



EVALUATION OF SOME BIORATIONALS AGAINST MUSTARD APHID *LIPAPHIS ERYSIMI* (KALT.)

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ABSTRACT

This study evaluates the insecticidal activity of few biorationals (methanolic extracts of plants/ plant parts), for their toxicity against *Lipaphis erysimi* (Kalt.) one of the most serious pest of mustard, especially late sown crop. The results reveal that thiamethoxam @ 0.33 g/l was superior than the castor seed and bhanga leaf extracts. Increase in seed yield was observed with castor seed extract treatment (1494.44 kg/ha) followed by *Cannabis sativa* extracts (1258.33 kg/ha), which was comparable to the thiamethoxam treatment (1216.66 kg/ha).

Key words: Mustard, *Lipaphis erysimi*, castor seed, cannabis leaf, thiamethoxam, cow urine, yield

Several plants possess pesticidal activity due to alkaloids, steroids and flavones. The three agro-ecological zones (subtropical comprising Jammu, parts of Udhampur and Kathua districts; intermediate consisting of Rajouri, parts of Udhampur and Kathua districts and temperate comprising Doda and Poonch districts) of Jammu region provide rich faunal diversity that can be explored for pesticidal activity. Being locally available such pesticidally active plants / plant parts may be easily utilized by farmers of Jammu region. Mustard / toria / Gobhi sarson is seriously infested by mustard aphid *Lipaphis erysimi* (Kalt.), inflicting economic losses to the crop (Patel, 2004; Reena Sinha et al., 2018). Farmers resort to the application of insecticides like imidacloprid, thiamethoxam, etc. for its management. This poses serious concerns to the aphid's natural enemies, pollinator bees, besides having several other environmental and ecological concerns (Wood and Goulson, 2017). This study evaluates the biopesticidal management options against *L. erysimi*.

MATERIALS AND METHODS

Experiments were carried at the Research Farm of Advanced Center for Rainfed Agriculture (ACRA), SKUAST-Jammu, (N32°37'50.86374", E74°55'0.19706"298 masl). Mustard was sown during November 1st week maintaining 30 cm row to row distance in 4 x 3 m² plots. Plant material viz., *Euphorbia hirta* whole plant, *Euphorbium microphyllum* whole plant, *Butea monosperma* leaves, *Ricinus communis*

seeds, *Cannabis sativa* leaves, *Nerium oleander* twigs, *Achyranthes aspera* whole plant, *Boerhavia diffusa* whole plant and *Vitex negundo* twigs, were collected from areas adjoining the research farm of ACRA, Dhiansar. These were shade dried and crushed. Besides, cow urine was also collected for preparation of extracts. Extracts of dried plant materials were prepared in cow urine as below:

One kg plant material were dipped in 2 l cow urine in a plastic container, covered with cotton cloth and left for 20 days. The material was stirred twice a day with wooden stick. After 20 days, it was strained and the liquid part was used as extract. This was taken as 100% and diluted further with water to make 2.5% for further use in the experiment. These extracts were assessed for their efficacy against mustard aphid along with the controls, cow urine and conventional chemical insecticides; Thiamethoxam 25% WG @ 0.33g /l and dimethoate @ 1.5 ml/l. All the treatments were replicated thrice. Observations on pre and post spray aphid counts (No./ ten cm twig) at 3, 5 and 7 days after spray were recorded, and % reduction computed (Shiberu and Negeri, 2014).

The aphid counts were recorded on the terminal shoot (10 cm) of five randomly selected plants from each plot before the application of treatments and at 3, 5 and 7 days after spray. The data were statistically analyzed as per the statistical guidelines (Gomez and Gomez, 1984). Pre spray and post spray counts at 3, 5

