Tropentag, September 20-22, 2023, hybrid conference

"Competing pathways for equitable food systems transformation: Trade-offs and synergies"

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

Beth Wangui Waweru[1], Njira Njira Pili[2], Godelieve Gheysen[1], Wim Wesemael[3], Goitom Teklu Misghina[4]

[1] *Ghent University, Molecular Biotechnology, Belgium*

[2] *Moi University, Kenya*

[3] *Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), Plant Sciences Unit, Crop Protection, Belgium*

[4] *Wageningen University and Research, Plant Research, The Netherlands*

Abstract

Finger millet (*Eleusine coracana* L.) is a staple crop for subsistence farmers and is primarily cultivated in arid and semiarid regions. In this study, we investigated the population dynamics, damage threshold and tolerance of the lesion nematode, *Pratylenchus* n. sp., and the root-knot nematode, *Meloidogyne javanica*, on a P-224 cultivar of finger millet. We used eleven 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 a mixed life stages (g of soil)$^{-1}$ for *Pratylenchus* n. sp. to inoculate finger millet seedlings. Each nematode density had eight replicates. Shoot height as growth indicator was recorded weekly, while harvestable variables fresh shoot weight, grain weight and final population densities of nematodes were determined 4.5 months after planting. The logistic growth model, Seinhorst yield loss and population dynamic models were fitted to the shoot height, plant biomass and final nematode population density. Based on the population dynamics model used parameters, maximum multiplication rates and maximum population densities for each nematode species were estimated. The maximum multiplication rates (a) were 32.39 and 17.46, whilst the maximum population densities (M) were 18.83 *Pratylenchus* (g of soil)$^{-1}$ and 19.78 J2 (g of soil)$^{-1}$ for *Pratylenchus* n. sp and *Meloidogyne javanica* respectively. The maximum height reached (C) was affected negatively with increasing Pi for both nematode genera, while the rate of growth (B) and the time to reach $0{,}5 \times$ C was not affected based on the logistic model. A tolerance limit (T) of 1.70, *Pratylenchus* (g of soil)$^{-1}$ and 0.65, J2 (g of soil)$^{-1}$; relative minimum grain yield (m) of 0.23 and 0.40 for *Pratylenchus* n. sp. and *Meloidogyne javanica* respectively was found. The results suggest P-224 cultivar is a good host and their presence in the field can significantly reduce yield. These findings can be used as base to develop other effective nematode management strategies for finger millet instead of rotation with P-224 cultivar.

Keywords: Host status, minimum yield, orphan crop, Seinhorst model, tolerance limit

Contact Address: Beth Wangui Waweru, Ghent University, Molecular Biotechnology, Proeftuinstraat 86, 9000 Ghent, Belgium, e-mail: bethwwr54@gmail.com