

Effect of malathion on morphological parameters in *Coriandrum sativum* in Gwalior (M.P.)

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Experiment was conducted at Jiwaji University, Gwalior. Malathion 50 EC was used. Malathion was sprayed at the rate of 1 ml l⁻¹ of water, 0.5 ml l⁻¹ of water, 2 ml l⁻¹ of water. At low and recommended dosages of malathion coriander did not show any significant reduction in morphological parameters but, at 2 ml l⁻¹ there was reduction in growth parameters.

Key words : Malathion, Morphological parameters, *Coriandrum sativum*

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INTRODUCTION

Coriander (*Coriandrum sativum* L.), Dhania/Dhanya is an annual spice crop and a member of Apiaceae family (Evans *et al.*, 2002) with 40-50 cm height and has two kinds of leaves, having white or pink flowers borne in compound umbels and fruit consists of two one-seeded carpels or mericarps with numerous oil ducts (European Pharmacopoeia, 2004; Handa and Kaul, 1996). Coriander occupies a principal position among all the crops grown in Madhya Pradesh and is grown in approximately 0.55 lakh hectares of land (Spice Board of India). Various parts of this plant possess diuretic, anti-oxidant, anti-diabetic, hyponotic, and anti-convulsant properties (Misharina and Samosenko, 2008; Emamghoreishi and Hamedani, 2006; Hosseinzadeh and Madanifard, 2005; Aissaoui *et al.*, 2008; Dhanapakiam *et al.*, 2008). For controlling insects and other pests, farmers use several types of insecticides. Amongst them, malathion is commonly used. It is a non-systemic broad spectrum organophosphate insecticide which is used for controlling sucking and chewing insects on fruits and vegetables (Bonner *et al.*, 2007; Chamber, 1992). Moreover, almost all the farmers were not using recommended doses for the particular chemical used. Hence, an attempt was adopted to study the effect of different concentrations of malathion on morphological parameters of coriander.

RESEARCH METHODOLOGY

The study was carried out during the winter season of 2010-11 at School of Studies in Botany, Jiwaji University Gwalior (M.P.). Well drained soil was prepared and filled into the pots of 35 cm × 30 cm size. Seeds of improved variety (Gujarati-1) were sown by conventional method and after germination seedlings were thinned to 5 plants in each pot. Various rates of Malathion 50 per cent EC were given after 50 and 60 days. Recommended dose of the malathion (labelled as MND *i.e.* 1 ml malathion, l⁻¹ of water), double dose of malathion (labeled as M2ND *i.e.*, 2ml malathion l⁻¹ of water) and half dose of malathion (labeled as M ½ ND *i.e.*, 0.5 ml malathion, l⁻¹ of water) was applied to the pots. Samplings of plants were done in order to observe the various parameters like shoot length, root length, fresh weight, dry weight and number of flowers. Sampling has been done as follows :

- I Sampling: 65 DAS.
- II Sampling: 75 DAS.
- III Sampling: 85 DAS.
- IV Sampling: 95 DAS.

Statistical analysis :

Statistical tests were performed using the standard procedures of mean and standard error.

RESEARCH FINDINGS AND ANALYSIS

Malathion significantly affected various morphological

parameters after II, III and IV samplings.

Shoot length :

The shoot length in M2ND and MND (33.8 cm and 29.4 cm, respectively), was more than control plants (23.4 cm) after I sampling, although the shoot length in M ½ ND (21.6 cm) was the least. After II, III and IV samplings, the maximum shoot length was observed in control plants and least was observed in M2ND plants (Table 1).

Root length :

The root length in M ½ ND (8.7 cm) was least during I sampling, as compared to control (10.0 cm) plants and MND and M2ND (10.4 cm and 10.2, respectively) was almost equal to control plants after I sampling. During II, III and IV samplings, the maximum root length was observed in control and least root length was observed in M2ND plants (Table 2).

Fresh weight of shoot :

After I sampling, the fresh weight of shoot in M2ND and MND (4.77 g and 4.00 g, respectively) was more than in control (3.61 g) plants, but M ½ ND (2.43 g) had least fresh weight. After II, III and IV samplings, the maximum fresh weight of shoot was observed in control followed by M ½ ND. However, M2ND projected less growth rate as compared to other treatments (Table 3).

Dry weight of shoot :

After I sampling, the dry weight of shoot in M2ND and MND (0.92 g and 0.89 g, respectively) was more than control (0.72 g), however, M ½ ND (0.36) showed least dry weight of shoot. After II, III and IV samplings, the maximum dry weight of shoot was observed in control and least was observed in M2ND plants. M2ND plants showed less growth rate in all samplings (Table 4).

Treatments	Shoot length (cm)			
	I sampling	II sampling	III sampling	IV sampling
Control	23.4 ± 2.485	52.4 ± 1.684	60.2 ± 3.046	64.2 ± 2.241
MND	29.4 ± 4.082	44.8 ± 1.842	53.6 ± 1.522	57.2 ± 2.962
M2ND	33.8 ± 2.961	41.2 ± 2.566	47.0 ± 2.806	48.8 ± 3.440
M ½ ND	21.6 ± 1.923	46.0 ± 2.442	56.8 ± 1.764	58.4 ± 3.681

Treatments	Root length (cm)			
	I sampling	II sampling	III sampling	IV sampling
Control	10.0 ± 0.401	12.2 ± 1.041	13.2 ± 1.047	13.9 ± 1.121
MND	10.4 ± 0.722	10.8 ± 0.640	12.1 ± 0.928	12.52 ± 1.022
M2ND	10.2 ± 1.443	10.4 ± 0.881	10.8 ± 0.645	11.4 ± 0.881
M ½ ND	8.7 ± 0.963	10.0 ± 0.810	12.7 ± 0.563	12.9 ± 1.121

