

Plant Parasitic Nematodes Infected and Associated with Potato Plants in Northern Egypt

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ABSTRACT: A nematological survey was conducted to identify plant-parasitic nematodes (PPN) infected or associated with potato plants in five Egyptian governorates. A total of 362 rhizosphere soil and root samples were collected throughout 2014-2017 from the major potato growing cultivation fields in Alexandria, Beheira, Gharbyia, Giza and Monufya governorates. A total of 12 PPN were presented in the collected soil, roots and tubers of potato plants. The golden nematode, *Globodera rostochinses* was the most prevalent in most potato fields with 31.7 frequency of occurrence % (FO) and population density (PD) of 219 second stage juveniles (J_2)/250 cm³ soil, followed by the root-knot nematode *Meloidogyne incognita* with 19.6 FO and 220 J_2 /250 cm³ soil, then *Hoplolaimus* spp., *Tylenchorhynchus* spp., *Pratylenchus* spp. and *Trichodorus* spp. with 2.8-6.6 FO and PD of 76-106 nematodes/250 cm³ soil. The other six PPN genera, i.e., *Aphelenchoides*, *Ditylenchus*, *Helicotylenchus*, *Hemicriconematoides*, *Heterodera*, and *Tylenchus* were also detected but with less frequencies of 0.3-1.4 FO and PD of 60-146 nematodes/250 cm³ soil. In Alexandria governorate, 5 PPN genera were presented on the 3 obtained potato cultivars; Burren, Cara and Slaney. The highest FO was recorded with *G. rostochinsis* on Burren and Slaney potato cvs. and *Tylenchorhynchus* on Burren cv. with 13.6 FO and PD of 147 and 117 J_2 or nematodes/250 cm³ soil, respectively. However, *M. incognita* was only detected on Burren cv. with 4.5 FO and PD of 1050 J_2 /250 cm³ soil. *Pratylenchus* was presented on Burren and Slaney cvs. with 4.5 and 28.6 FO and PD of 60 and 140 nematodes/250 cm³ soil, respectively. The spiral nematode *Helicotylenchus* was detected only on Slaney cv. with 14.3 FO and 50 nematodes/250 cm³ soil. In El-Beheira governorate, 12 PPN genera were identified on the 5 surveyed potato cvs; Cara, Galactica, Hermes, Lady Rosetta and Spunta. The golden nematode, *G. rostochinsis* and the root-knot nematode, *M. incognita* were most prevalent on (Hermes and Spunta) and (Cara, Hermes, Lady Rosetta and Spunta) potato cvs. with 44.4 and 26.9 FO and PD of 229 and 219 J_2 / 250 cm³ soil, respectively. The other PPN genera were found with less FO (0.4-4.3) and PD of (56-187 nematodes/250 cm³ soil. In El-Gharbya governorate, 5 PPN genera (*G. rostochinses*, *M. incognita*, *Pratylenchus*, *Tylenchorhynchus* and *Tylenchus*) were presented on the 3 surveyed potato cultivars, i.e., Antonio, Spunta and Mondial. In El-Giza, the 2 genera; *Aphelenchoides* and *M. incognita* were only detected on Lady Rosetta and Spunta potato cvs. with 27.3 and 9.1 FO and 157 and 60 nematodes/250 cm³ soil, respectively. In El-Menoufiya, 5 PPN genera were presented on the 2 surveyed potato cvs; Hermes and Krozo. The root-knot nematode *M. incognita* had the highest FO of 9.5 and 70 J_2 /250 cm³ soil on potato cv. Hermes. The other detected genera, i.e., *G. rostochiensis*, *Helicotylenchus*, *Pratylenchus* and *Tylenchorhynchus* were found with 4 FO and 30-80 nematodes/250 cm³ soil.

Keywords: Nematode distribution, phytoneematodes, potato cultivars, survey.

INTRODUCTION

The potato cyst nematode *Globodera rostochiensis* and *G. pallida* are the most important nematodes of potatoes and have the greatest distribution in cooler areas of subtropical and tropical regions, as well as temperate regions of the world (Mai, 1977 and Scurrah *et al.*, 2005). The parasitic nematodes recognized as major parasites of potato plants were cyst nematodes (*Globodera* spp.), root-knot nematode (*Meloidogyne* spp.), the false root-knot nematode (*Nacobbus aberrans*), *Ditylenchus* spp., *Pratylenchus* spp. The other nematode associated with potato were *Tricodorus*, *Paratricodorus*, *Longidorus*, *Paralongidorous* and *Belonolaimus* (Jensen *et al.*, 1979 and Jatala, 1989).

