http://www.pjbs.org

PJBS

ISSN 1028-8880

# Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 4 (4): 417-418, 2001


# Management of Plant Parasitic Nematodes Associated with Chilli Through Organic Soil Amendments

Aly Khan, S.S. Shaukat[1], F. Qamar[2], S. Islam, A.A. Hakro and A.H. Jaffry
Crop Diseases Research Institute (P.A.R.C.), University of Karachi, Karachi-75270,
[1]Department of Botany, University of Karachi, [2]P.C.S.I.R. Laboratory Complex, Karachi, Pakistan

**Abstract:** The effect of three organic amendments including poultry manure, pigeon manure and sawdust and carbofuran on the population of *Tylenchorhynchus curvus*, *Helicotylenchus indicus* and *Meloidogyne* sp., larvae associated with chilli and the chilli yield were investigated. Population densities of the nematodes were reduced by the organic amendments to varied extent. Poultry manure caused greatest reduction of nematode populations. Yield of chilli was remarkably increased by poultry manure and carbofuran.

**Keywords:** Nematodes organic soil amendments, carbofuran, sawdust, pigeon manure, poultry manure.

## Introduction

Use of organic amendments for the improvement of crop plants and increasing productivity is an old practice. Although chemical nematicides have been successful but high coast and their hazardous effects on the environment makes them less attractive (Owino and Sikora, 1992).

Several attempts have been made by various workers for the control of plant parasitic nematodes by organic amendments. Patel and Patel (1992) observed that poultry manure reduced the population of *Rotylenchulus reniformis* associated with pigeonpea, also there was on increase in plant height and shoot and root weight.

Joshi and Patel (1995) reported that application of poultry manure showed improved growth of groundnut crop and reduced nematode population in comparison to controls. Alam (1991) found that sawdust significantly reduced the population of plant parasitic nematodes on carrot, tablebeat, radish, wheat, turnip and barley. Subba Rao *et al*., (1996) found reduction in population of *Helicotylenchus indicus* and *Rotylenchulus reniformis* by application of sawdust in combination with NPK and neem cake in field trials.

Khan and Shaukat (2000) reported that poultry manure significantly reduced the population of *Pratylenchus zeae* and *Hoplolaimus indicus* associated with rice variety IRRI-6.

Khan and Shaukat (1998) observed that pigeon manure and poultry manure were effective in controlling population of *Helicotylenchus indicus*, *Merlinius brevidens* and *Hoplolaimus seinhorsti* associated with garlic. Khan *et al*., (1986) found poultry manure more effective compared to urea and super phosphate in controlling *Ditylenchus* sp., *Helicotylenchus indicus*, *Pratylenchus scribneri* and *Tylenchus mirus*.

The objective of the present investigation was to compare the efficacy of poultry manure, pigeon manure and sawdust against nematodes associated with chilli (*Capsicum frutescens* Linn.). For comparison a chemical nematicide carbofuran was also used. The effect of these amendments on yield was also examined.

## Materials and Methods

A plot at Crop Diseases Research Institute (PARC), Karachi was divided into microplots each with an area of $1m^2$ pre-treatment soil samples (upto 8 in-depth) were taken from the plot for determining the initial population expressed as number/100 ml soil. Nematodes were isolated after 48 h by improved Baermann's funnel technique and later fixed in 4% formaline. Slides were prepared from fresh specimens. Slides were prepared from fresh specimens. Nematodes were counted and identified under stereomicroscope. The experiment was conducted in a Randomized Complete Block Design (RCBD) with four replications. The microplots were treated with (I) Poultry manure (ii) Pigeon manure (iii) Sawdust (iv) Carbofuran 3G, 2-3-dihydro-2, 3-dimethyl benzofuran-7-nyl methyl carbamate. The organic amendments were added at a rate of 800 kg/ha to the soil, whereas the chemical nematicide was applied at a rate of 10 kg/ha. Untreated plots served as controls. Soon after the treatment the plots were watered for ensuring proper decomposition of the organic additives. Four-week old seedlings of chilli (*Capsicum frutescens* Linn.) were transplanted. The plants were regularly watered. Fruiting started at 18 weeks, picking were done after every 3 weeks, yield were taken for 3 months. Final population of nematodes in treated and control microplots was determined. The data was subjected to analysis of variance (ANOVA) followed by least significant difference (LSD) at 5% level.

## Results and Discussion

The organic amendments and carbofuran significantly affected the population density of the three nematode species, i.e., *Tylenchorhynchus curvus*, *Helicotylenchus indicus* and *Meloidogyne* sp., larvae. The nematode density also different significantly. The population density of *Tylenchorhynchus curvus* was reduced by the amendments in the order: poultry manure > pigeon manure > sawdust > carbofuran (Table 1). The amendments reduced the population size of *Helicotylenchus indicus* in the order: poultry manure > pigeon manure > carbofuran > sawdust, while that of *Meloidogyne* sp., larvae was abated in the order: carbofuran > poultry manure = pigeon manure > sawdust.