Treatments	Shoot fresh wt. (g)			
	I sampling	II sampling	III sampling	IV sampling
Control	3.61 ± 0.213	6.92 ± 0.623	9.75 ± 0.295	9.29 ± 0.229
MND	4.00 ± 0.36	4.67 ± 0.433	6.90 ± 0.384	6.44 ± 0.266
M2ND	4.77 ± 0.232	5.03 ± 0.404	5.77 ± 0.293	5.15 ± 0.481
M ½ ND	2.43 ± 0.127	6.05 ± 0.574	8.15 ± 0.410	7.58 ± 0.299

Treatments	Shoot dry wt. (g)			
	I sampling	II sampling	III sampling	IV sampling
Control	0.72 ± 0.179	1.68 ± 0.208	2.66 ± 0.214	1.67 ± 0.184
MND	0.89 ± 0.239	1.31 ± 0.186	1.48 ± 0.201	0.85 ± 0.126
M2ND	0.92 ± 0.174	0.98 ± 0.081	1.19 ± 0.161	1.02 ± 0.128
M ½ ND	0.36 ± 0.092	1.52 ± 0.080	1.56 ± 0.185	1.18 ± 0.335

Fresh weight of root :

After I sampling, the fresh weight of root was maximum in control (1.87 g) and least was observed in M2ND (1.58 g). Similar trend was observed after II, III and IV sampling *i.e.*, control showed maximum fresh weight of root and M2ND showed least fresh weight of root (Table 5).

Dry weight of root :

The dry weight of root was maximum in control and M ½ ND (0.18 g and 0.17 g, respectively) during I sampling, M2ND (0.12 g) showed least dry weight of root. Similar trend in results was observed after II, III and IV samplings *i.e.*, control projecting maximum dry weight in roots and M2ND showing least dry weight of root (Table 6).

Number of flowers :

The number of flowers in treatments, MND, M2ND and M ½ ND were 5, 7 and 6, respectively which was almost the same as control (5) plants during I sampling. After II, III and IV samplings, the maximum number of flowers was observed in control and least in M2ND plants (Table 7).

It was observed that of all the morphological parameters except fresh and dry weight of root, there was an increase in MND and M2ND treatments after I sampling when compared to control plants. The fresh and dry weight of root was observed maximum in control and M ½ ND plants compared

to other treatments after 65 days of sampling, but control and M ½ ND plants shows maximum growth rate. After II sampling, significant increase in all morphological parameters was observed in control and M ½ ND plants; however, detectable reduction was recorded in MND and M2ND plants. After III sampling, maximum growth was observed in control plants, whereas detectable reduction in growth was observed in M2ND plants. After IV sampling some decrease in growth rate was observed except fresh and dry weight of shoot in all plants.

The effect of different concentrations of malathion on morphological parameters (shoot length, root length, fresh weight and dry weight of shoot and root, number of flowers) revealed that, malathion applied at recommended (1 ml l⁻¹ of water) and half doses (0.5 ml l⁻¹ of water) had no significant adverse effect on growth of *Coriandrum sativum* compared to control plants. However, malathion at 2 ml l⁻¹ of water (double the recommended dosage) resulted in drastic reduction in morphological parameters compared to control plants. Similar results on effect of pesticides at higher dosages on plant growth were also reported by Gafar *et al.* (2011) in *Solanum tuberosum*. Samuel and Gamal (2004) also found a negative results of pesticides in radish at higher doses. Results of pesticides on plant growth were also reported to have the same trend by Zaki (1978) and Mobark (2009).

Table 5: Effect of different concentrations of malathion on fresh weight of *Coriandrum sativum* root

Treatments	Root fresh wt. (g)			
	I Sampling	II Sampling	III Sampling	IV Sampling
Control	1.87 ± 0.020	1.98 ± 0.018	2.17 ± 0.091	2.23 ± 0.372
MND	1.71 ± 0.012	1.76 ± 0.032	1.92 ± 0.128	1.96 ± 0.336
M2ND	1.58 ± 0.010	1.66 ± 0.040	1.79 ± 0.068	1.82 ± 0.072
M ½ ND	1.79 ± 0.030	1.86 ± 0.192	1.94 ± 0.074	2.14 ± 0.032

Table 6: Effect of different concentrations of malathion on dry weight of *Coriandrum sativum* root

Treatments	Root dry wt. (g)			
	I sampling	II sampling	III sampling	IV sampling
Control	0.18 ± 0.005	0.19 ± 0.018	0.22 ± 0.215	0.24 ± 0.160
MND	0.16 ± 0.004	0.17 ± 0.022	0.18 ± 0.010	0.19 ± 0.026
M2ND	0.12 ± 0.012	0.15 ± 0.015	0.18 ± 0.025	0.19 ± 0.031
M ½ ND	0.17 ± 0.004	0.18 ± 0.034	0.20 ± 0.023	0.20 ± 0.032

Table 7: Effect of different concentrations of malathion on number flowers of *Coriandrum sativum*

Treatments	Number of flowers		
	I sampling	II sampling	III sampling
Control	5 ± 0.00	62 ± 5.841	101 ± 5.202
MND	5 ± 0.00	43 ± 3.123	81 ± 6.561
M2ND	7 ± 0.00	34 ± 2.641	49 ± 5.601
M ½ ND	6 ± 0.00	53 ± 2.565	88 ± 3.611

Results indicate that malathion is generally of low toxicity to plant growth at recommended and lower dosage, while at higher doses it had adverse effect on all the morphological parameters observed.

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