Field evaluation of entomopathogenic nematodes against orchard pests

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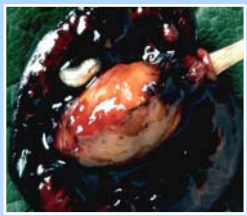
OBJECTIVE

The biological control potential of entomopathogenic nematodes (EPNs) against important pests of hazelnut, chestnut, and sweet cherry was evaluated under semi-field and field conditions.

INTRODUCTION

Survival of pest in micro-plot trials (container studies) or field plot trials was monitored after exposure to commercially used EPN strains. Experimental plots were artificially infested with pest larvae that naturally burrowed into the soil for diapause. Either larval mortality or adult emergence, was assessed to estimate the control effect of the EPN treatment. Here we present preliminary results from three ongoing projects.

PESTS:

	Hazelnut weevil *Balaninus nucum*	**Chestnut weevil & tortrix** *Curculio elephas & Cydia splendana*	**European cherry fruit fly** *Rhagoletis cerasi*
			
			

EXPERIMENTS

Microplot trials consisted of field plots in which PVC containers were inserted into the soil in a completely randomised block design. Pest larvae were collected from natural populations when emerging from damaged fruits/nuts. Experimental plots were artificially infested with up to 60 pest larvae per replicate for *B. nucum, C. elephas, C. splendana,* and *R. cerasi.*

EPNs were applied in 200 ml of water as a curative treatment to each container except for the open field trials in the cherry orchard, in which they were applied in 6 liters of water in a hand held sprinkling can. Following application the same amount of water as for EPN application was used to wash the nematodes into the soil.

NEMATODE APPLICATION:

SPECIES (& product name):	*S. feltiae* (nema PLUS) *H. bacteriophora* (nema TOP) *H. indica* (no commercial product)	*S. feltiae* (Traunem) *S. carpocapsae* (Carponem) *H. megidis* (BVW nematodes)	*S. feltiae* (Traunem) *S. carpocapsae* (Carponem) *H. megidis* (BVW nematodes)
SUPPLIER:	e-Nema, Germany	Andermatt Biocontrol, Switzerland	Andermatt Biocontrol, CH
CONTAINER DEPTH (& capacity)	0.5 m, 46 liters	0.4 m, 3 liters	Open field (1m² mini-parcels)
DOSAGE:	2,2 Mio IJ/m²	2 Mio IJ/m²	2 Mio IJ/m²
APPLICATION PERIOD:	July/August	October and/or June	June
IRRIGATION:	Yes (micro-sprinkler)	No (rain)	No (rain)
REPLICATES (per treatment):	3	6	5 (10)

PRELIMINARY RESULTS

CONTROL EFFECTS:

Legend
- ● = high (67-100% control)
- ◍ = medium (34-66% control)
- ○ = low (0-33%control)

	Lab	*Semi-field*
S. feltiae	●	○
H. bacteriophora	○	◍
H. indica	-	◍

	Lab	*Semi-field*
S. carpocapsae	●	◍
S. feltiae	○	-
H. megidis	◍	-

	Lab	*Field*
S. carpocapsae	○	○
S. feltiae	◍	○
H. megidis	○	○

CONCLUSIONS

First results indicate that entomopathogenic nematodes could substantially contribute to control hazelnut weevils, chestnut weevils, and chestnut tortrix in commercial orchards. However, more research is needed to select the most virulent EPN strains and to adjust application technique as well as application time to achieve sufficient control of pest populations.

On the other hand, we found no significant control using EPNs against the European cherry fruit fly in the field. One reason for the lack of efficiency may lay in the biology of the pest. Larvae immediately pupate after burying into the soil, while susceptibility strongly decreases in the pupal instar and the pest escapes parasitism by EPNs.

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