



Efficacy of Different Oil–Cakes on The Incidence of Root–Knot Nematodes (*Meloidogyne Javanica*) on Tomato

Manendra Kumar

Department. of Zoology, Mahila Shilp Kala Bhawan (MSKB) College, Muzaffarpur, Bihar, India
mkumar8011@gmail.com

Abstract: India is the second largest producer of vegetables in the world. Tomato is the most important vegetable crop in India but the production of tomato is still lower in India as compared to developed countries due to various factors, of which root–knot nematodes are also a serious problem. During recent years, the root–knot nematodes (*Meloidogyne* spp) have become a cosmopolitan pest of economic crop plants. Chemical pesticides are hazardous to human health and environment so certain plants extracts have been used as pesticides to control different pests by various researchers. In the present investigation a comparative evaluation of five types of oil–cakes viz. Linseed, Karanj, Groundnut, Castor, and Mustard was carried out to study their effects in minimizing the population of *Meloidogyne javanica* on tomato at Muzaffarpur (Bihar), India. All oil cakes included in the trial caused a reduction in galling. The mustard cake was found most effective. There was minimum infestation (7.65 galls/gm of root weight) in mustard oil cake treated soil while maximum (70.08 galls/gm of root weight) in plants of untreated soil.

To cite this article

[Kumar, M. (2017). Efficacy Of Different Oil–Cakes On The Incidence Of Root–Knot Nematodes (*Meloidogyne Javanica*) On Tomato. *The Journal of Middle East and North Africa Sciences*, 3(10), 41-43]. (P-ISSN 2412- 9763) - (e-ISSN 2412-8937). www.jomenas.org. 4

Keywords: Root–knot nematodes, *Meloidogyne*, soil, Tomato, Infestation, oil–cakes.

1. Introduction:

India is the second largest (next to China) producer of vegetables in the world. It produced about 121,015,200 metric tonnes vegetables in 2013 (Anonymous, 2015). Among vegetables, the production of tomatoes in India is the third (next to potato and onion). According to Choudhary and Kundal (2015), the area under tomatoes has risen from 458 (000' HA) in 2002 to 865 (000' HA) in 2011. Similarly, the production of the tomato has gone up from 7462 (000' T) in 2002 to 16826 (000' T) in 2011. The yield of the same in India from 2002 to 2011 has gone up from 16 (T/HA) to 19 (T/HA).

Tomato has become one of the most important crops of the farmers for improving their income. Tomatoes contain lycopene in abundance which is a pigment that contains carotene. Lycopene also helps in the bone development and has antioxidant properties to boost our immune system. Zinc and iron of tomatoes are responsible for producing collagen in the body. This is also important in maintaining our healthy skin. Tomatoes are an important source of Vit. A, B6, C & K. As compared to developed countries, the yield per hectare is still low in India due to various factors including an infestation of tomatoes by root–knot nematodes. The root–knot nematodes (*Meloidogyne* spp) are plant parasitic nematodes. They exist in soil in areas with hot climates or

short winters. Their larvae infest plant roots, causing the development of root-Knot galls that drain the plant's nutrients.

During recent years, the root–knot nematodes have become a cosmopolitan pest of economic crop plants. Since the first investigation on the control of root–knot nematodes in tomato with Karanj cake by RS (1965), exhaustive work on the application of oil–cakes for the control of plant parasitic nematodes have been carried out in India. Singh and Sitaramaiah (1971); Goswami and Swarup (1971), Khan et al. (1979), Goswami and Vijaylakshmi (1981 & 1983) observed that oil–cakes of neem, castor, karanj, mustard, peanut etc. significantly reduced root–knot and several other species of plant parasitic nematode populations in the soil. In the present investigation a comparative evaluation of five types of oil–cakes viz. Linseed, Karanj, Groundnut, Castor, and Mustard was carried out to study their effects on the incidence of *Meloidogyne javanica* in tomatoes at Muzaffarpur (Bihar).

