

Waste-eating worms could help reduce damaging greenhouse emissions from dumping food waste into landfill

January 15 2024, by Ashley Miznazi, Miami Herald



Credit: Sippakorn Yamkasikorn from Pexels

Fertile Earth Worm Farm is the largest commercial composting operation in South Florida, diverting tons of food scraps from landfills

and transforming it into dark, crumbly garden soil.

"Anything that used to live can be composted. We all turn back to stardust," said Lanette Sobel. Worms are essential to her specialized six-acre farm in Homestead. "To me, this is the basis of what Mother Nature intended. This is about circular economy. This is about keeping things where they're supposed to be and making a better future."

Sobel is an ardent apostle of the power of worms to help humanity with its mounting waste problems. But she is also a scientist by training who has studied the process of decay up close. If it began life sprouting or breathing, she's tried composting it. Fruit, veggies, cardboard, paper, fish, bones, discarded meats, pig heads and all sorts of assorted animal parts.

"I joke a lot that the mafia would hire me because I can turn anything into soil," said Sobel, who lives in a silver Airstream trailer on a funky farm that boasts organic gardens and things like an old boat hull serving as a worm bed.

Fertile Earth Worm Farm has been in the business for 15 years—at this site for the last several—and it's quite possible some of your leftovers have ended up consumed by Sobel's worm force. Big-name enterprises across Miami-Dade, Broward and Palm Beach counties—including the Miami Marlins, Miami Heat, Starbucks, Whole Foods and Chipotle—supply Sobel and her staff of six food waste for the compost piles and worms.

"We hope to get bigger, we need to get more people on board, we want to work with the cities and the counties," she said.

But that's been a challenge. Climate and waste experts believe more large-scale composting operations like this one could help reduce damaging

greenhouse emissions from dumping [food waste](#) into traditional landfills. But composting remains a tiny part of the waste industry and operators like Sobel struggle with confusing regulations and a lack of government support—Miami-Dade, for instance, failed to secure a federal grant last year that could have helped expand composting efforts across the county.

Not stinky, or gross

Composting may seem mysterious and off-putting to many people. For starters, it sounds like it might be a stinky business.

On an early November morning when the Herald visited Fertile Earth Worm Farm, some 11,000 pounds of raw meat had been buried under one mulch pile. There was not a single fly in sight. And the air was surprisingly pleasant, with an earthy after-rain aroma. At a farm next door, meanwhile, black vultures circled over some unknown decaying thing, the birds unaware of the vulture dream buffet of decay happening under the compost pile.

Worms also come with a decided gross image. That's a perception Sobel often strives to correct.

Sitting on the kitchen table of her Airstream is a portable tank display of worms she brings to farmer's markets. It helps her explain the many ways worms can deal with waste. She also keeps a bucket of seaweed-eating earthworms in her shower. Reaching in, she pulls up a handful of these "special worms"—they look like pink linguine squirming in her fingers—and talks about how they might be a potential solution to disposing of tons seaweed piling up on Florida, Caribbean and Mexican beaches, organic material now mostly trucked to landfills.

Though she can sometimes sound like a philosopher, Sobel comes to her

business with academic credentials. She has a master's degree in forest pathology and a doctorate in plant medicine from the University of Florida. And after more than a decade of raising earthworms, she also has gotten really good at understanding worm wants and habits. She knows some don't like milk or meat, but will eventually eat it. If they crawl out, it's time to check the moisture. And that "red wigglers" are less likely to flee.

"I find the other earthworms harder to raise," she said. "These stick around unless there's an issue."

Worms to the rescue on emissions?

The potential benefits from expanded, well-run composting systems are many—and the threat of climate change has renewed interest for researchers looking for ways to reduce damaging emissions.

That's largely because when living things are composted, the carbon is stored in the soil rather than released into the atmosphere. When that food gets thrown into landfills instead, it also generates methane, an even more potent greenhouse gas than CO₂.

