Population dynamics and damage threshold of *Pratylenchus* n. sp. and *Meloidogyne javanica* on finger millet

Beth Wangui Waweru[1,2], Njira Njira Pili[1], Wim M.L. Wesemael[3,4], Cecilia Wanjau[2,5], Misghina G. Teklu[6], Godelieve Gheysen[2]

Corresponding author: Waweru Beth:
Email: bethwwr54@gmail.com

Introduction

- Finger millet (*Eleusine coracana*) is a staple crop for subsistence farmers and is primarily cultivated in arid and semiarid regions.
- The harvested grain has excellent storage properties (30 years) and high nutritional value.
- Despite the benefits, there is limited data available on the occurrence of plant parasitic nematodes that specifically target finger millet and the damage arising from such infections.
- This study investigated the population dynamics, damage threshold and tolerance of the lesion nematode, *Pratylenchus* n. sp., and the root-knot nematode, *Meloidogyne javanica*, on finger millet cv. P-224.

Grain and shoot weight damage threshold

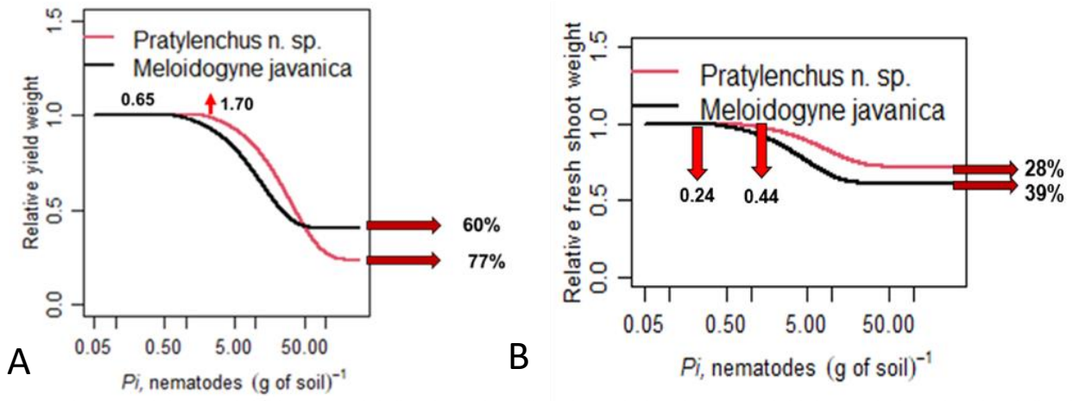
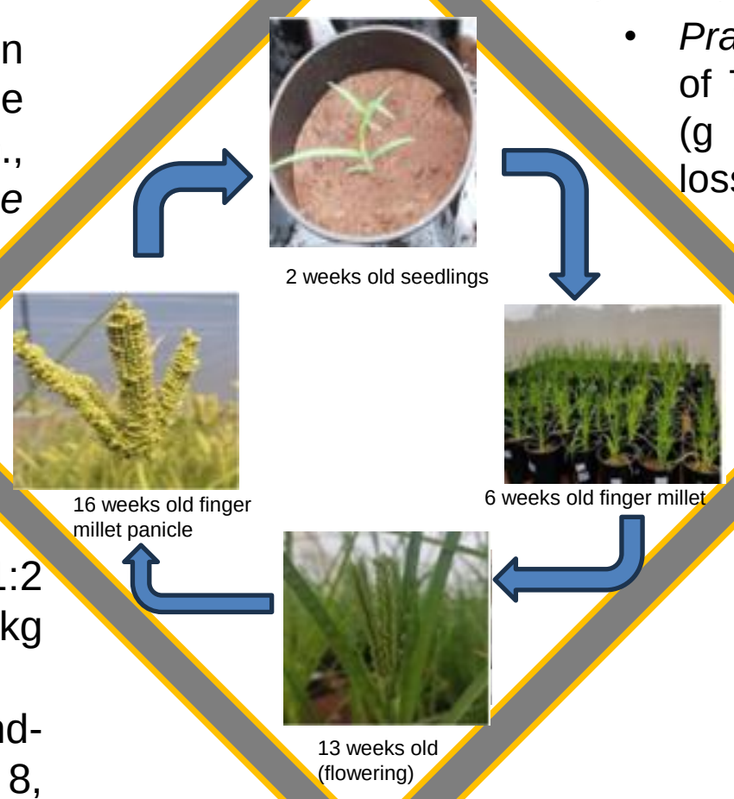


Fig 3: Seinhorst yield loss model fitted to describe the relation between initial population density (Pi) of *Pratylenchus* n. sp., and *M. javanica* , A. relative yield weight and B. relative shoot fresh weight

- *Pratylenchus* n. sp. caused a higher yield reduction of 77% with tolerance limit (T) of 1.70 nematodes (g of soil)−1 as compared to *M. javanica* yield losses of 60% with T of 0.65 J2 (g of soil)−1
- *Pratylenchus* n. sp. and *M. javanica* reduced shoot loss by 28 and 39% respectively

