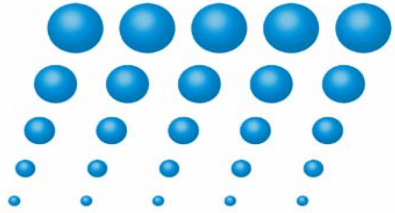


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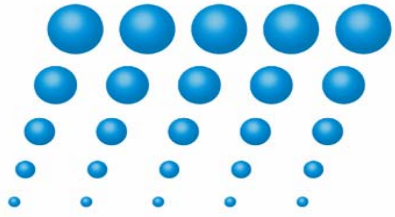
Safety of nematode biocontrol agents – a company perspective

COST/IOBC WG
Fungi and Nematodes:
Safety and Risk Assessment of Microbial Control Agents

ISO 9001
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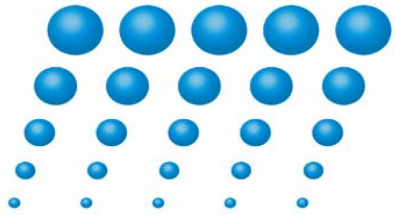


Focus groups - top 5 concerns

1. Effectiveness
2. Safety
3. Environmentally friendly
4. Long lasting/weatherproof
5. Easy to apply



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Nematode Safety Document – Review of important publications

Introduction

Epns have been used for the control of insects globally for many decades. Research into the side effects on non-targets has been continuous throughout that period.

OECD and COST workshop in 1996.

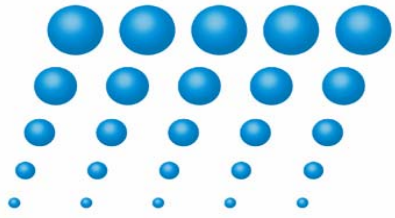
The key references from this workshop are listed below:

Natural Host Range

Peters, A. 1996. The Natural Host Range of *Steinernema* and *Heterorhabditis* spp. and Their Impact on Insect Population. *Biocontrol Science and Technology* 6, 389-402.

Details historical research demonstrating natural host range.

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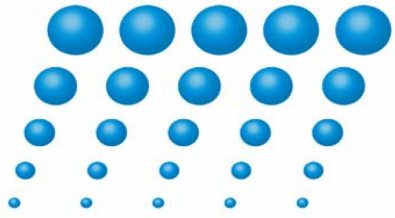
Effects on Nontarget vertebrates/arthropods

Ehlers, R-U, and Peters, A. 1995. Entomopathogenic nematodes in biological control: feasibility, perspectives and possible risks. **In:** *Biological Control: Benefits and Risks*. Eds H. M. T. Hokkanene and J. M. Lynch, Cambridge University Press.

Georgis, R., Kaya, H. K. and Gaugler, R. 1991. Effect of steinernematid and heterorhabditid nematodes (Rhabditida: Steinernematidae and Heterorhabditidae) on nontarget arthropods. *Environmental Entomology* **20**: (3) 815-822.

No reported negative effects of these nematodes or their symbionts on vertebrates and rare effects on non-target insects are transient due to the poor survival of applied nematodes.

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Symbiont safety

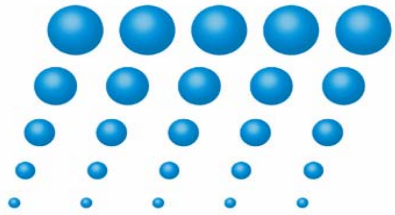
Boemare, N., Laumond, C. and Mauleon, H. 1996.
The entomopathogenic nematode-bacterium
complex: biology, life cycle and vertebrate safety.
Biocontrol Science and Technology **6**, 333-345.

*Reviews safety of the symbiotic bacteria on
vertebrates and concludes that all the tests showed
no negative effects, and pose no hazard to
vertebrates.*

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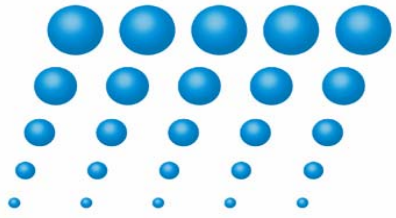
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MSDS