The potato-rot nematode *Ditylenchus destructor* and the yam nematode *Scutellonema bradys* have also been detected on potato plants (Palomares-Rius *et al.*, 2014). Seven species of root-knot nematode have been found infected potato plantations. *M. incognita* is the most widely distributed species in the tropics followed by *M. javanica* and *M. arenaria*. On the other hand, *M. hapla*, *M. chitwoodi*, *M. fallax* and *M. thamesi* were found principally in the cooler temperate regions (Taylor and Sasser, 1978). In Egypt, root-knot nematode species, i.e. *M. incognita* and *M. javanica*, were identified on many vegetable crops like pepper, potato and onion especially in Alexandria governorate (Ibrahim and Mokbel, 2009).

The aim of this work is to identify PPN genera and species attacking or associated with potato plantations in the 5 Egyptian governorates, i.e. Alexandria, El-Beheira, El-Garbayia, El-Giza and El-Menoufyia.

MATERIALS AND METHODS

A total of three hundred and sixty-two rhizosphere soil and root samples were collected throughout 2014-2017 from potato fields in five governorates at the Northern region of Egypt. The surveyed governorates and respective samples were as follows: Alexandria 44, Beheira 234, Gharbia 48, Giza 11 and Menoufyia 25 samples.

A composite soil sample of about 1 kg was collected from the rhizosphere of the surveyed potato plants at a depth of about 10-40 cm. Samples were sealed in a labeled plastic bags, kept out of the sun to prevent drying, then transported to the nematode laboratory for extraction and identification. PPN infected or associated with potato soil samples were extracted within 24 h after collection. Soil samples were thoroughly mixed and a volume of 250 cm³ soil was used for nematodes extraction using sieving and centrifugal sugar flotation techniques (Ayoub, 1980). The PPN presented in the suspension were collected by backwashing the retained materials on 325-mesh sieve into 250 ml beaker using tap water. Identification of the extracted (PPN) in each soil sample was based on morphological and anatomical characters of the adult and larval forms according to the description of Goody (1963) and Mai and Lyon (1975). The PPN genera were counted using Peter's 1-ml eelworm counting slide under a compound microscope. Frequency of occurrence % (FO) and population density (PD) /250cm³ soil were calculated for each nematode genus or species.

RESULTS AND DISCUSSION

Data presented in Table (1) indicated the presence of twelve plant-parasitic nematodes (PPN) genera infected or associated with soil, roots and tubers of potato plantations in the 5 surveyed Egyptian governorates. Five PPN genera were found in Alexandria and El-Menoufyia governorates, i.e. *G. rostochensis*, *Helicotylenchus*, *Meloidogyne incognita*, *Pratylenchus* and *Tylenchorhynchus*. Twelve PPN genera were presented in El-Beheira governorate, i.e. *Aphelenchoides*, *Ditylenchus*, *Globodera rostochensis*, *Helicotylenchus*, *Hemicriconemoides*, *Heterodera*, *Hoplolaimus*, *M. incognita*, *Pratylenchus*, *Trichodorus*, *Tylenchorhynchus* and *Tylenchus*. Five PPN genera

were detected in El-Gharbyia governorate, i.e. *G. rostochensis*, *M. incognita*, *Pratylenchus*, *Tylenchorhynchus* and *Tylenchus*. Two PPN genera were identified in El-Giza governorate, i.e. *Aphelenchoides* and *M. incognita*.

The golden nematode, *G. rostochensis*, was the most prevalent with frequency of occurrence % (FO) of 31.7 and population density (PD) of 219 2nd stage juveniles (J₂)/250 cm³ soil, followed by the root-knot nematode, *M. incognita* with 19.6 FO and PD of 220 J₂/ 250 cm³ soil, then *Tylenchorhynchus* spp. with 6.6 FO and 76 nematodes/250 cm³ soil. The genera, *Aphelenchoides*, *Hoplolaimus*, *Pratylenchus*, *Trichodorous* and *Tylenchus* were presented with 1.4 - 4.9 FO and 78-146 nematodes/250 cm³ soil. On the other hand, the genera *Ditylenchus*, *Helicotylenchus*, *Hemicriconemoides*, and *Heterodera* were found less common with 0.3- 1.1 FO and PD of 60-120 nematodes/ 250 cm³ soil.

