

ABSTRACT

Studies on the biocontrol agent, *Pasteuria penetrans* (Thorne) Starr and Sayre, and its utilisation in integrated management of root-knot nematodes (*Meloidogyne* spp.) associated with vegetable crops in Trinidad and Tobago.

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A structured national survey of vegetable crops was undertaken to determine the occurrence, distribution and importance of root-knot nematodes and their parasite *Pasteuria penetrans*. The most prevalent root-knot nematode species was *M. incognita*, the others being *M. mayaguensis*, *M. javanica*, *M. arenaria* and *M. chitwoodi*. Root-knot nematodes were associated with 53% of farms and 39.6% of crops sampled. A mean root-galling index of 4.9 was obtained. *P. penetrans* was found in 22% of crops sampled. Spore-attachment studies conducted revealed that populations of root-knot nematodes and *P. penetrans* are heterogenous. Forty-two monospecific and polyspecific populations of root-knot nematodes were considered highly susceptible to a standard *P. penetrans* population. The utilisation of *P. penetrans*, medicinal plants and cultural practices for the integrated management of root-knot nematodes was investigated. Laboratory studies demonstrated that water extracts of chopped leaves of *Parthenium hysterophorus* and neem induced high and significant percentages of immobility and mortality of juveniles of *M. incognita*. Chopped leaves of *P. hysterophorus* and neem, applied to soil, resulted in significant reduction in root-galling of tomato and associated soil population densities of juveniles. Water extracts of neem suppressed more substantially spore attachment

of juveniles by *P. penetrans* than did extracts of *P. hysterothorus*. However, unlike neem, *P. hysterothorus* had no effect on the number of spore-burdened juveniles. In pot trials *P. penetrans* used alone and combined with chopped leaves of *P. hysterothorus* or neem resulted in significant reductions in root-galling in tomato and associated soil population densities of juveniles. In a microplot trial, increased density and increased frequency planting treatments resulted in marginally lower root-galling indices and soil population densities of juveniles, and higher percentage *P. penetrans* spore encumbrment of juveniles and mean number of spores/juvenile than normal density and normal frequency planting treatments. Treatment with *P. hysterothorus* resulted in lower root-galling, percent juvenile encumbrment and mean number of spores/juvenile than treatment without *P. hysterothorus*. *In vivo* production of *P. penetrans* in microplots of tomato, celery and lettuce generated 5.17, 4.18 and 0.67 spores/10⁶/0.25 m², respectively, over one year. On-farm grow-box production of *P. penetrans* has the value-added benefit of localised suppressiveness, and on-farm research, is recommended.

Key words: *Azadirachta indica*; integrated management; *Meloidogyne* spp., *Parthenium hysterothorus*; *Pasteuria penetrans*; root-knot nematodes; survey; vegetable crops.