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Effect of organic cakes against infestation of *Meloidogyne incognita* in cucumber (*Cucumis sativus* L.)

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Department of Agricultural Entomology, [1]AICRP on Plant Parasitic Nematodes
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Most of the cucurbits are extremely susceptible and severely infected with root-knot nematodes, *Meloidogyne* spp., causing immense crop losses. Slow declinations of crop health leading to stunted growth, day time wilting during hot and dry weather condition are the important above ground symptoms of root-knot nematode infection to the crop. Root galls, which give the root system a knobby appearance, are most characteristic underground symptom of the disease. The number of nematicides labeled for managing cucumber is limited and hazardous. In order to prevent from hazardous effects, effective prophylactic management programme like use of organic matter should be adopted against nematodes starting from land preparation. Amendment of soil with decomposable organic cake is known to alter the soil and root rhizospheric environment particularly of the micro flora. Oil cakes have been demonstrated to incite the soil microflora releasing some substances which is fungicidal and nematicidal (Tousson *et al*., 1964). Keeping this background information in mind an approach was made to study the effects of organic cakes on *Meloidogyne incognita* in cucumber (*Cucumis sativus* L.).

The trial was conducted in a field infested with *M. incognita* (342 second stage infective juveniles per 200 cc of soil) at Central Research Farm of Bidhan Chandra Krishi Viswavidyalaya, Gayeshpur, Nadia, West Bengal during *rabi* season of 2009-2010. The experimental site was geographically located at 23ºN latitude, 89ºE longitudes and at an elevation of 9.75 meter from the mean sea level. The experiment was laid out in Randomized Block Design having 5 treatments and 5 replications. The treatments consisted of neem cake, castor cake and jatropha cake, which were applied @ 30g pit^{-1} at 10 days prior to sowing. Carbofuran 3G @ 10g pit^{-1} at sowing as treated control along with organic cakes and untreated check was also used. The method of delivery of treatments was soil incorporation in pit. Experimental plots measuring 3.5 × $2m^2$ were sown with cucumber cv. Baropata (local) at spacing of 100 × 70 cm. For gall indices, number of galls were counted and categorised in the scale: class 1- no visible galls; 2-very light infection (1-10 galls or egg masses); 3- light infection (11-30 galls or egg masses); 4- moderate infection (31-100 galls or egg masses) and 5- heavy infection (above 100 galls or egg masses).To study the nematode population, soil samples were collected from the experimental field before ploughing and during final harvest to a depth of 15-20 cm from rhizosphere of the plant. Nine subsamples were collected and mixed thoroughly to prepare three composite samples for initial nematode population whereas for final harvest three sub-samples were collected and mixed thoroughly to make one composite sample for each plot. Each of the sample weigh 200cc, thus twenty five samples were collected in polythene bag, labelled and brought to laboratory for further analysis. Extraction of nematode from 200cc composite soil sample was done by using Cobb's decanting and sieving technique followed by modified Baermann funnel method (Christie and Perry, 1951). For killing, nematode suspension was heated to a temperature of 60-65°C and later killed nematodes were fixed in hot formalin glacial acetic acid fixative and keep separately in the labelled vial for further study. Slide preparations of the killed nematodes were done using Seinhorst method. Cucumber roots for examination were separated from the plants and mixed together and only 1g of roots were collected from the composite sample. Roots were cleaned in tap water, cut into pieces of 2-3 cm and stained by NaOCl- acidfuchsin method (Byrd *et al*., 1983) and observed under the stereoscopic binocular microscope (Olympus, SZ11). Root knot nematode species was identified on the basis of perineal pattern, characteristics of mature female (Eisenback *et al*.1981). Counting of nematode population was done by taking vial containing fixed nematodes' suspension in a measuring cylinder to measure the total volume of the suspension obtained from 200cc soils. Then 2ml of thoroughly stirred suspension containing nematodes was taken in a counting dish. This operation was replicated thrice and nematode population per ml of suspension was calculated. Total nematode population was calculated by multiplying volume of suspension with per ml nematode count. Observations were also recorded on fresh and dry root weight, yield, root-knot index and nematode population in soil. All the data collected were analyzed statistically.

