

## LEAF EXTRACT AND THEIR ACTION AGAINST *MELOIDOGYNE INCOGNITA* (IN VITRO)

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Leaf extracts of six plants; *Utrica dioica* (bichubutti), *Ficus dioica* (tirmar), *Cannabis sativa* (bhang), *Ricinus communis* (castor), *Dhatura stramonium* (dhatura) and *Lantana camara* (lantana) @ 2,4 and 6 percent were tested for their nematicidal, action (mortality effect) against *Meloidogyne incognita*, under in vitro conditions (water phase and soil phase). Water phase experimentation showed knock down effect as more pronounced over mortality in all the treatments. There was immediate (within 1 hour of exposure) knock down effect in all the concentrations of all the treatments. Within 96 hours of exposure, except for dhatura and bhang there was complete (100%) revival of nematode population at 2% dose of all the treatments. Dhatura was most effective followed by bhang and tirmar in causing knock down effect/mortality. Soil phase experimentation also showed the superiority of dhatura and bhang in reducing the root gall-index.

**Keywords:** Knock down; leaf extract; *Meloidogyne incognita*.

### Introduction

The use of chemicals as nematicides being expensive and health hazardous, the use of plants and their products, having nematicidal properties are more advisable to be used as it overcomes the demerits of chemicals. Number of workers have studied the nematicidal action of various plants/plant products<sup>1-5</sup>.

Due to intensive and multiple cropping pattern, coupled with improved agronomic practices, the root-knot nematode (*Meloidogyne* spp.) has become a major limiting factor in vegetable production. It is therefore, that in the present investigation, leaf extracts of few plants in different concentrations were tested for their possible nematicidal action against *Meloidogyne incognita*.

### Materials and Methods

Fresh leaves of six plants namely; *Utrica dioica* (bichubutti), *Cannabis sativa* (bhang), *Ricinus communis* (castor), *Dhatura stramonium* (dhatura), *Ficus dioica* (tirmar) and *Lantana camara* (lantana) were tested in three different concentrations (2, 4 and 6 per cent), for their action against *M. incognita*. The experiment was conducted in two phases i.e., in water and in soil.

(i) *Water phase*:- Fresh leaves of each plant were finely macerated in small quantity of distilled water. The quantity of leaves and water (wt by volume) was adjusted so as to get 12% stock solution/suspension. The finely macerated suspension was sieved through Whatman filter paper, so as to decant off the coarse particles as supernatant. Desired quantity of each stock solution was further diluted to 8 and 4 per cent concentrations. One ml of each concentration (12, 8 and 4%) was poured in clean cavity block. One ml suspension (containing approx. 100 individuals) of freshly hatched juveniles of *M. incognita* was poured to cavity block so as to reduce the concentrations of leaf extracts in the cavity blocks to their half i.e. 6, 4 and 2 per cent. Besides, one control treatment was also maintained. Each treatment was replicated four times. Observations on the percent mortality were recorded after 1, 24, 48 and 96 hours of exposure.

(ii) *Soil phase*:- Coarsely macerated fresh leaves of each plant were thoroughly mixed with well sterilized (121°C temp with 15 lb/sq inch pressure) soil sand (3:1) mixture, contained in sterilized earthen pots. Quantity of leaves and soil (wt by wt) in the pots was



**Table 1.** Efficacy of different concentrations of leaf extracts on the % mortality/knock down effect of *M. incognita* population and root gall-index on tomato

