

Bioefficacy of plant extracts against mustard aphid and their natural enemies

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Received: 14.03.2019; **Accepted:** 18.05.2019**ABSTRACT**

The Bio-efficacy of eleven plant extracts namely viz. Neem Kernel; Rhizome of Ginger; Leaves of Datura, Gajarghas, Harsingar, Oak and Latjeera; Bulb of Garlic and Onion; Flowers of Chrysanthemum and Fruits of Chilli in the concentration of 5 percent and imidacloprid @ 40 g ai/ha was tested against mustard aphid, *Lipaphiserysimi* and their effect on *D. rapae* and Coccinellid beetle were tested in the Department of Entomology, College of Agriculture, Gwalior (M.P.). All the tested plant materials and imidacloprid @ 40 g ai/ha were effective significantly in reducing the aphid population over control. The aphid population in treated plots ranged from 7.2 to 40.0 as against 85.4 aphid/twig in untreated control. Among the plant material, three sprays of Neem Kernel were found most effective followed by three sprays of chilli fruits. All the plant extracts were found significantly safer to *D. rapae* and coccinellid beetle in comparison to insecticide (imidacloprid).

Figure : 00

References : 09

Table : 01

KEY WORDS : Coccinellid beetle, *Diaeretiellarapae*, *Lipaphiserysimi*, Mustard Aphid, Plant extracts.**Introduction**

Mustard crop (*Brassica* spp.) is grown both in subtropical and temperate countries. In India it occupies the third position with regard to average production of rapeseed and mustard in the world. In M.P. rapeseed mustard is grown in 791 thousand hectares area with annual production of 849 thousand tons and average productivity of 1075 kg/ha^{1,2}.

Rapeseed-mustard is highly vulnerable to attack by various insect pests. More than three dozen insect pest were associated with this crop³. Among them, mustard aphid, *Lipaphiserysimi* is a major insect pest of this crop. Most of the farmers are not aware with the ill effects of chemical pesticides and still using most of the systemic 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 instead of chemical insecticides for the control of insect pest of agricultural importance. The botanicals are more compatible with the environmental components, eco-friendly and non-hazardous to human beings. Therefore, the present investigations were conducted on bio-efficacy of plant extract against mustard aphid, *L. erysimi* and

their effect on natural enemies.

Materials and Methods

Bio-efficacy of eleven plant extracts was evaluated against mustard aphid, *Lipaphiserysimi* and its parasitoid, *Diaeretiellarapae* and predator, *Coccinella septem punctata* under field condition in the experimental area of the Department of Entomology, College of Agriculture, Gwalior (M.P.).

Experiment was laid out in randomized block design with three replications in a plot size of 3.0mX2.1m. Normal agronomical practices were followed for raising the crop. Eleven plant materials (Table-1) were collected locally and five percent solution of each plant material was prepared by mixing the grounded plant material into the water for spraying.

First spray of different treatments was given at the initiation of aphid infestation and second and third sprays were given at 15 days interval. The aphid population was recorded on 10 terminal twigs (10 cm) per plot at 24 hours before and 1, 7 and 14 days after each spray. Population of *Diaeretiella rapae* (mummified aphid) was also counted with aphid Population of *Coccinellid* beetle and recorded on 10 plants selected randomly. Grain yield from each plot was also recorded. The data were subjected to statistical analysis after transformation.

TABLE-1 : Effect of different plant extracts on aphid, *Diaeretiella rapae*, Coccinellid beetle and grain yield