The results show that all the treatments significantly suppressed the development of *Meloidogyne incognita* population as compared to control. Fresh and dry root weight of cucumber was significantly higher in the plants treated with jatropha cake, neem cake, castor cake and carbofuran 3G than in the control. Application of jatropha cake @ 30 kg pit^{-1} recorded the highest fresh and dry root weight of cucumber being, 97g and 11.2g, respectively. Control showed the lowest fresh (54g) and dry root weight

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(6.1g). The highest yield (13.91 kg plot^{-1}) of cucumber fruit was recorded in plants treated with jatropha cake @ 30 g pit $^{-1}$ followed by neem cake @ 30 kg pit^{-1} (11.06 kg plot^{-1}). Similar with the present findings Khan *et al.* (1974) stated that the liberation of ammonia from the decomposition of oil cakes, meant for the inhibitory effect on nemic activities avenue for the better growth as well as the improvement of the tomato yield. The treatment T_3 (jatropha cake @30 kg pit^{-1}) was found significantly superior in reducing root gall index and root knot nematode population. The lowest root gall index and soil population of root knot nematodes being, 2.3 and 339.4 second stage infective juveniles per 200cc of soil, respectively.

Table 1: Effect of treatments on root biomass, yield, gall indices and nematode population of cucumber

Treatments	Fresh root weight (g)	Dry root weight (g)	Yield (kg plot^{-1})	Root-knot index	Population of J_2/200cc of soil
T_1 :Neem cake @ 30 g pit^{-1}	67^{b}	7.72^{b}	11.06^{b}	3.44^{a}	413.5^{b}
T_2 : Castor cake @ 30g pit^{-1}	56^{b}	6.64^{b}	9.39^{b}	3.58^{a}	455.4^{ab}
T_3: Jatropha cake@ 30g pit^{-1}	97^{a}	11.20^{a}	13.91^{a}	2.30^{b}	339.4^{c}
T_4:carbofuran3G @10g pit^{-1}	65^{b}	6.86^{b}	10.75^{b}	2.66^{ab}	352.6^{c}
T_5: Untreated control	54^{b}	6.10^{b}	8.81^{b}	3.66^{a}	479.1^{a}
SEm (±)	**4.16**	**0.52**	**0.74**	**0.33**	**17.97**
LSD (0.05)	**12.48**	**1.55**	**2.20**	**0.99**	**53.87**

Note: Initial nematode population: 342 second stage infective juveniles per 200 cc of soil.# Data marked by common letters are not statistically significant according to DMRT at 5% level of probability.

Carbofuran 3G @10g pit^{-1} was found as second promising treatment where root gall index was 2.66 and soil population of the nematode was 352.6 second stage infective juveniles per 200cc of soil. This observation was in tune with the findings of an experiment conducted at the Kalyani centre of AICRP on plant Parasitic Nematodes, revealed efficacy of organic amendments like neem cake, mustard cake and jatropha cake to manage the root-knot nematode infestation in cucumber. All the organic cakes showed superior result over carbofuran 3G with regard to yield, gall index and soil nematode population in cucumber (Annon., 2008). Parkeerathan *et al*. (2009) also stated that use of eco-friendly green leaf manure which not only improves the plant growth but also increases the yield of tomato plant and reduces the nematode attack.

Similarly, Kalaiarasan *et al.* (2007) also stated that application of jatropha cake @ 20g plot^{-1} increased the plant growth of tomato and reduced egg hatching and increase juvenile mortality to the tune of 44.07 and 49.33%, respectively over control.

Therefore, it can be inferred that, application of jatropha cake@ 30g pit^{-1} as spot application at 10 days before sowing were found to be effective compared to all other treatments for the management of *M. incognita* in cucumber. Beside jatropha cake, neem cake and castor cake also showed good results to enhance growth and yield and to reduce nematode population in cucumber. It has been observed from the study that adoption of jatropha cake @ 30g pit^{-1} at 10 days prior to sowing could be effective control measure against root-knot nematodes infestation in cucumber.

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