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OriginalArticle

Efficacy of cypermethrin, bifenthrin and azadirechtin against crop infesting aphid species of *Lipaphis erysimi* (katenbach) and *Mhyzus persicae* (sulzer) on cauliflower and potato plants

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Abstract
This study was designed to evaluate the toxicity of three insecticides: *viz.* cypermethrin, azadirachtin and bifenthrin against two important crop infest aphid species *Lipaphis erysimi* (Katenbach) and *Myzus persicae* (Sulzer), reared on cauliflower and potato plants respectively. By brining leaves with tested aphid population of the vegetable plants, residual film technique (RFT) was applied. Cypermethrin was found to be most toxic with LC_{50} as 14.30 µg cm^{-2} for *L. erysimi* and 14.12 µg cm^{-2} for *M. persicae*. Bifenthrin showed moderate toxic with LC_{50} as 28.55 µg cm^{-2} for *L. erysimi* and 29.22 µg cm^{-2} for *M. persicae*. Among insecticides, azadirachtin showed highest toxicity with LC_{50} as 0.33 µg cm^{-2} for *L. erysimi* and 0.31 µg cm^{-2} for *M. persicae*.

Key words: Cypermethrin, bifenthrin, azadirachtin, *Lipaphis erysimi*, *Myzus persicae.*

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INTRODUCTION

Approximately 4,000 species of aphids are found in this world which came from 8 different sub-families. Aphids belong to order hemiptera, family; aphididae. Life cycle and hosts of aphids are different indifferent class of aphid. There are various aphids pest of crops including the cotton / melon aphid, (Lindquest and Richard, 1991). Development of insects pest resistant varieties is an important strategy of integrated pest management. Plant resistance development is an effective approach for the formulation of a rational policy of pest control (Bhatti *et al.,* 1976). Maxwell *et al.,* 1972 and Van Dinther, 1972 had advocated the use of resistance varieties as one of the most suitable methods of controlling insect pests.

Aphid feeding causes the transmission of plant viruses (Rana, 2005) and secondary pathogen infection on aphid honeydew (Gray and Gildoo, 2003). Galls on roots, stems or leaves are due to the causes of toxic action of salivary secretions by aphids (Toper Kaygin *et al.,* 2008).Against mustard aphid under outbreak situation, chemical control would contain the first line of defense. By the use of systemic insecticides more than 95% mortality of aphids is possible but within a period of 2 to 3 weeks with greater multiplication rate of the population attains similarity (Busvine, 1980; Singh *et al.,* 1984;). In direct application, through ingestion or as vapour, aphids take up insecticide. In the current study, residual film method (indirect application) was applied to determine three insecticides: *viz.* cypermethrin, bifenthrin and azadirachtin on important aphid species, *Lipaphis erysimi* (Katenbach), *Myzus persicae* (Sulzer).

MATERIALS AND METHODS

In Multan, one day after application, aphid population of LC_{50} were observed in plants treated with cypermethrin, bifenthrin and azadirachtin. Aphid population of *Lipaphis erysimi* and *Myzus persicae* were rared on cauliflower and potato plants respectively. In Laboratory, leaves of plants were brined with test aphids using residual film technique

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(Busvine, 1971). Serial dilutions of insecticides in acetone was made and 0.1ml of each insecticide was applied on 2.5cm circular leaf in petridish of about 9cm in diameter. With the help of four doses having three replications, each insecticide was tested. The doses were 28.36, 20.25, 14.10, 7.12 µg cm^{-2} for cypermethrin (95%) technical), 52.78, 34.58, 18.27, 12.13 µg cm^{-2} for bifenthrin (95% technical) and 0.82, 0.68, 0.42, 0.21 µg cm^{-2} for azadirachtin (nimbicidin 0.3%).

Leaf surface having acetone was used as control group. With the help of the cotton bud, petiole of the leaf was wrapped. After 24 h of treatment, the mortality of the aphid was recorded by using Abbott's formula (Abbott, 1925), corrected mortality (%) was calculated employing probit regression (Busvine, 1971).

RESULTS

The LC_{50}, 95% confidence limits, regression equations and chi-square values are represented. Cypermethrin was found to be most toxic with LC_{50} as 14.30 µg cm^{-2} for *Lipaphis erysimi* and 14.12 µg cm^{-2} for *Myzus persicae* of aphid population. Bifenthrin showed moderate toxicity in this experiment. LC_{50} as 28.55 µg cm^{-2} for *L. erysimi* and 29.22 µg cm^{-2} for *M. persicae* of aphid population was found due the application of bifenthrin. LC_{50} due to azadirachtin for *L. erysimi* was found to be 0.33 µg cm^{-2} while for *M. persicae* was found to be 0.31 µg cm^{-2} in this experiment (Table I). The present study represent that azadirachtin have high potential of toxicity. No significant heterogeneity was to be found in all cases of the experiment.

Table I: Statistical analysis of cypermethrin, bifenthrin and azadirachtin insecticides on *Lipaphis erysimi* and *Myzus persicae* (adult aphid) species after application of 24 hours.

Name of Insecticide	Aphid species	LC_{50} ug cm^{-2}	95% confidence limits		Regression equation	x^2 at 2df
			Lower	Upper		
Cypermethrin	*L. erysimi*	14.30	12.72	16.48	Y=0.4242099+4.184226X	1.07
	M. persicae	14.12	12.23	16.32	Y=1.261158+3.561761X	0.12
Bifenthrin	*L. erysimi*	28.55	18.44	28.58	Y=2.08871+2.174855X	1.18
	M. persicae	29.22	18.49	29.07	Y=2.2429+2.08718X	0.34
Azadirachtin	*L. erysimi*	0.31	0.34	0.63	Y=3.120188+2.816677X	0.44
	M. persicae	0.31	0.32	0.61	Y=3.118208+2.808573X	04.46

DISCUSSION

Kerns and Gaylor (1992 ab) used cypermethrin on *L. erysimi* and found to be most toxic. Some other authors reported the toxic effects of cypermethrin to *M. persicae* (Natwich *et al.,* 1996: Boiteau and Singh, 1999). Rana *et al.* (2007) studied bifenthrin 10EC, imidacloprid 200SL and carbosulfan 20EC and found better results against mustard aphid as compared to control plots.

A variety of insecticides such asmetasystox (0.10%), dimethoate (0.03%), fenthion (0.70%) and phosphamidon (0.02%) as foliar spray against aphid population of mustard gave 58.0 to 92.6% mortality after 72 h of application when compared with check (14.4%) (Sharma and Joshi, 1972).

In some studies Tang *et al.* (2001) found that LC_{50} of azadirachtin of adult aphid population (3882 ppm at 2d and 32.38 ppm at 4^{th}day of post treatment) was greater than that of population of aphid nymphs (42.92 ppm at 2 d and 4.01 pp at 4 d post treatment). In one study, Lowery and Isman (1995) found that neem-based insecticides have minor influence on a varity of organisms such as parasitoids, predators and honey bees.

Conclusion

In the present experiment, the LC_{50} values for azadirachtin were found to be lower as compared to the other insecticides and offered better results.

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