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Nematodes Associated with *Brassica compestris* and Their Control

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Abstract: On the examination of soil around the roots of Mustard in Kashmir Valley, two species of Nematodes were met, namely *Aphelenchus radicicolus* Steiner,1931 and *Psilenchus haki* Handoo, 1977. The species were identified under Stereoscopic microscope with the little intraspecific variations from the original in terms of the dimensions. The effect of organic amendments including poultry manure, pigeon manure and saw dust was also looked into in order to calculate their effects on these species. Population densities of both the species were reduced to a considerable extent on the application of organic amendments in the order of pigeon manure > Poultry manure > saw dust.

Key words: Mustard · Kashmir Valley · Organic amendments · Control

INTRODUCTION

Nematodes are the most numerous multicellular animals on earth [1]. Plant parasitic nematodes, which feed and reproduce on living plants and are capable of active migration in the rhizosphere, on aerial plant parts and inside the plants. Plant parasitic nematodes cause significant economic loses to a wide variety of crops. According to Sasser and Fackman [2] crop losses by nematodes range from 8 to 20 % on major crops around the world. Therefore besides the basic taxonomy of the nematodes, it is essential to look for feasible control measures. Chemical control is widely used option for plant parasitic nematode management. However, chemical nematicides are now being appraised in respect of environmental hazard, high costs, limited availability in many developing countries or their diminished effectiveness following repeated applications. Therefore continuing environmental problems associated with the sense of nematicides have introduced a sense of urgency into the search for alternative methods of nematode management [3]. One such method can be the use of organic soil amendments. Among various workers who contributed to the control of phytonematodes by using organic amendments, Patel and Pate [4] and Khan & Shoukat [5] are some note worthy. Alam [6] found that Saw dust significantly reduced the population of plant parasitic nematodes on carrot, radish, wheat, turnip and barley. Poultry manure is more effective compared to urea and super phosphate in controlling *Ditylenchus sp*. *Helicotylenchus indicus* and *Pratylenchus scribneri* and *Tylenchus mirus* [7].

The efficacy of various organic amendments including sawdust was worked out by Dahiya [8] against Heterodera avenae in wheat.

Wang *et al*. [9] estimated the effects of some organic amendments like sun hemp residues on nematodes associated with *Zea mays* and found significant effects on population density.

Kimenju *et al*. [10] has worked on assessing the role of organic soil amendments in management of root knot nematodes on common bean.

As suggested by Barman and Das [11] 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 nematicides /herbicides.

MATERIAL AND METHODS

The work taken up in the present problem deals with the study of plant parasitic nematodes of *Brassica compestris* in Kashmir valley and objectives supposed to be worked out were survey of nematodes occurring on the *Brassica compestris* and their control strategies especially the application of organic amendments like Poultry

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manure, pigeon manure and Saw dust. For better management strategies the basic taxonomy as well as control measures are a need of the time.

A field plot at Ganderbal was chosen for carrying out the study. The plot was divided into micro plots each with an area of $1m^2$. Pretreatment soil samples were taken from the rhizosphere of the mustard for determining the initial population expressed as number/100ml of soil. The soil samples were processed by Cobb's modified decantation and sieving techniques [12]. 300 mesh sieve of pore size 53 µm was used. Nematode suspension was killed and fixed in one operation by using equal amount of double strength hot F.A.A. solution. The fixed material was left as such for 24 hrs. Nematodes were thus collected and dehydrated in glycerine-alcohol solution containing 95 parts of 70% alcohol and 5 parts of glycerine. Slides were prepared from the specimens. Nematodes were identified and counted under stereomicroscope.

In order to carry out another part of the programme, the experiment was conducted in a randomized complete block Design (RCBD) with three replication. The micro plots were treated with Poultry manure, Pigeon manure and Sawdust. These organic amendments were added at a rate of 800kg/ha to the soil. Untreated plots served as controls. Soon after the treatment the plots were watered for ensuring proper decomposition of the organic additives. Small seedlings of mustard were transplanted. Final population of nematodes in treated and control micro plots was determined. The data was subjected to statistical analysis.

RESULTS AND REMARKS

The nematodes met are described herein along with their dimensions and descriptions.

***Aphelenchus radicicolus* Steiner, [13]:**

Females: L = 0.82-0.99mm, a = 30.65-38.06mm, b = 8.9-10.0, c = 25.08-27.5, c' = 50.1-51.4, v = 76-77.3%, Stylet = 18-19µm

Males: L = 0.69-0.88mm, a = 28.3-34.0, b = 8-9.3, c = 27.3-31, T = 57-62,Stylet = 16.1-18µm

Cuticle is transversely striated, average width of the annules being 1.5µ. Lateral fields with twelve incisures. Lip region broadly rounded. Lips amalgamated. Cephalic selerotization developed to form a hexaradiate ring, forming the spear guide.

