

## EFFICACY OF OIL CAKES IN MANAGING THE ROOT-KNOT NEMATODE *MELOIDOGYNE INCOGNITA* ON MUNG (*VIGNA RADIATA*)

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Experiments were set with oil cakes of mustard [*Brassica campestris* (L.) Germ and Coss.], sesame (*Sesamum indicum* L.) and cotton (*Gossypium* spp.) in two doses 3gm and 6gm per pot against root-knot nematode *Meloidogyne incognita* infecting mung. Dry and fresh weight of shoot, dry and fresh weight of root and nodule number increased in the oil cake amended pots while the number of egg masses and number of galls per plant were reduced to varying levels. Degree of effectiveness of oil cakes was maximum in sesame oil cake treated plants followed by mustard and cotton oil cake treated plants.

**Keywords:** *Meloidogyne incognita*; Mung; Oil cake.

### Introduction

Plant parasitic nematodes are serious soil borne pests of almost all agricultural crops. A variety of cultural, physical, biological and chemical methods of control have been tested but all the methods have their own merits and demerits. The conventional nematicides have an initial dramatic impact on plant parasitic nematodes. But the high cost of synthetic nematicides poses a serious problem in developing countries like India. Further repeated application of such toxic material causes several ill effects like pest resistance, pesticide residues in food, pollution in water, soil and atmosphere. Thus, the search for pest control agents from natural sources has started gaining importance and it needs to be hastened as plant products being naturally evolved ingredients, have an edge over synthetic insecticides in preserving the natural equilibrium in ecosystem. Efforts have been made for the management of root-knot nematode in order to protect mung crop. It is very easy and non-hazardous to use waste organic matter as soil amendment. All over the world farmers are using them because they can apply them without any guidance and they are controlling different pests very effectively. Bhatnagar *et al.*<sup>1</sup> applied water soluble fraction of oil cakes in soil to control *M. incognita*. Oil cakes could control the nematode *M. incognita* successfully<sup>2-5</sup>.

### Material and Methods

Oil cakes of mustard (*Brassica campestris* (L.) Gern and Coss.), sesame (*Sesamum indicum* L.), and cotton (*Gossypium* spp.) were used. 15 cm diameter earthen pots

were filled with autoclaved soil. Oil cakes in two doses viz. 3gm and 6gm per pot were mixed with the pot soil and watered regularly and allowed to decompose for 15 days. Mung seeds variety K-851 were surface sterilized with 0.1% HgCl<sub>2</sub> and sown in pots. After seven days seedlings were thinned to one plant/pot and inoculated with one thousand freshly hatched juveniles of *M. incognita* by pouring the suspension through the holes made around the root. Each experiment was replicated four times and one set was left uninoculated as control. Experiment was conducted in growing season in the month of July. Sixty days after inoculation mung plants were uprooted and various growth parameters, in terms of fresh and dry root, shoot weight and number of nodules, were recorded. The effect of nematode on the plant was evaluated by counting the number of egg masses/root system, per pot. All the data were subjected to statistical analysis.

### Results and Discussion

All the three oil cakes viz. mustard (*B. campestris* (L.) Gern and Coss), cotton (*Gossypium* spp.) and sesame (*S. indicum* L.) showed a significant improvement in plant growth of mung infected with *M. incognita*. The data presented in Table 1 indicated a significant reduction in egg mass population per root or the disease incidence was lowered when sesame cake (SC) was applied followed by mustard cake (MC) and cotton cake (COC) ; at higher doses the root-knot nematode infection was lowered and resulted in better growth of host.

Fresh and dry weight of shoot increased

**Table 1.** Effect of oil cakes against *Meloidogyne incognita* infecting mung (*Vigna radiata*).

S.No.	Treatments	Length (cm.)		Fresh wt. (g)		Dry wt. (g)		No. of galls/Root	No. of egg masses/Root	No. of nodules/Root	No. of eggs/egg mass	% decrease in egg masses
		Shoot	Root	Shoot	Root	Shoot	Root					
1.	Cotton 3gm	49.67	51.67	36.67	18.33	7.08	1.64	90.00	168.33	121.00	152.66	24.29
	6gm	57.00	59.67	41.33	21.67	8.57	2.03	72.66	152.66	136.66	141.66	31.34
2.	Mustard 3gm	53.33	56.33	39.33	19.83	7.82	1.62	77.00	151.66	143.00	147.66	31.79
	6gm	59.67	64.00	46.33	25.67	8.22	2.13	61.00	116.33	152.33	131.66	47.68
3.	Sesame 3gm	61.33	63.00	46.67	25.33	7.66	1.77	56.66	110.33	151.33	128.33	50.38
	6gm	64.67	72.67	51.00	32.00	8.92	2.43	23.33	92.00	165.33	114.33	58.62
4.	'N' alone	40.83	50.67	27.67	13.83	5.02	1.20	162.66	222.33	86.33	179.00	
	SEM ±	+ 0.72	+ 0.68	+ 0.98	+ 0.87	+ 0.02	+ 0.01	+ 0.08	+ 0.07	+ 0.05	- 0.75	
	CD at 1%	3.03	2.88	4.14	3.70	0.10	0.05	0.33	0.29	0.20	3.10	
	CD at 5%	2.17	2.06	2.96	2.65	0.07	0.04	0.24	0.21	0.14	2.19	
	CV	2.24%	1.97%	4.09%	6.76%	0.55%	1.17%	1.58%	0.98%	0.70%	2.30%	

