

Dissipation of Malathion on Fenugreek (*Trigonella foenum-graceum* L.)

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Received: 15 June 2004/Accepted: 28 August 2006

Fenugreek (*Trigonella foenum-graceum* L.), commonly known as metha, is an annual herbaceous plant belonging to the family leguminosae. It is used as a condiment as its seeds add nutritive value as well as flavour to food. It is also an important constituent of curry powder. Its tender pods and shoots are used as a green vegetable. Metha is also grown as fodder for milk animals. The crop gets severely infested by black aphid (*Aphis cracivora*, Koch) which adversely affect the growth of the plants. To control this sucking pest, spraying of malathion 50 EC @625 ml per hectare has been found to be quite effective. The purpose of this field trial was to study the persistence of malathion and to work out the safe time interval for the consumption of metha as a vegetable as well as fodder.

MATERIALS AND METHODS

A field experiment was conducted by raising metha crop (variety ML-150) according to the recommended agronomic practices (Anonymous, 2000). The treatment evaluated for insecticide residues were control, malathion 50 EC @ 625 and 1250 ml per hectare. The spray fluid used was @ 250 L per hectare. There were three replications for each treatment and the area of each plot was 50 m². The first application of the insecticide was made at 50 % flowering stage followed by second at an interval of 10 days.

The samples were collected from each treatment immediately before and 0,1,3,5,7,10 and 15 days after the last application.

A representative finely macerated 50 g sample was dipped in about 100 ml acetone and left over night. Filtered the contents in 1L separatory funnel and diluted with 600 ml brine solution. Partitioned into 100, 50 and 50 ml dichloromethane and dried over anhydrous sodium sulfate and concentrated to about 5 ml using a rotary vacuum evaporator at less than 30⁰ C.

A glass column (60 cm X 2 cm i.d.) was plugged with cotton and packed with a mixture of 20 g silica gel (60-120 mesh) and 500 mg activated charcoal spotted on a one inch layer of anhydrous sodium sulfate. Washed the column with 100 ml dichloromethane. When dichloromethane reached the adsorbent layer, added concentrated extract of 5 ml to the column and run the column dropwise. When the extract reached the adsorbent layer, eluted the column with 150 ml mixture of dichloromethane and acetone (1:1, v/v) dropwise. Concentrated the cleaned up

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Table 1. Mean* and range (mg kg⁻¹) of malathion residues on fenugreek.

Days after application	Dose applied @ g a.i. ha ⁻¹			
	312.5	Per cent dissipation	625	Per cent dissipation
Before 2 nd application	BDL (BDL-BDL)	-	BDL (BDL-BDL)	-
0	29.31 (28.10-30.56)	-	60.94 (57.91-63.97)	-
1	15.87 (13.85-18.60)	45.85	32.60 (29.59-35.61)	46.50
3	4.70 (3.98-5.42)	83.96	9.60 (8.80-10.40)	84.25
5	1.54 (1.51-1.57)	94.75	2.62 (2.60-2.64)	95.70
7	0.30 (0.24-0.36)	98.98	0.51 (0.50-0.52)	99.16
10	0.08 (0.08-0.09)	99.9	0.18 (0.17-0.19)	99.70
15	BDL (BDL-BDL)		BDL (BDL-BDL)	
t _{1/2}	1.13 days		1.12 days	

*Mean of three replications

BDL= Below detectable level of 0.01 mg kg⁻¹

Figures in parentheses indicate range of residues

extract and stored in a 15 ml centrifuge tube for estimation of residues using GLC equipped with Nitrogen-Phosphorous Detector (NPD) and a packed glass column of 3 % OV-101 on Chromosorb W HP. The temperature of the column, injector and detector were maintained at 210, 240, 260⁰ C , respectively. The gas flow for nitrogen, hydrogen and air were maintained at 40, 60 and 100 ml per minute, respectively. Under these operating conditions, malathion was eluted at retention time of 2.31 minutes. The limit of quantitation of malathion was found to be 0.01 mg kg⁻¹. The average recovery values obtained were found to be more than 80 % from samples spiked at different levels. Thereby, the residue values have been reported as such without applying any correction factor.

RESULTS AND DISCUSSION

Following application of malathion 50 EC @ 625 ml per hectare (recommended dose), the mean initial deposit on metha was found to be 29.31 mg kg⁻¹, which reduced to 15.87 mg kg⁻¹, thereby showing 45.9 per cent dissipation in just one day. The

residues further declined quickly and in 5 days, 94.7 % dissipation was observed (Table 1). At 10 days, there was almost a complete dissipation (99.7 %) and after 15 days, no residues of malathion could be detected. Similarly, following application of malathion @ 1250 ml per hectare (double dose), the average initial deposit of 60.94 mg kg⁻¹ reduced to 9.60 mg kg⁻¹ in three days, thereby showing 84.2 % loss. The residues further dissipated to 0.18 mg kg⁻¹ in 10 days showing 99.7 % loss (Table 1). Beyond this period, the residues were not detected. The maximum residue limit of 3 mg kg⁻¹ has been prescribed for malathion on green vegetables by Ministry of Health, Government of India under prevention of Food Adulteration Act, 1954 (Agnihotri; 1999). Thereby a waiting period of 5 days is recommended for the safe consumption of metha as vegetable as well as green fodder. Moreover, the consumer can further reduce the risk of residues in metha when used as a green vegetable if consumed after thorough washing.

Acknowledgments. We thank the Head, Department of Entomology, PAU, Ludhiana for providing the necessary research facilities.

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