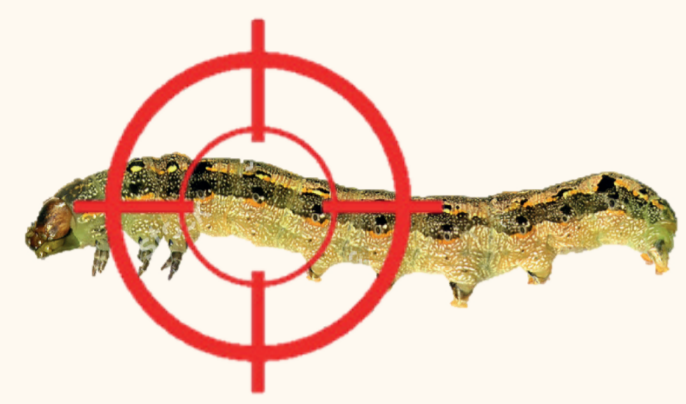


Successful foliar application of *Steinernema* spp. EPNs to control Lepidopteran caterpillars



Introduction

Entomopathogenic Nematodes (EPNs) are soil-thriving roundworms that are already been used as biological control agents (BCAs) against an array of root herbivores. The question remains whether they could also be applied onto the foliage of crops to control foliar insect pests as well.

We present here our work carried out from laboratory conditions to commercial settings to test the potential of *Steinernema feltiae* and *Steinernema carpocapsae* against Lepidopteran caterpillars.



Soil

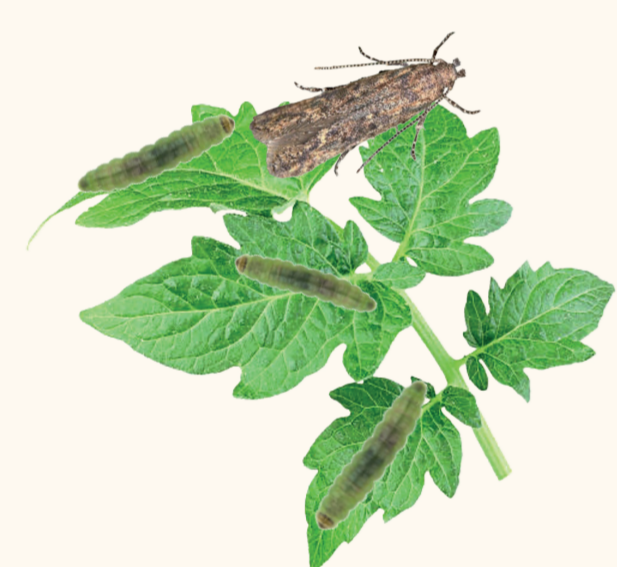


Leaves

Research objectives

1. Test the **infectivity** of EPNs against key foliar Lepidopteran species in the lab and validate it in commercial settings.
2. Determine the **survival** and **penetration success** of EPNs on foliage.
3. Explore the **behaviour** of EPNs towards herbivore-induced plant volatile organic compounds (VOCs).

Study system



Tuta absoluta
Tomato



Spodoptera exigua
Sweet pepper



Spodoptera littoralis
Lettuce



Koppert EPN products based on IJs of *S. feltiae* and *S. carpocapsae* (IJs = Infective Juveniles)

Conclusions

Despite being soil-borne organisms, EPNs can survive on the phyllosphere and successfully control foliar caterpillars when timely applied. They may even use foliar VOCs to locate the hosts in their proximity, opening the possibility to move from the (costly) inundative approach to the application of lower doses of mobile IJs.

