Natural host range of entomopathogenic nematodes

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Database

~ Collected in 1996

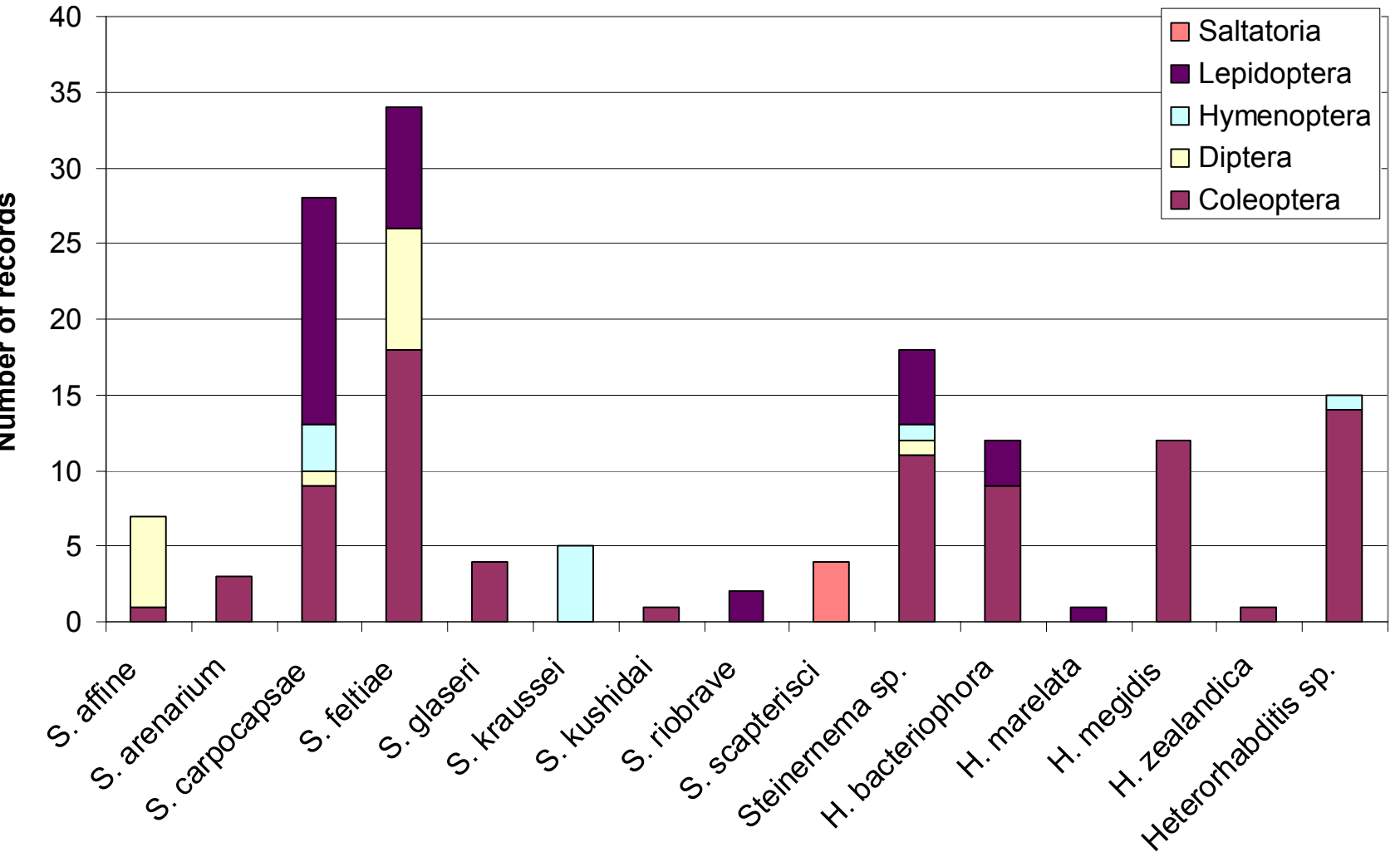
~ Available on www.e-nema.de => ‚links‘

  ~ Downloadable excel spreadsheet

~ Input of data at the same location

~ Copy in EDWIP (Ecological Database on World Insect Pathogens) http://insectweb.inhs.uiuc.edu/Pathogens/EDWIP/

Number of records



Steinernema carpocapsae

Cydia (Carpocapsa) pomonella

~ Most often in Coleoptera (Elateridae, Sacarabaeidae; Curculionidae) and Lepidoptera
~ Often found in *Cydia pomonella* (8 of 13 Lepidoptera reports)
~ The **only** nematode ever found in *C. pomonella*
~ Adapted to insect larvae on the soil surface or stem

Steinernema feltiae

- ~ Most widespread host range
- ~ Coleoptera:
  - ~ Elateridae; Pythidae; Cerambicidae; Scarabaeidae; Buprestidae; Curculionidae
- ~ Diptera:
  - ~ Mycetophagidae; Bibionidae; Anthomyidae
- ~ Lepidoptera:
  - ~ Hepialidae; Noctuidae

S. glaseri; S. arenarium; S. scarabaei, S. kushidai

~ All were **only** found in Scarabaeidae

~ Special adaptation of this taxonomic group to Scarabaeidae ?

