The New York Times https://nyti.ms/2Bj9iDU

IN THE GARDEN

As Summer Takes Hold, So Do the Jumping Worms

These invasive pests, which ravage the soil and damage plant life, are easiest to spot now, in their adult form. But what to do if you see them?

By Margaret Roach

July 22, 2020, 6:00 a.m. ET

In decades of writing about gardening, I have covered outbreaks and subsequent attempts at control of many invasive pests, from the hemlock woolly adelgid to the emerald ash borer. But there's one I haven't been able to stop thinking about since I learned of it in 2013.

Coming soon to a backyard or a forest near you (or maybe already there): the invasive jumping worm.

These Asian earthworms in the genus Amynthas or Metaphire — referred to in attention-grabbing headlines and YouTube videos as "crazy worms" or "snake worms" — do not target a particular organism the way many pests do. Instead, they ravage the soil on which all plant life relies. They process the organic matter in the top layer, including fallen leaves in the forest and garden mulch, so fast that the soil is often reduced to mineral content, a condition hospitable to neither roots nor soil-dwelling organisms.

Aided by human activity, the worms' tiny, easily missed cocoons have been moved around in tire treads, in compost or mulch and in the sale of plants. And gardeners who don't recognize them can worsen the situation by sharing plants or tracking the cocoons around.

If your soil looks different lately — if it resembles coffee grounds or hamburger meat — and some plants have stopped thriving, you may have an invasion on your hands.

As disruptive as they are in gardens, the worms are devastating in natural areas. Parts of the western Great Smoky Mountains National Park, where they were first seen in the 1990s, are already degraded. Their increasing presence in the Upper Midwest and Northeast raises concern for the Great Lakes and New England forests. Areas as wide-ranging as Oregon and Nebraska have them, too; lately, Iowa, Minnesota and Illinois joined the list.

"This is more systemic, ecosystem-wide damage — not species-specific," said Josef H. Görres, an associate professor in the department of plant and soil science at the University of Vermont, who has studied them since 2011. "It changes the soil food web in the forest."

Bradley M. Herrick, a plant ecologist at the University of Wisconsin-Madison Arboretum, who has been studying Asian jumping worms since discovering them on the grounds in 2013, holds a handful of adult Amynthas worms, with their distinctive, milky-white bands. Eric Hamilton/UW-Madison Communications

At the University of Wisconsin-Madison Arboretum, study of the worms began after they were discovered on the grounds in 2013. “They may have a cascading, behind-the-scenes impact that might not happen tomorrow, but that will eventually affect other organisms at a higher trophic level,” said Bradley M. Herrick, a plant ecologist and the research program manager at the arboretum.

Jumping worms are an annual species, hatching, reaching adulthood and dying in a single season, with only the next generation of cocoons overwintering. But that overwintering can last multiple years, making pest management daunting.

Now, as summer takes hold, the worms are coming into their active adult period — the moment when they are relatively easy to distinguish from other earthworms.

I asked Mr. Herrick and Dr. Görres about current research on potential solutions and what to do if you think you’ve got the worms in your garden.

Earthworms 101: The Short Version

In the last ice age, glaciers scraped down to bedrock, so in glaciated areas like New England, the Upper Midwest and Canada, no native earthworm species have existed for at least 11,000 years, roughly when the most recent glacial period ended. Any earthworms present there — including the common night crawler — are of European origin, presumably brought over by settlers as part of ship ballast material or in soil around plant roots.

Asian earthworms were first identified in the United States in the 1870s, in California, Dr. Görres said. Anecdotal reports suggest they migrated to the East Coast with Washington's famed cherry trees, and moved on to Baltimore and then Massachusetts in the 1930s and to New York, near Albany, in the 1940s.

"But in terms of scientists noting a wider invasion, it's been the last 10 or 15 years," Mr. Herrick said.

Their diversity-reducing effects have been documented on forest trees and the herbaceous layer below, which fail to flourish and regenerate. Soil-dwelling organisms like millipedes decline; salamanders and ground-nesting birds suffer. At the arboretum in Madison, the jumping worms are already displacing other earthworms.

Invasive jumping worms degrade topsoil by processing leaf litter, mulch or other organic matter rapidly, leaving behind a distinctive soil signature often described as resembling coffee grounds, which disrupts the soil food web. Susan Day/UW-Madison Arboretum

But Aren't Earthworms Beneficial?

