Appl. Ent. Phytopath
Vol. 66, 2&1, Feb.-Aug. 1998

Effect of some organic amendments on the density of nematodes associates with garlic (*Allium sativum* L.)

ALY KHAN and S. SHAHID SHAUKAT
Crop Diseases Research Institute, PARC, University of Karachi
and Department of Botany, University of Karachi, Karachi 75270

ABSTRACT

This study determines the effect of three organic amendments viz. Pigeon manure, poultry manure and sawdust on the populaton density of *Helicotylenchus indicus, Haplolaimus seinhorsti* and *Merlinius brevidens* associated with garlic. Pigeon and poultry manures were markedly more effective in controlling population density of the nematodes than sawdust. Garlic yield was elevated most by pigeon manure, followed by poultry manure and sawdust in that order.

INTRODUCTION

Garlic (*Allium sativum* L.) is an important crop grown in Sindh and other provinces of pakistan. It is prone to many types of plant parasitic nematodes (Maqbool, 1992). In view of the increased use of organic amendments which have no residual toxic effects, a study was undertaken using poultry manure, pigeon manure and sawdust against the population of *Helicotylenchus indicus* Siddiqi, 1963; *Hoplolaimus seinhorsti* (Luc, 1958)and *Merlinius brevidens* (Allen, 1955) Siddiqi, 1970 associated with garlic and the effect of these amendments on the bulb yield was investigated.

MATERIALS AND METHODS

The experiment was conducted in microplots of a field located at Karachi University campus. The field had an initial population of 52±8.2 *Helicotylenchus indicus,* 40±5.5 *Hoplolaimus seinhorsti* and 28±6.4 *Merlinius brevidens* individual/100 ml soil. Microplot

each measuring $1m^2$ containing sandy loam soil were amended with (i) poultry manure, (ii) pigeon manure, (iii) sawdust, at a rate of 900 kg/ha two weeks before sowing. Unamended soil was kept as control. In each microplot in four rows garlic was planted. There were 4 replicates of each treatment and the plots were randomized within blocks. The soil was irrigated twice a week and urea fertilizer at a rate of 100 kg/ha was applied once during the experiment. Weeds were regularly removed. At the time of harvest (4 months) nematodes population was determined by a modified Bearmann funnel techique using 100 gr composite soil sample from each plot, garlic bulb yield in grams was determined as well.

RESULTS

1. Population density of nematodes

Initial and the final density (at 4 months) of the three nematodes is presented in Fig. 1-3. The organic amendments significantly reduced the population density of the

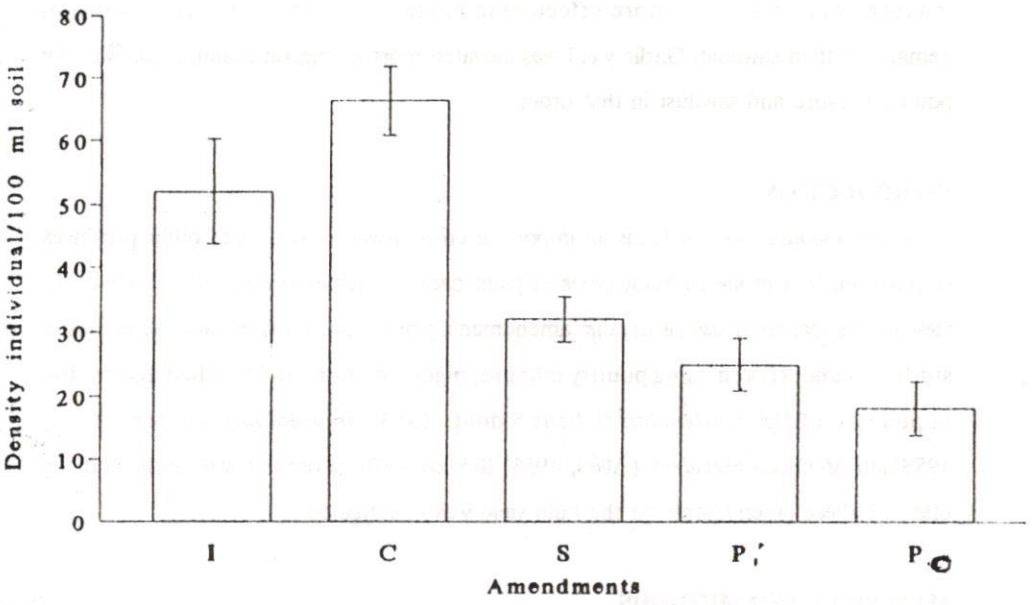

Fig. 1. Population density of *Helicotylenchus indicus* (number/100 ml soil) initially and after 4 months in different amendments. I= initial density, C= control, S= sawdust, P_i- Pigeon manure, P_0= poultry manure.

