RESEARCH NOTE - NOTA INVESTIGATIVA

CURRENT STATUS OF PHYTOPARASITIC NEMATODES AND THEIR HOST PLANTS IN EGYPT

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ABSTRACT

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In Egypt, phytoparasitic nematodes constitute a major constraint to agricultural production, especially in sandy soil and reclaimed desert lands. Nematological surveys were conducted to determine the genera and species of phytoparasitic nematodes on associated host plants in Egypt. Historical nematode records and survey results indicate the occurrence of 47 genera and 139 species of phytoparasitic nematodes on crops, grasses and weeds. Several of these species are reported for the first time associated with new host plants in Egypt. Important phytoparasitic nematodes include species of the citrus (*Tylenchulus*), cyst (*Heterodera*), dagger (*Xiphinema*), lance (*Hoplolaimus*), lesion (*Pratylenchus*), rice-root (*Hirschmanniella*), ring (*Criconema*, *Mesocriconema*), root-knot (*Meloidogyne*), spiral (*Helicotylenchus*) and stunt (*Tylenchorhynchus*) nematodes. Among these, *Helicotylenchus* and *Meloidogyne* were the most frequently encountered nematode genera.

Key words: Egypt, host plants, phytoparasitic nematodes, survey.

RESUMEN

Ibrahim, I. K. A., A. A. Mokbel, and Z. A. Handoo. 2010. Estado actual de los nematodos fitoparásitos y sus plantas hospedantes en Egipto. Nematropica 40:239-262.

En Egipto, los nematodos fitoparásitos constituyen un problema grave para la agricultura, especialmente en suelos arenosos. Se condujeron una serie de inventarios para determinar los géneros y especies de nematodos fitoparásitos asociados con las plantas en Egipto. Los registros históricos y los resultados de los inventarios indican que se presentan 47 géneros y 139 species de nematodos fitoparásitos en cultivos, pastos y malezas. Varias de estas especies se registran por primera vez en sus plantas hospedantes en Egipto. Algunas especies importantes están en los géneros *Tylenchulus*, *Heterodera*, *Xiphinema*, *Hoplolaimus*, *Pratylenchus*, *Hirschmanniella*, *Criconema*, *Mesocriconema*, *Meloidogyne*, *Helicotylenchus* y *Tylenchorhynchus*. Los géneros *Helicotylenchus* y *Meloidogyne* fueron los que se encontraron con mayor frecuencia.

Palabras clave: Egipto, plantas hospedantes, nematodos fitoparásitos, inventarios.

In Egypt, phytoparasitic nematodes have been recognized as important plant pests since 1901 when Preyer reported a nematode disease of banana in Alexandria. Early studies on the occurrence of parasitic nematodes on various host plants were mainly concerned with citrus, lesion and root-knot nematodes (Fikry, 1939; Oteifa, 1955; Oteifa, 1957; Oteifa, 1962; Oteifa, 1964; Oteifa and El-Gindi, 1956; Oteifa and Tarjan, 1965; Tarjan, 1964).

Previous studies in Egypt have shown the presence of large numbers of genera and species of phytoparasitic nematodes

associated with many crops, grasses and weeds in different localities (Abou-Elnaga, 1979; Abou-Elnaga, 1989; Abou-Elnaga *et al.*, 1985; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Ibrahim *et al.*, 1986; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964). Many of these phytoparasitic nematodes are considered a limiting factor in plant crop production in Egypt. Also, the practice of continuous cropping and use of local plant cultivars favor survival and rapid build-up of nematode populations in the soil (Abou-Elnaga *et al.*, 1985; Ibrahim, 1985; Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1988; Oteifa, 1962; Oteifa, 1964; Oteifa 1987).

Information concerning the occurrence and host plants of phytoparasitic nematodes in Egypt is very important since nematode pathogens, such as citrus (*Tylenchulus*), cyst (*Heterodera*), dagger (*Xiphinema*), lance (*Hoplolaimus*), lesion (*Pratylenchus*), rice (*Hirschmanniella*), ring (*Criconema*, *Mesocriconema*), root-knot (*Meloidogyne*), spiral (*Helicotylenchus*) and stunt (*Tylenchorhynchus*) nematodes may occur in large numbers and cause economic damage to many plant crops (Abou-Elnaga, 1979; Abou-Elnaga, 1989; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa, 1962; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964).

Cumulative records of phytoparasitic nematodes and their associated host plants in Egypt have been maintained in the Nematology Research Laboratory, Faculty of Agriculture, Alexandria University for the last 40 years. Nematode identifications as reported in this paper were made by many scientists. Nematode records and survey studies showed the occurrence of 47 genera and 139 species of phytoparasitic nematodes in Egypt (Abou-Elnaga, 1979; Abou-Elnaga, 1989; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Ibrahim *et al.*, 1986; Oteifa *et al.*, 1997).

The objectives of the present work were to elucidate the status of the genera and species of phytoparasitic nematodes and their associated host plants by way of nematode surveys and to compile a list of associated nematode plant hosts from previously published research in Egypt.

From 1999-2009, about 1120 rhizosphere soil samples were collected from a variety of cultivated and noncultivated plants from different localities in Alexandria, El-Behera, and Matrouh Governorates in northern Egypt. Nematodes from a composite sample of 250 g soil were extracted by means of Cobb's wet-sieving and centrifugal sugar-flotation techniques (Ayoub, 1980). Nematodes were examined under the compound microscope. Identification of the isolated nematodes to the generic level was based on the morphological characters of adult forms as described by Goodey and Goodey (1963) and Mai and Lyon (1975).

Some nematode samples were fixed in 2% formaldehyde solution and sent to the USDA Nematology Laboratory in Beltsville, Maryland, USA for species identification by Z. Handoo using compound microscopes.

The nematode genera and frequency of occurrence in the collected rhizosphere soil samples are shown in Table 1. It is evident that both *Helicotylenchus* and *Meloidogyne* were the most frequently encountered nematode genera, with 53% and 62.5% frequency of occurrence, respectively. The genera *Aphelenchus*, *Hoplolaimus*, *Pratylenchus*, *Tylenchorhynchus* and *Tylenchus* were quite common with 31.1-49.5% frequency of occurrence. The genera *Aphelenchoides*, *Criconemella*, *Ditylenchus*, *Heterodera*, *Hirschmanniella*, *Longidorus*, *Rotylenchulus*, *Trichodorus*, *Tylenchulus* and *Xiphinema* were

Table 1. Frequency of occurrence (FO) of phytoparasitic nematode genera found in rhizosphere soil samples collected from plants in Egypt.