Publication



Sources

Kay Moisan^a, Olga Kostenko^a, Magda Galeano^b, Roxina Soler^a, Sjoerd van der Ent^a, Ivan Hiltbold^c

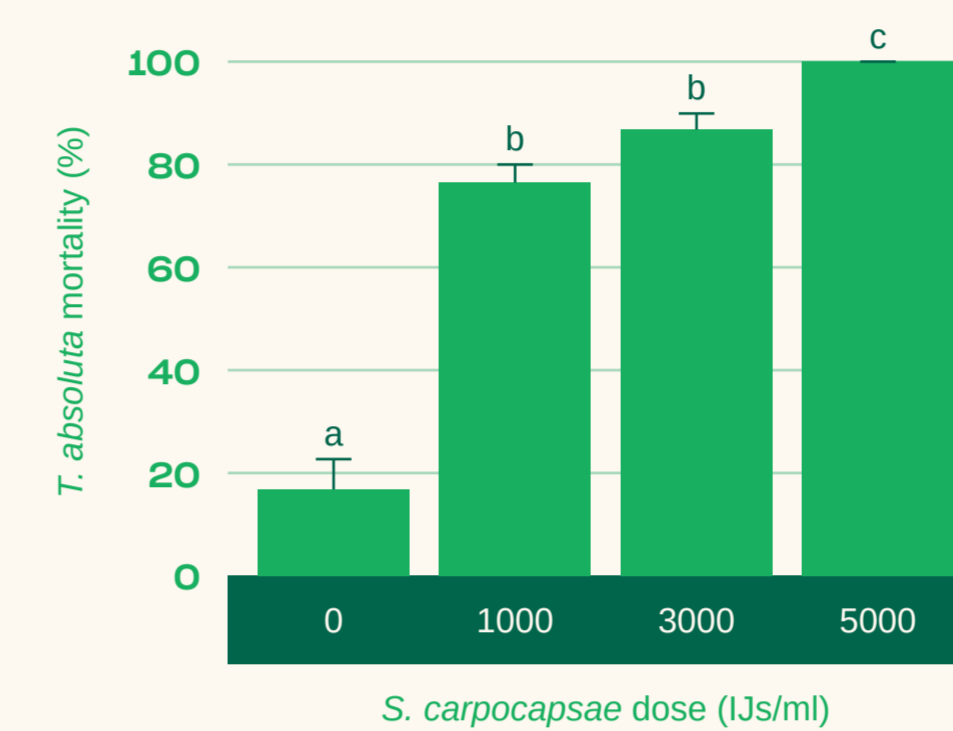
- ^a Koppert B.V. Agronomical Development AGD, Veilingweg 14, 2651 BE, Berkel en Rodenrijs, The Netherlands.
^b Koppert Spain, Research Center (R&D Dpt), 470 nb, Paraje Piedra Roda, 04738 Vicar (Almería) Spain.
^c Agroscope, Entomology and Nematology Group, 60 Route de Duillier, 1260 Nyon, Switzerland.

Results

1. Infectivity of EPNs

EPNs can successfully control numerous Lepidopteran caterpillars.

