A Survey of Plant Parasitic Nematodes Associated with Grapevines (*Vitis vinifera* L) in Ismailia Governorate

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Abstract: A survey to study the presence and distribution of plant-parasitic nematodes associated with grape (*Vitis vinifera* L) was conducted in Ismailia vineyards. A totals of 460 plant and soil samples were collected from vineyards of five different localities in Ismailia governorate viz. "Ismailia, El-Tall al Kabir, Abou-Swair, El-Kantara Sharq, and El-Kassasen". The results obtained from the survey showed that the population varied in their frequency and distributed among surveyed vineyards. There were eleven plant parasitic nematode genera found associated with common grape plants in Ismailia Governorate. These genera were *Meloidogyne* spp., *Hoplolaims* spp., *Tylenchorhynchus* spp., *Xiphinema* spp., *Pratylenchus* spp., *Rotylenchulus reniformis* , *Helicotyleuchus* spp., *Trichodorus* spp., *Criconemella* spp., *Tylenchulus semipenetrans* and *Longidorus* spp. The root-knot nematode *Meloidogyne* spp. was the most frequently genus occurred in grape with FO of 100% in all the studied regions. In El-Tall al Kabir region the data revealed the citrus nematode, *Tylenchulus semipenetrans* and dagger nematode, *Xiphinema* spp. were widely distributed with 40 and 65 FO% respectively from the collected samples. The needle nematode, *Longidorus* spp. and the lesion nematode, *Pratylenchus* spp. occupied the rank of the most second distributed common genera in the third region El-Kassasen with 74 and 70% respectively. While, in fourth region Abo-Sewir, the spiral nematode, *Helicotylenchus* spp. and the reniform nematode, *Rotylenchulus reniformis* was the most common genera with 67 and 45 F O % respectively. In region El-Qantara Shark, the stunt nematode, *Tylenchorhynchus* spp. was found with FO of 70%. While, the stubby root nematode, *Trichodorus* spp. was the lowest distributed genus with FO of 20%.

Keywords: Nematodes- Grapevines (*Vitis vinifera* L)

INTRODUCTION

Grape (*Vitis vinifera* L.), is one of the most important fruit crops in the world. In Egypt, grape fruit comprises the second stage after citrus of domestic consumption; in addition grape is being exported annually serving as one of source for hard currency. The area of grape plantations has been increased and setting up programs of grape production improved. The total cultivated area, according to statistics from the Ministry of Agriculture and Land Reclamation (Anonymous, 2007) was 164000 feddan in fruitful area reaches 144.624 feddan which produced 1.391749 tons.

Plant parasitic nematodes have often been found in soils where grapevines showed reduced vigor, and cause economic loss. The root-knot nematodes alone cause about 20% of economic loss (Riga, 2008). This species *Meloidogyne* spp. are widely distributed throughout the tropical and subtropical regions. Symptoms associated with nematode damage lead to general reduction in vine vigor and fruit production.

Currently, one of the most serious disease problems affecting grapevine production is the grapevine fan leaf virus (GFLV) transmitted by the dagger nematodes, *Xiphinema index.* In addition, grapevine roots can be infected and damaged by root-lesion nematode, *Pratylenchus*, citrus *Tylenchulus semipenetrans* , *Helicotylenchus, Meloidogyne, Xiphinema, Hoplolaimus, Tylenchorhynchus, Rotylenchulus, Criconemella* and *Longidorus* (Kanyagia (1988) , Khan *et al.*, (1993) Rubiano and Agudelo (1995), Baklawa 2004. El-Moflehi (2009), Aballay *et al.*, (2009) and Deimi and Nathaniel (2010).

The objective of this study was to determine the population density and frequency of occurrence of plant parasitic nematodes which was found associated with grapevines (*Vitis vinifera* L) in Ismailia Governorate.

MATERIALS AND METHODS

Sampling procedures:

The present survey study was carried out during the three successive seasons of (2009- 2010- 2011) at five different localities in Ismailia Governorate viz. "Ismailia, El-Tall al Kabir, Abou-Swair, El-Kantara Sharq , and El-Kassasen". A total of 460 composite soil samples were collected from the rhizosphere of the most common grapevines *Vitis vinifera* L. cultivars, from fields in Ismailia. Each soil sample of about 0.5 kg composed of sub samples obtained by rhizosphere of growing surveyed plants. The collected samples were brought in labeled polyethylene bags to the laboratory and kept in refrigerator at 5°C for the further studies.