Genus	FO%[y]	Genus	FO%[y]
Anguina	0.9	*Mesocriconema*	1.3
Aphelenchoides	23.4	*Nacobbus*	1.1
Aphelenchus	35.5	*Neotylenchus*	2.9
Basiria	1.3	*Nygolaimus*	0.8
Belonolaimus	4.2	*Paralongidorus*	2.0
Boleodorus	2.3	*Paratrichodorus*	3.8
Criconema	8.3	*Paratylenchus*	18.2
Criconemella[z]	25.1	*Pratylenchoides*	5.0
Diphtherophora	0.7	*Pratylenchus*	39.9
Discocriconemella	1.0	*Pseudhalenchus*	1.0
Ditylenchus	21.7	*Psilenchus*	16.0
Dolichodorus	3.2	*Radopholus*	3.6
Eutylenchus	1.2	*Rotylenchoides*	5.7
Filenchus	1.3	*Rotylenchulus*	25.9
Helicotylenchus	53.0	*Rotylenchus*	16.5
Hemicriconemoides	19.9	*Scutellonema*	14.7
Hemicycliophora	19.4	*Telotylenchus*	7.1
Heterodera	26.0	*Trichodorus*	23.2
Hirschmanniella	21.9	*Tylencholaimus*	0.9
Hoplolaimus	36.2	*Tylenchorhynchus*	49.5
Irantylenchus	1.1	*Tylenchulus*	26.6
Longidorus	27.2	*Tylenchus*	31.1
Meloidogyne	62.5	*Xiphinema*	29.6
Merlinius	3.0	*Zygotylenchus*	1.4

[y]FO% = 100 × Number of positive samples/Number of total soil samples.
[z]Formerly reported as *Criconemella*; now considered *Mesocriconema*.

common on certain host plants with 21.7-29.6% frequency of occurrence. The genera *Hemicriconemoides*, *Hemicycliophora*, *Paratylenchus*, *Psilenchus*, *Rotylenchus* and *Scutellonema* showed 14.7-19.9% frequency of occurrence. The other listed genera were either less common or of limited occurrence.

Species of phytoparasitic nematodes identified and reported from the 1999-2009 survey, along with those found previously in Egypt with their corresponding references, are shown in Table 2.

Nematodes of the genera *Helicotylenchus*, *Hoplolaimus*, *Meloidogyne*, *Pratylenchus*, *Rotylenchulus*, *Tylenchorhynchus*, *Tylenchulus* and *Xiphinema* were of widespread occurrence among the nematodes encountered in this study. *Tylenchorhynchus* and *Xiphinema* were represented by the highest numbers of species (16 each), followed by *Pratylenchus* and *Helicotylenchus* with 13 and

Table 2. Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Anguina sp.	*Hibiscus mutabilis* L.[z]	
Anguina tritici	*Triticum aestivum* L.	Abou-Elnaga, 1979; Oteifa, 1964; Oteifa *et al.*, 1997
Aphelenchoides sp.	*Brassica rapa* L., *Citrus aurantium* L., *Cucumis sativus* L., *Cynodon dactylon* (L.) Pers., *Fragaria* spp., *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Hedera helix* L., *Jasminum* spp., *Lycopersicon esculentum* Mill., *Malus sylvestris* Mill, *Musa sapientum* L., *Olea europaea* L., *Oryza sativa* L., *Saccharum officinarum* L., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Vitis vinifera* L.	Abou-Elnaga, 1979; Abou-Elnaga, 1989; Abou-Elnaga *et al.*, 1985; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997; Tarjan, 1964
Aphelenchoides besseyi	*Oryza sativa* L.	Amin, 2001
Aphelenchoides parietinus	*Gossypium barbadense* L., *Lycopersicon esculentum* Mill., *Solanum tuberosum* L., *Solanum melongena* L.	Abou-Elnaga, 1979; Abou-Elnaga *et al.*, 1985; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997
Aphelenchus avenae	*Beta vulgaris* L.[z], *Brassica oleracea* L., *Capsicum frutescens* L., *Citrus aurantium* L., *Colocasia esculenta* (L.) Schott, *Fragaria* spp.[z], *Gossypium barbadense* L., *Hibiscus mutabilis* L.[z], *Hibiscus palustris* L., *Musa sapientum* L., *Oryza sativa* L., *Phaseolus vulgaris* L.[z], *Solanum melongena* L., *Vitis vinifera* L., *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997
Basiria graminophila	*Solanum melongena* L.	Abou-Elnaga, 1979; Ibrahim and El-Sharkawy, 2001; Tarjan, 1964
Belonolaimus sp.	*Gossypium barbadense* L.	Ibrahim and El-Sharkawy, 2001; Oteifa and Ragab, 1957
Boleodorus pakistanensis	*Polypogon monspeliensis* L., *Solanum nigrum* L.	Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994
Boleodorus thylactus	*Brassica oleracea* L., *Capsicum frutescens* L., *Rosa* spp.	Abou-Elnaga, 1979; Elmiligy and Geraert, 1971; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997
Criconema sp.	*Washingtonia filifera* (Linden ex André) H. Wendl.[y]	Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Criconema mutabile (= *Nothocriconema mutabile*, *Nothocriconemella mutabilis*)	*Allium ampeloprasum* var. *porrum* L., *Allium cepa* L., *Bougainvillea glabra* Choisy[y], *Cucumis sativus* L., *Cucurbita pepo* L., *Cupressus arizonica* Greene, *Cupressus sempervirens* L.[z], *Cynodon dactylon* (L.) Pers., *Phoenix canariensis* Chabaud[y], *Roystonea regia* Cook, *Solanum tuberosum* L., *Washingtonia filifera* (Linden ex André) H. Wendl.	Abou-Elnaga *et al.*, 1985; Ibrahim, 1999; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Tarjan, 1964
Criconema sphaerocephala	*Amaranthus caudatus* L., *Carex festivella* Mockenz, *Cynodon dactylon* (L.) Pers., *Cyperus rotundus* L., *Dactyloctenium aegyptium* (L.) Richt., *Erigeron annuus* (L.) pers., *Phoenix dactylifera* L., *Portulaca oleracea* L., *Rosa* spp., *Setaria virdis* (L.) Beauv.	Ibrahim, 1999; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 2000
Diphtherophora sp.	*Washingtonia filifera* (Linden ex André) H. Wendl.	Ismail and Eissa, 1993
Discocriconemella sphaerocephaloides	*Cynodon dactylon* (L.) Pers.	Ibrahim *et al.*, 2000
Ditylenchus sp.	*Allium cepa* L., *Arachis hypogaea* L., *Cynodon dactylon* (L.) Pers., *Hordeum vulgare* L., *Oryza sativa* L., *Phoenix dactylifera* L., *Plantago major* L., *Solanum tuberosum* L., *Thymelea hirsuta* (L.) Endl., *Vicia faba* L., *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Ditylenchus angustus	*Oryza sativa* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997
Ditylenchus intermedius	*Cynara scolymus* L., *Triticum aestivum* L.	Oteifa *et al.*, 1997
Ditylenchus myceliophagus	*Beta vulgaris* L.	Abd El-Massih *et al.*, 1986; Oteifa *et al.*, 1997
Dolichodorus sp.	*Cynara scolymus* L.	Ibrahim, 1990; Ibrahim *et al.*, 1976
Eutylenchus sp.	*Plantago major* L.	Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000
Filenchus filiformis	*Colocasia esculenta* (L.) Schott, *Cucurbita pepo* L., *Cynara scolymus* L., *Lycopersicon esculentum* Mill., *Solanum tuberosum* L., *Vicia faba* L.	Abou-Elnaga *et al.*, 1985; Oteifa *et al.*, 1997