2. Methodology:

With a view to study the efficacy of different oil–cakes, twenty-four earthen pots (20 cm size and 2.5 kg capacity) were filled with sterilized soil. Five types of oil cakes Linseed (*Linum usitatissimum*), Karanj (*Pongamia*



pinnata), Groundnut (*Arachis hypogaea*) Castor (*Ricinus communis*) and Mustard (*Brassica nigra*) cakes were taken in grinded form. 10 gm of each oil cakes powder were properly mixed with the sterilized soil of five respective earthen pots. One pot was left for the control (untreated, without oil cake). Thus, there were six treatments including check and each treatment was replicated four times. The quantity of oil-cakes mixed with the soil was determined on the basis of the experiment carried by Lear (1958). After 15 days, two-week old tomato seed lings raised in sterilized soil were transplanted in all these earthen pots @ two seed lings/pot and then inoculation was made. These earthen pots were kept in identical condition for forty-five days. After the completion of this period, plants were uprooted, washed and observations were recorded in regard to the number of galls per gram of root weight.

3. Results:

After 45 days following transplanting, plants were uprooted, washed and observations were recorded in Table 1 and graphically represented in Figure 1. From the data of the table, it is evident that T5 (treatment with mustard cake) had minimum galls (7.65 galls per gram of root weight) followed by T3 (treatment with groundnut cake). Maximum galling (70.08 galls per gram of root weight) was observed in T6 (control) which was not treated with any oil cake. The statistical analysis of the data (Table 2) revealed a highly significant difference in terms of a number of galls per gram of root weight under different treatments. Mustard cake (T5) was statistically found to be significantly superior to other cakes.

Table 1: Efficacy of oil-cakes on the incidence of Root-Knot Nematodes (*M. javanica*) in Tomato

| Rx | Different Oil-cakes | No. of galls/gm of root wt. | | | | Total | Average No. of galls/gm of root wt. |
|----|---------------------|-----------------------------|-------|-------|-------|--------|-------------------------------------|
| | | Replications | | | | | |
| | | 1 | 2 | 3 | 4 | | |
| T1 | Linseed Cake | 28.40 | 34.35 | 37.18 | 30.12 | 130.05 | 32.51 |
| T2 | Karanj Cake | 44.56 | 38.42 | 52.04 | 47.41 | 182.43 | 45.60 |
| T3 | Groundnut Cake | 19.53 | 20.67 | 17.42 | 15.87 | 73.49 | 18.37 |
| T4 | Castor Cake | 18.35 | 20.54 | 29.38 | 23.35 | 91.62 | 22.90 |
| T5 | Mustard Cake | 4.36 | 9.54 | 6.82 | 9.90 | 30.62 | 7.65 |
| T6 | Control | 75.69 | 69.36 | 81.32 | 53.98 | 280.35 | 70.08 |

Rx: Treatment.

Table 2: Analysis of Variance

| Source | D.F. | S. Sq. | M. Sq. | F |
|-------------|------|---------|----------|------------------------------|
| Replication | 3 | 176.82 | | |
| Treatment | 5 | 9969.23 | 1993.846 | 61.172 Highly significant |
| Error | 15 | 488.91 | 32.594 | |

Total 23 10634.96

S.E. (Plot) = $\sqrt{32.594}$ = 5.709

S.E. (T) Mean = $\frac{5.709}{1.73}$ = 3.30

C.D. at 5% = 3.30 × 1.414 × 2.131 = 9.94

| T5 | T3 | T4 | T1 | T2 | T6 |
|------|-------|-------|-------|-------|-------|
| 7.65 | 18.37 | 22.90 | 32.51 | 45.60 | 70.08 |

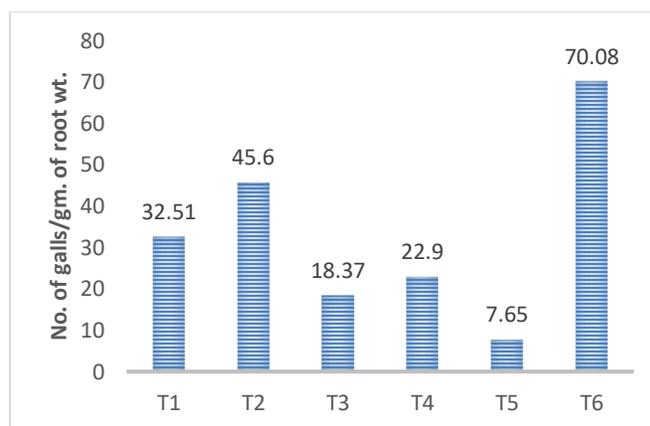


Figure 1. Efficacy of different oil cakes on the incidence of root-knot nematodes

T1: Linseed cake; T2: Karanj cake; T3: Groundnut cake
T4: Castor Cake; T5: Mustard cake; T6: Control.

