African Journal of Biotechnology Vol. 3 (8), pp. 379-381, August 2004
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2004 Academic Journals

Short Communication

Control of *Meloidogyne incognita* (kofoid and white) chitwood (root-knot nematode) of *Lycopersicon esculentus* (tomato) using cowdung and urine

Abubakar U., Adamu T.* and Manga S.B.

Department of Biological SciencesUsmanu Danfodiyo University, Sokoto, Nigeria.

Accepted 12 July, 2004.

Screenhouse experiments were conducted to test the efficacy of cowdung and urine separately and in combination in the control of root-knot nematode of tomato. Equal quantities of cowdung, urine and their mixture were separately made up to one litre with autoclaved soil. Two weeks old seedlings of tomato raised in autoclaved soil were transplanted into soil manure mixture and inoculated with 1,000 second stage larvae of *Meloidogyne incognita* race I. Treatments were completely randomized and effects assessed based on plant height, dry weight, extent of galling and the nematode multiplication factor. Results obtained showed that cowdung, urine, and their mixture produced significantly higher result than the untreated control. Similarly, the mixture of urine and cowdung, produced significantly higher results than the separate treatments.

Key words: *Meloidogyne incognita*, *Lycopersicon esculentus*, cowdung, urine, tomato.

INTRODUCTION

Soil amendments of different kinds used as nutrient sources for crop production have been found effective in control of root diseases of plants. The materials, green manure, cowdung, poultry droppings, dried crop residue (Akhtar and Alam, 1990, 1992; Abubakar, 1999) and industrial by-products such as neem and castor soil cakes (Akhtar and Alam, 1991; Akhatar and Mahmoud, 1994) have been successfully used. Remarkable reductions have been achieved in nematode population in both green house and field conditions with concomitant increase in growth and yield. (Abubakar and Majeed, 2000). Such increases in growth have been attributed to either improvement in soil condition resulting in greater root-growth, thereby enhancing the utilization of soil nutrients, or to changes in the biotic and abiotic environment of the plants. These ultimately alter the host parasite relationship thereby minimizing the nemadode damage (Vander-Borgett et al., 1994).

The production of tomato, *Lycopersicon esculantus*, a major source of nutrient to man and in-come generating to its growers is impaired by among other factors its infestation by nematodes. Reductions in yield ranging from 28 to 68 % have been reported (Adesiyan et al., 1990). Cowdung has been tested and proved effective in control of plant nematodes (Babatola, 1990; Abubakar and Majeed, 2000).

The aim of this work is to study the effectiveness of cow dung and urine of cow separately and in combination in the control of root-knot nematodes of tomato.

MATERIALS AND METHODS

A total of 30 (15cm mouth wide) plastic pots were divided into five groups of six. The pots in groups I and II were filled with one litre of autoclaved soil only. The third groups were filled to one litre with equal quantity of autoclaved soil and cowdung, the 4th group were

*Corresponding author. E-Mail: TukurAdamu@yahoo.com.

Table I. Effect of cowdung and urine on Root-knoct.

Treatment	Plant height (cm)	Plant dry wt	Root-knot index	RF
Uninoculated, untreated	14.53a	3.4a	0.0e	0.e
Inoculated untreated	8.7d	2.2d	4.1a	3.9a
Inoculated treated with Cowdung	13.8b	3.25b	1.2c	1.5c
Inoculated treated with Urine	11.5c	2.8c	1.6b	2.0b
Inoculated treated with cowdung + urine	14.4a	3.3a	0.9d	1.2d

filled with autoclaved soil thoroughly mixed with urine, while the 5th group were filled with equal volume of autoclaved soil and cow dung with urine mixed together.

Seeds of tomato *CV* Sokoto local, whose susceptibility to *meloidogyne incognita* have been established were raised in autoclaved soil. Two weeks after sowing, 2 seedlings were transplanted into each pot. Thereafter, one thousand second stage juveniles of *Meloidogyne incognita* race I. were inoculated into each pot except those of the 1st group which serve as control. The experiments were conducted in a screen house with the pot arranged in randomized block design. The plants were watered regularly.

Four weeks after transplant, the seedling were uprooted and growth was observed in terms of (i) plant height (ii) dry weight of plant, and (iii) extent of galling. The nematode multiplication factor was also accessed..