S. kraussei

~ Only found in Hymenoptera, (*Cephalcia abietis, C. falleni*)

~ A number of reports from meadows where *C. abietis* is not present (Switzerland, Italy, Scotland)

H. bacteriophora

~ Coleoptera
  ~ Scarabaeida; Chrysomelidae; Curculionidae
~ Lepidoptera
  ~ Noctuidae; Pyralidae
~ Generalist like *S. feltiae* but specially adapted to infect Scarabaeidae

H. megidis

- ~ Coleoptera
  - ~ Scarabaeidae and Curculionidae

News (after 1996)

Steinernema sp.	Coleoptera	Scarabaeidae	Geotrogus	G. inflatus (cf.)	Peters, A.	
S. feltiae	Coleoptera	Scarabaeidae	Phyllopertha	P. horticola	<r> Otto Nielsen (2000) Inter	
S. bicornutum	Coleoptera	Scarabaeidae	Phyllopertha	P. horticola	<r> Otto Nielsen (2000) Inter	
S. affine	Coleoptera	Carabidae	Pterostichus	P. nigrita	<r> Otto Nielsen (2000) Inter	
S. feltiae	Diptera	Bibionidae	Bibio	sp.	<r> Otto Nielsen (2000) Inter	
sp.	Diptera	Bibionidae	Bibio	sp.	<r> Otto Nielsen (2000) Inter	
S. intermedium	Coleoptera	Cantharidae	Cantharis	sp.	<r> Otto Nielsen (2000) Inter	
S. feltiae	Diptera	Anthomyidae	Delia	D. radicum	<r> Otto Nielsen (2000) Inter	
S. feltiae	Diptera	Anthomyidae	Delia	D. radicum	<r> Otto Nielsen (2000) Inter	
S. feltiae	Lepidoptera	Hepialidae	Hepialus	H. lupulinus	<r> Otto Nielsen (2000) Inter	
H. bacteriophora	Coleoptera	Scarabaeidae	Hoplia	H. philanthus	Minshad Ali Ansari	
H. sp.	Coleoptera	Scarabaeidae	Hoplia	H. philanthus	Peters, A.	
H. sp.	Coleoptera	Scarabaeidae	Amphimallon	A. majale	S. Keller	
S. affine	Coleoptera	Scarabaeidae	Hoplia	H. philanthus L	Schelfhout, Bavo; Biobest	

nematode(s)	insect	habitat/crop	% population infected	remarks
S. carpocapsae	*Cephalcia lariciphila*	forest (larch)	8-15	1 seasons sampling
S. feltiae	*Bibio* spp.	grassland	23-68	other samples of larvae were also infected with *S. affinis*, 4 seasons sampling
	Otiorhynchus ovatus, O. dubius	strawberries	20	3 seasons sampling
	Phyllobius urticae	strawberries	16.2	one seasons sampling
S. kraussei	*Cephalcia abietis*	forest	3-20 (Czech Republic)	5 seasons sampling
		"	3-28 (Germany)	5 seasons sampling
		"	1-16 (Austria)	1 season sampling
	C. Falleni	"	0.8-0.9	5 seasons sampling
S. scapterisci	*Scapteriscus borelli, Sc. Vicinus*	grassland "	35.8 7.8	1 seasons sampling
	Scapteriscus spp.	"	8 to 50	2 seasons sampling
S. riobravis	*Helicoverpa zea* *Spod. Frugiperda*	maize "	3-21.3 5-19.6	5 seasons sampling
Steinernema sp.	*Graphognatus* sp.	not reported	significant	-
H. megidis	*Phyllopertha horticola*	grassland	80	1 seasons sampling
Heterorhabditis sp.	*Agriotes ponticus*	grain, vegetables	0.2	2 seasons sampling
	Lepidiota crinita, *L. negatoria*, *L. picti-collis, Antitrogus consanguineus*	sugar cane	26 - 100	one seasons sampling; 2 distinct *Heterorhabditis* spp. were involved
	Graphognathus leucoloma	not reported	significant	-

Epizootics

~ Rare (3 with over 50%)

~ Seasonal

~ Insect populations recover

~ On 2 occasions possibly triggered by use of chemical pesticides

Intentional releases of non-indigenous species

- Florida. *S. scapterisci* (Parkman & Frank 1992)
  - Highy specific nematode
  - Highly mobile host => fast nematode dispersal
  - No adverse effects observed
  - Effect on target *Scapteriscus* species
- The Netherlands. *S. glaseri* (Gerritsen *et al. 1999*)
  - No effect on target grub *Melolontha*
  - No persistence neither after strong nor after cold winter

Intentional releases

- Steinernema sp. (from Morocco)
  - No significant effect on target species (*Melolontha*)
  - Not detected at site one year after release

Outlook

- ~ No problems occurred although seemingly risky releases have been done
- ~ Spatial distribution important
  - ~ Nematode distribution becomes patchier after application (Wilson *et al.* 2003)
  - ~ Nematodes are by far not as efficient in host finding as parasitoid insects
  - ~ High host densities needed for nematode epizootics