Table (1). Frequency of occurrence % (FO) of plant-parasitic nematode genera and their population density (PD) / 250 cm³ soil samples collected from potato plants in five Egyptian governorates

Nematode Genera	Governorate, FO and PD										Total (362)	
	Alexandria (44) ^a		Beheira (234)		Gharbia (48)		Giza (11)		Menoufyia (25)			
	FO	PD	FO	PD	FO	PD	FO	PD	FO	PD	FO	PD
<i>Aphelenchoides</i>	-	-	1.28	187	-	-	27.3	157	-	-	1.4	146
<i>Ditylenchus</i>	-	-	1.7	120	-	-	-	-	-	-	1.1	120
<i>Globodera</i>	13.6	147	44.4	229	8.3	85	-	-	4	80	31.7	219
<i>Helicotylenchus</i>	2.3	50	0.85	75	-	-	-	-	4	60	1.1	65
<i>Hemicriconemoides</i>	-	-	1.28	60	-	-	-	-	-	-	0.8	60
<i>Heterodera</i>	-	-	0.43	120	-	-	-	-	-	-	0.3	120
<i>Hoplolaimus</i>	-	-	4.3	78	-	-	-	-	-	-	2.8	78
<i>Meloidogyne</i>	2.3	1050	26.9	219	8.3	68	9.1	60	8	70	19.6	220
<i>Pratylenchus</i>	6.8	113	2.9	56	12.5	117	-	-	4	30	4.9	78
<i>Trichodorous</i>	-	-	5.1	106	-	-	-	-	-	-	3.3	106
<i>Tylenchorhynchus</i>	13.6	117	4.3	85	16.6	103	-	-	4	60	6.6	76
<i>Tylenchus</i>	-	-	0.43	80	12.5	107	-	-	-	-	1.9	103

a= Number of samples collected from each governorate; FO = (number of positive samples/a) × 100; PD = mean number of nematode present/250 cm³ soil in each governorate

Data shown in Table (2) indicated that the presence of PPN genera in soil, roots and tubers samples collected from the three surveyed potato cultivars grown in Alexandria governorate potato fields, namely Burren, Cara and Slaney. Five PPN genera were existed, i.e. *G. rostochensis*, *Helicotylenchus* spp., *M. incognita*, *Pratylenchus* spp. and *Tylenchorhynchus* spp. The Golden cyst nematode *G. rostochensis* was detected on Burren and Slaney potato cultivars, whereas *Tylenchorhynchus* spp. was only existed on Burren cv. with 13.6 FO and PD of 147-117 nematodes and J₂/250 cm³ soil, respectively. The root-lesion nematode *Pratylenchus* spp. was isolated from Burren and Slaney cvs. with 6.8 FO and PD of 113 nematodes/250 cm³ soil. The root-knot nematode *M. incognita* and *Helicotylenchus* spp. were only presented on Burren and Slaney cvs. with the same FO (2.3%) and densities of 1050 and 50 J₂ and nematodes/250 cm³ soil, respectively. However, no PPN genera were isolated from Cara potato cultivar.

Table (2). Frequency of occurrence % (FO) of plant-parasitic nematode genera and their population density (PD)/250 cm³ soil samples collected from Alexandria governorate in relation to potato cultivar

Nematode Genera	Potato cultivar						Total (44)	
	Burren (22) ^a		Cara (15)		Slaney (7)		FO	PD
	FO	PD	FO	PD	FO	PD		
<i>Globodera rostochensis</i>	22.7	144	-	-	14.3	160	13.6	147
<i>Helicotylenchus</i>	-	-	-	-	14.3	50	2.3	50
<i>Meloidogyne incognita</i>	4.5	1050	-	-	-	-	2.3	1050
<i>Pratylenchus</i>	4.5	60	-	-	28.6	140	6.8	113
<i>Tylenchorhynchus</i>	27.3	117	-	-	-	-	13.6	117

Legend as in Table 1.