Table 1. Efficacy of biorationals against *L. erysimi* on mustard

S. No.	Treatments	Prespray count	Postspray 3 DAS	Postspray 5 DAS	Postspray 7 DAS	Seed yield (kg/ha)
1.	<i>Boerhaavia diffusa</i> roots	76.80 (8.82)	63.38 (8.02)	55.00 (7.48)	50.33 (7.16)	1036.11
2.	<i>Boerhaavia diffusa</i> stem + leaves	133.54 (11.59)	122.58 (11.11)	111.67 (10.61)	105.33 (10.31)	777.78
3.	<i>Ricinus communis</i> seeds	164.35 (12.85)	114.08 (10.72)	99.00 (9.99)	83.67 (9.19)	1494.44
4.	<i>Butea monosperma</i> leaves	105.51 (10.32)	95.78 (9.83)	88.00 (9.43)	86.33 (9.34)	663.89
5.	<i>Achyranthes aspera</i> whole plant	123.04 (11.13)	114.33 (10.74)	105.67 (10.32)	100.33 (10.06)	672.22
6.	<i>Euphorbium microphyllum</i> whole plant	112.86 (10.67)	88.33 (9.44)	76.67 (8.81)	71.33 (8.50)	919.44
7.	<i>Euphorbia hirta</i> whole plant	100.49 (10.07)	90.00 (9.54)	83.33 (9.18)	78.00 (8.89)	541.66
8.	<i>Cannabis sativa</i> leaves	151.02 (12.33)	118.00 (10.91)	105.33 (10.31)	91.67 (9.62)	1258.33
9.	<i>Nerium oleander</i> twigs	114.30 (10.72)	101.00 (10.08)	98.00 (9.93)	91.67 (9.61)	499.99
10.	<i>Vitex negundo</i> twigs	106.81 (10.38)	94.67 (9.77)	88.33 (9.45)	85.67 (9.31)	674.99
11.	Cow urine	117.56 (10.88)	108.00 (10.44)	102.00 (10.15)	103.00 (10.20)	574.99
12.	Thiamethoxam @ 0.33 g / L water	117.71 (10.89)	76.00 (8.77)	75.67 (8.75)	73.00 (8.59)	1216.66
13.	Dimethoate @ 1.5 ml / L water	146.66 (12.15)	129.00 (11.40)	124.00 (11.18)	121.33 (11.06)	755.55
	C.D. at 5%	(0.74)	(0.71)	(0.67)	(0.61)	103.82
	±S.E. (m)	(0.25)	(0.24)	(0.23)	(0.21)	35.75

DAS – Days after spray
On farm trials

Location	No. of aphids/10 cm twig			Seed yield (kg/ha)		
	Farmer's practice	Improved practice		Farmer's practice	Improved practice	
		<i>Cannabis</i> leaf extract	Castor seed extract		<i>Cannabis</i> leaf extract	Castor seed extract
Rajani Farm (Kathua)	86.2	32.7	26.3	640	820	860
BalbirDass (Vill. Saida)	90.2	34.5	30.6	620	800	840
Devi Singh (Lacchipur)	77.6	29.1	29.6	640	840	840
Mean	84.67	32.1	28.83	633.3	820	846.7

Reduction in incidence = 62.09% and 65.95% respectively in *Cannabis* leaf extract and castor seed extract; increase in yield = 29.47% and 33.68% respectively.

and 7 days after spray (DAS) were made. On farm trials were also conducted taking the two best treatments, during *rabi* 2016-17 at three locations in district Kathua, in collaboration with Krishi Vigyan Kendra,

Kathua. The experiment comprised three treatments (i) farmer practices (no insecticidal spray) and improved practices (*Cannabis* leaf extract and castor seed extract @ 2.5%). Thirty liters of spray solution was sufficient

to cover one kanal area (500 m²); as and when the aphid population crossed ETL of 50-60 aphids / 10 cm twig, it was sprayed with these solutions. Reduction in aphid population in response to sprays after 5 days and seed yield were recorded.

RESULTS AND DISCUSSION

Among the various biorationals assessed *Ricinus communis* seeds, extracted in cow urine gave maximum reduction in mustard aphid count (30.58%) after 3 DAS, which was comparable to that of thiamethoxam @ 0.33 g/l (35.37%) (Table 1). This was followed by *Cannabis sativa* leaves extract (21.86%) and *Euphorbium microphyllum* whole plant (21.85%). After 5 DAS, *R. communis* seed extract, (39.76%), followed by thiamethoxam (35.75%) were the best, while cow urine spray alone recorded 12.31% reduction. At 7 DAS, a similar trend was observed. A corresponding increased seed yield was also observed. Butanol extract of *Boerhaavia diffusa* roots was bioassayed on *Musca domestica* last instar larvae (Suri et al., 1982). The hexane and acetone extracts of *B. diffusa* twigs showed insecticidal activity against *Culex p. fatigans* and *Domestica nebulosa* (Deshmukh et al., 1982). Among the several insecticides assessed alone or in combination, imidacloprid 17.8 SL + NSKE 5% proved to be the most effective insecticide in controlling the aphid incidence followed by thiamethoxam 25% WG + NSKE 5% (Lal et al., 2018). The two best treatments, i.e. castor seed extract and cannabis leaves extract validated under On-Farm Trials (OFTs), at three farmers' fields confirmed the above results. The % reduction in aphid incidence over farmer's practice was 62.09% and 65.95%, respectively in *Cannabis* leaf and castor seed extracts. The seed yield too increased accordingly. Ashraf et. al. (2018) showed that the neem seed extracts recorded least aphids population /plant Ali et. al. (2010) observed

that the leaf extracts of neem followed by Mexican marigold reduced the aphids.

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