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Helicotylenchus sp.	*Allium cepa* L., *Arachis hypogaea* L., *Arecastrum romanzoffianum* (Cham.) Becc., *Brassica oleracea* var. *capitata* L.[z], *Brassica rapa* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Cucumis sativus* L., *Cucurbita pepo* L., *Cycas revoluta* Thunb.[y], *Cydonia oblonga* Mill, *Cynara scolymus* L., *Cynodon dactylon* (L.) Pers., *Digitana sanguinalis* (L.) Scop, *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Helianthus annuus* L., *Hibiscus esculentus* L., *Lycopersicon esculentum* Mill., *Malus sylvestris* Mill., *Mangifera indica* L., *Musa sapientum* L., *Nerium oleander* L.[y], *Olea europaea* L., *Opuntia compressa* MacBirde, *Oryza sativa* L., *Phoenix dactylifera* L., *Pisum sativum* L., *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Sabal palmetto* (Walt.) Lodd., *Saccharum officinarum* L., *Solanum melongena* L., *Triticum aestivum* L., *Vitis vinifera* L., *Washingtonia robusta* Wendl.[y], *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa *et al.*, 1997; Tarjan, 1964
Helicotylenchus agricola	*Psidium guajava* L.	Abou-Elnaga, 1979; Elmiligy, 1970b; Ibrahim, 1990; Oteifa *et al.*, 1997
Helicotylenchus cavenessi	*Zea mays* L.	Abou-Elnaga, 1979; Elmiligy, 1970a; Ibrahim, 1990; Oteifa *et al.*, 1997
Helicotylenchus digonicus	*Gossypium barbadense* L., *Washingtonia filifera* (Linden ex André) H. Wendl.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997
Helicotylenchus dihystera	*Annona squamosa* L., *Beta vulgaris* L., *Brassica oleracea* L., *Citrus aurantium* L., *Citrus paradisi* Macfad., *Colocasia esculenta* (L.) Schott, *Eragrostis cilianensis* (All.) Vign. ex Janchen, *Gossypium barbadense* L., *Mangifera indica* L., *Myoporum pectum* L., *Olea europaea* L., *Prunus amygdalus* Batsch., *Saccharum officinarum* L., *Solanum tuberosum* L., *Solanum melongena* L., *Vitis vinifera* L.	Abd El-Massih *et al.*, 1986; Abou-Elnaga, 1979; Elmiligy, 1970a; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Helicotylenchus dihysteroides	*Musa sapientum* L.	Aboul-Eid and Ameen, 1991; Oteifa *et al.*, 1997

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Helicotylenchus egyptiensis	*Saccharum officinarum* L., *Washingtonia filifera* (Linden ex André) H. Wendl.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Helicotylenchus erythrinae	*Zea mays* L.	Abou-Elnaga, 1979; Oteifa, 1964; Oteifa *et al.*, 1997
Helicotylenchus exallus	*Musa sapientum* L.	Aboul-Eid and Ameen, 1991; Oteifa *et al.*, 1997
Helicotylenchus hydrophilus	*Citrus aurantium* L., *Musa sapientum* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Helicotylenchus mangiferensis	*Mangifera indica* L.	Abou-Elnaga, 1979; Elmiligy, 1970b; Oteifa *et al.*, 1997
Helicotylenchus microcephalus	*Citrus aurantium* L., *Cynodon dactylon* (L.) Pers., *Mangifera indica* L., *Musa sapientum* L., *Phoenix dactylifera* L.[y], *Thymelea hirsuta* (L.) Endl.[y], *Vitis vinifera* L.	Abou-Elnaga, 1989; Elmiligy, 1970b; Ibrahim, 1990; Ibrahim *et al.*, 2000
Helicotylenchus microlobus	*Gossypium barbadense* L.	Abou-Elnaga, 1979; Oteifa *et al.*, 1997; Tarjan, 1964
Helicotylenchus multicinctus	*Citrus aurantium* L., *Cynodon dactylon* (L.) Pers., *Mangifera indica* L., *Musa sapientum* L., *Psidium guajava* L., *Vitis vinifera* L.	Abou-Elnaga, 1979; Elmiligy, 1970a; Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Helicotylenchus pseudorobustus	*Andropogon virginicus* L., *Amaranthus caudatus* L., *Bromus catharticus* Vahl[y], *Carex festivella* Mockenz, *Citrus aurantium* L., *Cynodon dactylon* (L.) Pers., *Cyperus rotundus* L.[y], *Dactyloctenium aegyptium* (L.) Richt., *Gossypium barbadense* L., *Musa sapientum* L., *Phoenix dactylifera* L., *Poa annua* L.[y], *Polypogon monspeliensis* L.[y], *Vitis vinifera* L.	Abou-Elnaga, 1989; Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Hemicriconemoides sp.	*Allium cepa* L., *Cucurbita pepo* L., *Mangifera indica* L., *Phoenix canariensis* L., *Phoenix dactylifera* L., *Solanum tuberosum* L., *Zea mays* L.	Elmiligy and Geraert, 1971; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa *et al.*, 1997
Hemicriconemoides affinis	*Allium cepa* L., *Cucumis sativus* L., *Solanum tuberosum* L.	Oteifa *et al.*, 1997
Hemicriconemoides cocophilus	*Phoenix canariensis* L.[y], *Phoenix dactylifera* L.[y]	Ibrahim, 1999; Ibrahim *et al.*, 2000

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Hemicriconemoides mangiferae	*Agave sisalana* Perrine, *Mangifera indica* L., *Roystonea elata* (Bartr.) F. Harper, *Yucca aloifolia* L.[z]	Abou-Elnaga, 1979; Elmiligy and Geraert, 1971; Ibrahim, 1990; Oteifa *et al.*, 1997
Hemicycliophora sp.	*Arachis hypogaea* L., *Cynodon dactylon* (L.) Pers., *Helianthus annuus* L., *Mangifera indica* L., *Phoenix dactylifera* L., *Pyrus communis* L., *Rosa* spp., *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 2000; Tarjan, 1964
Hemicycliophora oostenbrinki	*Cynodon dactylon* (L.) Pers., *Vitis vinifera* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa, 1964; Oteifa *et al.*, 1997; Tarjan, 1964
Hemicycliophora similis	*Citrus aurantium* L.	Abou-Elnaga, 1979; Oteifa, 1964; Oteifa *et al.*, 1997; Tarjan, 1964
Hemicycliophora thienemanni	*Phoenix dactylifera* L.[y]	Ibrahim, 1999; Ibrahim *et al.*, 2000
Heterodera sp.	*Arachis hypogaea* L., *Brassica oleracea* L., *Ficus carica* L., *Lycopersicon esculentum* Mill., *Musa sapientum* L., *Oryza sativa* L., *Trifolium alexandrinum* L., *Triticum aestivum* L., *Vigna cylindrica* (L.) Skeels., *Zea mays* L.	Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim and Handoo, 2007; Oteifa *et al.*, 1997
Heterodera avenae	*Hordeum vulgare* L., *Triticum aestivum* L.	Ibrahim, 1990; Ibrahim and Handoo, 2007; Ibrahim *et al.*, 1986
Heterodera cajani	*Vigna cylindrica* (L.) Skeels.	Aboul-Eid and Ghorab, 1974; Ibrahim, 1990; Oteifa *et al.*, 1997
Heterodera daverti	*Oryza sativa* L.[z], *Trifolium alexandrinum* L.[y], *Triticum aestivum* L.	Ibrahim, 1990; Ibrahim *et al.*, 1986; Massoud *et al.*, 1988
Heterodera glycines	*Lycopersicon esculentum* Mill., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Vigna cylindrica* (L.) Skeels., *Zea mays* L.	Elmiligy, 1968; Ibrahim, 1990; Oteifa *et al.*, 1997
Heterodera goldeni	*Oryza sativa* L.[z], *Panicum coloratum* L.[y], *Zea mays* L.[z]	Handoo and Ibrahim, 2000; Ibrahim and Handoo, 2007
Heterodera latipons	*Hordeum vulgare* L., *Triticum aestivum* L.	Oteifa, 1987
Heterodera rosii	*Melilotus officinalis* L.	Ibrahim and Handoo, 2007; Ibrahim *et al.*, 1986