In El-Beheira governorate, data in Table (3) showed that twelve PPN genera were obtained from the 5 potato cvs., namely Cara, Galactica, Hermes, Lady Rosetta and Spunta. The isolated nematodes were found to belong to the genera *Aphelenchoides*, *Ditylenchus*, *Globodera rostochensis*, *Helicotylenchus*, *Hemicriconemoides*, *Heterodera*, *Hoplolaimus*, *Meloidogyne incognita*, *Pratylenchus*, *Trichodorus*, *Tylenchorhynchus* and *Tylenchus*. The Golden nematode *G. rostochensis* was presented on Hermes and Spunta cvs. with 44.4 FO and PD of 229 J₂/250 cm³ soil, followed by *M. incognita*, which found on Cara, Hermes, Lady Rosetta and Spunta cvs. with 26.9 FO and PD of 219 J₂/250 cm³ soil, then *Trichodorus*, which isolated only from Hermes cv. with 5.1 FO and 106 nematodes/250 cm³ soil. *Hoplolaimus* and *Tylenchorhynchus* were found with the same FO values of 4.3% and PD of 78 and 85 nematodes/250 cm³ soil on Galactica, Hermes and Spunta and Hermes and Spunta potato cvs., respectively. The root-lesion nematode *Pratylenchus* was presented on Cara, Hermes and Spunta with 2.9 FO and PD of 56 nematodes/250 cm³ soil. *Aphelenchoides* was isolated from Galactica, Hermes and Spunta cvs. with 1.28 FO and PD of 187 nematodes/250 cm³ soil. *Ditylenchus* was detected in both Galactica and Spunta cvs. with FO of 1.7 and PD of 120 nematodes/250 cm³ soil. *Helicotylenchus* was found on Hermes and Spunta cvs. with 0.85 FO and PD of 75 nematodes/250 cm³ soil.

Hemicriconemoides was only isolated on Hermes cv. with 1.28 FO and PD of 60 nematodes/250 cm³ soil. The genera *Heterodera* and *Tylenchus* were only detected on cv. Hermes with the lowest (0.43%) FO value and PD of 120 and 80 nematodes/ 250 cm³ soil, respectively.

Table (3). Frequency of occurrence % (FO) of plant-parasitic nematode genera and their population density (PD)/250 cm³ soil samples collected from El-Beheira governorate in relation to potato cultivars

Nematode Genera	Potato cultivar										Total (234)	
	Cara (6) ^a		Galactica (3)		Hermes (186)		Lady Rosetta (5)		Spunta (34)			
	FO	PD	FO	PD	FO	PD	FO	PD	FO	PD	FO	PD
<i>Aphelenchoides</i>	-	-	33.3	320	0.54	120	-	-	2.9	120	1.28	187
<i>Ditylenchus</i>	-	-	33.3	160	-	-	-	-	8.8	93	1.7	120
<i>Globodera rostochensis</i>	-	-	-	-	54.3	233	-	-	8.8	107	44.4	229
<i>Helicotylenchus</i>	-	-	-	-	1.1	90	-	-	2.9	70	0.85	75
<i>Hemicriconemoides</i>	-	-	-	-	0.54	60	-	-	-	-	1.28	60
<i>Heterodera</i>	-	-	-	-	0.54	120	-	-	-	-	0.43	120
<i>Hoplolaimus</i>	-	-	33.3	160	4.3	148	-	-	2.9	60	4.3	78
<i>Meloidogyne incognita</i>	33.3	580	-	-	26.8	235	20	100	35.3	121	26.9	219
<i>Pratylenchus</i>	16.7	60	-	-	1.1	75	-	-	14.7	49	2.9	56
<i>Trichodorous</i>	-	-	-	-	6.5	106	-	-	-	-	5.1	106
<i>Tylenchorhynchus</i>	-	-	-	-	4.3	77	-	-	8.8	60	4.3	85
<i>Tylenchus</i>	-	-	-	-	0.54	80	-	-	-	-	0.43	80

Legend as in Table 1.

