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Scientific Notes

Plant Parasitic Nematodes Associated with Crops in Sri Lanka

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Abstract: Plant parasitic nematodes of vegetables, fruit trees, ornamental plants and other plants were surveyed in Sri Lanka. Fifteen genera and nine species were detected in the total of 66 samples. *Globodera rostochiensis* on potato, *Radopholus similis* on banana and pepper, *Pratylenchus vulnus* on strawberry, and *Xiphinema radicicola* on ginger and strawberry were detected in this survey. *P. vulnus* was extracted from the rhizoshere of strawberry at high population density. *P. vulnus* and *X. radicicola* were the first record for the species in Sri Lanka.

Key words: Plant parasitic nematodes, Sri Lanka, *Pratylenchus vulnus, Xiphinema radicicola*

Introduction

Some surveys of plant parasitic nematodes were carried out in Sri Lanka (EKANAYAKE, 1990; EKANAYAKE and EKANAYAKE, 1990; EKANAYAKE and LAMBERTI, 1987; LAMBERTI and EKANAYAKE, 1981). EKANAYAKE and TOIDA (1996) conducted a survey on plant parasitic nematodes of agricultural crops in Sri Lanka and they reported the presence of forty eight species in 24 genera.

In recent years, ornamental plants are exported from Sri Lanka to Japan. However, we have little information about plant parasitic nematodes in Sri Lanka. We surveyed plant parasitic nematodes of this country during October to November, 1997. In this paper plant parasitic nematodes detected from vegetables, fruit trees, ornamental plants and other plants are reported with tables and brief comments.

Materials and Methods

Sampling site. Soil samples were collected in Minuwangoda, Kundasale, Nuwara-eliya, and their vicinities in the center of Sri Lanka.

Sampling method. A soil sample consisted of nine sub-samples were collected from each field in a selected site. Each sample composed of roots, soil around the root system, and stems and leaves if necessary.

Extraction methods. Nematodes were extracted from soil by the Baermann funnel technique and the sieving and Baermann funnel technique. Fragments of roots, stems or leaves cut into about 5 mm pieces were also processed by the same technique.

Preparation of mounting for observation. Extracted nematodes were examined in living condition or after fixation by TAF fixative under a microscope at 40 to 1,000 magnification. Some extracted nematodes were transferred to glycerol for permanent

mounts after the fixation. The procedures of the permanent mounts were processed by the simplified procedure of transferring nematodes to glycerol (MINAGAWA and MIZUKUBO, 1994). Galls with mature females of root-knot nematodes were prepared the mounting methods of perineal patterns (HARTMAN and SASSER, 1985).

Results and Discussions

Plant parasitic nematodes of 76 samples of vegetables, fruit trees, ornamental plants and other plants were investigated. Fifteen genera and nine species were detected in the 66 samples (Table 1, 2, 3, 4). *Globodera rostochiensis* was isolated from soil samples of the field, which was planted potato as the former crop. A high population of this nematode was detected from the field in Nuwara-eliya. EKANAYAKE (1990) and TOIDA and EKANAYAKE (1992) reported the presence of *G. rostochiensis* on potato in the highlands of Sri Lanka. *Radopholus similis* was detected from soil samples of banana and pepper at

Table 1. Plant parasitic nematodes of vegetables in Sri Lanka.

Plants	Localities	Plant parasitic nematodes							
		Mel.	*Glo.*	*Pra.*	*Rot.*	*Hel.*	*Xip.*	*Tri.*	*Paratri.*
Egg plant	Kundasale					+			
Egg plant	Kundasale	+				+			
Tomato	Kundasale	+				+			
Tomato	Rendapola					+			
Carrot	Sita-eliya					+		+	+
Potato	Nuwara-eliya		+						
Potato	Nuwara-eliya					+		+	
Potato	Nuwara-eliya			+		+			
Potato	Nuwara-eliya		+	+		+			
Red bean	Rendapola					+			+
Strawberry	Sita-eliya					+			
Strawberry	Nuwara-eliya			+		+			
Strawberry	Nuwara-eliya			+		+			
Strawberry	Nuwara-eliya				+	+			
Strawberry	Nuwara-eliya			+	+	+			
Strawberry	Nuwara-eliya			+		+			+
Strawberry	Nuwara-eliya			+					
Strawberry	Nuwara-eliya				+	+	+		
Strawberry	Nuwara-eliya					+	+		
Strawberry	Nuwara-eliya			+	+	+			
Strawberry	Nuwara-eliya				+	+	+		
Strawberry	Nuwara-eliya				+	+	+		
Strawberry	Nuwara-eliya				+	+	+		+
Spinach	Chilaw	+		+		+	+		

Abbreviations of nematodes: *Mel.*, *Meloidogyne* spp.; *Glo.*, *Globodera rostochiensis*; *Pra.*, *Pratylenchus* spp.; *Rot.*, *Rotylenchus* sp.; *Hel.*, *Helicotylenchus* spp.; *Xip.*, *Xiphinema* spp.; *Tri.*, *Trichodorus* sp.; *Paratri.*, *Paratrichodorus* sp.

Table 2. Plant parasitic nematodes of fruit trees in Sri Lanka.

