P0468

TO BE A GOOD KILLER : CHARACTERIZING THE VIRULENCE OF ENTOMOPATHOGENIC NEMATODES AGAINST WIREWORMS.

achacon@uliege.be

Andrea Chacon Hurtado[1], Fanny Ruhland[1], Salimata Drabo[1], Thibaut Smeets[1], Brice Checconi[1]
[2]Raquel Campos Herrera & François J. Verheggen[1]

[1]Chemical and Behavioural Ecology, Gembloux Agro-BioTech, University of Liege, Belgium
[2] Departamento de Viticultura, Instituto de Ciencias de la Vid y del Vino (CSIC, Universidad de La Rioja, Gobierno de La Rioja)

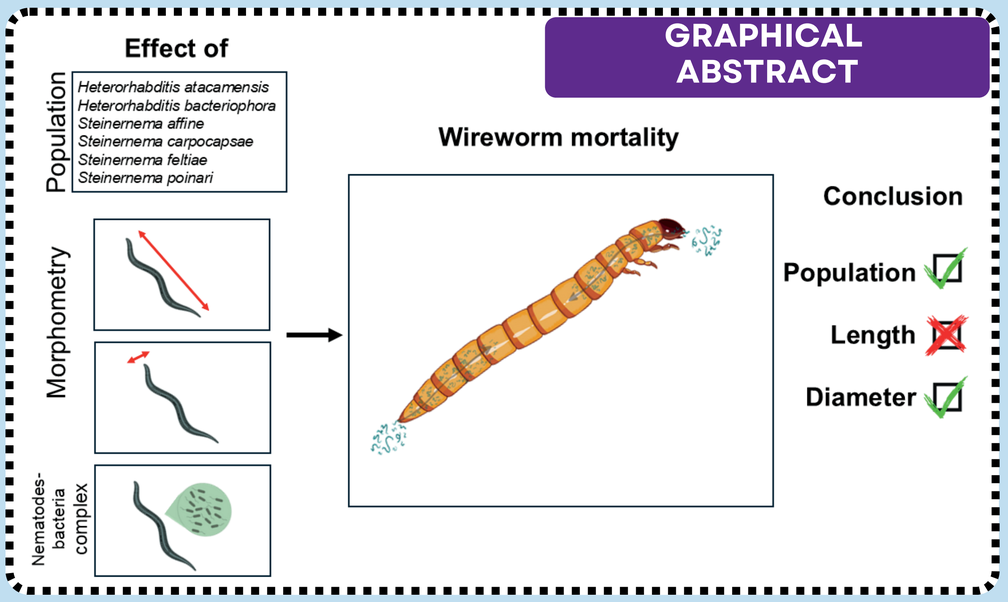
1 CONTEXT

Wireworms (Coleoptera: Elateridae) are polyphagous insect larvae which can cause significant losses in agricultural systems. Pesticides used so far to control them have been banned, which raises concerns about a potential increase of damages in the upcoming years. Entomopathogenic nematodes (EPNs) are a promizing tool in integrative pest manageament. However, wireworms are reconigzed to be highly resistant to EPNs.

2 AIM

This study aims at (i) identifying **virulent EPNs populations** against wireworms (*Agriotes* sp), (ii) understanding which **factors** (*i.e.*, morphometric characteristics and symbiotical association) may influence their efficiency.

GRAPHICAL ABSTRACT

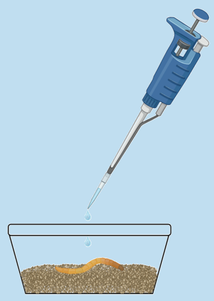


3 EXPERIMENTAL DESIGN

3.A

Ha UCH33043	Sc Bet8
Ha UCH31936	Sc enema
Hb 0943	Sc Gbx1
Hb enema	Sc Gl14
Hb UCH913	Sf AM25
Sa Jem19	Sf insectosphère
Sa OHM9	Sf OHM2
Sc B14	Sp Gl28

Ha: Heterorhabditis atacamensis
Hb : Heterorhabditis bacteriophora
Sa : Steinernema affine
Sc : Steinernema carpocapsae
Sf : *Steinernema feltiae*
Sc : *Steinernema poinari*

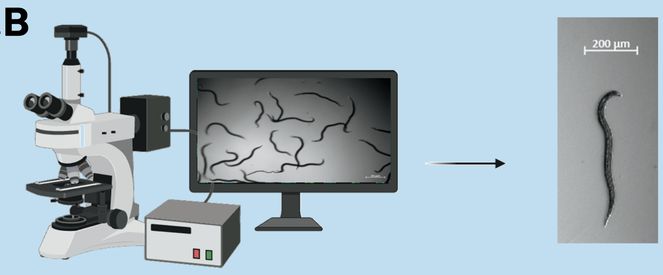


250 IJs/cm^3
n = 30

EPNs' **screening** over 56-days exposure.

