dianem®

Biological control of the Western Corn Rootworm *(Diabrotica virgifera virgifera)* with entomopathogenic nematodes

The insect pest

The Western Corn Rootworm is an invasive corn pest. In the USA it causes a yearly damage for more than 1 billion US$. Since its introduction in 1992 in Serbia the Western Corn Rootworm invaded large parts of Middle and Eastern Europe. D. *virgifera v.* is univoltine. Hibernation of the insect is in the egg stage. Larvae hatch in May and develop through three larval stages and the pupa to adults, which emerge between late June and early August.

The damage

Yields can be severely reduced due to root damage. All larval stages feed on roots, which can result in plant lodging. Subsequent acropetal growth leads to the typical 'gooseneck' symptom. In seed and sweet corn production major damage can also occur when adults feed on the silk, which reduces pollination and causes irregular development of kernels.

The control agent

The product dianem® is based on the entomopathogenic nematode *Heterorhabditis bacteriophora*. Dauer juveniles of these nematodes actively search for *Diabrotica* larvae and pupae in the soil. Three days after invasion the insects die. Dead insect turn orange-red. The nematodes propagate inside the insect cadaver. After 2 weeks thousands of new nematode dauer juveniles emerge and hunt for the surviving *Diabrotica* larva and pupae.

dianem® has several advantages:

- The nematodes attack only soil-dwelling insects.
- They are safe for plants, users, consumers and the environment.
- They cause no harm to bees or earthworms.
- The nematodes are exempted from regulation in most EU countries and the USA.
- They can be applied with conventional spraying technology.

Control effect

dianem® can achieve an efficacy of more than 80 %. Results of 7 years field testing in Hungary, Austria and Italy demonstrated that dianem® is equally effective when compared with neonicotinoide seed treatment or application of pyrethroide granules. Root damage and adult emergence were significantly reduced. In many cases dianem® was even superior in the reduction of adult emergence. The control effect was not different whether applied at larval emergence in June or during sowing. Nematodes applied in April/May persist in high enough numbers to control emerging larvae in June.

Application technique

The recommended application rate is 2 billion nematodes per ha with 200-400 L water. dianem® is applied during sowing into the rows. Nematodes are applied after the catcher roller of the machine onto the seeds. Special plough-shares (LIQ-Inject M1) are available for most seeding machines (www.cult-tec.de). The efficacy is not affected by fertilizers and most agrochemical plant protection products

Further information needed?
Please contact us!
We will be happy to answer your questions!

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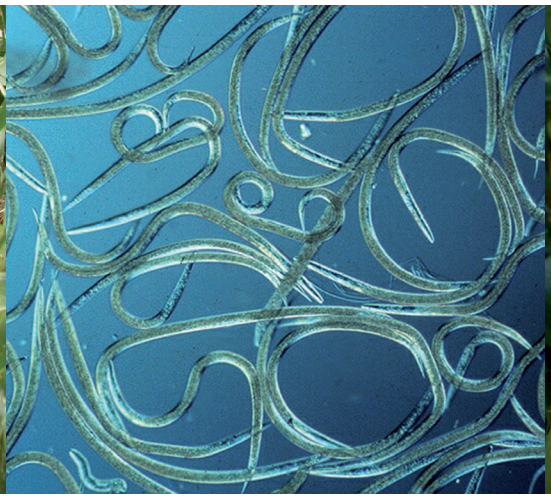
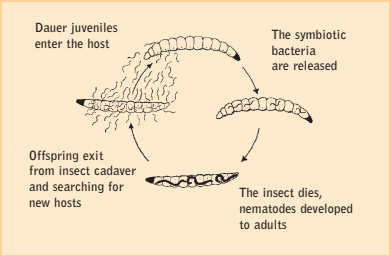
Plant lodging due to root damage



Heterorhabditis bacteriophora – highly efficient against *Diabrotica virgifera virgifera*

Irregular development of corn

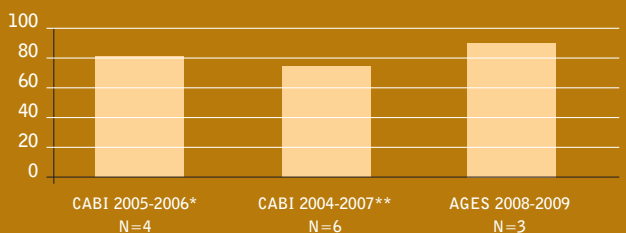
Control of *Diabrotica virgifera virgifera* with dianem® (*Heterorhabditis bacteriophora*)



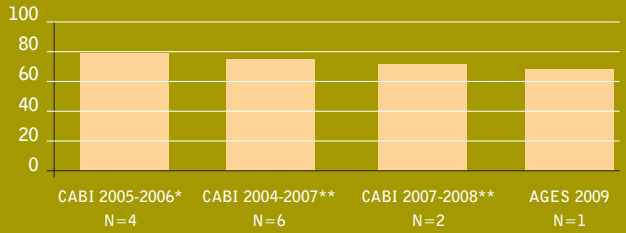
Nematodes recycle in host and infect surviving *Diabrotica virgifera virgifera* larvae

Diabrotica larvae infected with nematodes turn red

REDUCTION OF BEETLES IN % (Hungary and Austria)



REDUCTION OF ROOT DAMAGE IN % (Hungary and Austria)



* Töpfer et al. (2008) Journal of Applied Entomology 132, 337-348
** Töpfer et al. (2010) Journal of Applied Entomology 134, 467-480
N = number of field trials
CABI: Commonwealth Agriculture Bureau International, Schweiz
AGES: Österreichische Agentur für Gesundheit und Ernährungssicherheit, Wien