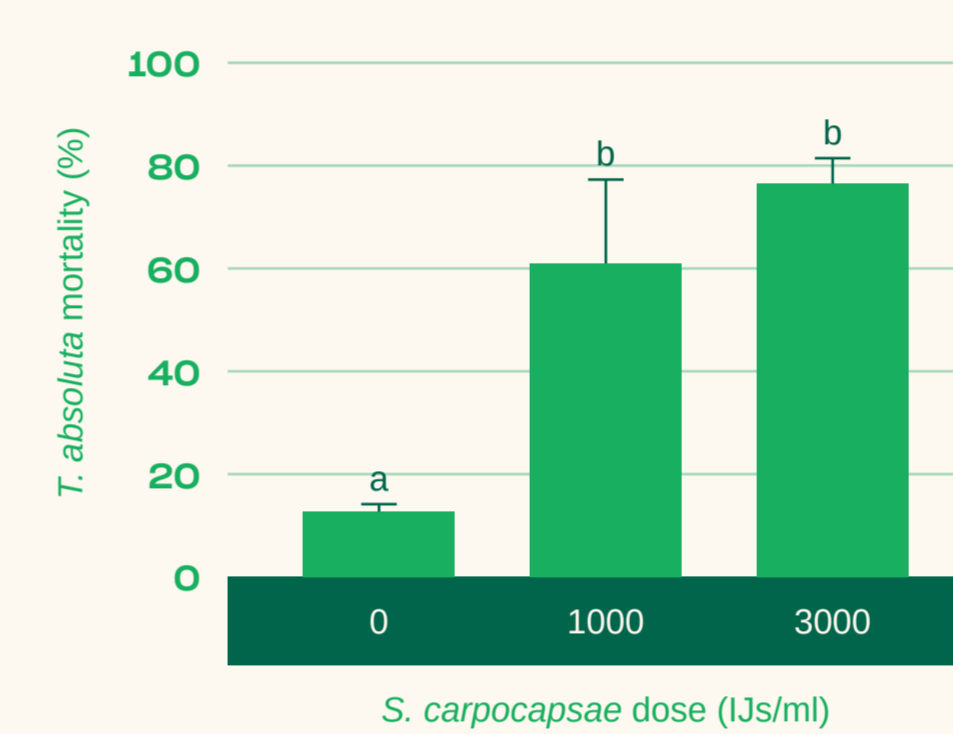
Climate cell



N = 2 trials



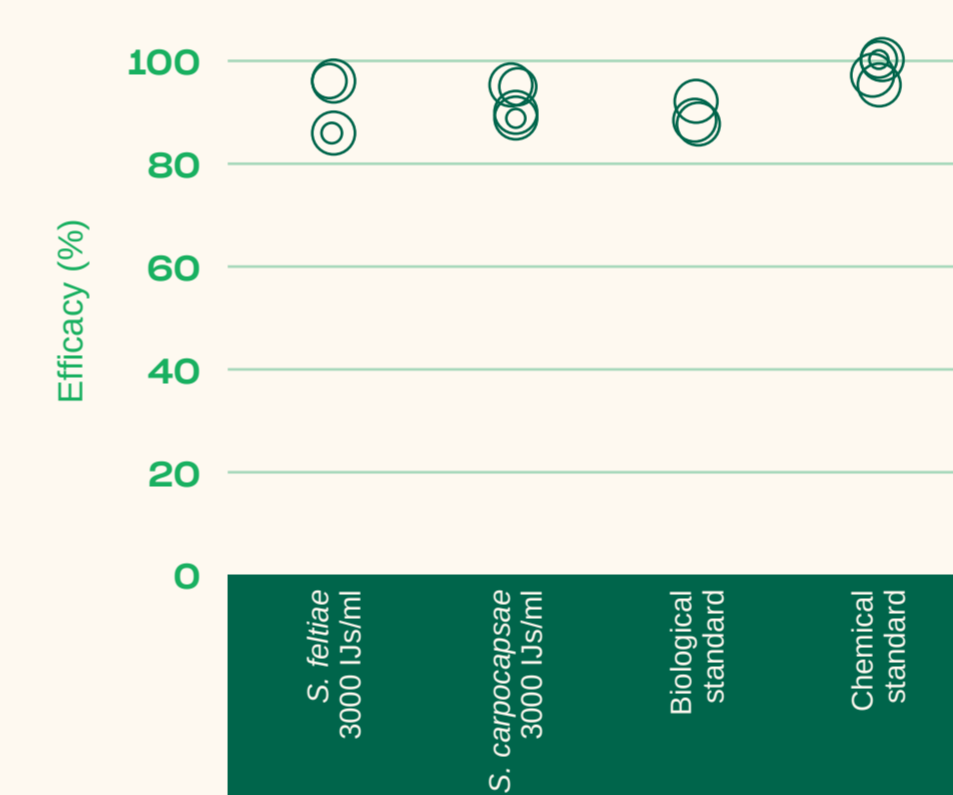
