

Bio-efficacy of some plant leaf extracts against mustard aphid, *Lipaphis erysimi* Kalt. on *Brassica campestris*

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The effect of seven different botanical leaves, neem leaf extract (*Azadirachta indica*), Congress grass leaf extract (*Parthenium hysterophorus*) Lemmon grass leaf extract (*Cymbopogon citrates*), Bhang leaf extract (*Cymbopogon citrates*), Garlic leaf extract (*Allium sativum*), Punch phuli leaf extract (*Lantana camera*) and Marigold Leaf extract (*Tagetes erecta*) on mustard aphid was assessed in field at Student's Instructional Farm of Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.). The dead aphids were counted on tagged plants on 10 cm terminal shoot from 10 randomly selected plant par plot. The botanical extracts showed varying effect on aphid population and neem leaf extract (T₁) inflicted consistently the maximum level of aphid mortality (77.33% and 71.76%) followed by Punch phuli leaf extract (74.35% and 70.96%) and Garlic leaf extract (73.19% and 62.17%) during seventh day after spray in both year 2009-2010 and 2010-2011. All the treatments of plant leaf extracts showed insecticidal activity, but Indian neem leaf extract followed by Punch phuli leaf extract and Garlic leaf extract reduced the aphid population to a great extent.

Key words : Mustard aphid, Botanical leaves extract, Yellow sarson

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INTRODUCTION

Rapeseed-mustard is most important source of edible oil for human consumption. India is the second largest producer of rapeseed-mustard after China. To increase the productivity of this commodity various modern techniques of agricultural practices such as use of high yield varieties, and heavy manuring were used (Srivastava and Guleria, 2003). Rapeseed-mustard is highly vulnerable to attack of various insect pests. In this regard, (Bhakatia and Sekhon, 1989) reported more than three dozens insect pest associated with this crop. Amongthem, mustardaphid, *Lipaphiserysimi* Kalt.is thoroughly studied as serious insect pest of this crop. Most of the farmers are not aware with the effect of chemical pesticides and using most of the systemic and organic insecticides to control this insect pest. Injudicious and continuous use of insecticides may be deleterious to agro-ecosystem, public health and create residual problems. Therefore, in recent years many scientists have switched to use of botanicals as well as plant extracts instead of chemical insecticides for the control of insect pest of agricultural

importance. The botanicals are more compatible with the environmental components, eco-friendly with plant health and non-hazardous to human beings. Therefore, in present investigations the bio-efficacy of seven plant leaf extracts were tested against mustard aphid, *L. erysimion* yellow sarson variety YST-151.

RESEARCH METHODOLOGY

The efficacy of plant extracts against mustard aphid in yellow sarson variety YST-151 was conducted with eight treatments. Each treatment was replicated four times in Randomized Block Design. These treatments included, Neem leaf extract (*Azadirachta india*), Congress grass leaf extract (*Parthenium hysterophorus*), Lemmon grass leaf extract (*Cymbopogon citrates*), Bhang leaf extract (*Cymbopogon citrates*), Garlic leaf extract (*Allium sativum*), Punch phuli leaf extract (*Lantana camera*) and Marigold leaf (*Tagetes erecta*). The experiment was conducted at Students Instructional Farm, N.D. University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) during the two consecutive years from 2009-

2010 and 2010-2011. The leaf of test material collected from the field of horticulture in the N.D. University of Agriculture and Technology, Kumarganj, Faizabad (U.P.). The collected fresh leaves were, cleaned and dried in shade and stored in the Laboratory of the Department of Entomology of the University. After drying the plant leaves ground into powder with the help of mechanical grinder to get them in a powder form and finally passing through a 30 mesh sized sieve. The crude extracts from plant leaves were prepared by using 200 g of the powder materials in 500 ml of petroleum ether(40-60°C) crude extract was prepared in a sox let apparatus. The One sprays at the rate of 5 per cent of each concentration were applied against mustard aphid, *Lipaphis erysimi* at ETL (25-50 aphids/10 cm central twig) in field condition.

The per cent reduction of aphid population was recorded after 1, 3, 5 and 7 day of the spray. The observations were taken on the 10 cm terminal shoot of ten randomly selected plant/plot. To compare the effectiveness of plant leaf extracts, a control (water spray) was also run simultaneously.

