



First report of *Meloidogyne javanica* infesting noni (*Morinda citrifolia*) in Brazil

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Noni (*Morinda citrifolia*) is a tree naturally occurring in a range Southeast Asia to Australia, and currently adapted and cultivated throughout the tropics (Kavitha *et al.*, 2011). This plant is known for its great medicinal and nutritional properties. In February 2014, three-year-old plants exhibiting yellowing of leaves and interveinal chlorosis associated with severely galled roots (Fig. 1), were found in a property located in the municipality of São José de Mipibu, state of Rio Grande do Norte, Brazil. Females of root-knot nematodes were observed in the symptom-bearing roots. The egg-laying females were removed from inside the roots for species identification.

Lactic acid was used to clear the perineal patterns of six females, which were mounted in glycerine and observed using optical microscopy. The perineal patterns (Fig. 2A) were consistent with those described in literature, showing low trapezoid shape dorsal arch, striae smooth, interrupted by a pair of incisors on both sides. These lateral ridges that divide the dorsal and ventral striae are unique for *M. javanica*. The males (Fig. 2B) presented a high round cap, distinctly set off from the head region. Also, the stylet has a very broadly elongated stylet knob. Many of those individuals were atypical, presenting some intersex characteristics, and more specific, female features. This trait is known to be present in some *M. javanica* populations (Eisenback, 1985). Additionally, individual females were used for identification through electrophoresis of isoenzymes in 6% polyacrylamide gel (Fig. 3) (Carneiro, 1996). The characteristics of the perineal patterns and the enzymatic phenotype allowed us to identify the specimens as *M. javanica* (Jepson, 1987; Carneiro, 1996).

One portion of 5 g of the root system was processed in a blender using 1% hypochlorite for extraction of eggs, males and juveniles by the method of Coolen and D'Herde (1972). After nematode extraction from the roots, the population level was obtained by counts in Peters' slides under optical microscopy (100x magnification) and estimated to be 347 nematodes (eggs + J2) per gram of roots. To confirm our findings, two seedlings of tomato cv. 'Rutgers' were transplanted into pots containing one litre of sterilised soil mixed with residuals of noni roots processed. Two tomato seedlings were cultivated in the same sterilised soil without residuals of roots. After ninety days in greenhouse conditions, the infested tomato plants were stunted with galled roots, whereas the uninfested plants showed no

symptoms. Egg-laying females were removed from the symptomatic roots of tomato, for identification using perineal patterns and electrophoresis of isoenzymes, as done previously. Both methods confirmed *M. javanica* as the causal agent of root-knots in tomato.

Symptomatic plants of the genus *Morinda* are frequently found to be damaged by *M. incognita* (Kavitha *et al.*, 2011) and *M. arenaria* worldwide (Fu *et al.*, 2013). The symptoms observed in our work are similar to that found for *M. incognita* but we have confirmed that noni is also a good host for *M. javanica*. Such a finding is an important contribution to the understanding of the biology and spread of *M. javanica* in Brazil and elsewhere, and its potential to cause yield loss.

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Figure 1

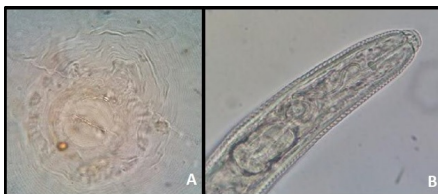


Figure 2

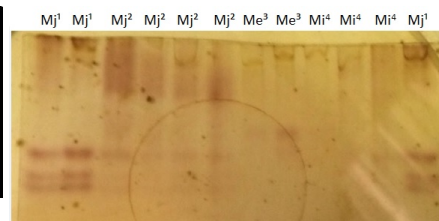


Figure 3

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