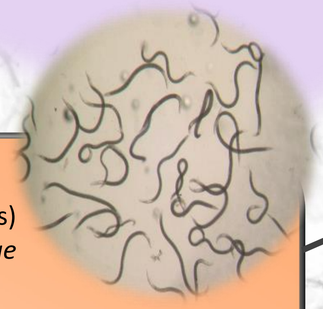
Virulence of entomopathogenic nematodes against two aerial pests: *Frankliniella occidentalis* (thysanoptera: thripidae) and *Tuta absoluta* (lepidoptera: gelechiidae): intra- and interspecific variability

Vicente-Díez, Ignacio[1], M. González-Trujillo[1], M. Galeano[2], M. Chelkha[1], J.E. Belda[2], J. Calvo[2], and R. Campos-Herrera[1].

[1]Instituto de Ciencias de la Vid y del Vino (Gobierno de La Rioja, CSIC, Universidad de La Rioja), La Grajera, Crta. Burgos Km. 6, Salida 13 Lo-20, 26007 Logroño (Spain).
[2] R&D Department of Koppert España, S.L. Paraje Piedra Rodada, 470, Vícar, Almería 04738 (Spain).

Background



Infective juveniles (IJs) of *Steinernema feltiae*

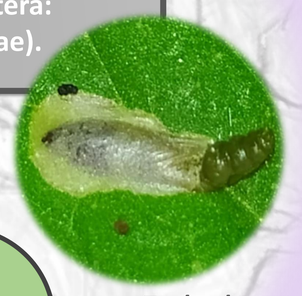
Entomopathogenic nematodes (EPNs), well-known as excellent biological control agents, can now be applied against **aerial pests** thanks to novel formulations [1]. Exploring the **intra- and inter-specific variability** on EPN virulence can support selecting the best candidates for a particular aerial insect pest.

Research objetives

F. occidentalis

HYPOTHESIS: populations of the same species but with different origins (habitat, geo-region) might differ in their ability to kill the same hosts.

AIM: to evaluate the virulence (mortality and time to kill) of various EPN species/populations against the last larval instar of two aerial pests: *Frankliniella occidentalis* (Thysanoptera: Thripidae) and *Tuta absoluta* (Lepidoptera: Gelechiidae).



T. absoluta

Material & Methods

Ten EPN populations belonging to three EPN species (Table 1) were cultured in *Galleria mellonella* (Lepidoptera: Pyralidae) larvae [2]. EPN populations were tested at two IJ concentrations: 80/160 and 4/21 IJs/cm^2 for *F. occidentalis* and *T. absoluta* trials, respectively *(*including distilled water as controls). The *F. occidentalis* trials were evaluated in round containers (3,14 cm^2), while *T. absoluta* trails in 5,5 cm diam. Petri dishes (Fig 1). Each treatment was replicated 5-6 replicates with 10 and 8 last instar larvae of *F. occidentalis* and *T. absoluta*, respectively. Both experiments were performed twice under a controlled environment chamber (60%, RH 22 ºC, and 16L: 8D). The larval mortality was revised daily up to six days post-inoculation.

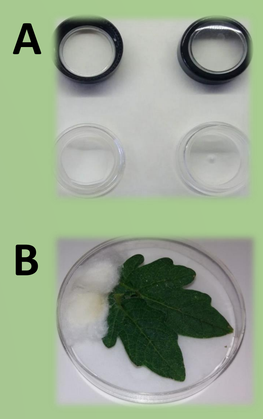


Fig. 1. *F. occidentalis* (A) and *T. absoluta* (B) set up

Table 1. EPN species populations and their origin

EPN species	Populations	Origin
S. feltiae	Koppert	Commercial
	RS-5	Switzerland
	AM-25	Portugal
	RM-107	Spain
S. carpocapsae	Koppert	Commercial
	MG-596ª	Switzerland
H. bacteriophora	Koppert	Commercial
	MG-618b	Switzerland
	AM-203	Portugal
	RM-102	Spain

Results

For *F. occidentalis* trails, we reported significantly different mortality rates *for S. carpocapsae* populations, particularly for Koppert's, which, in agreement with a previous study [3], reached values over 90% mortality after six days of exposure for both IJ concentrations (Fig.2).

Moreover, all EPN populations reached values over 65% mortality of *T. absoluta* larvae after six days of exposure for both IJ concentrations. Similar to previous reports [4,5], the four S*. feltiae* populations evaluated achieved over 90% mortality even for very low IJ inocula (4 IJs/cm^2), but comparable values were also reported for *S. carpocapsae* Koppert strain (Fig. 3).