In man-made environments like farms and gardens, earthworms have generally been regarded as soil-aerators and efficient recyclers that break down and then return organic material to the soil. But natural habitats like the hardwood forests of the Northeast and Upper Midwest, which regenerated after the last ice age as earthworm-free ecosystems, historically rely on fungi, bacteria and other less-aggressive leaf-litter feeders, or detritivores, to recycle slowly.

"Earthworms, whether European or Asian, literally consume the forest's duff layer — that organic, spongy, highly nutritious layer plants need especially when germinating, like tree seedlings trying to establish," Mr. Herrick said.

In some research plots infested with Asian worms, Dr. Görres said, the average number of maple saplings per square

meter was just half a sapling, while “outside their presence, you’d find 10.”

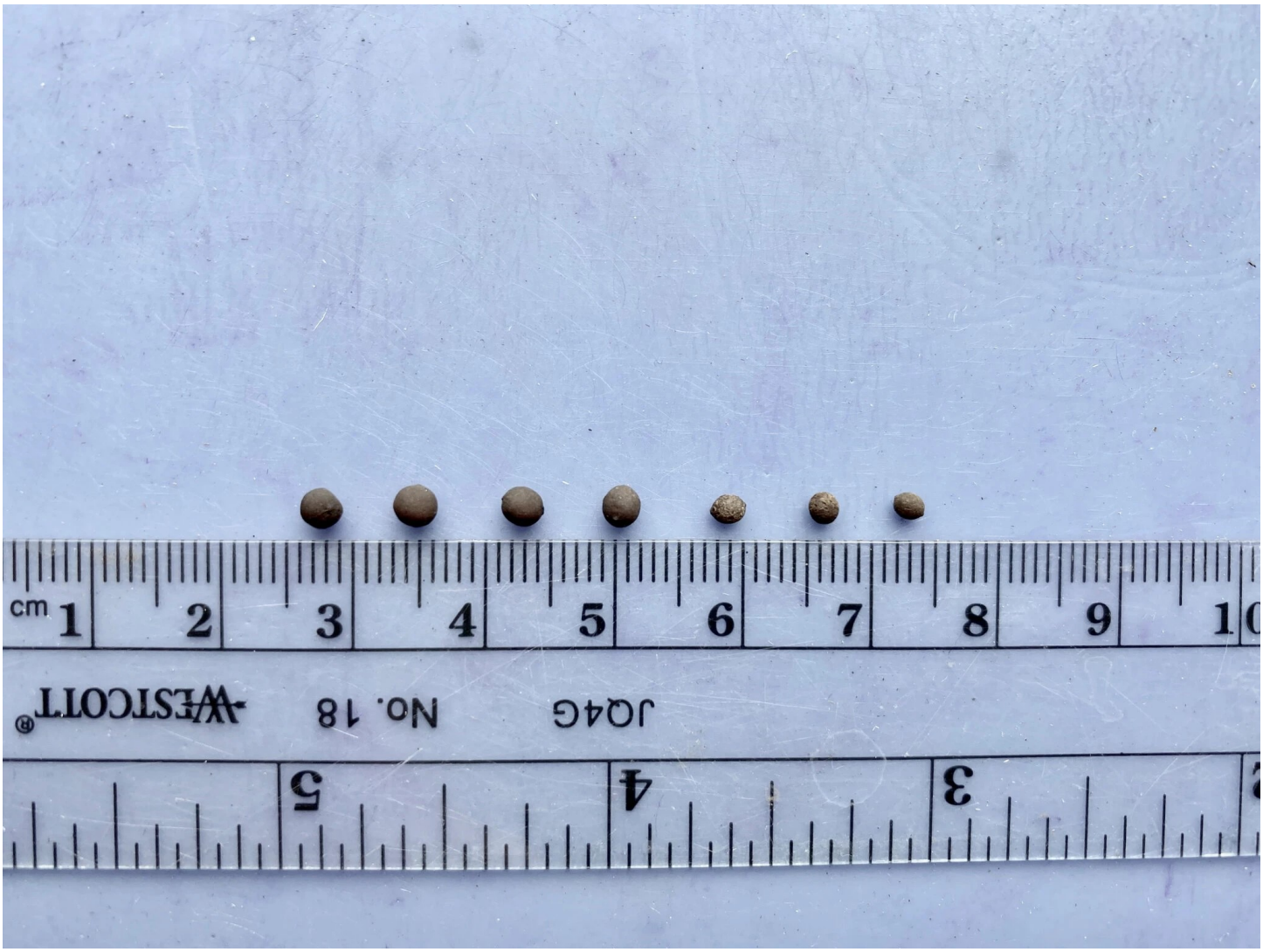
How to Identify Them

One clue to the presence of Asian jumping worms is the texture of the soil. They live in dense populations in the top few inches, so their work is often evident. Be sure to check under the leaf litter, too.