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Heterodera schachtii	*Brassica oleracea* var. *capitata* L.[y], *Brassica oleracea* var. *botrytis* L.[y]	Ibrahim and Handoo, 2007
Heterodera trifolii	*Trifolium alexandrinum* L.	Ibrahim, 1990; Ibrahim and Handoo, 2007; Oteifa *et al.*, 1997
Heterodera zeae	*Beta vulgaris* L.[y], *Hordeum vulgare* L.[y], *Oryza sativa* L.[z], *Solanum tuberosum* L.[z], *Triticum aestivum* L.[y], *Zea mays* L.[y]	Abd El-Massih *et al.*, 1986; Aboul-Eid and Ghorab, 1981; Ibrahim, 1990; Ibrahim and Handoo, 2007; Oteifa *et al.*, 1997
Hirschmanniella sp.	*Gossypium barbadense* L., *Oryza sativa* L., *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Tarjan, 1964
Hirschmanniella gracilis	*Oryza sativa* L.	Ibrahim, 1990; Oteifa, 1964; Oteifa *et al.*, 1997
Hirschmanniella oryzae	*Amaranthus caudatus* L.[y], *Chenopodium album* L., *Chenopodium murale* L., *Gossypium barbadense* L., *Oryza sativa* L.[y]	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Tarjan, 1964
Hoplolaimus sp.	*Arachis hypogaea* L., *Beta vulgaris* L., *Brassica oleracea* var. *capitata* L.[z], *Brassica rapa* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Cynodon dactylon* (L.) Pers.[y], *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Helianthus annuus* L., *Malus sylvestris* Mill, *Mangifera indica* L., *Musa sapientum* L., *Narcissus jonquilla* L., *Oryza sativa* L., *Phaseolus vulgaris* L.[z], *Phoenix dactylifera* L.[z], *Pinus strobus* L., *Prunus amygdalus* Batsch., *Psidium guajava* L., *Pyrus communis* L., *Sabal palmetto* (Walt.) Lodd.[y], *Saccharum officinarum* L., *Vigna cylindrica* (L.) Skeels., *Vitis vinifera* L., *Washingtonia filifera* (Linden ex André) H. Wendl.[y], *Zea mays* L.	Abd El-Massih *et al.*, 1986; Abou-Elnaga, 1979; Elmiligy, 1970a; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Tarjan, 1964
Hoplolaimus aegypti	*Agave sisalana* Perrine, *Ipomoea batatas* (L.) Lam., *Phoenix dactylifera* L.[y], *Roystonea elata* (Bartr.) F. Harper, *Roystonea regia* Cook[y], *Solanum tuberosum* L., *Yucca aloifolia* L.[z], *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Shafie and Koura, 1970; Shafie *et al.*, 1974
Hoplolaimus clarissimus	*Conyza aegyptiaca* (L.) Ait, *Conyza linifolia* L., *Cynodon dactylon* (L.) Pers.[y], *Cyperus rotundus* L.[y], *Erigeron annuus* (L.) Pers.	Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Hoplolaimus columbus	*Acalypha wilkesiana* Muell. Arg.[y], *Citrus aurantium* L., *Gossypium barbadense* L.[y], *Musa sapientum* L., *Saccharum officinarum* L., *Washingtonia filifera* (Linden ex André) H. Wendl.[y], *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Hoplolaimus galeatus	*Citrus aurantium* L., *Gossypium barbadense* L., *Vitis vinifera* L.	Abou-Elnaga, 1989; Ibrahim, 1990; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965
Hoplolaimus pararobustus	*Musa sapientum* L., *Psidium guajava* L.	Elmiligy, 1970a; Ibrahim, 1990; Oteifa *et al.*, 1997
Hoplolaimus seshadrii	*Citrus aurantium* L., *Musa sapientum* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Hoplolaimus tylenchiformis	*Arachis hypogaea* L., *Glycine max* (L.) Merr.	Oteifa, 1964; Oteifa *et al.*, 1997
Irantylenchus clavidorus	*Amaranthus caudatus* L.[y], *Bromus catharticus* Vahl[y], *Cynodon dactylon* (L.) Pers.[y], *Poa annua* L.[y], *Portulaca grandiflora* Hook., *Portulaca oleracea* L., *Setaria viridis* (L.) Beauv.[y], *Urtica urens* L.	Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000
Longidorus sp.	*Citrus aurantium* L., *Cynodon dactylon* (L.) Pers.[y], *Ficus carica* L., *Fragaria* spp.[y], *Gossypium barbadense* L., *Mangifera indica* L., *Musa sapientum* L., *Olea europaea* L., *Oryza sativa* L.[y], *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Saccharum officinarum* L., *Solanum melongena* L., *Vitis vinifera* L.	Abou-Elnaga, 1979; Abou-Elnaga, 1989; Aboul-Eid, 1970; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997; Tarjan, 1964
Longidorus africanus	*Citrus aurantium* L., *Musa sapientum* L., *Prunus amygdalus* Batsch., *Saccharum officinarum* L., *Vitis vinifera* L.	Abou-Elnaga, 1979; Aboul-Eid, 1970; Ibrahim, 1990; Oteifa *et al.*, 1997
Longidorus brevicaudatum (= *L. siddiqii*)	*Gossypium barbadense* L.	Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997
Longidorus elongatus	*Citrus aurantium* L., *Cynodon dactylon* (L.) Pers., *Fragaria* spp., *Gossypium barbadense* L., *Mangifera indica* L., *Olea europaea* L., *Prunus amygdalus* Batsch., *Saccharum officinarum* L., *Solanum melongena* L., *Vitis vinifera* L., *Zea mays* L., *Ziziphus zizyphus* (L.) H. Karst.	Abou-Elnaga, 1979; Aboul-Eid, 1970; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964

