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Blame Your Allergies on the Earthworm

by Stacy Kish, CSREES

While not as menacing as the sci-fi B-movie cult classic *Attack of the Killer Tomatoes*, agricultural scientists have discovered a dark side to, gulp, the earthworm. >>

Worms may delight gardeners with their ability to aerate the soil, but these organisms are not native to the northern regions of the United States and may be responsible for altering an ecosystem that developed in a worm-free environment.

With funding from USDA's Cooperative State Research, Education, and Extension Service (CSREES), scientists in Ohio are exploring a sinister link between earthworms and common allergens.

Scientists believe that when the last advance of glaciers plowed through northern portions of the North

American continent, they not only carved out and flattened land features, but they also eradicated the common earthworm. The gardener's best friend was reintroduced to the region only recently by colonists – and with mixed results.

In order to survive, native plants receive nutrients from the mulch of forest litter that collects on the forest floor. Scientists believe the introduction of nonnative earthworms is affecting the composition of weedy communities in crop fields because the litter is also the main meal for earthworms.

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Right: The earthworm, *Lumbricus terrestris*, dragging a giant ragweed seed to its burrow.

Credit: Kent Harrison



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Emilie Regnier and colleagues at Ohio State University determined that the rapid burrowing of earthworms, specifically the exotic European night crawler, is responsible for dragging ragweed seed from the soil surface in crop fields. This new insight explains why ragweed seeds, which are quite large and are known to be eaten in large numbers by birds and rodents, manage to survive, especially in no-tillage fields where the seeds have no means of getting into the soil quickly.

“The worms are amazing collectors, effectively transporting and burying 90 percent of ragweed seeds from the soil surface into their burrows. Some of the seeds were transported as deep as 22 centimeters,” Regnier said.

The research team painstakingly tied string to ragweed seed and waited. As each seed was carried to the worm’s subsurface lair, the string marked the path the worm followed.

The researchers noted that seeds dragged into the worm burrows grew into healthier plants, which suggests that the earthworms are actively altering the composition of weed communities.

Ragweed is a native plant to temperate regions of North America and South America. This weed is notorious for its effect as an allergen and as a weed in soybean and corn fields in the Midwest United States. The Asthma and Allergy Foundation of America indicates that up to

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20 percent of Americans suffer from ragweed allergies and that \$7 billion are expended on allergies annually.

“We were astonished by how quickly the seeds were removed,” Regnier says. “This work enhances our understanding of plant-animal interactions. We think of ants, mice, and squirrels as being very important in dispersing seeds,” she said, “but here’s a new mechanism — earthworms are burying them quite deliberately.”

The next time you have an allergy attack, don’t shake your fist at just the pollen in the air, but also at the innocuous little worm underfoot.

CSREES funded this research project through the National Research Initiative Biology of Weedy and Invasive Species in Agroecosystems program. Through federal funding and leadership for research, education and extension programs, CSREES focuses on investing in science and solving critical issues impacting people’s daily lives and the nation’s future. For more information, visit www.csrees.usda.gov. ■

References

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