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Incidence of the Potato Cyst Nematode, *Globodera rostochiensis* (Wollenweber 1924, Skarbilovich 1959, Behrens 1975) in Northeast Egypt

A.M. Korayem[1], S.D. Abou- Hussein[2] and M.M.A. Hammam[1]

[1]Plant Pathology & Nematology Department, Agricultural and Biological Institute, National Research Centre, 33 El Buhouth St., 12622 Dokki, Giza, Egypt.
[2]Vegetable Research Department, Agricultural and Biological Institute, National Research Centre, 33 El Buhouth St., 12622 Dokki, Giza, Egypt.

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ABSTRACT

A survey was carried out in the autumn season of 2025 in the area cultivated with potatoes in El-Kassasein, Ismailia governorate, northeast, Egypt. Soil and root samples were collected from the rhizosphere of potatoes after different days from potato emergence for the detection of potato cyst nematode (PCN), *Globodera* spp. The results showed the occurrence of PCN on potato (*Solanum tuberosum L.*) at all three times of sampling. Morphometrics and morphology of both cysts and the second-stage juveniles (J_2) were consistent with the taxonomic characteristics of *Globodera rostochiensis*. To our knowledge, The *G. rostochiensis* was previously detected in Egypt, but this is the first detection in Ismailia Governorate, located in the northeast of Egypt.

Keywords: Potato cyst nematode, *Globodera rostochiensis*, Egypt.

1. Introduction

Potato (*Solanum tuberosum* L.) is a cosmopolitan crop produced in different regions of temperate, subtropical, and tropical countries. So, it is among the most important food commodities worldwide, ranking third in human consumption after wheat and rice (Devaux *et al*., 2014). The potato cyst nematode, *Globodera* spp. are considered one of the major disease agents of potato throughout the world (Twomey, 2000, Evans and Haydock 2000, Gartner *et al*., 2021). Overall losses of potato production caused by PCN were estimated by 9% worldwide (Turner and Subbotin 2013). These losses are influenced by the population density of nematodes in soil, as well as several biotic and abiotic factors (Niere and Karuri 2018). However, a dramatic loss of potato yield may occur, especially in the intensified potato production system with shortened rotations or multiple cropping of potatoes, which will eventually lead to a high nematode population.

In Egypt, *G. rostochiensis* was first detected on potato in the El-Nobaria region, El-Behera governorate, northwest Egypt (Ibrahim *et al.,* 2017). Recently, the potato cyst nematode was recognized on potatoes grown in the Abo-El matameer region (another place of El- Behera governorate), and was identified by both morphological and molecular means as *G. rostochiensis* (Haroon *et al.,* 2021).

Potatoes have been grown in Egypt for more than one hundred years. In the latter years, the economic importance of potatoes has greatly increased, as one of the important exporting crops. Now potatoes are grown in different localities, either in northern or southern Egypt. Ismailia governorate is considered one of the promising regions for potato production. The cultivated area of potato in Ismailia governorate was estimated at 16570 acres, with a total production of 274222 tonnes in 2020 (Ministry of Agriculture and Land Reclamation, 2020).

Information about the incidence of PCN in Ismailia governorate is not available. So, the aim of this research was to study the occurrence of potato cyst nematodes on potato fields grown in Al-Kassasein locality, Ismailia governorate, northeast, Egypt.

Corresponding Author: A.M. Korayem, Plant Pathology & Nematology Department, Agricultural and Biological Institute, National Research Centre, 33 El Buhouth St., 12622 Dokki, Giza, Egypt. E-mail: - kor_asm@yahoo.com

2. Materials and Methods

2.1. Location of survey and collection of samples

Survey of nematodes was carried out during the autumn season, from September 2025 to December, 2025, in El-Kassasein locality, Ismailia governorate, northeast Egypt. A total of 150 soil and root samples were collected during the growing stages of potato in an area of about 1000 acres. Samples were taken 25 and 60 days after potato emergence as well as at the harvest stage, and were processed by the Nematology Lab, National Research Centre, Dokki, Egypt.

2.2. Nematode extraction and identification

The second-stage juveniles (J_2) were extracted from a composite sample of 250 cm^3 of soil according to the decanting and sieving method (Cobb 1918). Roots were examined for white and yellow females after washing. The brown cysts were extracted and assayed from 100g of soil dried at room temperature (EPPO, 2013). Some of the cysts were kept in water in a watch glass in the laboratory for juvenile hatching. Other brown cysts were processed for preparation and measurement according to the method of (Golden and Birchfield, 1972). Identification of nematodes was based on the morphology of second-stage juveniles, cysts, and their identities were confirmed using taxonomic keys (Wouts and Baldwin 1998, Subbotin *et al*., 2010). Infected potato roots and cysts were also processed for photography.

3. Results and Discussion

3.1. Identification

Morphological characteristics used for identification of nematode cysts involved cyst shape and color, cyst terminal cone including nature of fenestration, valval- slit length, shape of bullae (if present) and underbridge length and cyst wall pattern, while morphology of J_2s included body and stylet length, shape of stylet knobs, shape and length of tail and hyaline tail terminus. Morphometrics and morphology of both J_2 and brown cysts were corresponding with the potato cyst nematode, *G. rostochiensis*. (See fig. 1).

The occurrence and population densities of potato cyst nematode after different days from potato emergence are given in Table 1. Results showed the occurrence of *G. rostochiensis* infecting potato during its growing stage. The nematode population densities, number of J_2 in soil, number of white and yellow females in roots, and number of brown cysts in soil differed according to date of sampling. A high number of juveniles (750 J_2 in 250 cm^3 soil) was obtained 60 days after potato emergence, while a high number of brown cysts (150 cysts in l00g soil) was obtained at the harvest stage of potatoes. A high number of white and yellow females (240 in 5g roots) occurred at 60 days after emergence. In general, the nematodes occurred in samples taken at all three growing stages of potato.

