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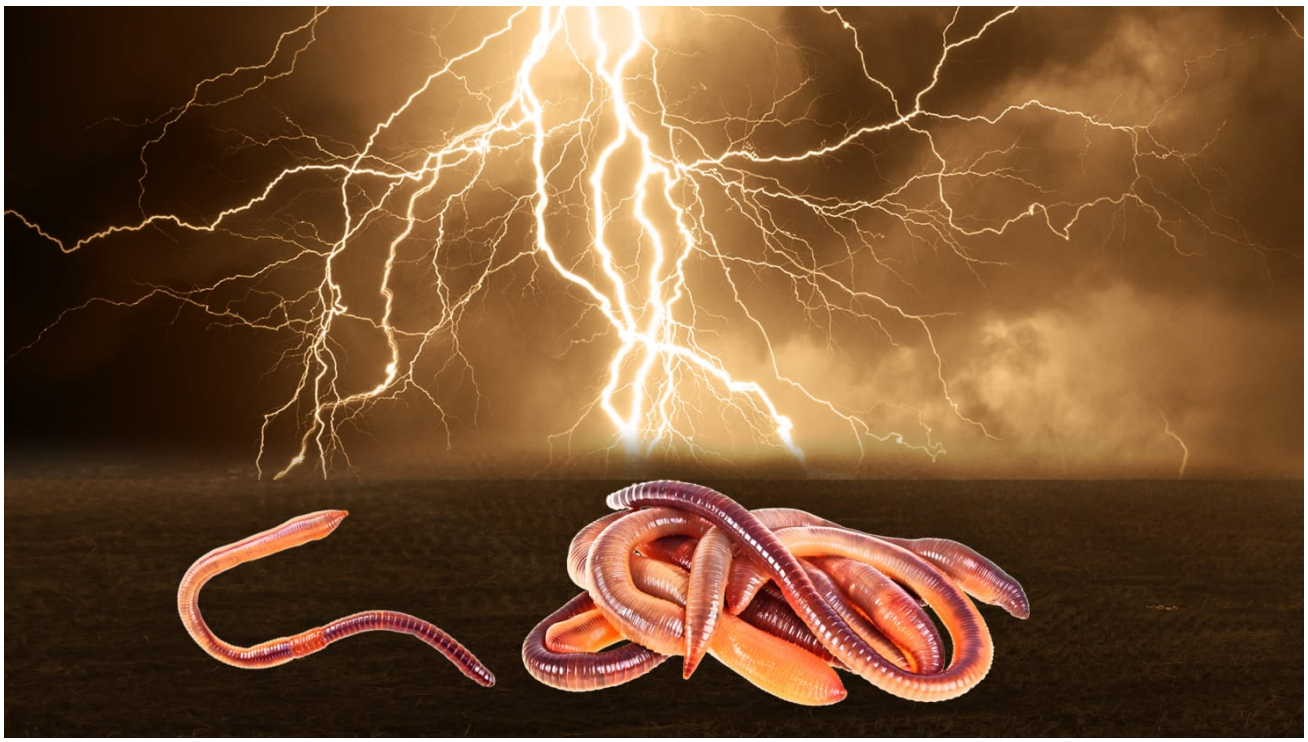

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WORM FOOD

The Coming Worm Apocalypse Should Terrify You

Worms may not be warm and fuzzy, but their essential role in many ecosystems across this planet makes them canaries in the agricultural coal mine.

David R. Montgomery

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You can't avoid the zombie apocalypse in popular culture. But you may not have heard about the real one going on right beneath your feet: A worm apocalypse has been transforming farmland around the world.

Why should you care? If you dreamed up plots to quietly undermine civilization, few could be more diabolical than destroying its foundation—the soil life that builds the fertility of the farmland we depend on to grow our food.

Still, it's safe to say that most of us missed the recent study in the journal *Soil Systems* that lays out the case for the worldwide decimation of earthworms. Yet this new report offers a stark assessment of the health of Earth's agricultural soils. And that should concern us all.

The study reviewed global evidence for loss of earthworms under modern conventional farming. Long-term farming trials—some that have run for over 170 years—consistently found losses of 50

percent to 100 percent of worm biomass, with an average loss of more than 80 percent.

In other words, modern farming practices have killed off four out of five worms that once lived on farms. Farmers around the world have been turning verdant fields into subterranean deserts.

"Practices that form the backbone of modern conventional agriculture destroy worm food and decimate soil life."

This matters because recent scientific advances have shown how soil life partners with plants through the original underground economy. For example, plants, we now know, push sugary exudates out of their roots for microbes to lap up like dogs at breakfast. They don't do this for free. The plants get something in return. Soil microbes consume and convert the exudates into metabolites that benefit the growth and health of their botanical hosts.

And no less than Charles Darwin recognized the importance of worms mixing organic matter into fertile soil. He called worms "God's ploughmen" and spent his whole career studying them. Both his first scientific paper and his last, lifetime best-selling book addressed the importance of lowly worms in keeping soils fertile.

So just what's been killing off the world's worms? The new study blames tillage (plowing) and intensive use of chemical fertilizers that deplete soil organic matter. In other words, practices that form the backbone of modern conventional agriculture destroy worm food and decimate soil life. In the U.S. and around the world, soil organic matter levels are roughly half of their historical levels before the advent of modern agriculture.

Soils are nature's recycling system that converts once living matter—the remains of plants and animals—back into the building blocks of new life that plants can take back up and reuse. Carbon-rich soil organic matter is a source of nutrients and fuel for soil life. Less organic matter means less worm food, and thus fewer worms—and thus less mixing of mineral and organic matter. And the loss of soil life makes farmers more dependent on chemical fertilizers to keep up crop yields.

"The worm apocalypse is one we can't afford to ignore."

Is degrading the soil and killing off worms and other soil life an inevitable consequence of intensive agriculture? Hardly. Bringing soil back to life can be done on commercial farms. How do I know? Researching my most recent book, *Growing a Revolution: Bringing Our Soil Back to Life*, I visited farmers around the world who already did so on small-scale subsistence farms in Africa and Costa Rica and large commodity crop farms across North America.

These farmers shared a common set of principles that underlay their unconventional practices. They cultivated beneficial soil life—like Darwin's worms. Specifically, they minimized their disturbance of the ground, planted cover crops to protect their soil and introduce organic matter to their fields, and diversified their crop rotations to include more than one or two crops. Some even brought livestock back onto their farms to manure their land. These were not radical organic farmers, but conventional farmers who had adopted practical new ways of doing things.

Their practices merged the modern technology that allows no-till farming with the ancient wisdom of cover crops, crop rotations, and manuring. Farmers who had adopted all of these practices built up their soil organic matter and the life in their soil, and did so remarkably fast—in years not decades. As the health of their soil improved they found they could harvest as much—if not more— with far less fertilizer, diesel, and pesticide. And this saved them money, making their farms more profitable.

Worms may not be warm and fuzzy, but their essential role in many ecosystems across this planet makes them canaries in the agricultural coal mine. And unlike the ever-popular zombie apocalypse, the worm apocalypse is one we can't afford to ignore. For we need fertile soils to feed the world today—and into the future.