- 1. Ingredients:** XX % *Steinernema feltiae* paste. Inert ingredients: XX % Inert carrier
- 2. Hazards:** Oral/skin/Ingestion/Inhalation: None known. Eyes: May cause mild irritation.
- 3. First Aid:** Skin Contact - Wash with water and soap.
Eye contact - Rinse with much water for a prolonged time.
If ill effects seek medical advice immediately.
- 4. Fire Fighting:** Considered inflammable. Extinguishing media: water mist, foam, carbon dioxide, dry powder. Thermal decomposition may yield carbon dioxide and nitrogen oxides.
- 5. Accidental Release:** Spilled product in contact with water causes surfaces to become slippery. May be clean up using standard equipment and rinsed into wastewater.
- 6. Personal Protection:** Exposure limit: 0.0X mg.in3 for dust. Respiratory / Skin: None required.
Eye Protection: Wear eye shields if contamination likely.
- 7. Stability and Reactivity:** Stable.
- 8. Toxicological Information / Ecological Information** No information available.
- 9. Disposal Considerations Waste:** No special method required / in accordance to regulations.

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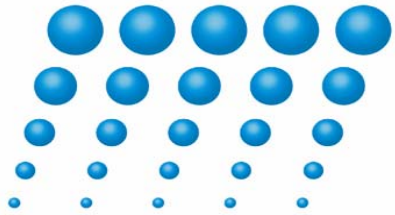
Biopesticides



Typical Greenhouse Applications

Safety is viewed by 'pesticide' users as paramount.

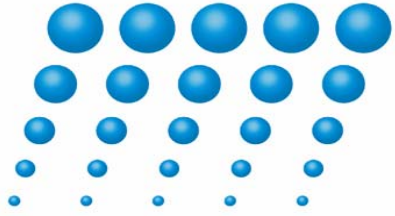
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Legislation

- **Current legislation at country level**
- **OECD Guidelines are a minimum requirement for registration**
- **EU 91/414 potential tightening?**

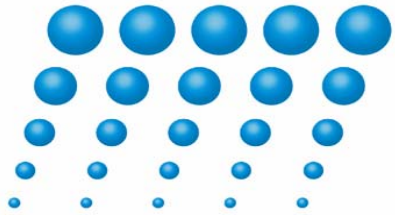
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Company standards

- Each company sets its own standards for safety of nematode products (to include formulation; area of use and nematode isolates used)
- Safety is linked to risk but is a perception
- Proof? Requirement for customers!

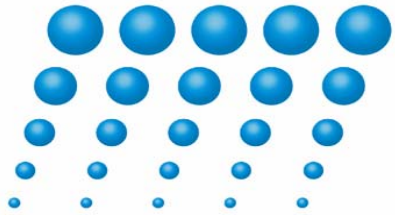
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Further Legislation

- **Safety relates to the claim of the product**
- **Use and misuse – important in biopesticide market?**
- **What is crucial for end users and legislators?**

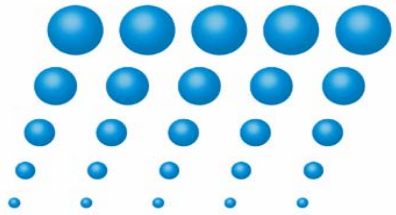
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Worst case scenario

- **User safety – chronic or acute?**
- **Environmental – chronic or acute?**
- **Current basis for producer confidence in the safety of the product**

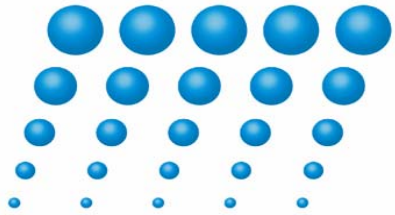
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Commercial Confidence

- **Commercial in confidence or confidence in the commercial?**
- **Previous safety data published is extensive**
- **Tested to US – EPA Standards**
- **Testing to what standard? Food grade.....**

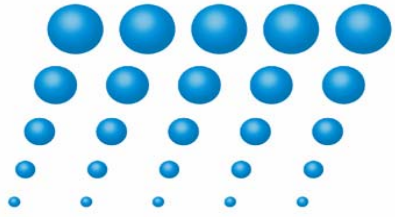
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The Future

- **Future requirements will be extensive and may not rely upon previous published data**
- **Registration of nematodes will require safety data / ecotox / etc.**
- **Risk assessment may become a more widely used part of IPM strategy but it is likely to be research led rather than industry.**
- **Is there a risk that researcher led risk and safety advice will stifle product development?**

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Warning labels?

- Safe for use with children & pets
- Safe if eaten
- No risk to bees
- Product not irritating to eyes, skin or respiratory system
- Others?



HARMFUL?