Our result indicates the occurrence of the potato cyst nematode, *G. rostochiensis*, on potato in El-Kassasein, Ismailia governorate, northeast, Egypt. To our knowledge, this represents new country records for *G. rostochiensis* in Egypt. Detection of PCN on potato in northeast Egypt is very important, as this nematode has been considered a serious pest on potato and other solanaceous vegetable crops. This nematode was previously detected in El-Behera governorate, northwest, Egypt (Ibrahim *et al.,* 2017). Therefore, many studies on the incidence and distribution of PCN in other potato-producing governorates throughout Egypt are needed. Determining the damage threshold and loss in potato yield is also very important. As good knowledge about these data in relation to the prevalent biotic and abiotic factors will support for planning effective and safe management methods without the use of chemical nematicides, which pollute the environment.

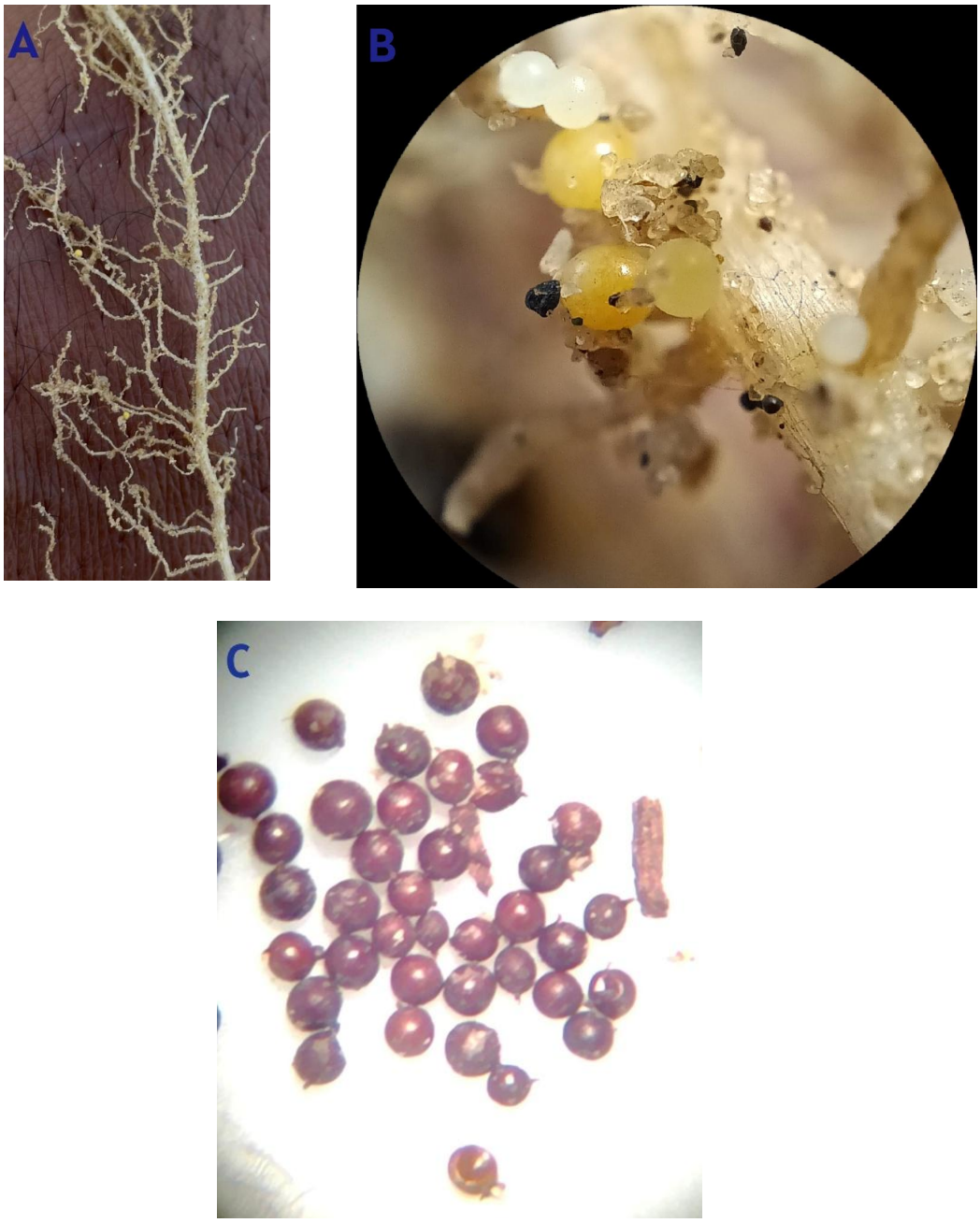

Fig. 1: Development of the nematode infection on potato roots at its different growing stages.

A: Shape of the infected potato roots 25 days after emergence with visible white young females of *G. rostochiensis.*
B: White and yellow females on potato roots at 60 days after emergence.
C: Spherical shape of brown cysts with a prominent neck isolated from soil at harvest stage.

Table 1: Occurrence and population density of potato cyst nematode, *G. rostochiensis*, during different growing stages of potato.

Parameters	Time of sampling		
	25 Days after potato emergence	**60 Days after potato emergence**	**At harvest**
No. of samples	50	50	50
No. of juveniles in 250 cm^3 soil	700	750	20
Fo (%)	6	8	4
No. of white and yellow females in 5g roots	20	240	25
Fo (%)	4	6	4
No. of brown cysts in 100g of soil	5	140	150
Fo (%)	4	4	4

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