Experimental greenhouse



N = 2 trials



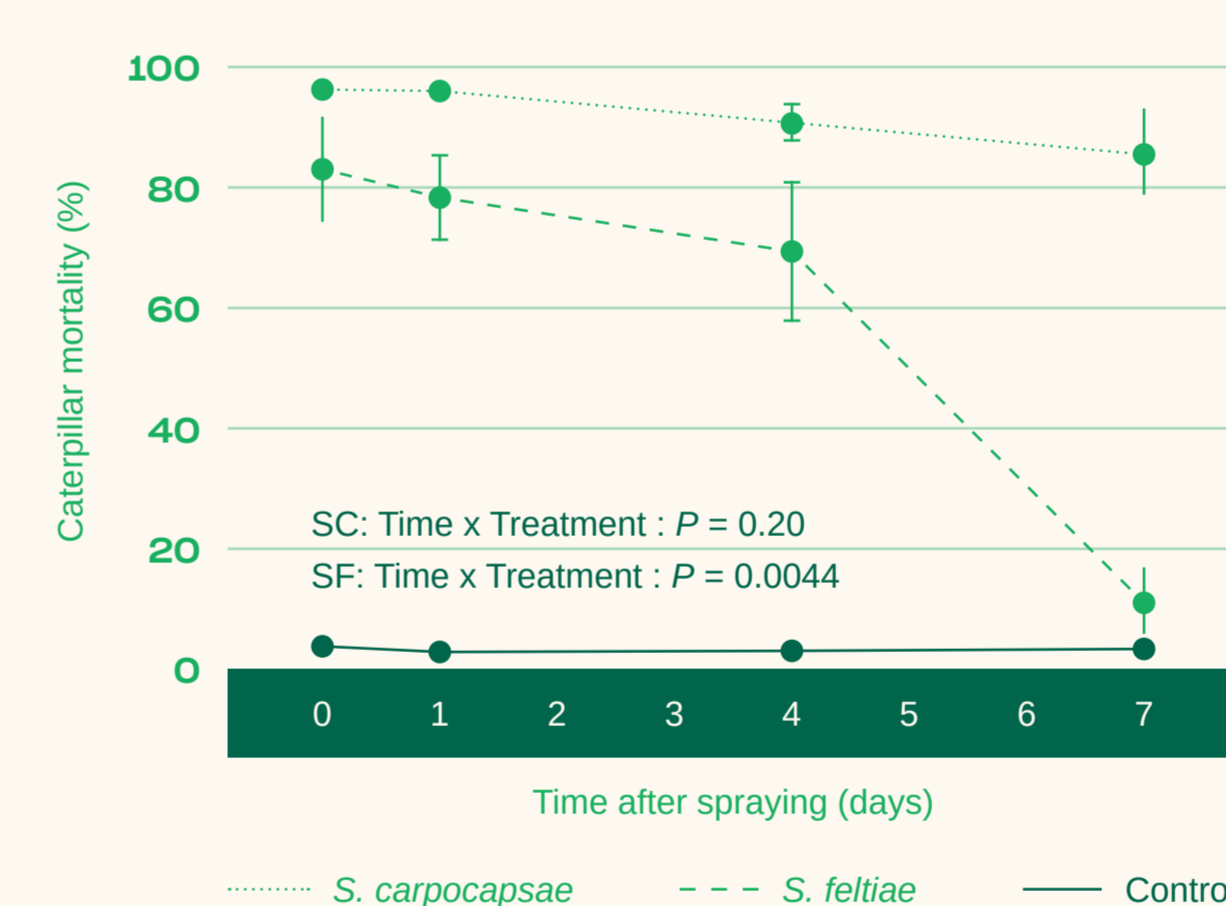
Commercial greenhouse



