

# 1:95 *Steinernema kraussei*

*Insect parasitic nematode*

*The Pesticide Manual Thirteenth Edition* entry number: 742

Nematode: Nematoda: Steinernematidae

**NOMENCLATURE:** **Approved name:** *Steinernema kraussei* (Steiner) Travassos; isolate L137. **Other names:** Parasitic nematode.

**SOURCE:** *Steinernema kraussei* occurs widely in soils in temperate areas.

**PRODUCTION:** Produced commercially by solid state or liquid fermentation on an undefined growing medium. Can be reared on vine weevil larvae.

**TARGET PESTS:** Vine weevils (*Otiorhynchus sulcatus* (Fabricius)), but also effective against other soil insects.

**TARGET CROPS:** Glasshouse vegetables and ornamentals and outdoor strawberries, also effective in vegetables and blackcurrants.

**BIOLOGICAL ACTIVITY:** **Biology:** The third stage larvae are the infectious stage and only these can survive outside the host insect, as they do not require food. They enter a host through one of its natural openings. The nematode larva then releases bacteria (*Xenorhabdus* sp.) into the insect's body and toxins produced by these bacteria kill the insect within 48 hours. The bacteria then digest the insect's body into material that the nematode can feed upon, and the nematode's fourth stage develops within the dead insect. These fourth stage larvae develop into males and females that reproduce sexually. After mating, the males die and the females lay eggs in the dead insect if there is enough food available or, if not, the first and second stage larvae develop inside her body. When larvae reach the third stage, they are able to leave the dead insect and seek out a new host. However, there may be two or more generations within the host, depending upon the availability of food. The third stage is always the infective stage.

**Duration of development:** Growth rate is very dependent upon temperature and it is likely that the nematode will complete its life-cycle in 14 to 20 days. **Efficacy:** *Steinernema kraussei* (L137) is able to survive winter field conditions including prolonged exposure to low temperatures, in contrast to *S. carpocapsae* Weiser which shows poor survival. Its ability to survive at low temperatures and the fact that it remains active at temperatures of 5 °C has led to its use for vine weevil control in preference to *Steinernema carpocapsae* or *Heterorhabditis megidis* Poinar, Jackson and Klein. **Key references:** 1) Z Mracek. 1994. *Steinernema kraussei* (Steiner, 1923) (Nematoda: Rhabditida: Steinernematidae): redescription of its topotype from Westphalia, *Folia Parasitologica*, **41**, 59–64. 2) R Gaugler & H K Kaya. 1990. Entomopathogenic nematodes. In *Biological Control*, CRC Press, Boca Raton, Florida, USA, 365 pp. 3) R Georgis & H K Kaya. 1998. Formulation of entomopathogenic nematodes. In *Formulation of Microbial Biopesticides, Beneficial*

Sample entry taken from *The Manual of Biocontrol Agents* published by BCPC in November 2004. Copies can be purchased from [www.bcpc.org/bookshop](http://www.bcpc.org/bookshop)

*Microorganisms, Nematodes and Seed Treatments*, H D Burges (ed.), pp. 289–308, Kluwer Academic Publishers, Dordrecht, The Netherlands.

**COMMERCIALISATION:** **Formulation:** Sold as third instar larvae in vermiculite in sealed trays. **Tradenames:** 'Exhibitline sk' (Syngenta Bioline), 'Grubsure LT' (Defenders), 'Nemasys L' (Becker Underwood).

**APPLICATION:** The best time to apply *Steinernema kraussei* is in the spring (March to May) and autumn (late August to November), as these are the times that most vine weevil grubs will be present in the soil. Apply by watering evenly over soil to be treated, at a rate of about  $1 \times 10^5$  juvenile nematodes per square metre. The treated area should be kept moist by normal watering after application to enable the nematodes to move in the soil moisture.

**PRODUCT SPECIFICATIONS:** **Purity:** Products contain only third instar infectious nematode larvae. Product efficacy can be determined by bioassay against vine weevil or other coleopteran larvae. **Storage conditions:** Can be stored in a refrigerator at 5 °C. Do not freeze or expose to bright sunlight. **Shelf-life:** If stored according to the manufacturers' instructions, the product can be kept for up to 2 weeks.

**COMPATIBILITY:** Compatible with a wide range of biological and chemical pesticides. Incompatible with strong oxidisers, acids and bases.

**MAMMALIAN TOXICITY:** No allergic or other adverse reactions have been reported by researchers, production staff or users during application in glasshouse or outdoor crops from *Steinernema kraussei* or its associated bacterium.

**ENVIRONMENTAL IMPACT AND NON-TARGET TOXICITY:** It is not expected that the use of products containing *Steinernema kraussei* will have any effects on non-target organisms nor have any adverse effects on the environment.

**Accepted for use in organic farming:** Yes.