Diseases Caused by Nematodes

First Report of *Meloidogyne enterolobii* Infecting Cassava (*Manihot esculenta*) Resulting in Root Gallings Damage in Africa

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Meloidogyne enterolobii is a highly polyphagous tropical species of root-knot nematode. It has been recorded causing major damage to a range of economically important crops and is increasingly recorded from new locations. Its morphological similarity and overlap of characteristics with other commonly occurring species, especially *M. incognita*, has confused its diagnosis using morphometrics. Cassava (*Manihot esculenta*) is an important crop across the tropics, including in Africa, where it is among the most important root and tuber crops for food security. Cassava can be heavily infected by root knot nematodes, which can incur heavy production losses. The main species known to affect cassava are *M. incognita* and *M. javanica* (Coyne and Affokpon 2018). With the exception of one report of *M. enterolobii* morphologically identified from cassava roots during a survey in Brazil (Rosa et al. 2014), there is no record with molecular confirmation of it infecting the crop. In the absence of any molecular or isozyme confirmation, diagnosis of *M. enterolobii* is difficult. In the current study, the species responsible for substantial galling damage on several cassava roots growing in Ibadan, Nigeria (7°22'39" N; 3°54'21" E), were diagnosed. DNA isolated from juveniles recovered using a modified Baermann method (Hooper 1986) from these roots was used for PCR amplification of the mitochondrial Nad5 using primer pair NAD5F2 (5'-TATTTTGTGTTGAGATATATTAG-3') and NAD5R1 (5'-CGTGAATCTTGATTTTCCATTTT-3'). The 515-bp

PCR DNA product was sequenced on both strands (GenBank accession no. MW965454) and found to be 100% identical to *M. enterolobii* with those in the DNA sequence database (KU372358, KU372359) (Janssen et al. 2016; Kolombia et al. 2017). In addition, *M. incognita* was also recovered from the galled roots and identified using the same primers (GenBank accession no. MW965455), indicating a combined species infection. Cultures of *M. enterolobii*, developed from single egg masses, were maintained on tomato plants and used to assess infection on cassava in 10-liter pots filled with steam-sterilized loam soil in the screenhouse. Cassava cultivar IITA-TMS-IBA070593 cuttings planted in June 2018 and repeated in April 2019 were inoculated with 1,000 juveniles per pot at 3 weeks after planting, and then maintained for 4 months before quantifying the nematode densities in both roots and soil. Nematode reproduction factor (RF), calculated from total nematode densities ($n = 8$) from soil and roots, was as high as 44.3, compared with uninoculated controls. Molecular diagnostics of *M. enterolobii*, as above, confirmed unequivocally the host status of cassava to this nematode. This study reports for the first time the infection of cassava by *M. enterolobii* under field conditions in Africa and for the first time demonstrates the host suitability of cassava to this nematode. *M. enterolobii* is among the most commonly occurring root-knot nematode species in West Africa (dos Santos et al. 2019). It is therefore anticipated that *M. enterolobii* has long been infecting cassava, especially in West Africa, but has been overlooked due to its morphological similarity with *M. incognita*. Given the high reproductive ability of *M. enterolobii* on cassava and its highly aggressive nature on a range of crops, it is likely that it is causing, or will result in, high levels of losses on cassava in Africa.

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