S. No.	Treatments	Number of aphids/ 10cm twig	Number of <i>D. rapae</i> (mummified aphids) /10cm twig	Number of <i>Coccinellid</i> beetle/ plant	Grain yield kg/ha
1.	Neem Kernel extract 5%	16.3 (4.04)*	2.3 (1.51)	0.5 (0.72)	1512.8
2.	Ginger Rhizome extract 5%	36.1 (6.00)	5.7 (2.37)	0.7 (0.84)	1090.0
3.	Datura Leaves extract 5%	38.0 (6.15)	6.9 (2.63)	0.7 (0.85)	1150.0
4.	Garlic Bulb extract 5%	34.3 (5.85)	5.9 (2.42)	0.9 (0.94)	1188.0
5.	Onion Bulb extract 5%	40.0 (6.32)	7.2 (2.67)	0.7 (0.81)	938.9
6.	Gajarghas extract Leaves 5%	35.9 (5.98)	5.9 (2.43)	0.9 (0.93)	1128.9
7.	Chrysanthemum Flowers extract 5%	36.6 (6.03)	6.6 (2.56)	1.0 (1.01)	1183.3
8.	Harsinga reextract Leaves 5%	37.4 (6.10)	6.2 (2.49)	0.8 (0.88)	1153.3
9.	Oak Leaves extract 5%	38.8 (6.21)	7.1 (2.65)	0.6 (0.79)	925.0
10.	Latjeara, Leaves extract 5%	35.3 (5.92)	6.1 (2.46)	0.9 (0.92)	1056.7
11.	Chilli Fruit extract 5%	20.9 (4.56)	3.3 (1.81)	0.4 (0.65)	1458.9
12.	Imidachloprid 40 g a.i./ha	7.2 (2.68)	1.0 (0.96)	0.2 (0.44)	1815.0
13.	Control	85.4 (9.24)	10.2 (3.17)	1.7 (1.28)	829.4
	SE_(M)±	(0.14)	(0.09)	(0.03)	27.45
	CD at 5%	(0.40)	(0.26)	(0.10)	80.14

* Figures in parenthesis are \sqrt{n} transformed value

Result and Discussion

Effect on population of aphid, *L. erysimi*.

On the basis of mean data of nine observations recorded on aphid population at different dates after application of different treatments, it was revealed that all the treatments were effective significantly over control in reducing aphid population. Among treated plots it ranged from 7.2 to 40.0 as against 85.4 aphid/twig in uncontrolled plot (Table-1). Maximum reduction in aphid population (91.6 percent) over control was recorded in plots treated with three sprays of Imidachloprid showed their higher efficacy against mustard aphid. Among plant materials maximum reduction in aphid population 80.9% was recorded by three sprays of neem kernel extract followed by three sprays of chilli fruit extract. Neem seed kernel

extract was effective against mustard aphid^{4,5,7}.

During present investigation, extract of ginger rhizome, datura leaf, onion bulb, gajarghas leaf, chrysanthemum flower, leaf of harsingar, Oak, and latjeara were also found effective in reducing the aphid population significantly. Ginger rhizome was effective in reducing the aphid population⁹. Extract of onion bulb and Chrysanthemum were effective against aphid⁴ which corroborate the present finding. Gajarghas leaf extract was also reported effective against aphid^{4,6}. Similar to the present finding datura leaf extract was also reported effective against aphid⁷.

Effect on population of *Diaeretiellarapae*

On the basis of nine observations recorded on population of *Diaeretiellarapae* (mummified aphids), it was

observed that *D. rapae* population in all the treated plots with plant extracts was significantly higher than the plot treated with insecticide.

Among different plant material maximum number of *Diaeretiellarapae* (mummified aphids), was recorded in plots treated with three sprays of onion showed their less toxicity to *Diaeretiellarapae* followed by three sprays of Oak, Datura and Chrysanthimum.

Effect on population of *Coccinellid beetle*

On the basis of nine observations recorded on population of *Coccinellid beetle*, maximum beetle recorded in plots treated with three sprays of Chrysanthemum

showed their less toxicity to *Coccinellid beetle* followed by three sprays of garlic and gajarghas.

Effect on seed yield

Significantly higher yield was obtained in all the treated plots as compared to control. Maximum seed yield (1815.0 kg/ha) was recorded in plots treated with three sprays of imidacloprid followed by three sprays of neem seed kernel, three sprays of chilli and three sprays of gajarghas. It was observed that the 54.3% yield loss may be avoided by three sprays of imidacloprid and 45.2% yield loss may be avoided by three sprays of neem kernel extract.

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