

Effectiveness of insecticides against anar butterfly, *Virachola isocrates* Fabricius infesting pomegranate

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Pomegranate (*Punica granatum* Linnaeus) is an ancient favorite table fruit of tropical and sub tropical regions of world. In India, total cultivated area was about 107.3 thousand hectare with total production of 743.1 thousand tonne and productivity of about 6.9 tonne/ha. In Gujarat, total cultivated area was about 5.8 thousand hectares and production of about 60.3 thousand tonne with productivity of about 10.4 tonne/ha (Anon., 2012). Balikai (2000) reported that the crop was damaged by 32 insect and non insect pests. Different insect pests have been recorded to attack on pomegranate in India viz., anar butterfly, pomegranate borer, bark eating caterpillars, stem boring beetles, leaf defoliators, termites, whitefly, mealy bug, fruitfly etc. Among them, anar butterfly, *Virachola isocrates* Fabricius is a serious pest of pomegranate having wide host range including apple, ber, citrus, guava, pear and aonla. In order to study the effect of different synthetic insecticides against *V. isocrates*, the experiment was laid out in a Completely Randomized Design with three repetitions during the year 2011-12. Six year old pomegranate orchard available at Horticulture Farm, B. A. College of Agriculture, AAU, Anand was used for the study. Thirty trees were randomly selected having uniform size and growth. The respective insecticides were sprayed on three randomly selected and tagged trees. One tree considered as one repetition. For worked out % damage, the fruits infested by *V. isocrates* and total number of fruits were counted before one day and after 1, 2, 3 and 4 weeks of

application from five branches of each trees. The pooled results of four periods are presented and discussed for two sprays.

The results (Table 1) indicated that all the insecticidal treatments were significantly superior over control in suppressing the infestation of pomegranate butterfly. The results of first spray indicated that the treatment chlorantraniliprole 0.006% recorded the lowest fruit damage (11.83%) and was at par with flubendiamide 0.015% (12.89%). Both the treatments were significantly superior than the remaining treatments and proved most effective. The treatment novaluron 0.01%, thiodicarb 0.075% and endosulfan 0.07% noted 16.92, 17.55 and 18.53 per cent fruit damage, respectively and were statistically at par with each other. Malathion and lufenuron, lufenuron and dichlorvos were at par with each other in controlling the fruit damage. Metaflumizone registered higher fruit damage (26.39%) and it was at par with dichlorvos. More or less the same trend of effectiveness was found from the results of second spray.

Pooled over periods and spray results (Table 1) revealed that the treatments chlorantraniliprole and flubendiamide proved more effective than all the treatments which recorded lower fruit damage of 12.20 and 13.25%, respectively. Novaluron, thiodicarb, endosulfan and malathion recorded 17.28, 17.94, 18.89 and 20.75 per cent fruit damage due to *V. isocrates* and they were at par with each other. On the other hand, the highest (26.77%) damage was noticed in plants treated with

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Table 1 Effectiveness insecticides on fruit damage caused by *V. isocrates* in pomegranate.

Insecticides	Before Spray	Fruit damage (%) after spray		Pooled	Cost of two sprays (₹/ha)
		*First	*Second		
Endosulfan 35 EC 0.07%	29.97 (24.95)	25.50 (18.53)	26.02 (19.24)	25.76 (18.89)	1914
Dichlorovos 76 EC 0.05%	31.68 (27.58)	29.29 (23.93)	29.91 (24.86)	29.60 (24.40)	1244
Malathion 50 EC 0.05%	30.74 (26.13)	26.84 (20.39)	27.37 (21.14)	27.10 (20.75)	1430
Novaluran 10 EC 0.01%	28.35 (22.65)	24.29 (16.92)	24.83 (17.63)	24.56 (17.28)	5570
Lufenuron 5 EC 0.05%	31.78 (27.74)	28.33 (22.52)	28.84 (23.27)	28.58 (22.89)	4270
Flubendiamide 480 SC 0.015%	26.14 (19.41)	21.04 (12.89)	21.66 (13.62)	21.35 (13.25)	6870
Chlorantraniliprole 20 SC 0.006%	29.65 (24.47)	20.12 (11.83)	20.76 (12.56)	20.44 (12.20)	6251
Metaflumizone 22 SC 0.022%	33.69 (30.77)	30.91 (26.39)	31.40 (27.15)	31.16 (26.77)	3187
Thiodicarb 75 WP 0.075%	28.18 (22.30)	24.77 (17.55)	25.35 (18.33)	25.06 (17.94)	3646
Control (Water spray)	36.88 (36.02)	34.73 (32.46)	35.83 (34.27)	35.28 (33.36)	
S. Em. ±Treatment (T)	1.99	0.69	0.76	1.14	--
Period (P)	-	0.46	0.51	0.23	--
Spray (S)	-	-	-	0.16	--
T x P	-	1.44	1.60	0.51	--
T x S	-	-	-	0.32	--
S x P	-	-	-	0.72	--
T x P x S	-	-	-	1.01	--
C.D. at 5%T	NS	1.54	1.47	3.38	--
P	-	-	-	0.63	--
S	-	-	-	0.45	--
T x P	-	NS	NS	1.41	--
T x S	-	NS	NS	NS	--
S x P	-	-	-	NS	--
T x P x S	-	-	-	NS	--
C. V. %	11.22	9.38	10.20	20.71	--

Figures in parenthesis are retransformed value, those outside are arcsine transformed value
 * pooled over four weeks

metaflumizone and it was at par with lufenuron and dichlorovos.

It can be exposed that the chlorantraniliprole 20 SC @ 0.006 per cent and flubendiamide 480 SC @ 0.015 per cent were found more effective insecticides, whereas novaluron, thiodicarb, endosulfan and malathion emerged out as mediocre against *V. isocrates* on pomegranate. Lufenuron, dichlorovos and metaflumizone noticed the less effective against *V. isocrates* on pomegranate. Earlier, Dubey *et al.* (1993) and Balikai *et al.* (2011) proved the effectiveness of endosulfan 0.14 per cent and malathion 50 EC 0.1 per cent against pomegranate fruit borer however, these both insecticides falls under mediocre in their effectiveness against this pest in present investigation.

The economic of insecticidal treatments indicated that the highest (6870 ₹/ha) cost of application was found in the treatment of flubendiamide 0.015%

followed by chlorantraniliprole 0.006% (6251 ₹/ha). However, these two insecticides were found effective against this pest. The lowest (1244 ₹/ha) cost of application was in dichlorovos 0.05% but it was less effective against this pest.

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