The nematode for this work were obtained from an infected tomato farm, previously inoculated with the egg mass of the nematode, using cobb's decantation and sieving techniques followed by modified Baermann's furnnel method. At the end of the experiment the soil nematode population were extracted by the same methods and counted. The roots of the tomato were cut into smaller pieces and mixed homogenously in a blender for 45 seconds. One gram (1 g) of the root was taken and examined under a dissecting microscope. The number of juveniles, eggs, and females were counted.

Root-knot index was determined using sasser et al, (1984) scale of 0 = No galling; 1 = 1-10 galls; 2 = 11 – 20 galls; 3 = 21 – 30 galls; 4 = 31-100 galls and 5 = more than 100 galls.

Data obtained were analysed using the new Duncan Multiple Range Test.

RESULTS AND DISCUSSION

The result obtained (Table I) showed that seedlings treated with all kinds of treatment produced significantly (P=0.05) higher results than those of the inoculated, untreated control. The results also showed that samples treated with the mixture of cow dung and urine, resulted in significantly (p = 0.05) higher plant height, dry weight, lesser root–knot indices and smaller reproductive factor (RF), than those treated separately with cowdung and urine. The mixture produced results which were comparable to those obtained with the uninoculated control (Table. I). Seedlings treated with urine alone produced lower plant height and dry weight, which were only higher than those of the inoculated, untreated control.

The observed increased in growth in tomato grown in treated soils compared to the untreated soils may be attributed to, among others, the increase in nutrients supply to the soil, resulting from the addition of cow dung and urine. The addition of manure to soil leads to a better environment for the growth of the roots. This enhances the utilization of soil nutrients, as a consequence of which the nematode damage might have been markedly reduced (Vander-Borgett et al., 1994). The observed decrease in number of nematodes may be responsible for the increased in growth of the seedlings. Such decrease means less disturbances to the seedlings resulting in an unhindered growth (Vander-Borgett et al., 1994).

The reduction in the reproductive factor of the nematode may be responsible for the observed decrease in root-knot indices. The decrease in number of the nematode accompanied by increase in growth of tomato suggests nematicidal potential of the cowdung and urine. Similar observation had been made by other workers (Babatola, 1990; Akhtar and Alam, 1990, 1992; Alam et al., 1994). The superior increase in growth observed in plants treated with combined cowdung and urine over those treated separate by doses of urine and cowdung may be attributed to the availability of more nutrients to plants for a longer period.

REFERENCES

Abubakar U (1999). Studies on the nematodes of Cowpea *Vigna Unguiculata* of the Savanna regions of Northern Nigeria and Control of *Meloidogyne incognta* using Selected plant extracts and aniamal manureso unpublished P.hD Thesis, Usmanu Danfodiyo University, Sokoto p.108

Abubakar U, Majeed Q (2000). Use of Animal manure for the control of Root-knot Nematodes of Cowpea J. Agric. Environ. 1(1): 29-33.

Adesiyan SO, Caveness FE, Adeniji MO, Fawole B (1990). Nematode Pest of Tropical Crops. Heinemann Educational Books (Nig.) Plc.

Aktar M, Alam MM (1990). Control of plant parasitic nematodes with agro-wastes soil amendment. Pakistan J. Nematol. 8: 25 – 28.

Aktar M, Alam MM (1991). Intergrated control of plant parasitic nematodes on potato with organic amendment of plant parastic nematodes. Nematicides and mixed cropping with mustard. Nema Med. 19: 169 – 171.

Aktar M, Alam MM (1992). Effects of crop residue amendments to soil for the control of plant parasitic nematodes. Bioresour. Technol. 14: 81 – 83.

Aktar M, Mohmoud I (1994). Control of root-knot nematode by bare-root dip in undecomposed and decomposed extracts of neem cake and leaf. Nematological J. Medit. 22: 55 –57.

Alam MM, Siddiqui SA, Khau MA (1994). Mechanism of control of the plant parasitic nematodes as a result of organic amendment to soil III.

Role of phenot in host roots, Ind. J. Nematol. 7(1): 23 – 31.
Babalola JO (1990). Pathogenicity of the root-knot nematode, *Meloidogyne incognita* on Okra, *Abelmochus esculentus,* and effect of some organic pests on Okra. Nig. J. plt. Proct. 1: 23 – 29.
Sasser, J.N; Carter, C.C. and Hartman, K.M. (1984). Standardization of host suitability studies and reporting of resistance to root-knot nematode. Crop nematode Research and control project Raleigh, North Carolina, p. 7.
Southey JF (1986). Laboratory methods for works with plant parasitic nematode. Ministry of Agric. Fish. HMSO. London, p. 202.