Data in Table (4) indicated the presence of PPN genera in soil, root and tuber samples collected from the three surveyed potato cultivars grown in El-Gharbyia governorate potato fields, namely Antonio, Spunta and Mondial. The five detected PPN genera were *G. rostochensis*, *M. incognita*, *Pratylenchus* spp., *Tylenchorhynchus* spp. and *Tylenchus* spp. The root-knot nematode, *M. incognita* was presented on Antonio, Spunta and Mondial cvs. with 8.3 FO and PD of 68 J₂/250 cm³ soil. The Golden cyst nematode *G. rostochensis* was only found on Hermes potato cultivar with 8.3 FO and 85 J₂/250 cm³ soil. The Stunt nematode *Tylenchorhynchus* spp. was detected on Antonio, Spunta and Mondial potato cultivars with 16.6 FO and PD of 103 nematodes/250 cm³ soil. The root-lesion nematode *Pratylenchus* spp. was isolated from Antonio and Spunta potato cultivars with 12.5 FO and PD of 117 nematodes/250 cm³ soil. The genus *Tylenchus* was detected on Antonio and Mondial potato cultivars with 12.5 FO and PD of 107 nematodes/250 cm³ soil.

Table (4). Frequency of occurrence (FO) % of plant-parasitic nematode genera and their population density (PD)/250 cm³ soil samples collected from El-Gharbia governorate in relation to potato cultivars

Nematode Genera	Potato cultivar						Total (48)	
	Antonio (15) ^a		Spunta (28)		Mondial (5)			
	FO	PD	FO	PD	FO	PD	FO	PD
<i>Globodera rostochensis</i>	-	-	14.29	85	-	-	8.3	85
<i>Meloidogyne incognita</i>	6.67	60	7.14	80	20	50	8.3	68
<i>Pratylenchus</i>	33.3	124	3.57	80	-	-	12.5	117
<i>Tylenchorhynchus</i>	13.3	110	17.85	104	20	80	16.6	103
<i>Tylenchus</i>	33.3	120	-	-	20	40	12.5	107

Legend as in Table 1

In El-Giza governorate, data in Table (5) showed that two PPN genera were obtained from the two potato cultivars, i.e. Lady Rosetta and Spunta. The two isolated PPN genera were the bud and leaf nematode *Aphelenchoides* and the root-knot nematode *M. incognita*. The bud and leaf nematode *Aphelenchoides* was presented on both surveyed potato cultivar with 27.3 FO and PD of 157 nematodes/250 cm³ soil, while, *M. incognita* was only detected on Lady Rosetta cv. with 9.1 FO and 60 J₂/250 cm³ soil. In Menoufia governorate, data in Table (6) indicated the presence of five PPN genera on Hermes and Krozo potato cultivars. The five existed PPN genera were *G. rostochensis*, *Helicotylenchus* spp., *M. incognita*, *Pratylenchus* spp. and *Tylenchorhynchus* spp. The root-knot nematode *M. incognita* was detected on Hermes cv. only with 8 FO and PD of 70 J₂/250 cm³ soil. *Globodera rostochensis* and *Helicotylenchus* were isolated from Hermes cv. with the same FO (4%) and PD of 80 and 60 nematodes and J₂/250 cm³ soil. The root lesion nematode *Pratylenchus* spp. and the Stunt nematode *Tylenchorhynchus* spp. were isolated from only Krozo cv. with 4 FO and PD of 30 and 60 nematodes/250 cm³ soil, respectively.

Table (5). Frequency of occurrence % (FO) of plant-parasitic nematode genera and their population density (PD)/250 cm³ soil samples collected from El-Giza governorate in relation to potato cultivars

Nematode Genera	Potato cultivar				Total (11)	
	Lady Rosetta (9) ^a		Spunta (2)		FO	PD
	FO	PD	FO	PD		
<i>Aphelenchoides</i>	11.1	300	100	85	27.3	157
<i>Meloidogyne incognita</i>	11.1	60	-	-	9.1	60

Legend as in Table 1.

