STUDIES ON THE ASSOCIATION OF PLANT PARASITIC NEMATODES ASSOCIATED WITH ROOT-KNOT NEMATODE INFECTING POTATO (SOLANUM TUBEROSUM).

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ABSTRACT

An extensive survey was undertaken to determine the diversity and abundance of endemic nematodes in the potato fields of 15 villages in Thoubal district of Manipur. The most obvious host response was shown by the root-knot nematode i,e Meloidogyne incognita in the Awang Takyenjam Leikai associated with 3 other plant parasitic nemotodes. It was followed by the Potato cyst nematode Globodera spp. in Dolaithabi and Helicotylenchus spp. in Langmeidong area.

KEY WORDS Diversity, nematode, Meloidogyne incognita, Potato and Thoubal.

INTRODUCTION

Potato is one of the most important food crops in the world and forms the staple food for more than half of the population. It is popularly known as the king of vegetable and is very susceptible to root knot nematode (RKM). It is also found to be parasitized by various plant parasitic nematodes (PPN). In Manipur, the root knot nematode or Meloidogyne spp. are economically important pests of many crop plants, including potato. The root knot nematodes are soil borne and feed on roots. Their life cycle includes egg, juvenile and adult stage; moreover the plant parasitic nematodes are also soil borne pest that causes significant changes to agricultural and horticultural crops worldwide. So far, not much is known about the occurrence of plant parasitic nematodes associated with potato plant in this region. Therefore, the present study was undertaken in order to assess the nematode community, especially the root knot nematode infecting potato plant of Thoubal district. The paper highlights the association of 3 plant parasitic nematodes identified up to their generic level. .

MATERIALS AND METHODS

Observations were made on the survey of root knot nematode in 15 different localities of Thoubal district, viz. Chagoning loupham, Mamang loupham, Dolaithabi, Khekman-mayai leikai, Waithou, Kopalli, Moijing, Keibung, Leisangthem-khong Manung, Leisangthem-khong Maning, Leisangthem –khong Mamang, Awang-Takyenjam Leikai, Langmeidong, Lilong chajing and Lilong haoreibi in Manipur from January to June, 2012. From the potato fields, the tubers as well as soil samples about 500gms were collected from around the rhizospheric regions of potato plants. Details relevant to the study like locality, month, date and time of collection were also noted. The soil samples collected in polythene bags were brought to the laboratory for processing, root samples and tubers were washed with tap water and the processing of the soil samples were done following the extraction of nematodes by Cobb's sieving and decanting method followed by Baermann's funnel method (Southey, 1986). The nematodes collected were also processed further for identification and their population or counts were noted. Root knot species was identified as M .incognita up to their species level by seeing cuticular perennial pattern of gravid female (Norton ,1978).

RESULT AND DISCUSSION

The result presented in Table 1 indicate that 3 genera of plant parasitic nematodes were found associated with potato and the root knot nematode is well distributed in a wider range comparing to the other plant parasitic nematodes which infect potato. Out of the 15 localities investigated, the root knot nematode has been encountered in 13 localities, except in the 2 localities namely Kopalli and Keibung of Thoubal district. The highest rate of root knot nematode infection was recorded in Awang-Takyenjam Leikai followed by Chagoning loupham and medium rate of infection was seen in Leisangthem–khong Mamang. Globodera spp. and Helicotylenchus spp. also showed medium rate of infection whereas the lowest rate of infection was done by Tylenchus spp. The results of the investigation co-relates with the works of Mani and Prakash 1992 , who reported about the association of plant parasitic nematodes associated with certain vegetable crops in Andhra Pradesh. Krishna Prasad 2006 also worked out on potato cyst nematodes and their management which can adjustable conformity with the present findings. Our results also support the findings of Seenivasan et al 2007 investigated on management of potato cyst nematode through biological control and increased in yield production .The present investigation also support the findings of Joymati et.al.2011 about the community analysis of plant parasitic nematodes in different villages of Bisnupur Districts of Manipur.

Sl. No.	Localities	RKN (Meloidogyne spp.)	Globodera spp.	Helicotylenchus spp.	Tylenchus spp.
1	Chagoning loupham	+++	++	+	_
2	Mamang loupham	+	_	+	_
3	Dolaithabi	+	+++	+	_
4	Khekman-mayai leikai	++	_	_	+
5	Waithou	+	++	++	_
6	Kopalli	_	_	+	+
7	Moijing	++	_	_	_
8	Keibung	_	+	_	+
9	Leisangthem-khong Manung	++	++	+	_
10	Leisangthem-khong Maning	_	+	_	_
11	Leisangthem –khong Mamang	+++	_	+	_
12	Awang-Takyenjam Leikai	+++	++	+	+

13	Langmeidong	+	_	++	_
14	Lilong chajing	+	_	+	_
15	Lilong haoreibi	+	_	_	_

Table 1 Association of plant parasitic nematode associated with M. incognita infecting potato plant in Thoubal diatrict of Manipur

********The symbols +++ indicates high incidence or infection by the species in the particular area, ++ indicates medium infection, + indicates lowest infection rate and – sign indicates the absence of the species in the areas.

The present study revealed lesser knowledge, high level of ignorance of the farmers of this district about plant parasitic nematodes associated with potato in spite of their common occurrence. Further, it implied that rigorous efforts are needed to be undertaken by all extensive agencies by using the modern methods in order to disseminate the knowledge of these infections and their management among the farmers.

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REFERENCES

1. Brown, E.B (1969). Assessment of the damage caused to potatoes by potato cyst eelworm, Heterodera rostochiensis. Annals of Applied Biology.53: 493-502.
2. Kaushal, K.K., Srivastava, A.N., Pankaj, Chawla, G. and Khajan Singh (2007). Cyst forming nematodes in India – A review. Indian journal of Nematology 37:1-7.
3. Joymati L, Christina Kh., Jennifer O and Bibi K (2011). Community analysis of plant parasitic nematodes associated with agricultural crop in Bishnupur district of Manipur.Indian journal of Nematology. 41:220-221.
4. Krishna Prasad, K.S. (1986). Potato nematodes. In “plant parasitic nematodes in India” (Gopal Swarup and D.R. Dasgupta Eds.), Indian agricultural Research Institute, New Delhi. 497 pp.
5. Krishna Prasad, K.S. (2006). Potato cyst nematodes and their management in the Nilgiris (India). Technical bulletin No.77, Central Potato Research Institute (ICAR). Shimla, H.P., India, 20 pp.
6. Mani, A. and Prakash, K.S.(1992). Distribution of plant parasitic nematodes associated with certain principal crops in Andhra Pradesh. Current Nematology. 3: 21-26.
7. M. John Sudheer, P. Kalaiarasan, M. Senthamarai, S. Prabhu, G.M.V. Prasad Rao, P. Priya, P. Harnatha, V. Harinatha, M. Reddy Kumar and Sailaja rani (2008). Diversity and community structure of major plant parasitic nematodes in selected districts of Andhra Pradesh, India. Indian journal of Nematology. 38: 68-74.
8. N. Seenivasan, K. Devrajan and N. Selvaraj (2007). Management of potato cyst nematodes, Globodera spp. through biological control. Indian journal of Nematology. 37:21-26.

9. Norton, D.C. (1978). Ecology of plant parasitic nematodes. John Wiley, New York.266 pp.

10. Ramana, K.V. and Mohandas (1988). Occurrence of potato cyst nematode G. pallida in Kerala. Indian journal of Nematology 18: 141.

11. Southey, J.F. (1986). Laboratory method for work with plant and soil nematodes, Min. Agric. Fish @ Fa., No. 402/London, HMSO. pp 202.