Treatment	Conc (%)	Water Phase					Soil Phase
		Mortality/Knock down effect (%) after					Root gall-index (1-6 scale)
		1hr	24hrs	48 hrs	72hrs	96 hrs	
<i>Utricia dioca</i>	2	100	100	90	nil	nil	6.0
	4	100	100	100	25	20	5.25
	6	100	100	100	100	75	3.0
<i>Ficus dioca</i>	2	100	100	100	nil	nil	5.0
	4	100	100	100	95	42.5	5.0
	6	100	100	100	100	100	4.5
<i>Cannabis sativa</i>	2	100	100	100	55	45	5.0
	4	100	100	100	100	100	4.0
	6	100	100	100	100	100	4.0
<i>Ricinus communis</i>	2	100	100	67.5	nil	nil	5.25
	4	100	100	95	85	37.5	4.75
	6	100	100	100	100	87.5	4.0
<i>Dhatura stramonium</i>	2	100	100	100	100	72.5	4.5
	4	100	100	100	100	100	4.25
	6	100	100	100	100	100	4.45
<i>Lantana camara</i>	2	100	100	90	nil	nil	6.0
	4	100	100	100	25	20	5.25
	6	100	100	100	100	75	3.0
Control	-	nil	nil	nil	nil	nil	6.0

**Table 2.** Overall effect of leaf extracts on nematode mortality/knock down (recorded after only 96 hrs. of exposure) and root gall-index on tomato.

Treatment*	Knock-down effect/mortality (%)**	Revival (%)	Root gall-index (1-6 scale)
<i>Utricia dioca</i>	31.6	68.3	4.75
<i>Ficus dioca</i>	47.5	52.5	4.83
<i>Cannabis sativa</i>	81.6	18.3	4.33
<i>Ricinus communis</i>	41.6	58.3	4.66
<i>Dhatura stramonium</i>	90.8	9.2	4.33
<i>Lantana camara</i>	31.6	68.3	4.75
Control	nil	100.0	6.00
C.D. (5%)	62.79		N.S.

\* For each extract, all the three concentrations (2, 4 &amp; 6%) together

\*\* Mean of the values, for all the three concentrations, recorded after 96 hr. of exposure (Table 1.)



adjusted so as to get the concentrations of 6, 4 and 2 percent. Fifteen days old tomato (var. Solan Gola) seedling were transplanted in the pots, @ 1/pot. After 5 days of transplanting, freshly hatched juveniles population of *M. incognita* (approx. 500 individuals), contained in 5 ml of suspension was inoculated in each pot and the plants were allowed to grow for a period of 60 days. Each treatment, including control (with only nematodes) was replicated four times. At the termination, observations were recorded on the root gall-index (1-6 scale-1 = no galling; 2= 1-20% galling; 3=21-40% galling; 4=41-60% galling; 5=61-80% galling; 6=81-100% galling).

### Results and Discussion

1. *Water Phase*:- The observations on percent nematode mortality/knock down were recorded and presented in Table 1. From this it can be inferred that in water phase experimentation, dhatura was most effective as compared to others in causing knock down effect to prolonged period of time, followed by bhanga, while lantana and bichubutti were least effective in all the treatments (Table 2). Khanna<sup>4</sup> has also reported the superiority of bhanga against *M. incognita* population.

2. *Soil Phase*:- From the observations recorded for the soil phase experimentation (Table 1), it can be inferred that at minimum dose (2%), dhatura was most effective in reducing the gall-index (4.5) over other leaf extracts (gall-index 5.0- 6.0), while bichubutti and lantana were least effective. However, at the highest dose (6%) the latter two were most effective (gall-index 3.0), followed by bhanga and castor (gall-index 4.0). Whereas, root gall-index did

not vary significantly among the treatments, minimum gall-index was recorded from dhatura and bhanga treated plants (Table 2).

From the overall foregoing observations, it can be concluded that although, at 6 per cent dose of tirmar, bhanga and dhatura, none of the nematode individuals were found reviving from the knock down effect, even after 96 hours of exposure (in water phase experimentation), there was 21-60 per cent root galling (in-soil phase) at the same concentration. It confirms that even at this highest conc. (6%) tested, nematode population does revive. Therefore it is revealed that whereas, various leaf extracts tested, do cause knock down effect, thereby slowing down the activity and multiplication rate of nematodes to variable extent (depending upon the conc. and type of leaf extract), mortality effect may be negligible and that too at the doses higher than 6 per cent. Also, no definite correlation was found between the results of water phase and soil phase experimentation. However, knock down effect and gall index were positively and negatively correlated, respectively to the conc. of their treatments, showing thereby that higher the conc. favourable are the results.

### References

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