



The Scoop on Alternatives for Grubs

Every year there is growing interest in controlling Japanese beetle grubs using alternative pest control materials such as microbial-based insecticides and beneficial nematodes.

Japanese beetles were first introduced into the USA early this century. By 1948 one of the first microbial insecticides ever registered in the US was being used to control Japanese beetle grubs in turfgrass. That microbial insecticide is milky spore.

Milky spore disease (*Bacillus popillae*) is a bacterium applied to turfgrass as a dust. It is effective only in controlling Japanese beetle grubs. Japanese beetle grubs must ingest the bacteria. The primary way for it to get into the grubs is through the mouth. The bacterial spores reproduce within the grub, eventually turning the hemolymph, the internal insect fluids, an opaque white. Infested grubs eventually die, and bacterial spores disperse into the surrounding soil. Ingestion of the bacteria does not always produce infection: spores may pass through the gut and be discharged with fecal matter.

Most research has shown that successful use of milky spore disease requires attention to environmental conditions. Effectiveness appears to depend most heavily on soil temperatures. Ideal soil temperatures for spore development during grub attack are between 60 and 70 degrees Fahrenheit. Where soil temperatures remain above 70 F for several months, the disease can build up in a year. Unfortunately, New Hampshire does not fall into this category, and it may take three or more years for a build-up in soil. Studies conducted by UNH Cooperative Extension Entomology specialist, Dr. Stan Swier, have yielded inconclusive data relative to the success of milky spore disease in NH.

If you do decide to use milky spore you should know that it does not spread unless grubs are present in the soil. Other grub controls used before or after an application of milky spore disease will negate its effectiveness; live grubs **must** be present for the bacterium population to build. Also, milky spore is not effective against European chafer. European chafer appeared in New Hampshire in 1995 and in the southern part of the state it causes much more damage to turfgrass than Japanese beetle.

Beneficial nematodes are also becoming widely available for white grub control. The most promising results to date have been with *Heterorhabditis bacteriophora* (the so-called 'HB' strain) at a rate of at least 1 billion per acre or *Steinernema glaseri* at a rate of 2 billion per acre. It is critical that the soil temperature be close to 70 degrees F and that you water them in with ¼ inch of water.

Nematodes are very dependent on moist soils to live so it is important to keep your lawn moist for at least a week after an application of nematodes. Nematodes "swim" through

water between soil particles seeking grubs to attack. If the soil is too dry they can die before reaching their destination. It is best to apply nematodes early in the morning or in the evening as even an hour of heat and sun can kill them. Unfortunately, many nematodes are sold by mail order and sometimes die when packages are left in the sun during shipping.

Most important of all, to my mind, are studies done in upstate NY by Cornell that show that only 25% of the lawns examined needed grub controls. That means that thousands of hours of precious leisure time and disposable income are being poured into lawns that don't need these resources. Check for grub populations in spring (April and early May) and fall (late August and September). Do this by lifting a square foot of turf and counting the number of grubs in the exposed soil. If you don't count more than 10 to 12, you probably don't need to apply a grub control.

Good care of your lawn during the growing season goes a long way towards avoiding insect and disease problems. Mow at the proper height (1 ½ to 3 inches). Never cut more than 1/3 of the blades at a time; scalping is not good for the health of your grass. If we don't have rain, apply the equivalent of 1 inch of rain each week using your sprinkler. Apply the water all at one time so it penetrates down to the bottom of the root system, and measure it by putting a can under the spray pattern. This encourages deep rooting. Fertilize spring or fall or both, using a slow release fertilizer that is low in nitrogen. For extra nutrients, leave the clippings on the lawn instead of collecting them. Apply lime every 2 or 3 years to keep your soil pH above 6.0.

If you do determine that you have a grub problem, consider using imidacloprid (Merit, Grubex and others). This is a stomach and nerve poison that only affects grubs. It is safe for non target organisms and has very low toxicity. Applied between June 15 and July 15 it is effective against both European chafer and Japanese beetle grubs. Another insecticide, halofenozide (Mach 2) is very effective against Japanese beetle grubs. It's a growth hormone that interferes with the normal development of white grubs. It is most effective when applied in mid to late July. Both imidacloprid and halofenozide are environmentally friendly products.

On the surface at least, coping with grubs appears to be a fairly simple process. What really seems to matter once you've made your choices, is the timing and the environmental conditions that need to be met. And don't forget to check and see if you really have infestation first. Just checking could save you all kinds of time and money!

Margaret Hagen
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