Plants	Localities	Plant parasitic nematodes					
		Rado.	*Pra.*	*Roty.*	*Hel.*	*Xip.*	*Tri.*
Pineapple	Hendiwahava, Minuwangoda		+				
Pineapple	Hendiwahava, Minuwangoda		+				
Banana	Gannoruwa	+		+	+		
Banana	Gannoruwa	+			+	+	
Banana	Hendiwahava, Minuwangoda				+		
Banana	Hendiwahava, Minuwangoda	+			+		
Orange	Kundasale			+			
Cacao	Kundasale				+		+
Cacao	Kundasale				+		
Ambul banana	Kundasale				+		
Ambul banana	Kundasale		+		+		
Ambul banana	Kundasale						
Mango	Gannoruwa				+		
Mango	Gannoruwa			+	+		
Avocado	Gannoruwa			+			
Avocado	Gannoruwa			+			
Avocado	Gannoruwa			+			

Abbreviations of nematodes: *Rado., Radopholus similis*; *Pra., Pratylenchus* spp.: *Roty., Rotylenchulus* sp.; *Hel., Helicotylenchus* spp.; *Xip., Xiphinema* spp.; *Tri., Trichodorus* sp.

low population densities.

Pratylenchus vulnus was only detected from strawberry samples. Two high population densities of this nematode were found from the field of strawberry in Nuwara-eliya. This nematode was reported from strawberry in Japan (GOTO, 1974), Australia (COLBRAN, 1974) and Uruguay (MINAGAWA and MAESO-TOZZI, 1990). This nematode caused serious injury to strawberry in Japan (CHIKAOKA, 1970; YOSHITAKE and OBA, 1977). *P. vulnus* was the first record for the species in Sri Lanka.

Xiphinema spp. were extracted from ginger, banana, strawberry, and other plants (Table 4). *X. radicicola* was detected from ginger in Minuwangoda and strawberry in Nuwara-eliya. This nematode was also the first record for the species in Sri Lanka.

Helicotylenchus spp. were most common in this survey. Other nematodes were extracted from some samples (Table 1, 2, 3).

Nine species were detected in this survey. Four species detected are not known to occur in Japan (Table 4).

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Table 3. Plant parasitic nematodes of ornamental plants, industrial crops and other plants in Sri Lanka.

Plants	Localities	Plant parasitic nematodes											
		Mel.	*Rado.*	*Pra.*	*Roty.*	*Hopl.*	*Hel.*	*Xip.*	*Tri.*	*Paratri.*	*Macro.*	*Hemi.*	*Para.*	*Aph.*
Anthurium	Peradeniya			+										
Anthurium	Peradeniya			+										
Rose	Haggala						+							
Camellia	Haggala							+	+	+				
Camellia	Haggala							+	+					
Ginger	Hendiwahava, Minuwangoda	+			+			+						+
Ginger	Hendiwahava, Minuwangoda	+				+	+	+			+			
Betel pepper	Galawatta, Udugampola	+				+							+	
Betel pepper	Galawatta, Udugampola	+											+	
Pepper	Kundasale				+									
Pepper	Kundasale		+		+					+				
Pepper	Hendiwahava, Minuwangoda				+	+								
Pepper	Hendiwahava, Minuwangoda				+	+							+	
Arabian coffee	Galawatta, Udugampola							+			+			
Liberica coffee	Kundasale						+	+		+		+		
Liberica coffee	Kundasale						+	+						
Jackfruit	Galawatta, Udugampola					+		+					+	
Jackfruit	Kundasale						+	+						
Rubber	Hendiwahava, Minuwangoda			+										
Rubber	Hendiwahava, Minuwangoda			+										
Ambaralla	Kundasale				+									
Ambaralla	Kundasale				+								+	
Kiri Ala	Kundasale				+		+	+						
Mara tree	Kundasale						+							
Wild tree	Kundasale				+		+		+					

Abbreviations of nematodes: *Mel., Meloidogyne* spp.; *Rado., Radopholus similis; Pra., Pratylenchus* spp.; *Roty., Rotylenchulus* sp.; *Hopl., Hoplolaimus* sp.; *Hel., Helicotylenchus* spp.; *Xip., Xiphinema* spp.; *Tri., Trichodorus* sp.; *Paratri., Paratrichodorus* sp.; *Macro., Macroposthonia* sp.; *Hemi., Hemicriconemoides* sp.; *Para., Paratylenchus* sp.; *Aph., Aphelenchus* sp.

Table 4. Plant parasitic nematodes of sampling plants in Sri Lanka.

Species	Sampling plants
Globodera rostochiensis	Potato, Potato field
*Radopholus similis**	Banana, Pepper
Pratylenchus vulnus	Strawberry
Meloidogyne incognita	Spinach
Xiphinema americanum sensu lato	Liberica coffee
*X. ensiculiferum**	Camellia, Strawberry
*X. ifacolum**	Banana
X. insigne	Liberica coffee, Kiri Ala, Camellia
*X. radicicola**	Ginger, Strawberry

*No occurrence in Japan.

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和 文 摘 要

スリランカの農作物から検出された植物寄生線虫

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スリランカ国内の農作物に発生している植物寄生線虫の調査を行うために，根及び根圏土壌を採集し，分離・検出操作後に同定した。その結果，66の試料から15属9種の植物寄生線虫を検出し，同定した。これらの線虫の内，イチゴから検出したクルミネグサレセンチュウ（*Pratylenchus vulnus*），イチゴ及びショウガから検出した*Xiphinema radicicola*は同国における未記録種であった。また，種まで同定した線虫の内4種は，わが国の未記録種であった。