significantly in all the treatments when compared to control ('N' alone). Maximum shoot weight was 51 gm in (SC, 6gm) treatment, followed by 46.33 gm (MC, 6gm), 41.33gm (CoC, 6gm), respectively. 3gm dose of cotton cake was not found to be effective in enhancing the shoot weight. Dry weight also followed the similar trend and maximum in (SC, 6gm), where it was 8.92gm. Minimum dry weight was observed in 'N' alone infected control plant followed by (CoC, 3gm), where it was 7.08. Fresh and dry weight of root was in accordance with the shoot where maximum fresh root weight (32 gm) was observed in (SC, 6gm), followed by 25.67 gm, 21.67 gm in roots with 6gm (MC), 6gm (CoC) treatments, respectively. Minimum fresh root weight was recorded in cotton cake 3gm (18.33gm) treated plants.

A maximum nodule number was 165.33 in 6gm (SC) treatment as against a minimum number of 121 in 3gm (COC) treatment.

A marked reduction in number of galls per plant was recorded in all oil cakes treatment. Maximum reduction (23.33) was recorded in 6gm (SC) treatment,

followed by 56.66, 61, 72.66, 77 and 90 in 3 gm (SC), 6 gm (MC), 6 gm (COC), 3 gm (MC) and 3 gm (CoC) treatments, respectively, as against a high average of 162.66 in root-knot nematode infected control plant.

The number of egg masses were also comparatively less than control in 6 gm (SC), 3gm (SC), 6gm (MC), 3gm (MC), 6gm (CoC) and 3g (CoC) treated plants in contrast to 'N' alone treated plants where it was maximum of 222.33 egg masses (Table 1).

In the present investigation it was found that oil cakes are very effective in controlling the root-knot population on mung. Oil cakes of sesame, mustard and cotton (higher dosage) were found very effective in reducing nematode population. However, lower dose of cotton was found nearly ineffective in enhancing plant growth.

Saifullah and Zulfiqar<sup>6</sup> reported a great suppression in nematode population in plants amended with cotton, castor, mustard and sesame deoiled cakes. Contrary to our findings, Prasad and Chawla<sup>7</sup> reported the aqueous deoiled cotton cake was comparatively more

toxic to *Meloidogyne incognita* infecting soybean.

Effectivity of oil cakes varied with soil condition, such as sandy as well as inorganic soil and pH of the soil etc. At the pH range of 7.7 to 8.4, they were found equally efficacious in winter as well as in summer crops<sup>8</sup>. It has been confirmed in various field studies that efficacy of oil cakes persists for long duration, as it remained against plant parasitic nematode, even in subsequent crop<sup>9-10</sup>.

Application of neem cake leads to highest reduction in nematode population, followed by castor and other cake<sup>2</sup>. Mehta *et al.*<sup>3</sup> observed that mustard cake amendment resulted in maximum plant weight, compared to cotton seed cake and neem cake at 3% w/w dose.

Poornima and Vadivelu<sup>11</sup> showed that cakes were less effective in reducing gall as compared to their respective oils. Efficacy of oil cakes varied with period of decomposition of oil cakes in soil. Toxicity of exudates increased upto 3 weeks of decomposition and decreased by sixth week<sup>12,13</sup>. Bhosle *et al.*<sup>14</sup> used organic amendments for managing root-knot nematode, *Meloidogyne incognita*, on okra. Spot application of groundnut cake (2.5q/ha) sawdust, coal ash (50q/ha) and sunflower cake (2.5 q/ha), significantly reduced the root-knot nematode population. Kalita and Bora<sup>15</sup>, Yadav *et al.*<sup>16,17</sup>, Vaitheeswaran *et al.*<sup>18</sup>, Ahmed and Choudhary<sup>19</sup> and Borah *et al.*<sup>20</sup> reported that neem oil cake was effective in reducing gall, egg masses and soil population of *M. incognita*. Singh<sup>4</sup> found that linseed oil cake, castor oil cake, sesamum oil cake and mustard oil cake greatly suppressed population of nematodes. Experiments done by Anver<sup>5</sup> revealed that oil seed cakes (neem cake, castor cake, mustard cake, dhan cake, groundnut cake) were highly effective in reducing the multiplication of nematode.

Present study concludes that use of sesame and mustard oil cakes is useful in managing root-knot nodule population and in enhancing plant growth of mung.

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