

Regular Article

Insecticidal Activity of Ethanolic Extract of *Mentha piperata* Leaves against Cotton Aphid *Aphis gossypii* Glover on Okra Crop (*Abelmoschus esculentus*)

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ABSTRACT: Different concentrations of ethanolic extract of *Mentha piperata* leaves were tested against the adult apterous females and third instar nymphs of aphid *Aphis gossypii* infesting okra crop. This aphid is a major limiting factor for the profitable cultivation of okra. The aphicidal activity of *Mentha piperata* extract was examined on *Aphis gossypii* with the counted number of third instar nymphs and adult viviparous females. The 2% concentration of the extract has resulted in 100% mortality of nymphs and adults in 72hrs. and 96hrs. time period respectively. The lower concentration of 1.5% also caused 100% mortality but required more time of 96hrs. At 2% concentration the LT_{50} value for nymphs and adults were 13.37 and 26.66hrs. The extract of *M. piperata* can be used as a potent insecticide for the control of cotton aphid *A. gossypii* infesting okra plants.

Key words: Cotton aphid, *Aphis gossypii*, Insecticidal activity, *Mentha piperata*, okra crop

Introduction

Aphis gossypii Glover is a polyphagous and major pest of many vegetables and vector dasheen mosaic disease (Shafia and Hunter, 1998). Among those vegetables okra is an important crop found in India (Nath and Singh, 2008, Yadav *et al.* 2008) which contains high protein, carbohydrates and minerals (Dhanalaksmi and Mallapur, 2008) is infected by aphid *Aphis gossypii* Glover. However the use of chemical pesticides has been most potent method of controlling the pest but increasing the use of synthetic pesticides in agriculture leads to serious problems like environment pollution, health hazards and insect resistance to insecticides (Sahayaraj and Paulraj, 1999 and Yadav *et al.*, 2008).

Chemical insecticides used in agriculture are neurotoxicants which affect all living organisms in different manner (Jayakumar *et al.*, 2008). The whole range of living organisms including natural enemies, pollinators, domestic and wild animals, birds, fish and other aquatic organisms and even soil fauna are affected by the use of insecticides in agriculture. So that the essential oil have more attention as sources of useful insect-active compounds because of the necessity of finding safer insecticides (Zhu *et al.*, 2003). The increasing concern for environmental safety and global demand for pesticide residue free food have evoked keen interest to use eco-friendly products in pest control which are easily biodegradable and do not leave any harm, toxic residue in fruits, besides conserving the natural enemies (Gawri *et al.*, 2002).

Present study therefore undertaken to record the aphicidal effect of ethanolic extract of *M. piperata* leaves against aphid *Aphis gossypii* okra plants.

Material and Method

The fresh leaves of the plant *M. piperata* were collected and washed thoroughly under tap water and dried in shade. After drying the plant material was powdered in an electric grinder and sieved through the fine muslin cloth. This powder (10gm.) was extracted serially in glass soxhlet apparatus with 200ml of ethanol as a solvent. The extraction was carried out for 20-24hrs. Finally the extracted material was transferred to a small beaker for complete

evaporation of the solvent. The crude extract was diluted in distilled water to prepare stock solution of 8% concentration. The required concentrations 1, 1.5, and 2% of test solution were prepared by diluting the stock solution with distilled water.

The observations were made after every 12hrs. T corrected percentage of mortality was calculated according to Abbott's (1925) formula. The data were subjected to probit analysis (Finney, 1952) for calculating regression equation and fiducial limits. LT_{50} values were calculated by graphical superimposition method as described by Marwaha and Sarup (1978).