N = 5 trials

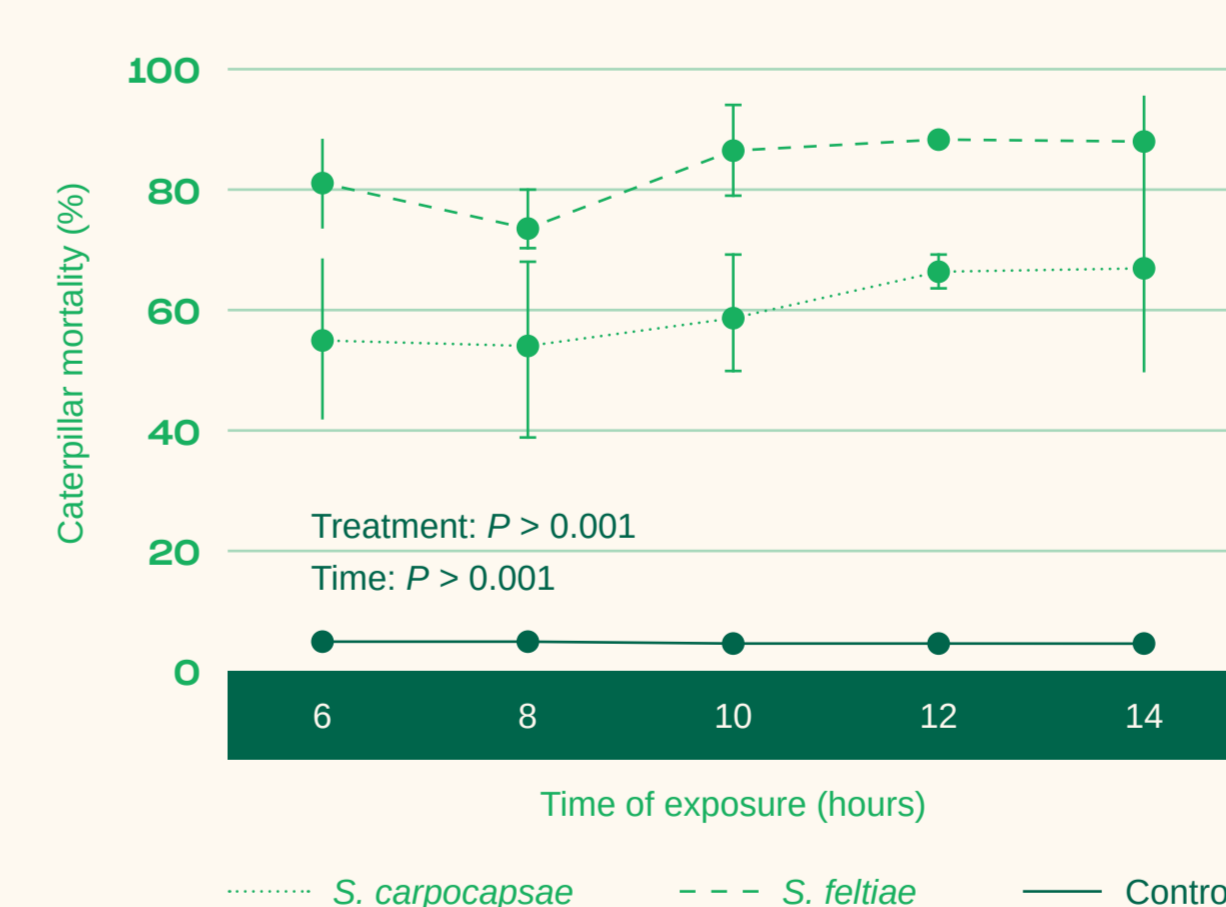
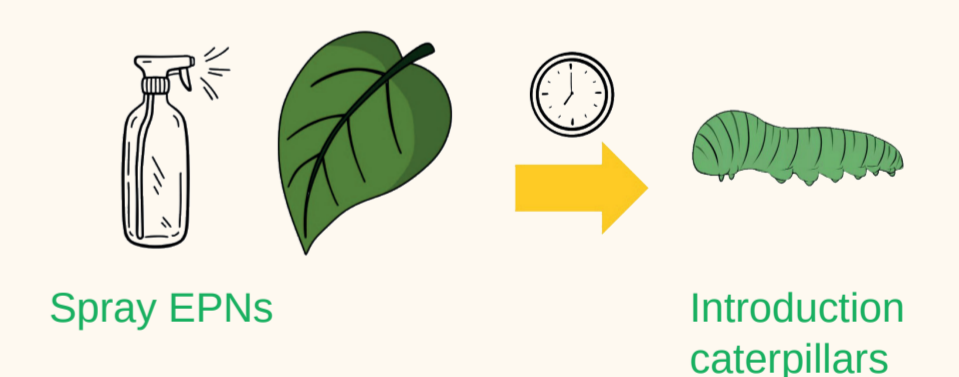