***Psilenchus haki* Handoo, [14]:**

Females: L = 1.02-1.13, a =42.8-47.6, b = 6.8-7.1, c = 6.6-7.0, V = 49-47%, stylet = 12.13-14.3µ

Body is ventrally arcuate assuming c-shape when fixed. Body tapering from neck base anteriorly to a conical head region. Lateral field originating in region of metacorpus occupying $1/4^{th}$ of body width at midbody and is marked by 4 incisures. Lip region not striated continous with body contours, tapering anteriorly. Spear slender measuring 12.13-14.3µ in length. Anterior portion less than half the length of the shaft. Opening of dorsal oesophageal gland located about 2 µ behind spear base. Vulva transerve slit. Vagina at right angles to body axis. Reproductive system didelphic-amphidelphic. Uteri with a columellate cell and distally with an oval spermatheca filled with sperms. Ovaries well developed, out stretched with oocytes arranged in double rows. Rectum longer than one anal body width in length. Post anal gland sac absent. Tail with coarser striations than the body, measuring about more than 10 anal body width in length with a bluntly rounded clavate terminus.

Males: Not found.

Remarks: The species is described by Handoo [14] on *Brassica oleracea* in the Kashmir Valley for the first time. The dimensions and descriptions of the present specimens are similar to that of the original except very less considerable alterations probably due to habitat alteration, but the specimens are recorded on mustard in the present programme which forms their new host in the Kashmir Valley.

The organic amendments significantly affected the population density of the three nematodes species i,e. *Aphelenchus radicicolus,* Steiner, 1931[13], *Psilenchus haki* Handoo, [14]. The overall Nematode density also

Table 1: Effect of treatments on the nematode density occuring on maize. Population mean values follow by standard error

Nematode species	Initial density	Control	Poultry manure	Pigeon manure	Sawdust
Aphelenchus radicicolus (Cobb, 1913) Steiner, 1931	51.12±4.92	65.5±3.95	25.15±3.3	22.15±3.79	27±3.7
Psilenchus haki Handoo, 1977	63.35±5.2	97.75±3.7	38.5±6.7	27.85±3.8	58.35±8.7

differed significantly. The population density of *Aphelenchus radicicolus* Steiner, 1931[13]was reduced by the amendments in the order Pigeon manure > Poultry manure> Sawdust (table 1). The amendments reduced the population size of *Psilenchus haki* Handoo, 1977[14] in the similar order.

REFERENCES

1. Kimpinski, J. and A.V. Sturz, 2003. managing crop root zone ecosystems for prevention of harmful and encouragement of beneficial nematodes. Soil Till Res., 72: 213-221.
2. Sasser, J.N. and D.W. Freckman, 1987. A World perspective on Nematology: the role of the society. In: Veech JA, Dickson DW (Eds.) vistas on nematology: a commemoration of the 25th anniversary of the society of nematologists. Society of nematologists, Lakeland, FL., pp: 7-14.
3. Kerry, B.R., 2000. Rhizosphere interactions and the exploitation of microbial agents for the biological control of plant parasitic nematodes. Annu. Rev. Phytopathol., 38: 423-441.
4. 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: 4-18.
5. 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, Intl. J. Nematol., 9: 191-195.
6. 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.
7. Khan, A., T. Rajput and F.M. Bilqees, 1986. Influence of some fertilizers on plant parasitic nematodes. Pakistan J. Zool., 18: 311-316.
8. Dahiya, R.S., 2003. Effect of few organic amendments on cereal cyst nematodes, Heterodera avenae in wheat. In proceedings of national symposium on bio-diversity and management of nematodes in cropping systems for sustainable agriculture, Jaipur, India.,11-13 November.
9. Wang, K.H., R. Mcsorley, A.J. Marshali and R.N. Gallaher, 2004. Nematode community changes associated with decomposition of Crotalaria juncea amendment in litter bags, Appl. Soil Ecol., 27(1): 31-45.
10. Kimenju, J.W., D.M. Muiru, N.K. Karanja, W.M. Nyongesa, D.W. Miano and G.K. Mutua, 2004. Assessing the role of organic soil amendments in management of root knot nematodes on common bean, *Phaseolus vulgaris* L. J. Tropical. Microbiol., 3(1): 14-23.
11. 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 on green gram.Indian J. Nematol., 26: 72-76.
12. Cobb, N.A., 1918. Estimating the nema population of soil. Agric. Tech. Circ. U.S. Deptt. Agric., 1: 48.
13. Steiner, G., 1931. Uberdae verhallnis dermarinea freilebenden Nematoden. The denen dessurwarrers and des landes. Bio. Zentrabl., 37: 186-210.
14. Handoo, Z.A., 1977. Soil and Plant parasitic nematodes of vegetable and fruit crops of Kashmir. Ph.D thesis submitted to Department of Zoology, University of Kashmir, Srinagar.