[y]Identified in 1999-2009 survey; also found in previous records.
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Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Longidorus laevicapitatus	*Citrus aurantium* L., *Glycine max* (L.) Merr., *Musa sapientum* L., *Vitis vinifera* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Lamberti *et al.*, 1996; Oteifa *et al.*, 1997; Tarjan, 1964
Longidorus pisi (= *L. latocephalus*)	*Glycine max* (L.) Merr., *Vitis vinifera* L.	Lamberti *et al.*, 1996
Longidorus taniwha	*Citrus aurantium* L., *Eragrostis cilianensis* (All.) Vign. ex Janchen, *Ficus carica* L., *Musa sapientum* L.	Abou-Elnaga, 1979; Aboul-Eid, 1970; Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Meloidogyne sp.	> 150 plant species, found on many field, fruit, ornamental and vegetable crops as well as grasses, weeds, timber trees; notably *Beta vulgaris* L.[y], *Brassica oleracea* var. *capitata* L.[z], *Fragaria* spp.[y], *Psidium guajava* L.[y]	Abou-Elnaga, 1979; Ibrahim, 1985; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim and Mokbel, 2009; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1988; Oteifa *et al.*, 1997; Tarjan, 1964
Meloidogyne arenaria	many plant crops, grasses and weeds; notably *Arachis hypogaea* L.[y], *Cycas revoluta* Thunb.[y], *Lycopersicon esculentum* Mill.[y], *Zea mays* L.[y]	Abou-Elnaga, 1979; Ibrahim, 1985; Ibrahim, 1990; Ibrahim and Mokbel, 2009; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Meloidogyne hapla	*Fragaria* spp., *Lycopersicon esculentum* Mill.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa, 1964; Oteifa *et al.*, 1997
Meloidogyne incognita	many plant crops, grasses and weeds; notably *Beta vulgaris* L.[y], *Lycopersicon esculentum* Mill.[y], *Oryza sativa* L.[y], *Phoenix dactylifera* L.[y], *Psidium guajava* L.[y], *Triticum aestivum* L.[y], *Zea mays* L.[y]	Ibrahim, 1985; Ibrahim and Mokbel, 2009; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Meloidogyne javanica	many plant crops, grasses and weeds; notably *Arachis hypogaea* L.[y], *Citrullus vulgaris* Schrad.[y], *Lycopersicon esculentum* Mill.[y], *Phoenix dactylifera* L.[y], *Pittosporum tobira* (Thunb.) W.T. Aiton[y]	Ibrahim, 1985; Ibrahim and Mokbel, 2009; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Merlinius brevidens	*Brassica oleracea* var. *capitata* L., *Cucumis sativus* L., *Cucurbita pepo* L., *Lycopersicon esculentum* Mill., *Mangifera indica* L., *Solanum tuberosum* L., *Solanum melongena* L., *Vicia faba* L., *Zea mays* L.	Elmiligy and Geraert, 1971; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Merlinius nanus	*Cynodon dactylon* (L.) Pers.[y]	Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000
Merlinius nothus (= *Tylenchorhynchus nothus*)	*Citrus aurantium* L., *Morus alba* L., *Solanum melongena* L., *Zea mays* L.	Abou-Elnaga, 1979; Elmiligy and Geraert, 1971; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997; Tarjan, 1964
Mesocriconema sp. (= *Criconemella* sp., *Criconemoides* sp.)	*Arachis hypogaea* L., *Citrus aurantium* L., *Cynodon dactylon* (L.) Pers., *Ficus carica* L., *Lycopersicon esculentum* Mill., *Malus sylvestris* Mill., *Mangifera indica* L., *Musa sapientum* L., *Oryza sativa* L., *Phoenix dactylifera* L., *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Solanum melongena* L., *Vicia faba* L., *Vitis vinifera* L., *Washingtonia filifera* (Linden ex André) H. Wendl., *Zea mays* L.	Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Tarjan, 1964
Nacobbus sp.	*Lycopersicon esculentum* Mill.	Oteifa, 1960
Neotylenchus sp.	*Prunus amygdalus* Batsch.	Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Nygolaimus sp.	*Citrus aurantium* L., *Musa sapientum* L., *Vitis vinifera* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Nygolaimus parasquaticus	*Allium sativum* L., *Citrullus vulgaris* Schrad.	Abou-Elnaga *et al.*, 1985; Oteifa *et al.*, 1997
Paralongidorus erriae	*Vitis vinifera* L.	Ibrahim and El-Sharkawy, 2001; Lamberti *et al.*, 1996
Paralongidorus georgiensis (= *Longidorus georgiensis*)	*Citrus aurantium* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Paratrichodorus minor (= *Trichodorus christiei*, *Trichodorus minor*)	*Alopecurus geniculatus* L., *Alopecurus partensis* L., *Amaranthus caudatus* L., *Carex festivella* Mockenz, *Cynodon dactylon* (L.) Pers., *Dactyloctenium aegyptium* (L.) Richt., *Lycopersicon esculentum* Mill., *Phoenix dactylifera* L., *Portulaca oleracea* L., *Setaria glauca* (L.) P. Beauv., *Setaria verticillata* (L.) P. Beauv., *Vitis vinifera* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim, 1999; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964

[y]Identified in 1999-2009 survey; also found in previous records.
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Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Paratylenchus sp.	*Bougainvillea glabra* Choisy[y], *Brassica oleracea* var. *capitata* L.[z], *Cynodon dactylon* (L.) Pers.[z], *Phoenix dactylifera* L.[y], *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Paratylenchus minor	*Amaranthus caudatus* L.[y], *Cyperus rotundus* L.[y], *Phoenix dactylifera* L.[y], *Portulaca oleracea* L.[y], *Setaria verticillata* (L.) P. Beauv.[y]	Ibrahim *et al.*, 2000
Paratylenchus projectus	*Phoenix canariensis* Chabaud[y], *Washingtonia filifera* (Linden ex André) H. Wendl., *Washingtonia robusta* H. Wendl.[z]	Ibrahim, 1999; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 2000
Pratylenchoides sp.	*Citrus aurantium* L., *Pyrus communis* L.	Ibrahim, 1990; Tarjan, 1964
Pratylenchoides crenicauda	*Citrus aurantium* L., *Gossypium barbadense* L., *Pyrus communis* L., *Vitis vinifera* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Pratylenchus sp.	*Arachis hypogaea* L., *Beta vulgaris* L., *Brassica oleracea* var. *capitata* L.[z], *Citrus aurantium* L., *Cycas revoluta* Thunb., *Cydonia oblonga* Mill, *Fragaria* spp., *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Lycopersicon esculentum* Mill., *Malus sylvestris* Mill., *Mangifera indica* L., *Musa sapientum* L., *Olea europaea* L., *Oryza sativa* L.[y], *Phoenix canariensis* Chabaud[y], *Phoenix dactylifera* L., *Pinus strobus* L., *Pisum sativum* L., *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Rosa* spp., *Sabal palmetto* (Walt.) Lodd., *Thymelea hirsuta* (L.) Endl., *Trifolium alexandrinum* L., *Triticum aestivum* L., *Vitis vinifera* L., *Washingtonia robusta* Wendl.[y], *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa *et al.*, 1997; Tarjan, 1964
Pratylenchus brachyurus	*Arachis hypogaea* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Fragaria* spp., *Gossypium barbadense* L., *Hibiscus esculentus* L., *Ipomoea batatas* (L.) Lam., *Lycopersicon esculentum* Mill., *Musa sapientum* L., *Oryza sativa* L., *Pisum sativum* L., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Vicia faba* L., *Vigna cylindrica* (L.) Skeels., *Vitis vinifera* L., *Zea mays* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa, 1962; Oteifa *et al.*, 1997