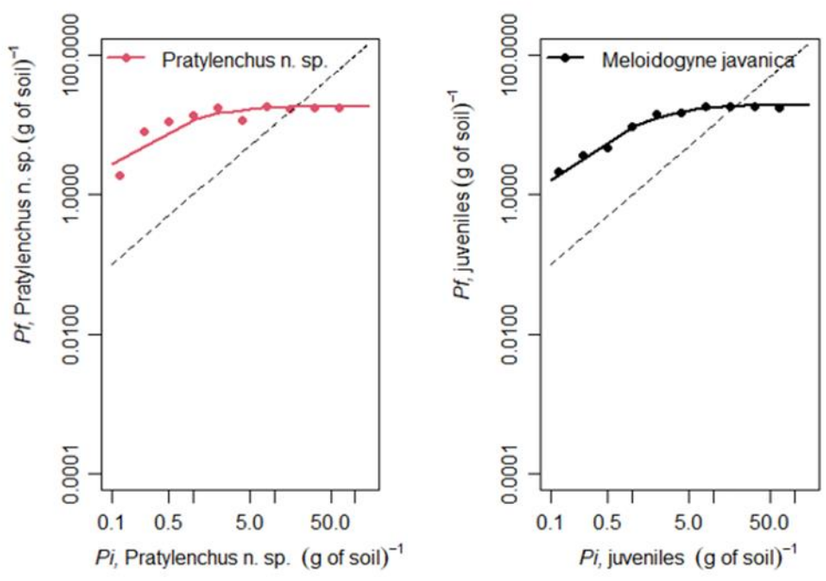


Methodology

- Forest soil and sand were mixed in 1:2 proportion, sterilized and transferred to 3kg black pots with 4 drainage holes.
- 11 initial population densities (Pi) of second-stage juveniles 0, 0.125, 0.25, 0.5, 1, 2, 4, 8, 16, 32 and 64 J2 (g of soil)-1 for *M. javanica* and the same densities of mixed life stages for *Pratylenchus* n. sp. were inoculated on the 2nd week while maintaining 8 replicates per nematode density
- The logistic growth model, Seinhorst yield loss and population dynamic models were fitted to the shoot height, plant biomass and final nematode population density.

Population dynamics

Fig 4: Seinhorst population dynamics fitted to describe the relation between the initial densities (Pi) and final (Pf) population densities of A. *Pratylenchus* n. sp. and B. *M. javanica*



- The maximum multiplication rate of *Pratylenchus* n. sp. was higher (32.4) compared to (17.5) *M. javanica*.

Results-Height

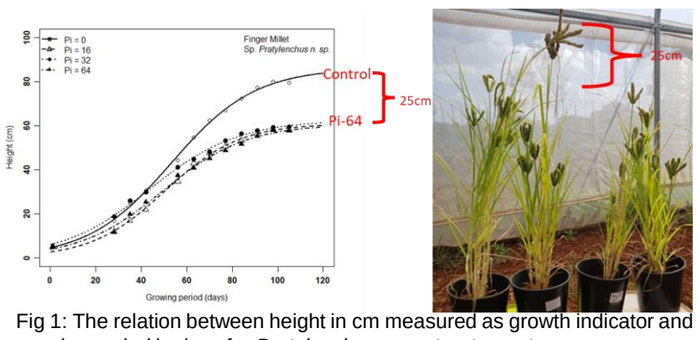


Fig 1: The relation between height in cm measured as growth indicator and growing period in days for *Pratylenchus* n. sp. treatements

- The rate of growth and the time to reach 0.5 x C was not affected based on the logistic model

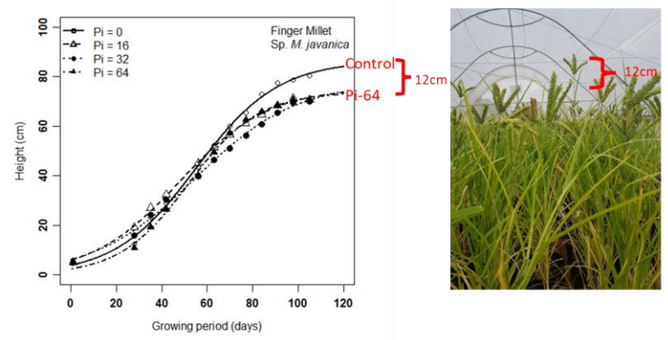


Fig 2: The relation between height in cm measured as growth indicator and growing period in days for *Meloidogyne javanica* treatements

- *Pratylenchus* n. sp. and *Meloidogyne javanica* reduced height by 29.5% and 14.7%, respectively

Conclusion

- Finger millet cv. P-224 is a good host for both *Pratylenchus* n. sp. and *M. javanica*, which significantly reduce yield.
- *Pratylenchus* n. sp. and *M. javanica* infection in finger millet causes above-ground symptoms (height reduction) under higher inoculum densities
- P-224 should be avoided as a rotational crop in controlling *Meloidogyne* spp and *Pratylenchus* spp in the field
- These findings can be used as a base to develop effective nematode management strategies for finger millet.
- Combined infections of *Pratylenchus* n. sp. and *M. javanica* should be studied under field conditions.

Acknowledgement