RESEARCH FINDINGS AND ANALYSIS

Among different plant leaf extracts, Indian neem leaf extract significantly ($p < 0.05$) reduced maximum aphid population (77.33% and 71.76%) followed by Punch phuli leaf extract (74.35% and 70.96%) and Garlic leaf extract (73.19% and 62.17%) during seventh day after spray at each tested 5% concentration (Table 1 and 2) in both year 2009-2010 and 2010-2011. All the treatments of plant leaf extracts showed insecticidal activity. The different leaf extracts of plants affects various physiological systems of mustard aphid through different mechanisms. For confirmation of this statement, Day *et al.* (2005) made electron microscopic study of cuticular and antennal sensilla of mustard aphid

Table 1. Effect of different plant leaf extracts on aphid population during 2009-2010

Reduction of mustard aphid (Av. no./10 cm central twig/plot)

No.	Treatments	Concn. (%)	No. of spray	1 DAS		3 DAS		5 DAS		7 DAS	
				% reduction	Reduction	% reduction	Reduction	% reduction	Reduction	% reduction	Reduction
C ₁	Neem leaf extract	5	1	31.8 (5.65)	59.62 (1.75)	79.01 (1.71)	8.60 (3.05)	72.10 (58.51)	71.0 (2.75)	77.33 (51.65)	
C ₂	Cummins Press leaf extract	5	1	31.63 (9.39)	67.38 (8.05)	26.55 (31.01)	31.73 (6.89)	31.73 (51.23)	21.98 (53.7)	68.01 (55.60)	
C ₃	Punch phuli leaf extract	5	1	57.15 (11.3)	38.00 (6.20)	30.23 (33.21)	35.39 (5.98)	28.53 (11.0)	22.35 (1.78)	58.90 (50.15)	
C ₄	Garlic leaf extract	5	1	55.53 (11.8)	36.18 (6.85)	37.09 (35.16)	56.1 (1.56)	20.78 (1.61)	3.05 (1.30)	61.71 (55.72)	
C ₅	Control leaf extract	5	1	11.0 (6.91)	29.38 (5.75)	35.97 (35.75)	52.11 (1.26)	5.13 (3.97)	12.8 (3.60)	73.19 (58.89)	
C ₆	Punch phuli leaf extract	5	1	65.15 (8.4)	30.55 (5.31)	53.16 (15.18)	66.56 (8.19)	19.50 (1.71)	16.70 (1.7)	71.35 (59.59)	
C ₇	Neem leaf extract	5	1	51.28 (11.8)	10.73 (6.39)	19.86 (21.51)	33.50 (6.83)	31.78 (5.57)	29.55 (5.18)	71.38 (39.91)	
C ₈	Control (water spray)	5	1	61.73 (8.72)	18.35 (6.96)	21.86 (31.26)	52.93 (1.50)	19.10 (1.97)	52.10 (12.2)	21.96 (21.15)	
	S.E.			(0.18)	(0.18)	(0.35)	(0.17)	(0.17)	(0.17)	(0.23)	
	C.D. (10%)			(0.33)	(0.33)	(1.31)	(0.66)	(0.71)	(0.31)	(0.37)	
	C.V. (%)			(3.95)	(3.95)	(21.91)	(6.10)	(5.50)	(1.8)	(8.15)	

* Av. no./10 cm central twig/plot based on aphid counts on 10 plants during 10 days after each application
 ** Pro. variation: 1 Day and 3 day (3.35) *** Pro. variation: 5 days and 7 day (2.85)
 † Error within treatments and between years (1/1) (1/1) (1/1) (1/1) (1/1) (1/1) (1/1) (1/1) (1/1) (1/1) (1/1)

Table 24. Bio efficacy of plant leaf extracts against mustard aphid on Brassica campestris. (Av. no./10 cm² of leaf area) (W/F/S spray)