Results and Discussion

The ethanolic extract of leaves of *M. piperata* results significantly, as it caused 71% mortality of 3rd nymphs of aphid *Aphis gossypii* at 1% conc. after 72hrs. A concentration of 1.5% was also effective, as it caused 100% mortality after 96hrs in nymphs. The corrected percentage of mortality caused by 2% of stock solution after 12, 24, 48, 72, and 96hrs were 44.87%, 55.84%, 75.00%, 100%, and 100% respectively. The corrected percentage of mortality at 1%, 1.5% and 2% was found to be 62.82 and 80.76 and 74.35 and 94.87 and 80.76 and 100% after 72 and 96hrs. respectively in adults viviparous females. The LT_{50} values were observed to be 42.42, 24.97, 13.37hrs. for nymphs and 55.07, 46.25, 26.66hrs. for adults respectively at 1%, 1.5% and 2% concentrations of *M. piperata* leaf extract. The number of young ones produced after the spray of 1.00, 1.5, 2.0% conc. after 48hrs, 10.00, 8.00 and 5.00 as compared to 16.50 in control. All the apterous females died in 96 and 72hrs. after single sprays of extract at a concentration of 1.5 and 2% respectively.

Sampson *et al.* (2005) has reported the insecticidal effect of *M. piperata* against adult of *Lipaphis pseudobrasicae*. Mumtaj *et al.* (2006) have recorded toxic effect of 5% leaf extract of *Mentha piperata* against eggs of *Chilo auricillus*. Sivropoulou *et al.* (1995) also examined the efficacy of mint essential oils against antimicrobes. Bhatnager (1995) observed the effect of various plant extract on the development *Chilo partellus*. Latha and Divakar (1997), Nauen *et al.* (1998) and Dheenadayalan (1999) have reported that application of aqueous extract of botanicals has reduced aphid population by 40 to 70%. Vaidya (1996) also observed effect of *Mentha arvensis* on mustard aphid *Lipaphis erysimi* where 90.04% mortality was observed at 50% concentration.

Zhou and Liang (2003) also reported repelling and controlling effect on *Aphis gossypii* by using alcoholic extract of eight plant species. Zhou *et al.* (2004) also observed that volatile oils had distinct repelling effect on aphid *Aphis gossypii*. Bagavan *et al.* (2009) evaluated some plant extracts against *Aphis gossypii*.

In the present study the efficacy of ethanolic extract of *Mentha piperata* has shown the remarkable insecticidal properties against the viviparous females and 3rd instar nymphs of cotton aphid *Aphis gossypii* for protecting the okra crop.

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Table-1: Effect of ethanolic extract of *Mentha piperata* leaves against third instar nymphs of aphid *Aphis gossypii*.

Concentration (%)	Corrected % mortality after					LT ₅₀ * Value (h)	²	Fiducial limit	Regression equation
	12h	24h	48h	72h	96h				
Control	2.5	3.75	5.00	5.00	6.25				
1.0	32.05	42.85	56.57	71.62	86.84	42.42	0.314	0.484-0.676	Y=0.017X+38.27
1.5	34.61	48.05	68.42	86.84	100.00	24.97	0.015	0.590-0.770	Y=0.020X+38.24
2.0	44.87	55.84	75.00	100.00	100.00	13.37	0.038	0.666-0.834	Y=0.028X+38.26

* Time required for 50% mortality

Table 2: Effect of ethanolic extract of *Mentha piperata* leaves against adult apterous viviparous females of aphid *Aphis gossypii*

Concentration (%)	Corrected % mortality after					LT ₅₀ * value (h)	²	Fiducial limit	Regression equation
	12h	24h	48h	72h	96h				
Control	00.00	1.25	2.50	2.50	3.75				
1.0	20.00	37.50	47.43	62.82	80.76	55.07	0.056	0.394-0.586	Y=0.033X+39.98
1.5	26.25	40.00	51.89	74.35	94.87	46.25	0.134	0.474-0.666	Y=0.011X+39.38
2.00	36.25	45.00	61.01	80.76	100.00	26.66	0.049	0.558-0.742	Y=0.042X+39.97

* Time required for 50% mortality

Table 3: Effect of ethanolic extract of *Mentha piperata* leaves on the fecundity of adult apterous viviparous females of aphid *Aphis gossypii*

Concentration (%)	Fecundity after treatment			
	24h	48h	72h	96h
1.0	8.00	10.00	16.00	22.50
1.5	6.00	8.00	12.00	-*
2.0	3.50	5.00	-	-
Control	11.50	16.50	21.50	26.00
SE \pm	1.09	1.58	1.67	2.89
CD at 5%	2.07	2.49	3.16	5.47

* All treated females died

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