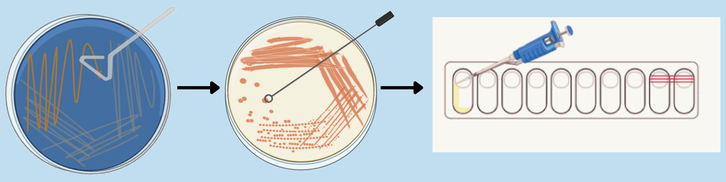
Populations : commercial, foreign countries and native (*i.e.*, forests, horticulture and grassland sites with and without pesticide use).

3.B



Infective juveniles (IJs) morphometric analysis: Body length and diameter (n=40).

3.C



Culture NBTA PCR | Culture PCA | API test 20E and 20NE

EPNs' **symbiont bacteria** identification and biochemical characterizations (API 20E and 20NE).

4 RESULTS

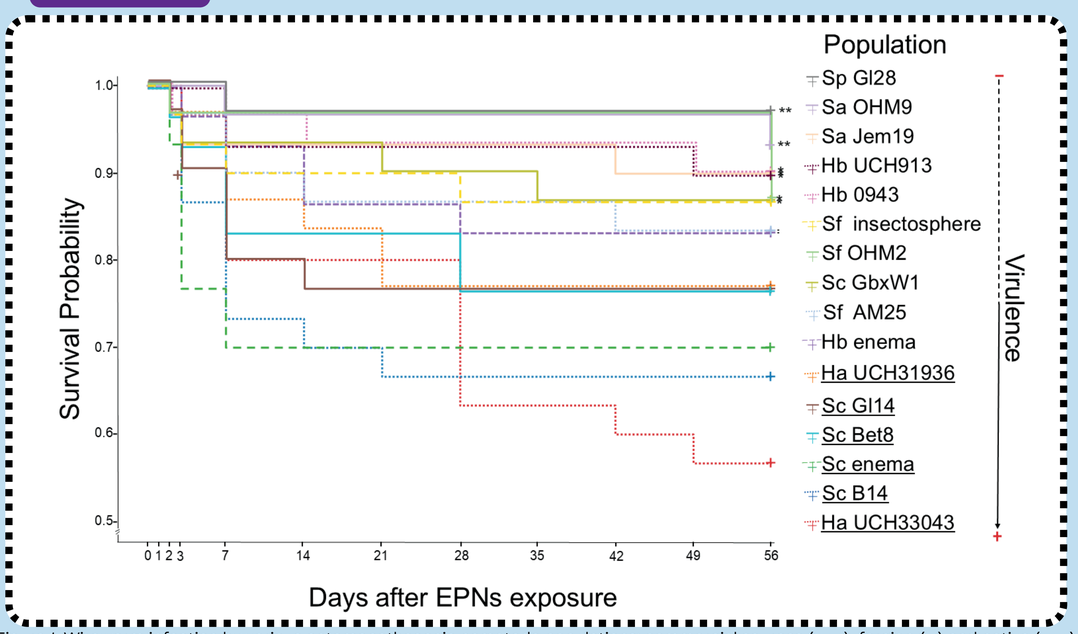


Figure 1. Wireworm infection by various entomopathogenic nematode populations: commercial sources (- - -), foreign (···) and native (——) populations. Differences in mortality rate (with Ha UCH33043 as reference) are designated by asterisks (** = p<0.01; * = p<0.05;'= p<0.1) and were determined by Pairwise comparisons using the Log-Rank test. Underlined populations refer to the most virulent group.

Virulence

Wireworm mortality : 3 to 43% after 56 days of exposure

Ha UCH33043 induced the higher mortality.

Six EPNs populations can be grouped as **"virulent populations":** Ha UCH33043, Sc B14, Sc enema, Sc Bet8, Sc Gl14, Ha UCH31936