Nematode extraction, counting and identification:

Each soil sample was carefully mixed and a volume of 250 g soil was used to extract nematode by sieving and Baermann pan technique according to Barker, *et al.*, 1985. The extracted nematodes were counted by using counting slide under a stereoscopic microscope and identified to the generic level based on the morphology of adult females and juvenile according to Mai and Lyon, (1975) and Muller, *et al.*, (1985). For each genus, population density (P.D.) per 250 g soil and frequency of occurrence (F.O %) were calculated according to Norton 1978 as follows:

Population density (P.D.) = total numbers of individuals of each genus per 250g soil / number of samples contain this genus

Frequency of occurrence %:

$$\textbf{(FO \%)} = \frac{\text{Number of samples containing a certain genus}}{\text{Total number of collected samples}} \times 100$$

RESULTS

Data presented in Table (1) show the Population densities (PD) and Frequency of occurrence (FO %) in soil samples collected from Ismailia region. The root-knot nematode, *Meloidogyne* spp. was the most prevalent genus in all collected soil samples with PD of 370 j_2 per 250g soil. In the meantime, the spiral nematode, *Helicotylenchus* spp. and the stunt nematode, *Tylenchorhynchus* spp. were found with PD of 75 and 65 respectively and with FO% 54 and 29 respectively. The ring nematode, *Criconemella* spp. was found with PD of 54 and with FO% 68. The stubby root nematode, *Trichodorus* spp. and the root lesion nematode, *Pratylenchus* spp. were less common with PD of 35 and 25 respectively and FO% 15 and 17.

Table (1): The Population density (PD) and frequency of occurrence of nematode genera associated with vineyards in Ismailia region.

Genera	PD	FO %
Criconemella	54	68
Helicotylenchus	75	54
Hoplolaimus	30	20
Meloidogyne	370	100
Pratylenchus	25	17
Trichodorus	35	15
Tylenchorhynchus	65	29

P.D (Population Density) = number of nematode per 250g soil / number of samples contain this genus
F.O % (Frequency of Occurrence %) = number of samples contained genus / total samples collected X 100

Data of Table (2) show that 8 plant parasitic nematode genera were identified in soil samples of the samples collected from El-Tall al Kabir region. The root-knot nematode, *Meloidogyne* spp., was the most prevalent genus giving PD of 320 j_2 per 250 g soil. While the second widely distributed genus the dagger nematode, *Xiphinema* spp. with PD of 100 and FO% 65. In the meantime the citrus nematode, *Tylenchulus semipenetrans* was found with PD of 170 and FO% 40. In addition, the stubby root nematode, *Trichodorus* spp. was found with PD 90 and FO% 27. The ring nematode, *Criconemella* spp. and the spiral nematode, *Helicotylenchus* spp. were less common with found with P D of 80 and 75 respectively and FO% 20 and 33 respectively.

Data presented in Table (3) show the population densities (PD) and Frequency of occurrence (FO %) of eight plant parasitic nematode associated with grape soil samples collected from El-Kassasen region. the root-knot nematode, *Meloidogyne* spp. was the most prevalent genus with PD of 200 j_2 per 250g soil. The needle nematode, *Longidorus* spp. was the second most dominant genus with FO% 74. In the meantime, the root lesion nematode, *Pratylenchus* spp. was the third most prominent genus with PD of 120 and FO% 70. The reniform nematode, *Rotylenchulus reniformis* was common distributed with FO 45%. While, the spiral nematode, *Helicotylenchus* spp. and the stunt nematode, *Tylenchorhynchus* spp. were less common distributed genera with FO% 25 and 30 respectively.

Table (2): The Population density (PD) and frequency of occurrence % of nematode genera associated with vineyards in El-Tall al Kabir region.

Genera	PD	FO %
Criconemella	80	20
Helicotylenchus	75	33
Longidorus	60	40
Meloidogyne	320	100
Rotylenchulus	120	40
Trichodorus	90	27
Tylenchulus	170	40
Xiphinema	100	65

Table (3): The Population density (PD) and Frequency of occurrence % of nematode genera associated with vineyards in El-Kassasen region.

Genera	PD	FO %
Helicotylenchus	145	25
Longidorus	80	74
Meloidogyne	200	100
Pratylenchus	120	70
Rotylenchulus	90	52
Tylenchulus	65	37
Tylenchorhynchus	75	30
Xiphinema	60	42

Data presented in Table (4) show the Population densities (PD) and Frequency of occurrence (FO %) in soil samples collected from Abo-Sewir region. The root-knot nematode, *Meloidogyne* spp. was the most prevalent genus with PD of 250 j_2 per 250 g soil. While, the stunt nematode, *Tylenchorhynchus* spp. was the second most genera with PD of 130 and FO 74%, the sperial nematode, *Helicotylenchus* spp. was the third most common genus with PD of 140 and FO% 67, followed by the reniform nematode, *Rotylenchulus reniformis* with PD of 75 and FO 45%. In the meantime, the citrus nematode, *Tylenchulus semipenetrans,* and the lance nematode, *Hoplolaimus* spp. were less common genera associated with grape soil samples with PD of 50 and 40 and FO% 23 and 35 respectively.