[y]Identified in 1999-2009 survey; also found in previous records.
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Species	Hosts	References
Pratylenchus coffeae	*Arachis hypogaea* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Lycopersicon esculentum* Mill., *Musa sapientum* L., *Pisum sativum* L., *Solanum tuberosum* L., *Vicia faba* L., *Vigna cylindrica* (L.) Skeels.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa, 1962; Oteifa *et al.*, 1997
Pratylenchus crenatus	*Saccharum officinarum* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Pratylenchus goodeyi	*Citrullus vulgaris* Schrad., *Fragaria* spp., *Musa sapientum* L., *Oryza sativa* L., *Vicia faba* L., *Vigna cylindrica* (L.) Skeels.	Ibrahim, 1990; Oteifa, 1962; Oteifa *et al.*, 1997
Pratylenchus minyus	*Arachis hypogaea* L., *Citrullus vulgaris* Schrad., *Gossypium barbadense* L., *Lycopersicon esculentum* Mill., *Musa sapientum* L., *Oryza sativa* L., *Prunus persica* (L.) Batsch., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Triticum aestivum* L., *Vigna cylindrica* (L.) Skeels., *Vitis vinifera* L., *Zea mays* L.	Ibrahim, 1990; Oteifa, 1962; Oteifa *et al.*, 1997
Pratylenchus musicola	*Musa sapientum* L.	Ibrahim, 1990; Oteifa, 1962; Oteifa *et al.*, 1997
Pratylenchus neglectus	*Citrus aurantium* L., *Mangifera indica* L., *Vitis vinifera* L., *Zea mays* L.	Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965
Pratylenchus penetrans	*Arachis hypogaea* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Cucumis sativus* L., *Gossypium barbadense* L., *Hibiscus esculentus* L., *Lycopersicon esculentum* Mill., *Mangifera indica* L., *Musa sapientum* L., *Phoenix dactylifera* L.[z], *Pisum sativum* L., *Portulaca oleracea* L.[y], *Prunus persica* (L.) Batsch., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Triticum aestivum* L., *Vigna cylindrica* (L.) Skeels., *Vitis vinifera* L., *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa, 1962; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965
Pratylenchus pratensis	*Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Colocasia esculenta* (L.) Schott, *Cucumis sativus* L., *Fragaria* spp., *Gossypium barbadense* L., *Lycopersicon esculentum* Mill., *Oryza sativa* L., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Vigna cylindrica* (L.) Skeels., *Vitis vinifera* L., *Zea mays* L.	Ibrahim, 1990; Oteifa, 1962; Oteifa *et al.*, 1997

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Pratylenchus scribneri	*Citrullus vulgaris* Schrad., *Fragaria* spp., *Ipomoea batatas* (L.) Lam., *Solanum tuberosum* L., *Vigna cylindrica* (L.) Skeels.	Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa, 1962; Oteifa *et al.*, 1997
Pratylenchus thornei	*Arachis hypogaea* L., *Bougainvillea glabra* Choisy[y], *Brassica oleracea* var. *capitata* L., *Ficus carica* L., *Gossypium barbadense* L., *Hibiscus esculentus* L., *Ipomoea batatas* (L.) Lam., *Lycopersicon esculentum* Mill., *Oryza sativa* L., *Phoenix dactylifera* L.[y], *Pisum sativum* L., *Prunus persica* (L.) Batsch., *Psidium guajava* L., *Solanum melongena* L., *Solanum tuberosum* L., *Trifolium alexandrinum* L., *Triticum aestivum* L., *Vigna cylindrica* (L.) Skeels., *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa, 1962; Oteifa *et al.*, 1997; Tarjan, 1964
Pratylenchus vulnus	*Citrus aurantium* L., *Citrullus vulgaris* Schrad., *Cucumis sativus* L., *Fragaria* spp., *Mangifera indica* L., *Musa sapientum* L., *Prunus persica* (L.) Batsch., *Trifolium alexandrinum* L., *Vigna cylindrica* (L.) Skeels., *Vitis vinifera* L.	Ibrahim, 1990; Oteifa, 1962; Oteifa *et al.*, 1997
Pratylenchus zeae	*Arachis hypogaea* L., *Citrus aurantium* L., *Gossypium barbadense* L., *Hibiscus esculentus* L., *Mangifera indica* L., *Oryza sativa* L., *Prunus persica* (L.) Batsch., *Triticum aestivum* L., *Vicia faba* L., *Vigna cylindrica* (L.) Skeels., *Zea mays* L.	Ibrahim, 1990; Oteifa, 1962; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965
Pseudhalenchus sp.	*Cynodon dactylon* (L.) Pers.	Ibrahim, 1990; Tarjan, 1964
Pseudhalenchus anchilisposomus	*Pyrus communis* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Psilenchus sp.	*Cucurbita pepo* L., *Gossypium barbadense* L., *Lycopersicon esculentum* Mill., *Portulaca grandiflora* Hook., *Solanum tuberosum* L., *Washingtonia filifera* (Linden ex André) H. Wendl.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Psilenchus aestuarius	*Gossypium barbadense* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Tarjan, 1964
Psilenchus hilarulus	*Gossypium barbadense* L., *Oryza sativa* L.	Elmiligy and Geraert, 1971; Ibrahim, 1990; Tarjan, 1964