Table (6). Frequency of occurrence %(FO) of plant-parasitic nematode genera and their population density (PD)/250 cm³ soil samples collected from El-Menoufiya governorate relation to potato cultivars

Nematode Genera	Potato cultivar				Total (25)	
	Hermes (21) ^a		Krozo (4)		FO	PD
	FO	PD	FO	PD		
<i>Globodera rostochensis</i>	4.7	80	-	-	4	80
<i>Helicotylenchus</i>	4.7	60	-	-	4	60
<i>Meloidogyne incognita</i>	9.5	70	-	-	8	70
<i>Pratylenchus</i>	-	-	25	30	4	30
<i>Tylenchorhynchus</i>	-	-	25	60	4	60

Legend as in Table 1.

Similar results were published with many authors (Ibrahim *et al.*, 2000; Scurrah *et al.*, 2005; Mokbel *et al.*, 2006; Ibrahim and Mokbel, 2009 and Ibrahim *et al.*, 2017). The golden cyst nematode *G. rostochensis* was the most prevalent in Alexandria, El-Beheira and El Menoufiya governorates. Ibrahim *et al.* (2017) concluded that golden potato nematode (*Globodera rostochensis*) was found in

the most examined samples of potato in Egypt, particularly in El-Nubaria region of El-Beheira governorate. Moreover, It was found that the potato cyst nematodes *Globodera rostochensis* and *G.pallida* are the most important nematodes of potatoes that infect roots and causing stress and reducing the uptake of water and nutrients (Scurrah *et al.*, 2005).

According to the obtained data, root-knot nematode, *M. incognita* was detected in the most the investigated governorates after the golden cyst nematode. Similar results were recorded by Abou El-Naga *et al.* (1985) and Ibrahim *et al.* (2000). They concluded that *Meloidogyne* species considered one of the most phytonematodes distribution in the most Egyptian soils. Moreover, *M. incognita* and *M. javanica* were occurred in galled roots of many vegetable crops (Ibrahim and Mokbel; 2009). Mokbel *et al.* (2006) reported similar results. She found that among the 6 genera of plant-parasitic nematodes detected on potato plants in Egyptian governorates, root-knot nematode had the highest frequency of occurrence (33.3 %), followed by the genera *Criconemella*, *Tylenchorhynchus* and *Heterodera* with 7.9, 7.9 and 4.8 FQ. The two genera, *Ditylenchus* and *Pratylenchus* were found less common with 1.6 FO.

The other plant parasitic nematodes found in the examined samples throughout this investigation, i.e. bud and leaf nematode (*Aphelencooides* spp.), stem and bulb nematode (*Ditylenchus* spp.), spiral nematode (*Helicotylenchus* spp.), lesion nematode (*Pratylenchus* spp.), ring nematode (*Hemicriconemoides* sp.), lance nematode (*Hoplolaimus* spp.) and the stunt nematode (*Tylenchorhynchus* spp.) were found less common. These findings were in harmony with data recorded by Ibrahim *et al.* (2010).

The virus-transmitted nematode *Tricodorus* spp. was found only in the examined samples of El-Beheira governorate. It should be considered, that this nematode causes damaging to the roots of many crops worldwide including potato plants and transferring virus diseases called corky ring spot (Yan *et al.*, 2016).