2. Survival and penetration success on leaves



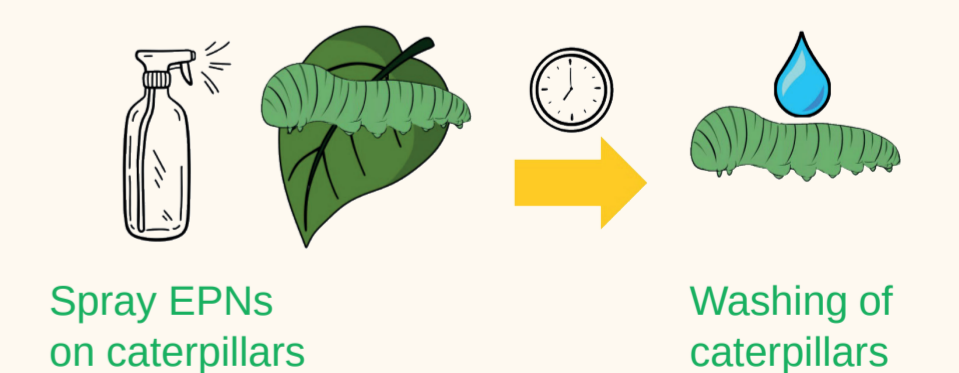
N = 2 trials

Both EPNs remain alive up to a few days on leaves and can still kill *S. exigua* caterpillars upon optimal conditions (constant 21°C and 80% RH).

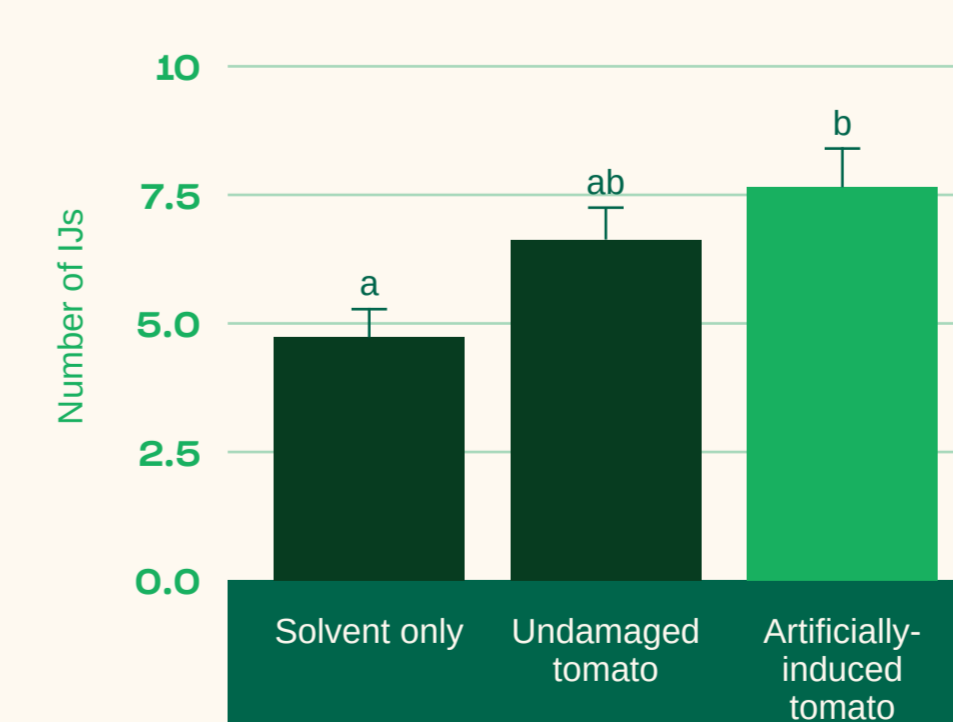


N = 2 trials

Both EPNs need less than 6 hours to kill at least 50% of *S. exigua* caterpillars upon optimal conditions (constant 21°C and 80% RH).



3. EPN behaviour towards plant VOCs



IJs of *S. feltiae* were more attracted to VOCs from the tomato leaves.

Three-choice bioassay