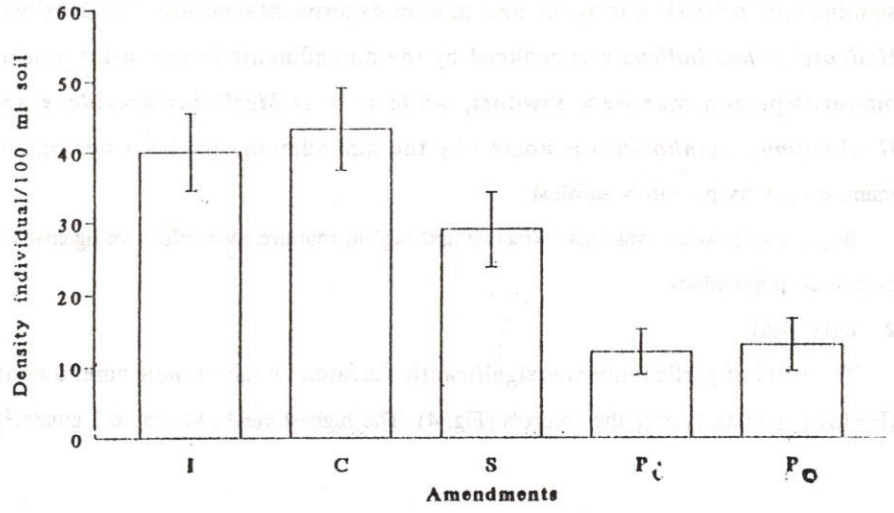

Fig. 2. Population density of *Hoplolaimus seinhorsti* (number/100 ml soil) initially and after 4 months in different amendments (symbols as in Fig. 1).

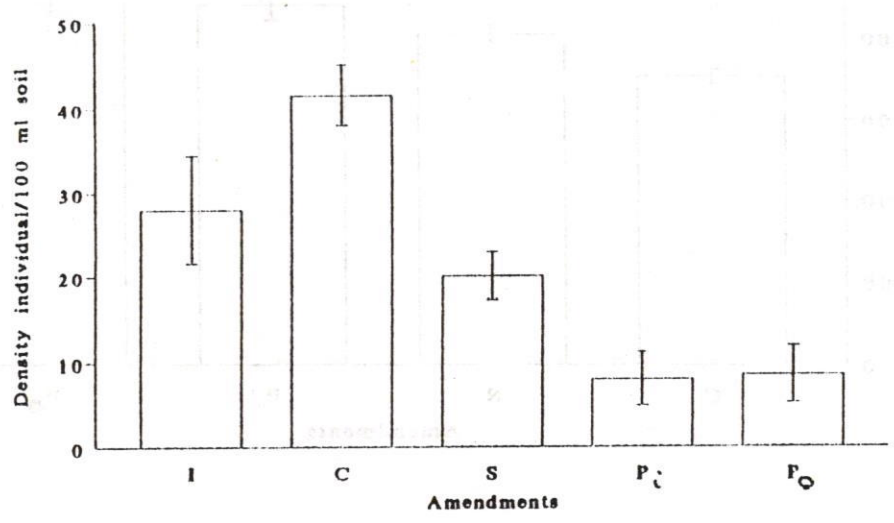

Fig. 3. Population density of *Merlinius brevidens* (number/100 ml soil) initially and after 4 months in different amendments (symbols as in Fig. 1).

nematodes (F=244.3, p<0.001). The density levels of the three nematode species after 4 experimental period also differed significantly (F= 76.3, p<0.001). The interaction of species and amendments was also found significant (F= 5.8, p<0.001). Initially the density of *Helicotylenchus indicus* was highest followed by that of *Hoploaimus seinhorsti* and *Merlinius brevidens*. The density of the three nematode species increased significantly (p<0.01) during the four months experimental period. The density of *Helicotylenchus indicus* was reduced by the amendments in the order poultry manure>pigeon manure> sawdust, while that of *Merlinius brevidens* and *Hoplolaimus seinhorsti* was abated by the amendments in the order pigeon manure>poultry manure> sawdust.

In general, sawdust was least effective and pigeon manure most effective against the nematode populations.