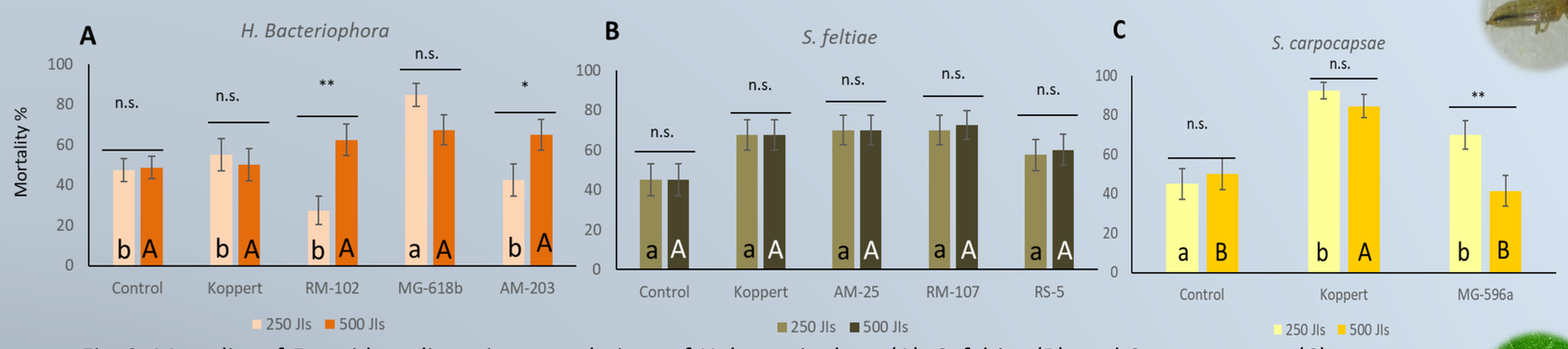


Fig. 2. Mortality of *F. occidentalis* against populations of *H. bacteriophora* (A), *S. feltiae* (B), and *S. carpocapsae* (C).

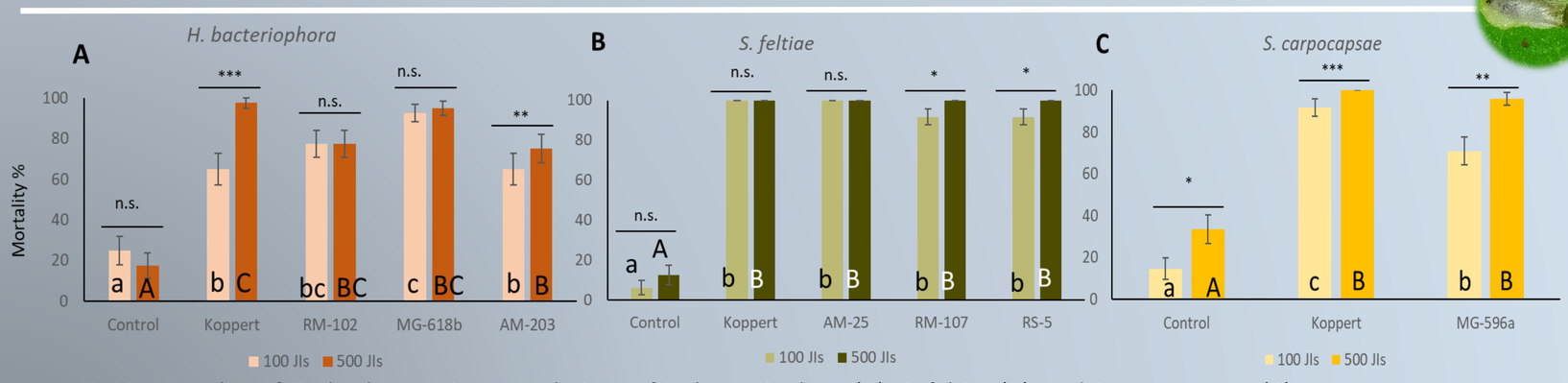


Fig. 3. Mortality of *T. absoluta* against populations of *H. bacteriophora* (A), *S. feltiae* (B), and *S. carpocapsae* (C).

Asterisks indicate significant differences within pair-treatment comparisons (t-Student) at *** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, and n.s. not significant. Different letters indicate significant differences in Tukey's test (HSD). Values are least-square means ± SE.

Conclusions

Overall, different EPN species populations, except few exceptions, did not highly differ in their virulence against *F. occidentalis and T. absoluta* larvae. We consider the EPN species *S. feltiae* and *S. carpocapsae* as very promising for their potential aerial application to control these two serious pests.

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[5] Dlamini et al. 2019. J Nematology

* ignacio.vicente@icvv.es / mariadelmar.gonzalez@icvv.es / raquel.campos@icvv.es

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