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Species	Hosts	References
Psilenchus iranicus	*Cucurbita pepo* L., *Lycopersicon esculentum* Mill., *Solanum tuberosum* L.	Abou-Elnaga *et al.*, 1985; Oteifa *et al.*, 1997
Psilenchus magnidens	*Eragrostis cilianensis* (All.) Vign. ex Janchen, *Ficus carica* L., *Gossypium barbadense* L.	Ibrahim, 1990; Tarjan, 1964
Psilenchus striatus	*Ipomoea batatas* (L.) Lam., *Solanum tuberosum* L., *Vicia faba* L.	Abou-Elnaga *et al.*, 1985; Oteifa *et al.*, 1997
Radopholus similis	*Musa sapientum* L., *Pyrus communis* L.	Ibrahim, 1990; Oteifa, 1964; Tarjan, 1964
Rotylenchoides variocaudatus	*Gossypium barbadense* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997
Rotylenchulus sp.	*Bougainvillea glabra* Choisy[y], *Brassica oleracea* var. *capitata* L.[z], *Brassica rapa* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Cycas revoluta* Thunb.[y], *Cynara scolymus* L., *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Helianthus annuus* L., *Lycopersicon esculentum* Mill., *Musa sapientum* L., *Opuntia compressa* MacBirde., *Phoenix canariensis* Chabaud[y], *Sabal palmetto* (Walt.) Lodd.[y], *Saccharum officinarum* L., *Vitis vinifera* L., *Washingtonia robusta* Wendl.[y], *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.* 2000; Ibrahim *et al.*, 1976; Oteifa, 1964; Oteifa, 1970; Oteifa *et al.*, 1997; Tarjan, 1964
Rotylenchulus reniformis	*Beta vulgaris* L., *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Colocasia esculenta* (L.) Schott, *Cucumis melo* L., *Cucurbita pepo* L., *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Jasminum* spp., *Lycopersicon esculentum* Mill., *Musa sapientum* L., *Nerium oleander* L.[y], *Oryza sativa* L., *Saccharum officinarum* L., *Solanum tuberosum* L., *Vitis vinifera* L., *Washingtonia filifera* (Linden ex André) H. Wendl.	El-Sherif and Embabi, 1975; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa, 1964; Oteifa, 1970; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Rotylenchus sp.	*Brassica oleracea* var. *capitata* L.[z], *Citrullus vulgaris* Schrad., *Citrus aurantium* L.[y], *Gossypium barbadense* L., *Lycopersicon esculentum* Mill.[y], *Mangifera indica* L., *Musa sapientum* L., *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Trifolium alexandrinum* L., *Vitis vinifera* L.	Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 1976; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Rotylenchus robustus	*Citrus aurantium* L., *Mangifera indica* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965
Rotylenchus uniformis	*Citrus aurantium* L.	Ibrahim and El-Sharkawy, 2001; Oteifa, 1964; Oteifa *et al.*, 1997
Scutellonema sp.	*Mangifera indica* L., *Musa sapientum* L., *Vitis vinifera* L., *Digitana sanguinalis* (L.) Scop.	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa *et al.*, 1997
Scutellonema blaberum	*Cynodon dactylon* (L.) Pers.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997
Scutellonema brachyurum	*Cynodon dactylon* (L.) Pers., *Nerium oleander* L.[y], *Vitis vinifera* L.	Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997; Tarjan, 1964
Telotylenchus ventralis	*Cynodon dactylon* (L.) Pers., *Digitana sanguinalis* (L.) Scop.	Oteifa *et al.*, 1997; Tarjan, 1964
Trichodorus sp.	*Arachis hypogaea* L., *Brassica oleracea* var. *capitata* L.[z], *Citrullus vulgaris* Schrad., *Citrus aurantium* L., *Cycas revoluta* Thunb.[y], *Gossypium barbadense* L., *Ipomoea batatas* (L.) Lam., *Jasminum* spp., *Lycopersicon esculentum* Mill., *Mangifera indica* L., *Opuntia compressa* MacBirde., *Oryza sativa* L.[y], *Phaseolus vulgaris* L.[z], *Pisum sativum* L., *Prunus amygdalus* Batsch., *Pyrus communis* L., *Rosa* spp., *Trifolium alexandrinum* L., *Vitis vinifera* L.	Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Trichodorus teres	*Citrus aurantium* L., *Vitis vinifera* L., *Zea mays* L.	Ibrahim, 1990; Oteifa and Tarjan, 1965; Tarjan, 1964
Tylencholaimus sp.	*Brassica rapa* L., *Brassica oleracea* var. *capitata* L.	Abou-Elnaga *et al.*, 1985; Oteifa *et al.*, 1997
Tylencholaimus teres	*Citrus aurantium* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Tylenchorhynchus sp.	*Arachis hypogaea* L., *Beta vulgaris* L., *Bougainvillea glabra* Choisy, *Brassica oleracea* var. *capitata* L.[z], *Brassica rapa* L., *Citrus aurantium* L., *Cucumis sativus* L., *Cucurbita pepo* L., *Cycas revoluta* Thunb.[y], *Cydonia oblonga* Mill., *Cynodon dactylon* (L.) Pers.[y], *Daucus carota* L., *Ficus carica* L., *Fragaria* spp., *Glycine max* (L.) Merr., *Gossypium barbadense* L., *Lycopersicon esculentum* Mill., *Malus sylvestris* Mill., *Mangifera indica* L., *Musa sapientum* L., *Olea europaea* L., *Opuntia compressa* MacBirde.,	Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
	Oryza sativa L., *Phoenix dactylifera* L.[y], *Pisum sativum* L., *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Sabal palmetto* (Walt.) Lodd., *Saccharum officinarum* L., *Thymelea hirsuta* (L.) Endl.[y], *Trifolium alexandrinum* L., *Vitis vinifera* L., *Washingtonia robusta* Wendl.[y], *Zea mays* L.	
Tylenchorhynchus annulatus	*Myoporum pictum* L.[y]	Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000
Tylenchorhynchus besselatus	*Citrus aurantium* L., *Musa sapientum* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Tylenchorhynchus brassicae	*Citrus aurantium* L., *Cynodon dactylon* (L.) Pers., *Pyrus communis* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964
Tylenchorhynchus capitatus	*Allium cepa* L., *Saccharum officinarum* L.	Abou-Elnaga, 1979; Oteifa, 1964; Oteifa *et al.*, 1997
Tylenchorhynchus clarus	*Brassica rapa* L., *Cucurbita pepo* L., *Oryza sativa* L., *Phoenix canariensis* Chabaud[y], *Psidium guajava* L., *Trifolium alexandrinum* L., *Washingtonia filifera* (Linden ex André) H. Wendl., *Zea mays* L.	Elmiligy and Geraert, 1971; Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa and Tarjan, 1965; Tarjan, 1964
Tylenchorhynchus clavicaudatus	*Citrus aurantium* L.	Ibrahim, 1990; Oteifa and Tarjan, 1965; Tarjan, 1964
Tylenchorhynchus cylindricus	*Vitis vinifera* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965
Tylenchorhynchus dubius	*Gossypium barbadense* L.	Abou-Elnaga, 1979; Ibrahim, 1990; Oteifa *et al.*, 1997
Tylenchorhynchus ebriensis	*Washingtonia filifera* (Linden ex André) H. Wendl.[y]	Ibrahim, 1999; Ibrahim *et al.*, 2000
Tylenchorhynchus goffarti	*Acalypha wilkesiana* Muell. Arg.[y], *Anabsis articulata* L., *Capsicum frutescens* L., *Cucurbita pepo* L., *Gossypium barbadense* L., *Hibiscus mutabilis* L.[z], *Hibiscus palustris* L., *Polypogon monspeliensis* L.[y], *Solanum tuberosum* L., *Solanum melongena* L., *Zea mays* L.	Elmiligy and Geraert, 1971; Ibrahim, 1990; Ibrahim *et al.*, 2000; Oteifa *et al.*, 1997
Tylenchorhynchus kegenicus	*Gossypium barbadense* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Tarjan, 1964