“If you’re seeing little piles of soil or middens, like on your lawn, those are likely European species,” Mr. Herrick said. “But more of a uniform, coffee-ground-like soil signature, very loose and granular, is a telltale sign you have the Asian variety.”

Adult worms observed in early spring are unlikely to be jumping worms, as they don’t grow to adult size until at least midsummer. A distinctive tell is a milky-white band, or clitellum, around a worm’s body. In Asian worms, it is smooth and goes all the way around, close to the animal’s front end; in European worms, the clitellum is more saddle-like.

The way the worms move offers another clue: Asian worms’ movement is snakelike, and they may thrash, especially if disturbed.



The worms hatch from tiny, almost invisible cocoons deposited in the soil, reaching adulthood and dying in a single season. The cocoons, however, can overwinter for multiple years, making them difficult to control. Maryam Nouri-Aiin, Plant and Soil Science Department, University of Vermont

What's Being Done to Stop Them?

Research on various adult and cocoon controls is underway in many regions. Heat is among the tactics being explored, from prescribed burns to soil solarization. Mr. Herrick's team, for example, came up with safety recommendations for commercial compost by determining that anything heated to at least 104 degrees for three days contained no viable cocoons.

Others are looking into plant-based chemical compounds called saponins, inspired by the worm-reduction results produced by a golf-course fertilizer (no longer on the market) made from tea seed meal. Could other saponin sources — including alfalfa, quinoa and even natural soap — be equally effective?

There are two ways of getting rid of cocoons in the soil, Dr. Görres said: "We develop some 'pixie dust' that kills them, which doesn't exist yet, or we determine how not to have juveniles turn to adults and lay them."

At his lab, research is being done on various biocontrols, including fungi that have been used on insects in Integrated Pest Management programs. Researchers are tinkering with formulations of the entomopathogenic fungi Beauveria bassiana, which is certified for greenhouse use and therefore presumably not harmful to plants. It seems to be working on worms.

Other factors may figure into a solution: Jumping worms don't like drought, Dr. Görres said (although cocoons remain viable through it, and through frost). And they need 90 frost-free days to go from hatchling to adult and to begin to produce cocoons.

"It would be nice to give a recommendation of a best date for intervention," he said. "However, it will take a model that takes into account the last day of frost, temperature and rain to predict the peak. We are working on it."

This year, Mr. Herrick is testing how two species of jumping worms respond to various litter types, from tree leaves to prairie grasses. The results could help determine the potential vulnerability of certain habitats.

In a research program run by Josef H. Görres, an associate professor in the department of plant and soil science at the University of Vermont, Maryam Nouri-Aiin, a doctoral candidate, checks on an experiment on biological control of invasive jumping worms, testing various formulations of entomopathogenic fungi in pots of geraniums. Jessica Rubin, Plant and Soil Science Department, University of Vermont

What Can I Do?

First, if you have jumping worms, report them — to your state department of natural resources or your local cooperative extension. Your data may help scientists.

And if you're game, you can try the same saponin experiment Dr. Görres is conducting in his home garden in Vermont: Using a low-concentration soap solution, he is drenching small areas where he finds adult worms — perhaps a tablespoon of natural, plant-based soap in three or four gallons of water. (Just be sure to avoid areas close to water; saponins should not be used near streams.)

"I will try it gradually on spots where we don't mind if it goes wrong," he said, "like in between plants in a mulched area. See how many worms surface, then die, that you can extract. If you feel that it helps, try it next on a small area of pretty robust plants."

Should I Keep Mulching?

"People want to know, 'Should I add more organics?'" Mr. Herrick said.

In his garden, Dr. Görres has stopped mulching, other than on new plantings, after watching several inches of wood mulch disappear in the space of six months a decade ago. But that might not work for you.

“The answer is complicated; it depends on what your other needs are,” Mr. Herrick said. “It’s one thing to try to get rid of a pest, but at the expense of what? It’s a bit of ‘damned if I do and I don’t,’ because it protects plants, but it’s also food for earthworms. Right now, since we have no silver-bullet control, it’s a little bit of ‘choose your own adventure.’”

For weekly email updates on residential real estate news, sign up here. Follow us on Twitter: @nytrealestate.