

EARTHWORMS: THATCH-BUSTERS

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Earthworms, called the "intestines of the earth" by Aristotle, are very important soil organisms that aid in the decomposition of plant litter, such as the thatch layer, and in recycling of nutrients. They help to break down and condition plant remnants in their gut. Earthworm tunnels help oxygen and water to enter the soil more easily and their castings (waste) enrich it.

Earthworms may be viewed as pests because their burrows and castings create a roughened surface to the turf. Also, since earthworms are a preferred food for moles, pesticides are sometimes applied in an effort to remove food so that the moles will go elsewhere. There is no scientific evidence that elimination of earthworms will reduce problems with moles. Earthworms contribute significantly to a fertile, healthy soil. Attempts to control them to reduce surface disruption can have severe consequences, especially in thatch build up.

Thatch is a layer of living and dead roots, stems, and organic matter that accumulates at the soil surface. Thatch accumulates when the rate of decomposition is much lower than the rate of grass growth. Use of certain fertilizers or pesticides may encourage an accumulation of thatch by increasing turf growth and/or killing beneficial organisms, such as earthworms. Excessive thatch reduces penetration of water, fertilizer, and other materials. It also encourages shallow grass roots which makes turf more susceptible to stress and pests. A heavy build up of thatch can require expensive dethatching. Earthworms break apart the thatch and pull organic matter into the soil. They also mix large amounts of soil into the thatch layer. This aids in a more rapid breakdown of the layer by increasing microbial activity and enhances its properties for growth of turfgrass.

Earthworms are generally found in the top 12" to 18" of the soil because this is where food is most abundant. The worm ingests soil and organic matter, which is swallowed and ground in the gizzard. The ejected material, or castings, are used to line the burrow or are deposited at the entrance. Earthworm activity depends directly on soil moisture and temperature. They become active when soil thaws in the spring and move deeper in late summer as the soil dries.

Pesticides and Earthworms

Pesticides applied to control turf diseases or insect pests may severely affect earthworms. This can be avoided by accurately identifying and assessing problems and, if a treatment is necessary, selecting products that have the least detrimental effect. Products commonly used on turf areas vary greatly in their toxicity to earthworms but some can cause severe and long term reductions in earthworm numbers (Table 1). Most of the common earthworm species in Kentucky grow slowly, live for several years, and have low reproductive rates. Consequently, repopulation of poisoned soil is slow. Preservation of earthworms is important where thatch is a problem.

Generally, the only time an insecticide application is necessary for most turf situations is to control white grubs. Information on recognition, evaluation, and treatment is available at your county extension office (ENT-10, *Controlling White Grubs*).

The following toxicity information for earthworms was obtained during a 3-year research project by the UK entomology department.

Low Toxicity (0% to 25% reduction)

Common Name	Brand Name
• chlorothalonil	Bravo
• fenarimol	Rubigan
• fosetyl-Al	Aliette
• iprodione	Chipco 20619, Rovral
• mancozeb	Dithane M-45, Manzate 200
• metalaxyl	Ridomil, Subdue
• myclobutanil	Nova, Rally
• propiconazole	Banner, Tilt
• tebuconazole	Folicur
• triadimefon	Bayleton
• dicamba	Banvel
• dithiopyr	Dimension
• isoxaben	Gallery
• pendamethalin	Pre-M, Prowl, Herbicide 2
• prodiamine	Kerb
• 2,4-D	2-4,D
• trichlopyr	Garlon
• azadirachtin	Margosan-O
• bifenthrin	Talstar
• cyfluthrin	Baythroid, Tempo

- fluvalinate Mavrik
- isophenphos Oftanol
- flurprimidol Cutless
- mefluidide Embark

Moderate Toxicity (26% to 50% reduction)

- chlorpyrifos Dursban, Lorsban
- diazinon Diazinon, Spectracide
- isazofos Triumph
- trichlorfon Proxol

Severe Toxicity (51% to 75% reduction)

- thiophanate Fungo, Cleary-3336
- thiophanate-methyl Topsim-M

Very Severe Toxicity (76% to 100% reduction)

- benomyl Benlate, Tersan-1991
- bendiocarb Turcam
- carbaryl Sevin
- ethoprop Mocap
- fonofos Crusade, Dyfonate
- phorate Thimet

To reduce detrimental effects:

- apply pesticides only when needed; eliminate preventive applications,
- especially in the spring when earthworms are near the soil surface
- select products that are least injurious to earthworms and do not exceed
- labeled rates.
- if possible, treat only infested areas

Other Factors

Excessive nitrogen applications that greatly reduce soil and thatch pH can be detrimental to earthworms. Earthworms are generally intolerant of acidic soils (pH < 6.0). Soil samples can determine fertility needs and allow management decisions that will help to maintain healthy turf and beneficial organisms.

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