37.67)	4.56 (20.33)	3.23 (10.00)	1.78 (2.67)	2.19 (4.33)	3.58 (15.00)	60.24	362.67
T_5: Fenpyroximate 5 SC (0.06%)	0.006	6.81 (46.00)	5.80 (33.33)	3.34 (10.66)	2.60 (6.67)	0.87 (0.33)	1.34 (1.33)	2.79 (10.46)	72.27	792.00
T_6: Propargite 57 EC (0.1%)	0.057	6.72 (46.66)	6.20 (38.00)	5.25 (27.33)	3.61 (12.67)	2.02 (3.00)	3.02 (8.67)	4.02 (17.93)	52.47	525.00
T_7: Control	--	(42.66) 6.56	6.59 (43.00)	6.46 (41.33)	6.44 (41.00)	4.94 (24.00)	6.31 (39.33)	6.14 (37.73)	--	300.00
SEm±		0.10	0.120	0.171	0.149	0.451	0.169	0.212	-	23.29
CD		NS	0.370	0.526	0.459	0.146	0.522	0.404	-	71.76
CV		2.67	3.42	5.91	6.37	11.38	9.33	7.28	-	8.26

DAS=days after spray * Figures outside the parenthesis are √x+0.5 transformed value while figures in the parenthesis are original values or re-transformed value.

Table 3: Efficacy of various acaricides against yellow mite, *P. latus* infesting sesamum (*Kharif*2016)

Treatments	Dose	Pre-treatment count	Yellow mite population at						% population reduction over control	Seed yield (kg/ha)
			1 DAS	3 DAS	7 DAS	10 DAS	14 DAS	Mean		
T_1:Imidacloprid 17.8 SL (0.05%)	0.05	5.67 (31.67)	5.11 (25.67)	23.67 (4.91)	20.00 (4.52)	4.05 (16.00)	3.34 (10.67)	4.38 (19.21)	44.47	492.89
T_2: Wettable Sulphur 80 WP (0.25%)	0.25	5.67 (31.66)	5.27 (27.34)	24.00 (4.94)	19.00 (4.41)	3.89 (14.66)	3.53 (12.00)	4.40 (19.40)	43.93	345.00
T_3:Profenofos 50 EC	0.05	5.61 (31.00)	5.04 (25.00)	19.00 (4.41)	15.00 (3.93)	3.18 (9.67)	2.55 (6.00)	3.82 (14.94)	56.82	510.00
T_4: Ethion 50 EC	0.05	5.61 (31.00)	4.84 (23.00)	15.34 (3.97)	10.00 (3.24)	2.67 (6.68)	1.85 (3.00)	3.31 (11.61)	66.44	345.00
T_5: Fenpyroximate 5 SC (0.06%)	0.006	5.58 (30.68)	4.60 (20.68)	9.00 (3.07)	6.00 (2.54)	2.03 (3.68)	0.87 (0.33)	2.62 (7.94)	77.06	755.00
T_6: Propargite 57 EC (0.1%)	0.057	5.55 (30.34)	5.01 (24.67)	15.67 (4.01)	9.67 (3.18)	2.52 (6.00)	1.86 (3.00)	3.31 (11.80)	65.89	470.00
T_7: Control		5.78 (33.00)	5.81 (33.34)	35.00 (5.95)	33.67 (6.01)	6.06 (36.34)	34.67 (5.93)	5.95 (34.60)	--	379.33
SEm±		0.08	0.054	0.081	0.076	0.130	0.125	0.190	-	25.52
CD		NS	0.167	0.249	0.235	0.402	0.387	0.282	-	78.64
CV		2.52	2.84	3.13	3.32	6.47	7.63	4.68	-	9.38

DAS=days after spray * Figures outside the parenthesis are √x+0.5 transformed value while figures in the parenthesis are original values or re-transformed value.

Table 4: Efficacy of various acaricides against yellow mite, *P. latus* infesting sesamum (Pooled)

Treatments	Dose	Pre-treatment count	Yellow mite population at						% population reduction over control	Seed yield (kg/ha)	Net Profit Over Control	BCR
			1 DAS	3 DAS	7 DAS	10 DAS	14 DAS	Mean				
T_1:Imidacloprid 17.8 SL (0.05%)	0.05	5.75 (33.11)	5.10 (25.55)	4.53 (20.56)	3.83 (15.00)	2.47 (6.89)	2.70 (7.34)	3.42 (15.06)	50.09	490.59	2684.80	3.69
T_2: Wettable Sulphur 80 WP (0.25%)	0.25	5.77 (33.22)	5.29 (26.71)	4.92 (24.22)	4.10 (16.77)	3.17 (10.67)	3.48 (12.00)	4.19 (18.07)	43.84	340.91	6122.40	8.95
T_3:Profenofos50 EC	0.05	5.82 34.00)	5.05 (30.55)	4.14 (17.00)	3.23 (10.45)	2.16 (4.78)	1.89 (3.45)	3.29 (13.24)	58.85	561.33	10274.40	10.67
T_4: Ethion 50 EC	0.05	5.74 (32.89)	5.14 (27.21)	4.01 (15.78)	2.96 (8.44)	2.04 (3.89)	1.87 (3.00)	3.20 (11.67)	63.73	349.00	6329.00	9.72
T_5: Fenpyroximate 5 SC (0.06%)	0.006	5.83 (34.11)	4.95 (25.34)	3.21 (9.89)	2.16 (4.66)	1.20 (1.34)	0.97 (0.56)	2.49 (8.35)	74.75	752.33	13916.60	12.32
T_6: Propargite 57 EC (0.1%)	0.057	5.79 (33.55)	5.262 (7.55)	4.281 (8.44)	2.99 (8.89)	2.13 (4.00)	2.17 (4.58)	3.36 (12.69)	60.56	465.00	8250.00	7.86
T_7: Control	--	5.83 (33.89)	5.82 (33.56)	5.80 (33.56)	5.78 (32.78)	5.36 (28.57)	5.70 (32.45)	5.69 (32.18)	--	320.00	--	--
SEm±		0.08	0.092	0.193	0.139	0.196	0.237	0.171	-	20.46	-	-
CD		NS	0.285	0.595	0.428	0.604	0.732	0.528	-	63.04	-	-
CV		2.42	2.75	4.63	5.70	8.25	9.69	6.20	-	7.56	-	-

DAS=days after spray * Figures outside the parenthesis are √x+0.5 transformed value while figures in the parenthesis are original values or re-transformed value.