Indian J. Nematol. 6 (1976) : 160-162

SHORT COMMUNICATIONS

SPATIAL DISTRIBUTION OF THE LANCE NEMATODE, *HOPLOLAIMUS INDICUS* IN RICE SOILS

BY

K. V. RAMANA and Y. S. RAO

Central Rice Research Institute, Cuttack 753 006, India.

The lance nematode, *Hoplolaimus indicus* Sher has been reported in association with over 30 species of crop plants including rice (Das *et al.*, 1970) and under different soil conditions (Das & Rao, 1970 ; Gupta & Atwal, 1971). The nematodes are known to prefer sandy loams (Ramana, 1972) and are reported to occur in the top 10-20 cm of soil (Mukhopadhyaya &

Prasad, 1968). In view of its importance as a pest of rice (Banerjee & Banerjee, 1966 ; Das & Rao, (1970) and in order to develop methods for cultural and chemical control, the spatial distribution of the nematodes in the rhizosphere of rice was investigated under different soil conditions.

Fields under continuous rice culture for seed multiplications were selected to represent uplands and low lands based on the water management and soil conditions on the Farm at the CRRI. In all 20 fields growing the variety *Padma* were selected and 3 cores of soil (21 cm x 2.5 cm) at the rate of one per 5 m^2 area were drawn at 30 days after sprouting of seedlings in nursery soils and at peak tillering stage (90 days age) of crops in fields, during October, 1971. After the auger was drawn out, 2 cm cylindrical sub-samples were cut out serially from each core of soil sample and separately processed for extraction and estimation of nematodes (Whitehead & Hemming, 1965). The physical properties of the soils were analysed by Buycos Hydrometric method (Tamhane *et al.*, 1960). A sample of 6 plants was collected from each area of soil sampling to measure the depth of root penetration. The mean percentage of nematodes prevailing in each 2 cm stratum out of the total population in the core of soil sample was compared from the three sampling areas in each field.

Population of *H. indicus* was highest (105/core) in upland nursery soil and least (36) in low land field soil (Fig. 1, A). In the low land nursery soil, the nematodes numbered 46 while

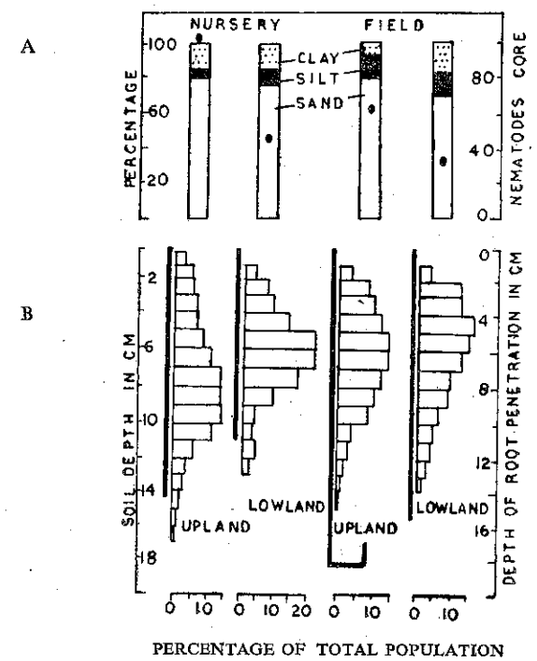

Fig. 1. Distribution of *Hoplolaimus indicus* in rice soils. A—Soil composition and nematode population ; B—Prevalence of nematodes in relation to root penetration (The solid line represents depth of root penetration).

in upland field soil, this number was higher (64). In the uplands, the sand content was 80 per cent but the silt content was higher in field soil. The sand content was lower in nursery (75 per cent) and field (64 per cent) in low lands. The low sand content and high silt fraction in the field soils under both upland and low land conditions may be considered as less conducive for the movement and migration of the nematodes due to low porosity (Tamhane *et al.*, 1960). The results confirmed the earlier findings on the preference of the lance nematode to coarse textured soils (Das. & Rao, 1970 ; Gupta & Atwal, 1971).

One core of soil sample in the above study weighed about 375-400 g. The population of *H. indicus* per core (mean of 60 cores) was 292 and 98 in nursery soils in uplands and low lands respectively. In fields soils, the population was 146 and 112 per core in upland and low land respectively. Nematodes prevailed upto 18-20 cm in uplands and 12-16 cm in low lands (Fig. 1, B). High population (16-20 per cent) prevailed in 7-10 cm stratum in nursery soils under uplands and in 5-8 cm stratum in nusery soils in low lands. In the field soils, high population of nematodes (10-14 per cent) prevailed in 4-8 cm stratum in uplands and in 4-6 cm depth in low lands. Further, nematodes prevailed upto 17 cm depth in uplands and 15 cm depth in low lands. Roots penetrated deeper, 21.5 cm and 15 cm in fields under upland and low land fields respectively but no nematodes prevailed below 15 cm depth in these soils. In the nurseries, roots penetrated to 14.2 cm and 11 cm under upland and low land conditions respectively and nematodes prevailed even below these depths. The results suggested that the depth of prevalence of the nematodes had no correlation with the depth of root penetration in low lands, though the higher population of nematodes in the top 4-8 cm may be due to the more lateral spread of roots in these soils. The plough layer is upto 15 cm depth, but 30-40 per cent of rice roots are reported to proliferate below this layer (Hollis, 1968). Since the concentration of *H. indicus* was in the plough layer in low lands, cultural practices like ploughing may help reduce the nematodes in this layer while in uplands deeper ploughing seems necessary to expose the nematodes.

REFERENCES

BANERJI, S. N. & BANERJI, D. K. (1966). Occurrence of the nematode *Hoplolaimus indicus* in West Bengal. *Curr. Sci.* **35** : 597-598.

DAS, P. K. & RAO, Y. S. (1970). Life history and pathogenesis of *Hoplolaimus indicus* in rice. *Indian Phytopath.* **23** : 459-464.

DAS, S. N., SAHU, H. & RAMANA, K. V. (1970). Host range and pathogenesis of *Hoplolaimus indicus* Sher, 1963 on sugarcane with some observations on its survival in fallow soils. *Bull. Indian Phytopath. Soc.* **6** : 43-51.

GUPTA, J. C., & ATWAL, A. S. (1971). Biology and enclogy of *Hoplolaimus indicus* (Hoplolaimidae : Nematoda) II. The influence of various environmental factors and host plants on the reproductive potential. *Nematologica* **17** : 277-284.

HOLLIS, J. P. (1969). Soil layer distribution of rice root system. *Phytopathology* **58** : 1053.

MUKHOPADHAYAYA, M. C., & PRASAD, S. K. (1968). Vertical distribution of some plant parastic nematodes. *Indian J. Ent.* **31** : 221-332.

RAMANA, K. V. (1972). *Ann. Tech. Rept.* Central Rice Research Institute, Cuttack, 1974, p. 40.

TAMHANE, R. V., MOTIRAMANI, D. B & BALI, Y. P. & DONAHUE, R. L. (1960). *Soils-Their Fertility in Tropical Areas.*

WHITEHEAD, A. G. & HEMMING, J. R. (1965). A comparison of some quantitative methods of extracting small vermiform nematodes from soil. *Ann. appl. Biol.* **55** : 25-30.