Indigenous plant parasitic nematodes associated with ornamental palms from Egypt

Ismail, A. E. and Eissa, M. F. M.*

1 Introduction

Ornamental palms are used increasingly to decorate parks, home gardens and roads. The area used for production of these trees is small in comparison with the total land area under cultivation, despite the cash return being high because of their high sale value. Many workers have recorded the presence of numerous plant parasitic nematode genera associated with ornamental palms all over the world. In Florida VAN WEERDT et al. (1959) showed distribution of the following nematode genera on coconut palm, cocos nucifera, Aphelenchoides, Criconemoides, Helicotylenchus, Hemicriconemoides, Hemicyclophora, Heterodera, Hoplolaimus, Meloidogyne, Pratylenchus, Radopholus similis, Rotylenchulus reniformis, Rotylenchus, Trichodorus, Tylenchorhynchus and Xiphinema. SHER (1963) reported that Sabal palmetto, in England was injured by Peltamigratus christiei. GOODEY et al. (1965) found Meloidogyne incognita acrita on lady palm, Rhapis sp. and Washington palm, Washingtonia sp. in North Carolina - RUEHLE (1967) stated that Meloidogyne sp. was associated with Livistona chinensis and Washingtonia sp. In Egypt, OTEIFA et al. (1970) reported infection of date palm, Phoenix dactylifera by M. arenaria, M. incognita, M. incognita acrita and M. javanica. In Algeria, LAMBERTI et al. (1975) reported the occurrence of Meloidogyne sp. and Pratylenchus penetrans on date palm, Phoenix dactylifera. In India many different nematodes have been found to be associated with Cocos nucifera (GOVINDANKUTTY and KOSHY, 1978 and 1979), but the major nematode disease affecting the crop is red ring disease caused by Rhadinaphelenchus cocophilus. They added that the only other nematode known to cause damage to coconut is Radopholus similis. Red ring disease has been found in many various palm trees (GRIFFITH and KOSHY, 1990), including: Acrocomia aculeata A. intumescentes, Phoenix canariensis, P. dactylifera, Roystonea oleracea, R. regia and Sabal palmetto. Dasgupta and Rama (1987) found Radopholus similis on Arecastrum romanzoifianum, Chamaedorea cataractarum, Cocos nucifera, Phoenix canariensis, P. dactylifera, Rhapis excelsa and Roystonea regia.

Thus, the objective of conducting this study was to provide information on the distribution of phytonematode genera in three botanical gardens in Egypt where ornamental palms are extensively grown.

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2 Material and Methods

The present detection of plant parasitic nematodes was carried out in three botanical gardens namely, Kasr El-Manial, Orman and Zohria. Soil and root samples were collected from the root zones of various palm species 25 - 30 years old at a depth of 60 - 70 cm by using a manual auger. The required depth for screwing the auger into the rhizosphere was indicated when the roots became more brittle. Samples were mixed thoroughly and taken in line with CHRISTIE and PERRY’s (1951) sieving and decanting method. Nematodes were finally extracted from the soil suspensions by the centrifugal flotation technique (JENKINS, 1964). The number of nematodes per ml suspension was determined and identified to the generic level according to GOODEY (1963).

3 Results and Discussion

Data concerning plant parasitic nematodes associated with different palm species in three botanical gardens are presented in Tables (1 - 3). The soil samples of Kasr El-Manial garden showed the presence of ten nematode genera (Table 1). The reniform nematode, Rotylenchulus reniformis, the spiral nematode, Helicotylenchus, the bulb nematode, Ditylenchus and the ring nematode, Criconemoides, which appeared to be the most dominant genera encountered. The highest incidence of Rotylenchulus reniformis was on Chrysalidocarpus lutescens, Thrinax parviflora and Phoenix dactylifera and the lowest on Washingtonia filifera, but this nematode was totally absent in some samples including: Caryota urens, Chameolaria humilis, Kentia belmoreana, Rhapis humilis, Trachycarpus fortunei and Walichia sp. (Table 1).