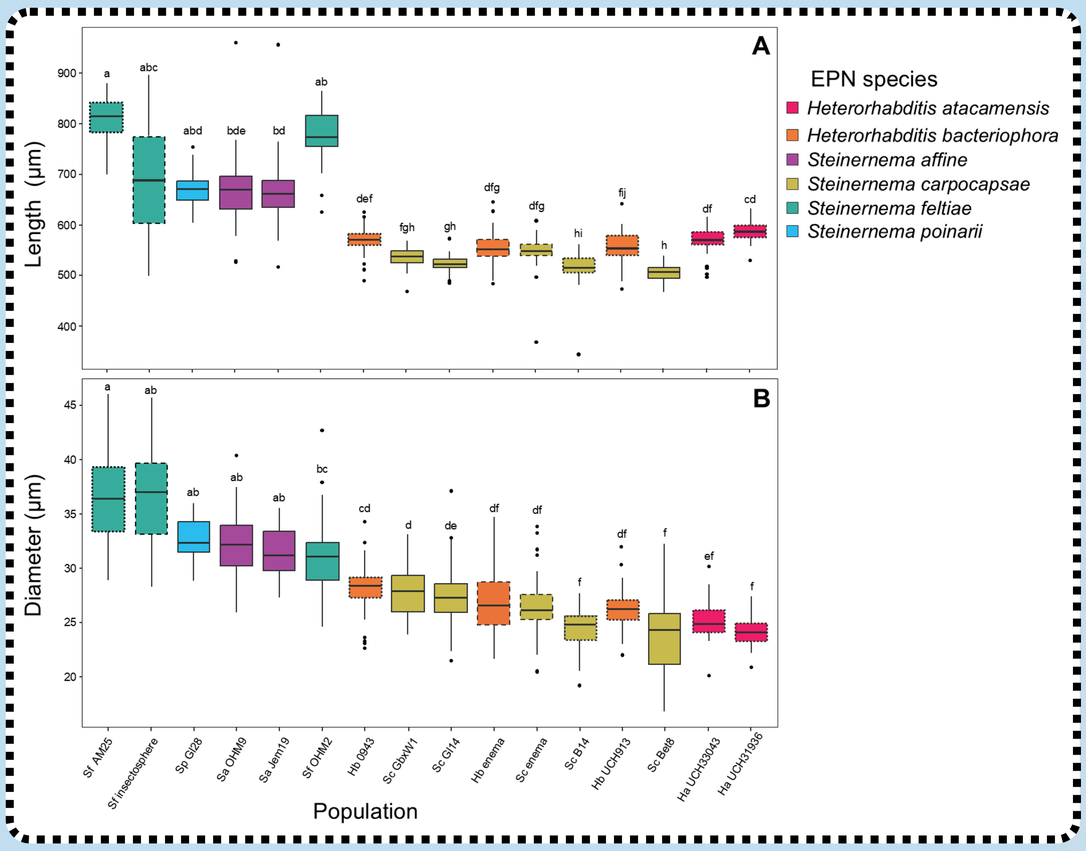


Figure 2. Length (A) and diameter (B) of different EPN populations (n = 40 individuals per population). Populations from commercial sources (- - -), foreign (···) and native (——) populations. Letters assigned denote significant differences between populations, determined by Dunn-Bonferroni post hoc analysis.

Morphometry

EPNs **length** varied across populations.
The longest : Sf AM25
The shortest : Sc Bet8 and Ha UCH31936

→ did not impact wireworms' mortality

EPNs **diameters** varied across populations.
The largest: Sf AM25
The thinnest: Ha UCH33043, Ha UCH31936

→ smaller diameters were associated with higher wireworm mortality

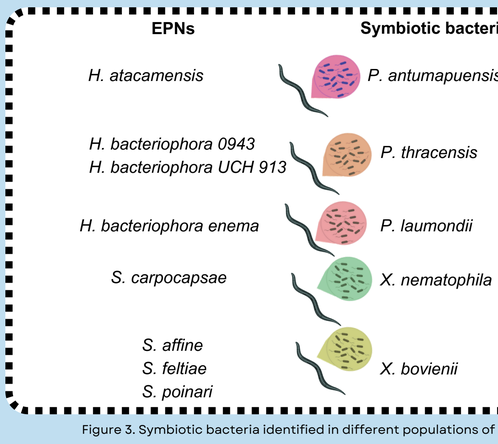


Figure 3. Symbiotic bacteria identified in different populations of EPNs.

Nematode-bacteria complex :

There was **no significant effect** of **nematode-bacteria complex** and **biochemical profile** (see supplementary material) on wireworms' mortality.

CONCLUSION AND OUTLOOK

5 Variations in mortality rates could be attributed to **wireworms' resistance** against EPNs due to physical barriers (*e.g.*, robust intertegument, thickness of intersegmental membranes, dense hairs in the preoral cavity, and powerful rectal muscles). Thinner IJs demonstrated a **competitive advantage** in swiftly navigating the physical barriers of wireworms.

By shedding light on these dynamics, our findings offer insights for the **selection and deployment of EPNs** for wireworms and similar pest control. Understanding the intricate interplay between EPN characteristics and wireworm physiology enhances the efficacy and precision of biocontrol, ultimately contributing to **sustainable pest management.**

More results

Figures, tables and Supplementary material

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