

## Diseases Caused by Nematodes

### First Detection of the Potato Cyst Nematode, *Globodera rostochiensis*, Infecting Potato in the Central Region of Colombia

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Potato cyst nematodes (PCNs; *Globodera* spp.) cause significant losses in potato (*Solanum tuberosum*) crops worldwide. In Colombia, PCN was first reported in 1970 (Baeza 1972), although this report lacked a comprehensive species description and diagnosis. After that, *G. pallida* has been the only PCN species reportedly affecting potatoes in the main potato-producing regions of Colombia (Evans et al. 1975; Nieto et al. 1983; Vallejo et al. 2021). However, in the survey conducted by Vallejo et al. (2021), a single sample from Chocontá, Cundinamarca, in the central region of the country (5.223960°N, 73.657133°W) showed molecular characters similar to *Globodera rostochiensis*. As correct identification is essential for effective pest management, the location was resampled in September 2022. From the soil samples collected, PCN cysts and second-stage juveniles (J2s) were retrieved from soil using Fenwick and centrifugation methods, respectively. Morphometric characters of cysts ( $n = 53$ ) were consistent with *G. rostochiensis*, with a length without neck (L) ranging from 451 to 614  $\mu\text{m}$  ( $\bar{X} = 546.9 \pm 20.3 \mu\text{m}$ ) and width (W) from 424 to 658  $\mu\text{m}$  ( $\bar{X} = 546.9 \pm 25.5 \mu\text{m}$ ), and the L/W ratio was  $1.00 \pm 0.02$ . The distance from the anus to

the vulva varied from 41 to 109  $\mu\text{m}$  ( $\bar{X} = 75.67 \pm 13.8 \mu\text{m}$ ) and Granek's ratio from 2.3 to 5.5  $\mu\text{m}$  ( $\bar{X} = 3.89 \pm 0.7 \mu\text{m}$ ), and the number of cuticular ridges between the vulva and the anus was 14 to 20 ( $\bar{X} = 16.19 \pm 1.7$ ). The J2 ( $n = 90$ ) length ranged from 394 to 547  $\mu\text{m}$  ( $\bar{X} = 495.62 \pm 31.0 \mu\text{m}$ ), and the stylet length varied from 18 to 24  $\mu\text{m}$  ( $\bar{X} = 21.21 \pm 0.9 \mu\text{m}$ ) with rounded knobs. The length of the hyaline tail ranged from 20 to 31  $\mu\text{m}$  ( $\bar{X} = 24.09 \pm 1.92$ ) and that of the true tail from 31 to 56  $\mu\text{m}$  ( $\bar{X} = 48.30 \pm 5.71 \mu\text{m}$ ). Molecular analyses confirmed the morphological identification. DNA was extracted from cysts and J2s. PCR was performed for the 28S rDNA D2-D3 segment using the primers D2A and D3B (Subbotin et al. 2006) and for the mitochondrial COI gene region using the primers JB3 and JB5 (Derycke et al. 2005). BLAST analyses of target 28S rDNA D2-D3 sequences (OP293373 to OP293380) showed 100% identity to 658 bp of other sequences on GenBank, including isolates from Turkey, the United Kingdom, and Iran (MK311329.1, MG994942.1, KU297659.1, and KU297658.1). Similarly, the target COI region sequences (OP297993 to OP298001) were 100% identical to 407 bp of the *G. rostochiensis* POT01 isolate from Germany and 99.75% identical to voucher NRM67 from Indonesia and the isolate CD2200 from the United States (MF773722.1, MT240262.1, and MN095979.1). Phylogenetic analysis of both gene regions strongly supported *G. rostochiensis*, with the Colombian sequences clustering with MH399815.1 and KU297654.1 isolates for the COI and 28S regions, respectively. In addition, a pathogenicity test was conducted in the greenhouse. For this, 10 cysts were inoculated to potato plants of the Criolla variety grown in five 15-cm-diameter pots with sterile soil and sand (1:1). Noninoculated plants served as controls (three replicates each). After 3 months,  $54 \pm 23$  cysts per 100 g of soil were isolated from inoculated plants, resulting in a reproduction factor ( $R = P_i/P_0$ ) of  $4.54 \pm 0.86$ , whereas no yellow females or cysts were observed on the control plants. To our knowledge, this is the first report of *G. rostochiensis* in Colombia. This is an important pest that causes serious yield losses of potatoes and is a quarantine nematode in many countries (EPPO 2017). Further studies are necessary to prevent the spread of this PCN species in the main potato-producing regions of Colombia.

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