2. Garlic yield

The yield of garlic bulbs was significantly elevated by the organic amendments (F=131.6, p<0.001) over the controls (Fig. 4). The highest yield (441.75±6.2 gms/m^2),

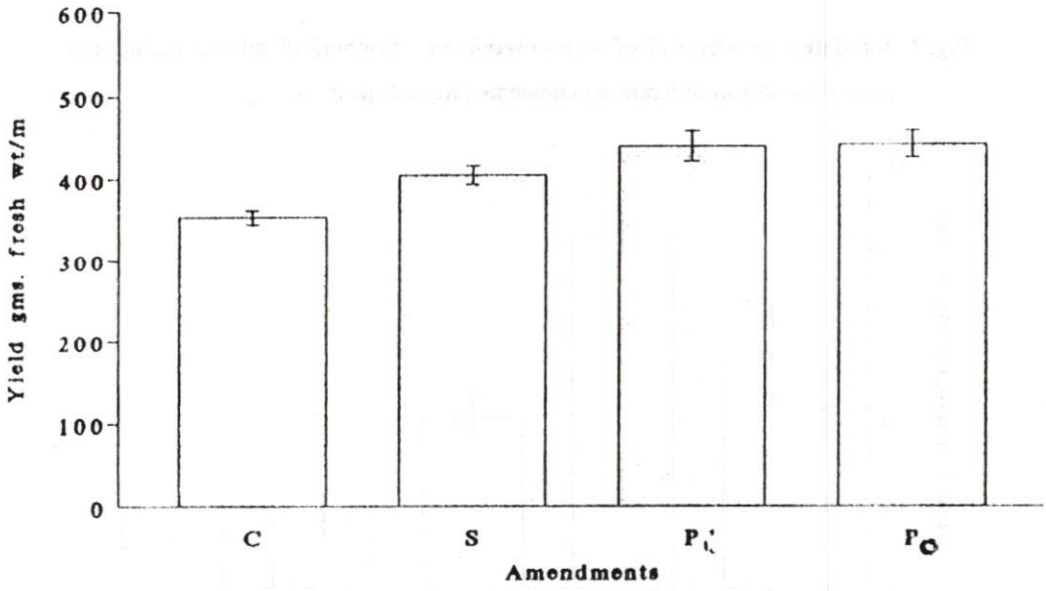

Fig. 4. Yield of garlic bulbs gms fresh wt./m^2 (C= control, S= sawdust, P_i= pigeon manure, P_0= poultry manure).

was recorded for pigeon manure amendment and the lowest for sawdust amendment (404.75 ± 11.4 gms/m^2).

DISCUSSION

All the soil amendments reduced the population of *Helicotylenchus indicus, Hoplolaimus seinhorsti* and *Merlinius brevidens.*

Our results are in agreement with those of Babatola (1989) who observed an immediate decrease in the nematode population when the soil amendments were applied but rose gradually thereafter. In earlier studies khan *et al.,* (1986) found poultry manure to be the most effective as compared to urea, farmyard-manure, super phosphate and potassium sulphate in controlling population of *Helicotylenchus indicus, pratylenchus scribneri, Tylenchus mirus* and Ditylenchus species, while in the present study pigeon manure was the most effective amendment in the control of *M. brevidens* and *H. seinhorsti* while pultry manure in the control of *H. indicus.*

Montasser (1991) reported poultry, cattle and sheep manures more effective as compared to quail and rabbit manure in controlling root-knot nematodes associated with okra.

Sivakumar and Marimuthu (1986) reported the reduction of *Meloidogyne incognita, Rotylenchus reinformis, Hirschmanniella mucronata* and *Dorylaimus* sp. in piper beetle nurseries (29.3%) by sawdust and (40.9%) by poultry manure.

Sayre (1980) suggested that the effectiveness of organic amendments could be explained on the following grounds: (a) the release of decomposition products of organic amendments that may cause toxicity to the nematodes, and (b) the organic amendments may cause the modification of soil microflora and microfauna resulting in "the build-up of bacteria, microbivorous nematode trapping fungi and other soil antagonists that destroy plant parasitic nematodes".

Besides the population control of the nematodes, the organic amendments seem to have several advantages, such as: ease of application, relatively low capital investment, build-up of soil fertility, reduced cost of fertilizers, durability, relatively harmless to beneficial soil microorganisms, no pollution to the environment, possibility of multiple disease control and effective utilization of farm and town waste.

References

BABATOLA, J. O., 1989. Effect of some organic manures on nematodes in tomato cultivation. Pak. J. Nematol., 7: 39-46.

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

MAQBOOL, M. A., 1992. Distribution and host association of plant parasitic nematodes. National Nematological research Centre, University of Karachi, 250p.

MONTASSER, S. A., 1991. The efficacy of some organic manures in controlling root-knot nematode of okra. Pak. J. Nematol., 9: 139-143.

SAYRE, R. M., 1980. Promising organisms for biocontrol of nematodes. Plant Disease, 64: 527-532.

SIVAKUMAR, M. and T. MARIMUTHY, 1986. Efficacy of organic amendments against phytonematodes associated with betelvine (*Piper beetle* L.). Indian J. Nematol., 16: 278.

Address of the authors: Dr. ALY KHAN and Dr. SHAHID SHAUKAT Crop Diseases Research Institute, PARC and Department of Botany, University of Karachi, Karachi- 75270, Pakistan.