Treat. No.	Plant extracts	Concn. (%)	No. of spray	Pre-treatment**			Post-treatment***			Days after spray (DAS)	% Reduction	S.E.D.
				DAS	% Reduction	3 DAS	5 DAS	% Reduction				
1	Neem leaf extract	5	1	89.35 (9.17)	78.75 (1.99)	37.75 (6.56)	55.75 (7.96)	29.73 (5.73)	65.77 (53.87)	23.58 (1.97)	7.76 (5.75)	
2	Curry leaf extract	5	1	64.58 (8.13)	38.50 (6.27)	30.53 (5.56)	59.37 (6.97)	25.58 (5.70)	67.06 (57.70)	27.55 (5.00)	62.52 (52.26)	
3	Mustard leaf extract	5	1	57.03 (7.58)	73.50 (5.60)	33.73 (5.80)	77.73 (10.28)	30.70 (5.55)	76.67 (73.02)	29.38 (5.75)	78.50 (77.77)	
4	Chickpea leaf extract	5	1	77.53 (8.77)	56.53 (7.55)	77.58 (6.92)	33.37 (35.25)	37.73 (6.75)	77.57 (73.57)	37.70 (5.67)	55.59 (48.27)	
5	Carrot leaf extract	5	1	74.55 (7.07)	38.53 (6.28)	29.28 (5.75)	70.67 (39.55)	20.53 (7.57)	58.87 (50.70)	18.55 (7.36)	62.77 (52.09)	
6	Mustard leaf extract	5	1	39.50 (6.32)	25.75 (5.09)	77.20 (7.19)	56.66 (78.33)	77.65 (3.88)	62.62 (52.72)	17.78 (3.75)	70.96 (57.73)	
7	Water leaf extract	5	1	68.55 (8.37)	53.53 (7.55)	77.23 (6.90)	37.73 (33.78)	37.68 (5.85)	79.20 (77.60)	37.58 (6.77)	75.79 (72.27)	
8	Control (water spray)		1	75.68 (5.80)	70.77 (6.77)	72.08 (6.52)	77.79 (73.78)	72.75 (6.53)	77.77 (6.07)	72.20 (6.53)	77.57 (75.60)	
	S.E.D.			(1.58)	(1.58)	(1.72)	(2.00)	(0.22)	(2.22)	(0.08)	(1.5)	
	C.D. (0.05)			(5.80)	(6.25)	(6.36)	(5.88)	(0.67)	(5.52)	(0.27)	(3.57)	
	C.V. (%)			(2.67)	(2.88)	(7.72)	(0.38)	(0.07)	(9.59)	(0.10)	(5.16)	

* Av. no./10 cm² of leaf area (W/F/S spray) of aphid colonies on 7th day after treatment. ** Pre-treatment. *** Post-treatment. Days after spray (DAS)

after spraying the leaf extract of *Eupatorium adenophorum* and found prominent swellings in some sensilla and shrinkage in others. Other observations on the successful use of neem (*Azadirachta indica*) for control of aphid on various crops are Tang *et al.* (2002) on *Toxoptera citricida* on citrus; West and Mordue (2004) on *Rhopalosiphum padi* on cereals and Lowery and Isman (2006). *Nasonovia ribisnigri* on lettuce.

Therefore, the present study revealed that all the treatments showing insecticidal activity against mustard aphid but the leaf extract of Indian neem leaf extract followed by Punch phuli leaf extract and Garlic leaf extract have been proved the best spray for managing *Lipaphis erysimi* population and achieving high yield of yellow sarson.

LITERATURE CITED

- Bakhetia, D.R.C. and Sekhon, B.S. (1989).** Insect-pests and their management in rapeseed-mustard. *J. Oilseed Res.*, **6**: 269–299.
- Dey, S., Sinha, B. and Kalita, J. (2005).** Effect of *Eupatorium adenophorum* Spreng leaf extracts on the mustard aphid, *Lipaphis erysimi* Kalt: a scanning electron microscope study. *Microscopic Res. Technique.*, **66**: 31–36.
- Lowery, D.T and Isman, M.B. (2006).** Insect growth regulating effects of neem extract and azadirachtin on aphids. *Entomol. Exp. Appl.*, **72**: 77–84.
- Srivastava, A. and Guleria, S. (2003).** Evaluation of botanicals for mustard aphid, *Lipaphis erysimi* (Kalt.) control in *Brassica*. *Himanchal J. agric. Res.*, **29**: 116–118.
- Tang, Y.Q., Weathersbee, A.A. and Mayer, R.T. (2002).** Effect of neem seed extract on the brown citrus aphid (Homoptera: Aphididae) and its parasitoid *Lysiphlebus testaceipes* (Hymenoptera: Aphididae). *Environ. Entomol.*, **31**: 172–176.
- West, A.J. and Mordue, A.J. (2004).** The influence of azadirachtin on the feeding behaviour of cereal aphids and slugs. *Entomol. Exp. Appl.*, **62**: 75–79.

