# Earthworms – Can Farmers' Friend be Forests' Foe?

UCONN HOME AND GARDEN EDUCATION CENTER

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Happy are the farmers and gardeners who cultivate their fields or turnover their garden beds to find numerous earthworms working hard to improve their soil. Typically, high numbers of earthworms are associated with a healthy soil. They are even one of the field indicators for soil health assessments and for good reason. Earthworms are considered 'ecosystem engineers' meaning they have the ability to affect and change basic ecosystem processes and functions.

In manmade systems of agricultural fields and home gardens, earthworms usually bring welcome beneficial changes. As they tunnel through the soil, they create channels for air and water and plant roots to travel. This helps in water distribution as well as gas exchanges. A healthy soil breathes. As it heats up during the day, it expands allowing atmospheric gases like oxygen to enter and when the soil cools at night, it contracts allowing gases that built up in the soil, like carbon dioxide to escape.

As the earthworm feed on decaying organic matter, they also consume soil microbes and small particles of soil. After being ground up and digested, what is not used by the earthworm is excreted in the form of casts, small aggregates of nutrient rich droppings. Analyses of casts have found them to be higher in nitrogen, phosphorus and potassium than the surrounding soil. It is estimated that a single earthworm could potentially produce 10 pounds or more of casts annually. This aggregation is welcome in compacted soils as it improves the soil's structure increasing pore spaces for air and water to travel.

The nutrients bound in organic matter are transformed by the earthworm into forms that plants can easily take up. This increases readily available nutrient levels in the soil plus nutrients are also contained in the casts. As the casts slowly break down, more nutrients are released over time. Depending on the earthworm species, casts may be deposited on top of the soil, at surface levels or deeper in the soil.

While earthworms contribute greatly to the improvement of soils under cultivation, their actions result in the opposite effect in our northern forests. To see why, we need to go back in time, say about 14,000 years or so, to when glaciers covered the top part of what is now the United States coming as far down as Long Island in the east and the top parts of Washington to the west.

The glaciers decimated populations of plants and slow moving animals and when it receded, these northern areas were rendered earthworm free. As plants, including tree species, repopulated the areas once covered by glaciers,

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they co-evolved with mycorrhizal fungus species. Mutually beneficial or symbiotic relationships formed between the trees and fungi. Trees evolved to share their photosynthetic end products with the fungi in exchange for the ability to acquire more nutrients, water and protection from certain pathogens.

Over thousands of years, our woodland ecosystems became quite distinctive with their characteristic crunchy layer of fallen leaves, gorgeous ephemeral wildflowers like lady slipper orchids and trilliums, and abundant wildlife species. The forest floor or litter layer usually has several inches of leaves and other plant parts that slowly decompose releasing nutrients to the soil below. If one moves aside some of the leaves, often the white, threadlike mycelium of the fungal organisms are visible.

Enter the non-native earthworm. Many of the earthworms we find in our fields and gardens were introduced by early European settlers as they brought plants over from the Old World or in the ballasts of ships. These European earthworms thrived in cultivated areas and diligently worked to improve the soil. They move very slowly by themselves, perhaps a half mile over 100 years.

About 70 years ago, a new species of earthworm was first detected in some forests in New York. It was noticed because areas of woodlands were losing their leaf litter covering and upon closer inspection, Asian snakeworms (*Amynthas spp.*) were discovered. These are large, ravenous, non-burrowing, surface feeding earthworms that thrash wildly when disturbed. Adults may reach 8 inches in length.

They are now found in all New England states and also, in Oregon. When present in woodland settings, they devour the leaf litter layer and in doing so, change the forest ecosystem. The leaf litter layer serves as a home to many creatures including birds, mammals, amphibians, reptiles, insects and microbes. Once their home is gone, they are too. Various species of wildflowers use this layer as a germination medium. Seeds of trees drop into the fallen leaves and some are hidden from squirrels and other seed eaters allowing them to germinate and slowly replace the forest trees as they mature and die.

Vast amounts of casts are deposited as the Asian snakeworms feed. These small aggregates are high in organic matter and nutrients. Large amounts of nutrients are released to plants, often more than the plants can absorb especially since the mycorrhizal fungus populations are declining. Instead of being conserved in the slowly decomposing litter layer, the excess nutrients can be lost by leaching. Also, the casts are quite light when dry and can easily be washed away by heavy rains.

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Too many, it seems incredible that these relatively small creatures can cause so much havoc to our natural ecosystems. Presently there is no control for any type of earthworm but Dr. Josef Gorres from the University of Vermont is experimenting on biological control agents. In the meanwhile, do your best to not spread these earthworms when sharing plants and always check out compost and mulch piles before having any delivered. Asian snakeworms can be collected and dispensed with in whatever manner one sees fit. Cornell has an excellent fact sheet on thesenvasive worms: https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/a/4227/files/2017/11/JumpingWoms_FactSheet-11_15_17-2026fwt.pdf

For questions on the Asian snakeworms or on for other horticultural topics, feel free to contact us, toll-free, at the UConn Home & Garden Education Center at (877) 486-6271, visit our website at www.ladybug.uconn.edu or contact your local Cooperative Extension center.

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