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الملخص العربي

النيماتودا النباتية المتطفلة والمصاحبة لنباتات البطاطس فى شمال مصر

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عمل حصر للنيماتودا المتطفلة على نباتات البطاطس فى خمس محافظات بجمهورية مصر شملت ٤٤ عينة من الإسكندرية ، ٢٣٤ من البحيرة ، ٤٨ عينة من الغربية ، ١١ عينة من الجيزة ، ٢٥ عينة من المنوفية وذلك فى الفترة بين ٢٠١٤-٢٠١٧. تم جمع عدد ٣٦٢ عينة من الجذور والدرنات والتربة المحيطة بالجذور وأسفرت نتائج العزل والفحص الميكروسكوبى عن تواجد ١٢ جنساً من النيماتودا المتطفلة والتى تصيب البطاطس. وكان أكثرها تواجدا فى العينات نيماتودا الحوصلات الذهبية *Globodera rostochensis* بنسبة تواجد ٣١.٧% ، ومتوسط ٢١٩ يرقة/٢٥٠ سم^٣ تربة ، يليها نيماتودا تعقد الجذور من النوع *Meloidogyne incognita* بنسبة تواجد ١٩.٦% ومتوسط ٢٢٠ يرقة / ٢٥٠ سم^٣ تربة ، ثم نيماتودا التقزم (*Tylenchorhynchus*) بنسبة تواجد ٦.٦% ومتوسط ٧٦ نيماتودا/ ٢٥٠ سم^٣ تربة. ولقد شكلت الأجناس التسعة الأخرى (*Aphelenchoides, Ditylenchus, Helicotylenchus, Hemicriciconemoides, Heterodera, Hoplolaimus, Pratylenchus, Trichodorus, Tylenchus.*) التى تم التعرف عليها نسب تواجد منخفضة تراوحت بين ٠.٣ - ٤.٩% ومتوسط ٦٠-١٤٦ نيماتودا/٢٥٠ سم^٣ تربة. تم عزل وتعريف ٥ أجناس نيماتودية متطفلة بتربة ونباتات صنفى برن وسيلاني بمحافظة الأسكندرية هى (*G. rostochensis, Helicotylenchus, M. incognita, Pratylenchus, Tylenchorhynchus*). وتواجدت النيماتودا الذهبية *G. rostochensis* على صنفى بورين وسيلاني ، ونيماتودا التقزم *Tylenchorhynchus* على صنف بورين فقط بنسبة تواجد ١٣.٦% ومتوسط ١٤٧-١١٧ يرقة / ٢٥٠ سم^٣ تربة على الترتيب. وفي محافظة البحيرة تواجد ١٢ جنساً نيماتودياً متطفلاً على خمسة أصناف من البطاطس هى كارا ، جلاكتيكا ، هيرمس ، ليدى روزتا ، واسبونتا ، وكانت النيماتودا الذهبية الأكثر تواجداً بتربة ونباتات صنفى هيرمس ، واسبونتا بنسبة تواجد ٤٤.٤% وبمتوسط ٢٢٩ يرقة/ ٢٥٠ سم^٣ تربة ، تبعها نيماتودا تعقد الجذور *M. incognita* على أصناف كارا ، وهيرمس ، وليدى روزتا ، وسبونتا بنسبة تواجد ٢٦.٩% وبمتوسط كثافة ٢١٩ يرقة يرقة/ ٢٥٠ جم تربة. وفي محافظة الغربية تواجدت ٥ أجناس من النيماتودا متطفلة على ٣ أصناف من البطاطس هى أنطونيو ، واسبونتا ، ومونديال. وتواجدت نيماتودا التقزم على الأصناف الثلاثة بنسبة تواجد ١٦.٦% ومتوسط نيماتودا / ٢٥٠ سم^٣ تربة ، ونيماتودا التقزم على صنفى أنطونيو ، واسبونتا بنسبة تواجد ١٢.٥% ومتوسط ١١٧ نيماتودا / ٢٥٠ سم^٣ تربة ، ونيماتودا الجنس تيلنكس على صنفى البطاطس أنطونيو ، ومونديال بنسبة تواجد ١٢.٥% ومتوسط ١٠٧ نيماتودا / ٢٥٠ سم^٣ تربة. وفي محافظة الجيزة تم عزل وتعريف نيماتودا البراعم والاوراق من تربة ونباتات صنفى البطاطس ليدى روزتا ، واسبونتا ، ونيماتودا تعقد الجذور على الصنف ليدى روزتا بنسبة

تواجد ١١.١ ومتوسط ٦٠ يرقة/٢٥٠ سم^٣ تربة. وقد تواجدت نيماتودا البراعم والأوراق علي صنف ليدي روزتا وسبونتتا بنسبة تواجد ٢٧.٣% وبتوسط ١٥٧ نيماتودا /٢٥٠جم تربة . وتم عزل وتعريف ٥ أجناس نيماتودية متطفلة بتربة ونباتات البطاطس المنزرعة بمحافظة المنوفية ، وكان أكثرها تواجداً نيماتودا تعقد الجذور بنسبة ٨ % ومتوسط ٧٠ يرقة/٢٥٠ سم^٣ تربة علي صنف هيرمس فقط . وتواجدت نيماتودا الحوصلات الذهبية ، والحلزونية ، والتقرح والتقرم بنسبة ٤ % ومتوسط ٣٠-٨٠ نيماتودا/٢٥٠سم^٣ تربة.