The yield was significantly influenced by the organic amendments and carbofuran. The yield was significantly elevated by carbofuran and poultry manure (Fig. 1). The mode of action of these amendments may be similar to that of other organic additives which posses nemato-toxic substance (Alam, 1991, Miller and Edington, 1962) or could be as these

Table 1: Effect of different treatment of the nematodes associated with chilli. Mean followed by standard error

| | Treatments | | | | | |
|---|---|---|---|---|---|---|
| Nematodes | Initial | Control | Carbofuran | Poultry manure | Pigeon manure | Sawdust |
| *Tylenchorhynchus curvus* Williams, 1960 | 56.25 ± 5.92 | 61.5 ± 0.95 | 32 ± 1.08 | 15.25 ± 1.79 | 25.5 ± 2.06 | 27 ± 3.1 |
| *Helicotylenchus indicus* Siddiqi, 1963 | 112.25 ± 9.12 | 115.75 ± 3 | 40.75 ± 3.09 | 30.75 ± 0.47 | 38.5 ± 8.77 | 66.25 ± 9.91 |
| *Meloidogyne* sp. larvae Goeldi, 1892 | 55.25 ± 2.05 | 49 ± 2.97 | 5.5 ± 2.10 | 10.5 ± 0.64 | 10.75 ± 2.86 | 48.75 ± 2.35 |

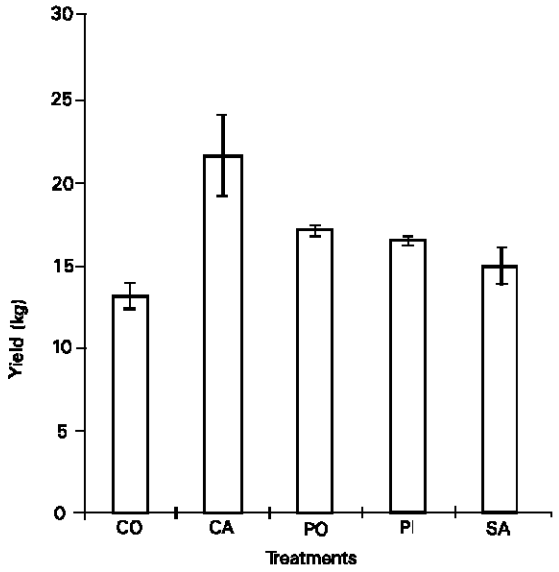


Fig. 1: Yield in different treatment (CO = Control; CA = Carbofuran; PO=Poultry manure; PI= Pigeon manure; SA = Sawdust).

amendments when added charge the physical and chemical properties of soil inimical to plant parasite nematode (Ahmad *et al.*, 1972).

As suggested by Barman and Das (1996) good control of nematodes by organic amendments can be achieved but it requires large quantities in actual field conditions for effective management. It would therefore be advisable to evaluate a management scheduled to apply organic amendments in combination with a nematicide/herbicide (Khan and Shaukat, 1999).

## References

Ahmad, R., A.M. Khan and S.K. Saxena, 1972. Changes resulting from amending the soil with oil-cakes and analysis of oil-cakes. Proc. 59th Sec. Indian Sci. Congr., Calcutta, Part-III: 164.

Alam, M.M., 1991. Effect of sawdust and ammonium sulphate on the population of plant parasitic nematodes and plant growth. Pak. J. Nematol., 9: 31-38.

Barman, M. and P. Das, 1996. Effect of chemical seed dressing and organic amendments alone and in combination for the management of root-knot nematode, Meloidogyne incognita on green gram. Indian J. Nematol., 26: 72-76.

Joshi, P.R. and H.R. Patel, 1995. Organic amendments in management of *Meloidogyne javanica* on groundnut. Indian J. Nematol., 25: 76-78.

Khan, A., T. Rajput and F.M. Bilqees, 1986. Influence of some fertilizers on plant parasitic nematodes. Pakistan J. Zool., 18: 311-316.

Khan, A. and S.S. Shaukat, 1998. Effect of some organic amendments on density of nematodes associated with garlic (*Allium sativum* L.). Appl. Ento. Phytopath., 66: 13-19.

Khan, A. and S.S. Shaukat, 1999. Interaction of organic amendments and a herbicide on population density of two nematode species and growth parameters of rice var. Lateefy. International J. Nematol., 9: 191-195.

Khan, A. and S.S. Shaukat, 2000. Effect of some organic amendments and carbofuran on population density of four nematodes and growth and yield parameters of rice (*Oryza sativa* L.) var. IRRI-6. Pak. J. Zool., 32: 145-150.

Miller, P.M. and L.B. Edington, 1962. Effect of paper and sawdust soil amendments on meadow nematodes and subsequent *Verticillium* wilt of tomatoes. Plant Dis. Reptr., 46: 745-747.

Owino, P.O. and R.A. Sikora, 1992. Influence of leaf extracts of marigold and the fungicide benlate on fungal parasitism of *Meloidogyne javanica* eggs in Kenyan soil. Pak. J. Nematol., 10: 57-67.

Patel, R.G. and D.J. Patel, 1992. Comparative efficacy of some organic amendments and granular nematicides in the control of *Rotylenchulus reniformis* infecting pigeonpeas. Indian J. Nematol., 22: 14-18.

Subba Rao, D.V., K. Sitaramaiah and S. Maiti, 1996. Management of plant parasitic nematodes in betelvine gardens through non-chemicals methods. Indian J. Nematol., 26: 93-97.