Population densities (PD) and frequency of occurrence (FO %) of nematode genera associated with vineyards in El- Qantara Shark region, presented in Table (5) revealed that the root-knot nematode, *Meloidogyne* spp., was the most prevalent genus in grape plant with PD of 300 j_2 per 250gm soil. The stunt nematode, *Tylenchorhynchus* spp. was the second most common genus with PD of 120 and FO %70. While the third most common genus was the lesion nematode, *Pratylenchus* spp., was found with P D of 80 and FO% 39. In the meantime, the dagger nematode, *Xiphinema* spp., the needle nematode, *Longidorus* spp., and the stubby root nematode, *Trichodorus* spp. were less

common genera with PD of 60, 35 and 30% respectively, also FO % of these genera were 20,15 and 20 respectively.

Table (4): The Population density (PD) and Frequency of occurrence % (FO %) of nematode genera associated with vineyards in Abo- Swier region.

Genera	PD	FO %
Helicotylenchus	140	67
Hoplolaimus	40	35
Meloidogyne	250	100
Pratylenchus	60	40
Rotylenchulus	75	45
Tylenchulus	50	23
Tylenchorhynchus	130	74

Table (5): The Population density (PD) and frequency of occurrence % (FO %) of nematode genera associated with vineyards in El- Qantara Shark region.

Genera	PD	FO %
Longidorous	35	15
Meloidogyne	300	100
Pratylenchus	80	39
Rotylenchulus	45	25
Trichodorus	30	20
Tylenchorhynchus	120	70
Xiphinema	60	20

Plant parasitic nematodes, play an important role as limiting factor of many economic agriculture crops production in Egypt. the present survey study showed that the root-knot nematodes, *Meloidogyne* spp. were dominate in the five tested regions (Ismailia, El-Tall al Kabir, Abou-Swair, El- Qantara Shark, and El - Kassasen) this nematode induces gall formation in young rootlets and heavy infection may completely destroy the root systems of young plants. Previous studies proved certainly the spreading of this genus in Ismailia Governorate on the fruit crops Baklawa 2004.

The results obtained from this survey determined the presence of *Pratylenchus* spp. and the two ecto-parasitic genera, *Xiphinema* spp. and *Tylenchorhynchus* spp. The important of the presence of *Xiphinema* spp. is due to its ability to transmit plant viruses such as the fan leaf yellow mosaic virus as a disease complex of grape. A survey studied by Lamberti *et al.*, 1996 reported the occurrence of six other species of *Xiphinema* on grape and other cultivated plants in Egypt. The genus *Pratylenchus* (lesion nematode) was the second most distributed genus in surveyed areas. The most prevalent and destructive lesion nematodes has been reported associated with grapevines, the damage usually is more, loss of vigor and reduced production. The third genus distributed in the three areas (El-Tall al Kabir, El – Kassasen and Abou-Swair) was the citrus nematode *Tylenchulus semipentrans*, the symptoms of this genus, discolored of the roots, which owing numerous lesions formed by nematode invasion, which act as port of entry of other microorganisms such as fungi and bacteria causing disease complex of grape.

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حصر للنيماتودا المتطفلة والمصاحبة لكرمات العنب فى محافظة الاسماعيلية

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تم اجراء حصر للنيماتودا المتطفلة والمصاحبة لجذور كرمات العنب المنزرعة فى محافظة الاسماعيلية . تم جمع ٤٦٠ عينة تربة وجذور من مزارع العنب فى ٥ مراكز (الاسماعيلية - التل الكبير- ابوصوير- القنطرة شرق- القصاصين). اوضحت النتائج وجود ١١ جنسا نيماتوديا مصاحبا لعينات العنب و قد اختلفت هذه الاجناس فى نسب تواجدها فى العينات المختبرة . وكانت نيماتودا تعقد الجذور Meloidogyne spp.,هى اكثر الاجناس انتشاراعلى العنب حيث بلغت نسبة انتشارها ١٠٠% فى العينات المختبرة. اوضحت نتائج العينات فى مركز التل الكبيروجود نيماتودا الموالح والنيماتودا الخنجرية Xiphinema spp.,& Tylenchulus semipentrans حيث بلغت نسبة تواجدهما ٤٠ و٦٥% فى العينات المختبرة. اما الجنسان نيماتودا التقرح والنيماتودا الابرية Pratylenchus spp., & Longidorus spp.,كانا اكثر انتشارا فى مركز القصاصين حيث بلغت نسبة تواجدهما ٧٤ و٧٠% فى العينات المختبرة. بينما فى مركز ابوصوير كانت النتائج مختلفة حيث كانت النيماتود الحلزونية و النيماتودا الكلوية Helicotylenchus spp., & Rotylenchulus reniformisأكثرالاجناس تواجد حيث بلغت نسبة تواجدهما ٦٧ و٤٥%. بلغت نسبة تواجد نيماتودا التقزم Tylenchorhynchus spp., 70%فى مركز القنطرة شرق. فى حين كان أقل الاجناس انتشارا هو نيماتودا تقصف الجذور Trichodorus spp., حيث بلغت نسبة تواجده ٢٠ % فى العينات المختبرة.