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Tylenchorhynchus latus	*Citrus aurantium* L., *Ficus carica* L., *Gossypium barbadense* L., *Mangifera indica* L., *Prunus amygdalus* Batsch., *Pyrus communis* L., *Vitis vinifera* L., *Ziziphus zizyphus* (L.) H. Karst.	Ibrahim, 1990; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Tylenchorhynchus martini	*Oryza sativa* L.	Ibrahim, 1990; Oteifa, 1964; Oteifa *et al.*, 1997
Tylenchorhynchus mexicanus	*Casuarina glauca* L.	El-Hamawi, 1993; Oteifa *et al.*, 1997
Tylenchorhynchus phaseoli	*Citrus aurantium* L., *Musa sapientum* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Tylenchulus semipenetrans	*Citrus aurantium* L.[y], *Diospyros virginiana* L., *Olea europaea* L., *Vitis vinifera* L.[y]	Abou-Elnaga, 1979; Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Tylenchus sp.	*Arachis hypogaea* L., *Brassica oleracea* var. *capitata* L.[z], *Citrullus vulgaris* Schrad., *Cucumis sativus* L., *Cupressus sempervirens* L.[z], *Cycas revoluta* Thunb., *Cydonia oblonga* Mill, *Cynodon dactylon* (L.) Pers.[y], *Daucus carota* L., *Fragaria* spp., *Helianthus annuus* L., *Lycopersicon esculentum* Mill.[y], *Malus sylvestris* Mill., *Musa sapientum* L., *Myoporum pictum* L.[y], *Opuntia compressa* MacBirde., *Oryza sativa* L.[y], *Phoenix dactylifera* L., *Pisum sativum* L., *Pittosporum tobira* (Thunb.) W.T. Aiton, *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Solanum melongena* L., *Trifolium alexandrinum* L., *Vitis vinifera* L., *Washingtonia filifera* (Linden ex André) H. Wendl.[y], *Washingtonia robusta* H. Wendl.[y], *Zea mays* L.[y]	Ibrahim, 1990; Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa *et al.*, 1997; Tarjan, 1964
Tylenchus afghanicus	*Amaranthus caudatus* L.[y], *Portulaca grandiflora* Hook., *Portulaca oleracea* L.[y]	Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000
Tylenchus exiguus	*Amaranthus caudatus* L., *Bromus catharticus* Vahl[y], *Convolvulus arvensis* L.[y], *Cynodon dactylon* (L.) Pers., *Poa annua* L., *Portulaca oleracea* L., *Setaria virdis* (L.) Beauv., *Urtica urens* L.[y], *Washingtonia filifera* (Linden ex André) H. Wendl.	Ibrahim and El-Sharkawy, 2001; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Xiphinema sp.	*Arachis hypogaea* L., *Brassica oleracea* var. *capitata* L.[z], *Citrullus vulgaris* Schrad., *Citrus aurantium* L.[y], *Cucumis sativus* L., *Cucurbita pepo* L., *Ficus carica* L., *Fragaria* spp., *Lycopersicon esculentum* Mill.[y], *Mangifera indica* L., *Morus alba* L., *Musa sapientum* L., *Nerium oleander* L., *Olea europaea* L., *Opuntia compressa* MacBirde., *Oryza sativa* L., *Phaseolus vulgaris* L.[z], *Phoenix dactylifera* L., *Pisum sativum* L., *Prunus amygdalus* Batsch., *Prunus persica* (L.) Batsch., *Pyrus communis* L., *Rosa* spp., *Saccharum officinarum* L., *Solanum tuberosum* L., *Solanum melongena* L., *Trifolium alexandrinum* L., *Vitis vinifera* L.[y], *Washingtonia filifera* (Linden ex André) H. Wendl., *Zea mays* L.	Ibrahim, 1990; Ibrahim *et al.*, 1994; Ibrahim *et al.*, 2000; Ibrahim *et al.*, 1976; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Xiphinema americanum	*Citrus aurantium* L., *Gossypium barbadense* L., *Mangifera indica* L., *Prunus amygdalus* Batsch., *Vitis vinifera* L.	Ibrahim, 1990; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Xiphinema arenarium	*Citrus aurantium* L., *Ficus carica* L.	Ibrahim, 1990; Oteifa, 1964; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Xiphinema basilgoodeyi	*Acalypha wilkesiana* Muell. Arg.[y], *Arecastrum romanzoffianum* (Cham.) Becc., *Roystonea regia* L., *Sabal palmetto* (Walt.) Lodd.[y]	Ibrahim, 1999; Ibrahim *et al.*, 2000
Xiphinema elongatum	*Allium cepa* L., *Citrus aurantium* L., *Fragaria* spp., *Olea europaea* L., *Vitis vinifera* L.	Ibrahim, 1990; Oteifa *et al.*, 1997; Oteifa and Tarjan, 1965; Tarjan, 1964
Xiphinema diversicaudatum	*Fragaria* spp.	Aboul-Eid, 1970; Ibrahim and El-Sharkawy, 2001
Xiphinema ensiculiferum	*Phoenix dactylifera* L.[y]	Ibrahim, 1999; Ibrahim *et al.*, 2000
Xiphinema hygrophilum	*Mangifera indica* L.	Ibrahim and El-Sharkawy, 2001; Lamberti *et al.*, 1996
Xiphinema imitator	*Citrus aurantium* L., *Musa sapientum* L., *Vitis vinifera* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Xiphinema incognitum	*Ficus carica* L.	Lamberti *et al.*, 1996

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

Table 2. (Continued) Species of phytoparasitic nematodes reported and identified in Egypt and their associated host plants

Species	Hosts	References
Xiphinema index	*Vitis vinifera* L.	Lamberti *et al.*, 1996
Xiphinema insigne	*Citrus aurantium* L., *Mangifera indica* L., *Musa sapientum* L., *Saccharum officinarum* L., *Vitis vinifera* L.	Ibrahim, 1990; Oteifa *et al.*, 1997
Xiphinema ismailiensis	*Medicago sativa* L.	Oteifa *et al.*, 1997
Xiphinema italiae	*Vitis vinifera* L.	Lamberti *et al.*, 1996
Xiphinema lamberti	*Citrus aurantium* L., *Musa sapientum* L., *Vitis vinifera* L.	Abou-Elnaga, 1989; Oteifa *et al.*, 1997
Xiphinema santos	*Vitis vinifera* L.	Lamberti *et al.*, 1996
Xiphinema simillimum	*Ficus carica* L.	Lamberti *et al.*, 1996; Oteifa *et al.*, 1997
Zygotylenchus guevarai	*Zea mays* L.	El-Hamawi and Ali, 1992; Oteifa *et al.*, 1997

[y]Identified in 1999-2009 survey; also found in previous records.
[z]Identified in 1999-2009 survey; new host association not previously reported.

14 species, respectively. The genera *Hoplolaimus*, *Heterodera* and *Longidorus* had 7-10 species, while the other listed genera showed only 1-5 species each.

Some of the nematodes reported herein, especially of the genera *Aphelenchoides*, *Aphelenchus* and *Ditylenchus* may be feeding on fungi, algae or other soil microorganisms present in the rhizosphere of the plants that were surveyed. Also, some of the nematodes may have fed on the roots of the previous crop in the rotation rather than the one present at the time of sampling.

Occurrence of the nematode species *Criconema mutabile* associated with cypress is considered a new record in Egypt. Also, survey results showed new host plant associations for most of the identified nematode species in Egypt, such as *Heterodera daverti* on rice and wheat, *Heterodera zeae* on potato, *Hemicriconemoides mangiferae* and *Hoplolaimus aegypti* on aloe yucca, *Aphelenchus avenae* and *Tylenchorhynchus goffarti* on cotton and rose-mallow, and *Tylenchus exiguus* on Washington palm. More research is needed to further identify other genera and species of phytoparasitic nematodes that might occur in Egypt, especially on grasses, weeds and wild plants in desert areas, the Sinai Peninsula and the Mediterranean coast. Results reported herein form a valuable database that should be consulted in designing crop rotations and nematode control programs to deal with phytoparasitic nematode problems.

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