

Nematode Information

This WordPress weblog is about insect- and plant-parasitic nematodes

- [Home](#)
-

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[Home](#) > [Beneficial nematodes](#) > Use Beneficial Nematodes to Control Japanese Beetles

Use Beneficial Nematodes to Control Japanese Beetles

July 23rd, 2009

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- The Japanese beetle, *Popillia japonica*, is a most economically important pest of many ornamental plants and turf grasses. Larvae of these beetles are called white grubs that generally feed on roots of over 300 plants but their primary food source is grass roots. Severe damage caused by these grubs can result in dead patches of turf that can be picked up like a loose carpet. Adults mostly feed on leaves and flowers by chewing the tissue between the veins, a type of feeding called skeletonizing. Chemical insecticides including Imidacloprid (Merit), Chlorpyrifos, Isofenphos, and Diazinon are generally used to manage white grubs but due to human health and environment pollution concerns their use is restricted.
- Currently, environmentally safe biological control agents including a milky disease causing bacterium *Bacillus popilliae* (Milky spores) and entomopathogenic nematodes have been used to control this pest. Three entomopathogenic nematodes including *Heterorhabditis bacteriophora* GPS11 and TF strains, *H. zealandica* X1 strain and *Steinernema scarabaei* have been considered to be the most effective species against Japanese beetle grubs. It has been demonstrated that the application of *H. bacteriophora* GPS11 and TF strains, *H. zealandica* X1 strain and *S. scarabaei* at rate of 2.5 billion infective juveniles per hectare can cause about 96, 98 and 100%, respectively control of Japanese beetle grubs infesting turfgrass (for more information read Grewal et al., 2005). Nematodes can be applied using traditional sprayers that are used for the application of insecticides. Nematodes perform better when they are applied to target small stages of grubs. Nematodes also survive better and remain efficacious when field/lawns are irrigated before and after nematode applications
- [How Entomopathogenic Nematodes kill Japanese beetles](#)

When the infective juveniles are applied to the soil surface or thatch layer, they start searching for their hosts, in this case Japanese beetle grubs. Once a Japanese beetle grub has been located, the nematode infective juveniles penetrate into the Japanese beetle grub body cavity via natural openings such as mouth, anus and spiracles. Infective juveniles of *Heterorhabditis* also enter through the intersegmental members of the grub cuticle. Once in the body cavity, infective juveniles release symbiotic bacteria (*Xenorhabdus* spp. for Steinernematidae and *Photorhabdus* spp. for Heterorhabditidae) from their gut in grub blood. In the blood, multiplying nematode-bacterium complex causes septicemia and kills Japanese beetle grubs usually within 48 h after infection. Nematodes feed on multiplying bacteria, mature into adults, reproduce and then emerge as infective juveniles from the cadaver to seek new larvae in the soil.

References

1. Grewal, P.S., Koppenhofer, A.M., and Choo, H.Y., 2005. Lawn, turfgrass and Pasture applications. In: Nematodes As Biocontrol Agents. Grewal, P.S. Ehlers, R.-U., Shapiro-Ilan, D. (eds.). CAB publishing, CAB International, Oxon. Pp 147-166.

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- [December 2008](#)
- [November 2008](#)
- [May 2008](#)
- [April 2008](#)
- [March 2008](#)
- [February 2008](#)

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1 2 3 4 5 6

7 8 9 10 11 12 13

14 15 16 17 18 19 20

21 22 23 24 25 26 27

28 29 30

[« Aug](#)

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