4. Discussion:

In case of oil cakes treatments, all the cakes included in the trial caused a reduction in galling. The mustard cake was found most effective in reducing the galls of the root-knot nematodes (*M. Javanica*). The efficacy of oil cakes as a manure may be attributed to the fact that decomposition of organic matter in soil encouraged the predatory nematodes and fungi. Similar claims were made by Mankau (1962). Winslow and Willies (1972) reported that the addition of organic matter in soil promoted fungal and other enemies of nematodes. Goswami and Swarup (1971) have recorded appreciable reduction of *M. incognita* population after application of peanut and Karanj cakes besides general improvements in growth characters.



According to Zaiyd (1977), there was reduced gall number and increased shoot weight by addition of mustard and other cakes. Trivedi et al. (1978) reported that there was better shoot in soil amended with oil-cakes of mustard and groundnut. According to Goswami and Meshram (1991), Karanj cake, mustard cake, and carbofuran suppressed the effect of nematodes in tomato.

5. Conclusion:

The mustard cake was found to be most effective in controlling the root-knot nematode (*M. javanica*) on tomato followed by groundnut cake.

Corresponding Author:

Manendra Kumar, D.Sc. (USA)
Department of Zoology Mahila Shilp Kala Bhawan
(MSKB) College, Muzaffarpur, Bihar, India.
E-mail: mkumar8011@gmail.com

References:

1. Anonymous (2015). Top five countries that produce the most vegetables. Sources: *FAOSTAT* data.
2. Choudhary, K., & Kundal, R. (2015). A Study on Area, Production, and Yield of Tomatoes in India from 2002 to 2011. *International Journal*, 3(7): : 90–94
3. Goswami, B. K., & Swarup, G. (1971). Effect of oil-cake amended soil on the growth of tomato and root-knot nematode population. *Indian Phytopathology*. 24 : 491–494
4. Goswami, B. K., & Vijaylakshmi, K. (1981). Effect of some indigenous plant materials and oil-cake amended soil on the growth of tomato and root-knot nematode population. *Indian Journal of Nematology*, 11(1), 121–121.
5. Goswami, B. K., & Vijaylakshmi, K. (1983, May). Studies on the efficacy of some indigenous plant extracts and non-edible oil seed cakes against root knot nematodes on tomato (Abstract) 3rd. In *Nematology Symposium, Solan* (pp. 32-33).
6. Goswami, B. K., & Meshram, N. J. (1991). Studies on the comparative efficacy of mustard and karanj oil seed cakes with a nematicide, carbofuran, against root-knot nematode, *Meloidogyne incognita*, on tomato. *Indian J. Nematol*, 21(1), 66-70.
7. Khan, M. W., Khan, A. M., & Saxena, S. K. (1979). Suppression of phytophagous nematodes and certain fungi in the rhizosphere of okra due to oil-cake amendments. *Acta Botanica Indica*. 7 : 51–56
8. Lear, B. (1958). Application of castor pomace and cropping of castor beans to soil to reduce nematode populations. *Plant Dis. Rep*, 43(4), 459-460.
9. Mankau, R. (1962). The effect of some organic additives upon a soil nematode population and associated natural enemies. *Nematologica*, 7(1), 65-73.
10. RS, S. (1965). Control of root knot of tomato with organic soil amendments. *FAO Plant Protection Bulletin* 13 : 35–37
11. Singh, R. S., & Sitaramaiah, K. (1971). Control of root knot through organic and inorganic amendments of soil-- the effect of oil cakes and sawdust. *Indian journal of mycology and plant pathology*. 1 : 20–29
12. Trivedi, P. C., Bhatnagar, A., & Tiagi, B. (1978). Control of root-knot nematode on *Capsicum annuum* by application of oil-cakes [sweet peppers, India]. *Indian Phytopathology (India)*. 31 : 75–76
13. WINSLOW, R., & Willis, R. J. (1972). Nematode diseases of potatoes. *Economic Nematology* Chap 2, 17–48
14. Zaiyd, M. (1977). Effect of organic soil amendments on the incidence of root knot nematode (*Meloidogyne javanica*) on bhindi plants. *Proc. Bihar Acad. Agric. Sci.* 25 : 23–26

Received July 13, 2017; revised August 01, 2017; accepted September 11, 2017; published online October 01, 2017.