Seven plant parasitic nematodes were only detected in soil samples of Orman garden (Table 2), viz., Helicotylenchus, Rotylenchulus reniformis, Criconemoides, Ditylenchus, Tylenchus, Longidorus and Diphtherophora in a decreasing order. Spiral nematodes were highly populated on Thrinax parviflora, Phoenix canariensis and Rhapis flabelliformis and the lowest population on Sapel palmetto and totally absent on Kentia sp. and Ptecosperma elegans.

The same trend was also noticed in El-Zohria garden, whereas the spiral nematodes were the highest in terms of population, followed by reniform and ring nematodes (Table 3). The highest population density of the spiral nematodes was on Phoenix dactylifera and the lowest population density was on Caryota mitis and they were totally absent on Arecastrum romanzooffianum, Binanga gracilior, Livistona australis, Phoenix sp. and Walichia. The ring nematodes’ highest population was on Livistona australis, followed by Phoenix canariensis and negligible population densities were detected on Walichia sp. (Table 3).
The data shows that ornamental palm species are favourable hosts for plant parasitic nematode genera, particularly *Criconemoides*, *Helicotylenchus* and *Rotylenchulus reniformis*. Whereas all the ornamental palm species were associated with the previous mentioned nematode genera.

In general, it was concluded that the collected soil of different palm species from botanical gardens revealed the presence of certain predominant nematode genera as followed: *Criconemoides*, *Ditylenchus*, *Helicotylenchus*, *Rotylenchulus reniformis* and *Tylenchus*. The two genera *Helicotylenchus* and *Rotylenchulus reniformis* were detected in almost all the processed samples in higher population densities than any other nematode. Based on this study, the remarkable poor growth in some ornamental palms could be attributed to the presence of these ecto-, semiendo- and endo parasitic forms of nematodes.

This work is considered as a step towards the clarification of the pathogenic role which these nematodes might be playing in the economic production and protection of ornamental palm species in Egypt.

4 Summary

Samples of 24 available ornamental palm rhizosphere were analysed from the major botanical gardens in Cairo, Egypt (Kasr-El-Manial, Orman and Zohria). The dominant nematode genera under the examined ornamental palm trees were *Criconemoides*, *Ditylenchus*, *Helicotylenchus* and *Rotylenchulus reniformis*.

Einheimische pflanzenparasitierende Nematoden an Zierpalmen Ägyptens


Nematodos autóctonos parasitarios vegetales en palmeras de adorno egipcias

En 24 palmeras de adorno de los jardines botánicos de El Cairo se realizaron investigaciones sobre la presencia de nematodos. De esta manera se pudieron registrar 10 especies diferentes. Las especies más significativas fueron *Criconemoides*, *Ditylenchus*, *Helicotylenchus* y *Rotylenchulus*. La mayor concentración en todas las palmeras investigadas fue registrada con las especies *Helicotylenchus* y *Rotylenchulus*. Las diferentes especies de nematodes se presentaron en forma asociada en la mayoría de las palmeras. Se comprobó que los motivos del crecimiento poco satisfactorio de las palmeras fueron la presencia de nematodos de acción ecto, semiendo y endoparasitaria.
Table 1: Population density of plant-parasitic nematode genera recovered from different palm species in Kasr El-Manial garden

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<th>Palm species</th>
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<th>Longidorus</th>
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Table 1 - Continuation: Population density of plant-parasitic nematode genera recovered from different palm species in Kasr El-Manial garden

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1. Each value is a mean of four replicates.
Table 2: Population density of plant-parasitic nematode genera recovered from different palm species in Orman garden.²

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² Each value is a mean of four replicates
Table 3: Population density of plant-parasitic nematode genera recovered from different palm species in El-Zohria garden

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3 Each value is a mean of four replicates.
5 References