In the U.S., food is what's most commonly sent to landfills, making up about 24% of solid waste. When wood and paper are included in the count, these organic materials make up 51% of landfill waste, according to the U.S. Environmental Protection Agency.

Studies also show compost grows taller and tastier plants. Compost is rich in organic matter like carbon, nitrogen and phosphorus that boosts the health of the soil, said Florida International University microbiologist and soil scientist, Krish Jayachandran.

"It is recycling materials into a renewable resource Miami can use,"

Jayachandran said. "If we use compost, we don't have to rely on chemical fertilizers that can leech into our waterways."

Apart from carbon sequestration and improving soil health, Jayachandran said most of South Florida was built on bedrock so the region could use more of its own organic soil.

The soil from Fertile Earth helps support a community garden. Every few days, volunteers come out to tend to garden beds bordered by bamboo tree cutting. Last month, they were blossoming with kale, dill, Cuban oregano, cranberry hibiscus all planted in compost.

"The idea of this is to use the Earth's materials to help families self-sustain themselves," Shae Waits a leading volunteer at Fertile Earth Worm Farm's community garden said.

Windrows and worms

The composting process at Fertile Earth Worm Farm isn't reinventing the wheel. It's mostly letting nature take its course. After trucks bring thousands of pounds of organic material back to the farm, the composting happens in a few stages.

It starts with mixing the "browns and greens" which is mulch and living material, like food. That's flipped and rotated up to six times.

The organic material is then put into rows of long piles called "windrows" that heat up as billions of tiny microbial bacteria break down the [organic material](#). The ideal pile height is between four and eight feet with a width of 14 to 16 feet, according to the EPA.

Sobel measures the temperature of the piles to make sure they're above 131 degrees for over 15 days which kills off disease and weed seeds. To

be ready to put in the garden, the piles have to cool down to 80 degrees which can take anywhere from three to six months. The process can stop there, or the compost material can be fed to the helpful worms.

'A science and an art'

When worms eat they make castings—which is just a fancy name for worm poop. The castings are a more granulated version of compost, richer for gardening.

Sobel's neighbor in the Redland, Peter Fedele, started a post-retirement career in sustainable farming a few years ago with five pounds of worms. Now, there are about a million at his Lion Fruit Farms. Sobel and Fedele now have a partnership where she brings over food for his worms, and keeps some of her worms at his place too.

"Worm farming is a combination of a science and an art," Fedele, 71, said. "Basically, there's a balance on how you feed them and how you water them."

The majority of worm farmers live up north and are mainly sell to bass and freshwater anglers. Fedele learned a trick from them that one of the best treats to give worms is cold rabbit "pellets"—AKA poop. So he started breeding New Zealand rabbits.

"We feed our plants, the plants feed the rabbits, which poop and feed the worms like a full cycle process," Fedele said.

Nestled under a shaded canopy on Lion Fruit Farms' 15-acre property, eight raised aluminum garden beds, about two feet deep, house 28 different worm beds. The [worms](#) take more than 8,000 gallons of feed a week, which is a combination of things like compost, pellets, avocado and watermelon.

Worm castings can also be brewed into a "worm tea." You won't want to drink it but your plants may fruit and flower more from the microbes and plant hormones, Fedele said. Bananas, sugar apples, soursop, avocados and turmeric spice all sprout around the farm seem to thrive on the stuff. Each tree has an irrigation jet that connects to thousands of feet of underground piping that waters the plants with worm tea.

"We don't use any chemicals whatsoever, but you still need to bring balance back to the plants," Fedele said.

Jayachandran and his students at FIU are analyzing the turmeric and tomatoes at Fidele's farm to see assess how much it benefits growth. Jayachandran said the results are "striking" so far.

Large-scale composting in South Florida?

Other states and some communities in Florida have created robust composting programs. Miami-Dade has lagged behind but last year was selected to receive funding to jump-start a pilot composting program that would scale up the three locally-owned compost operations in the county, including Fertile Earth Worm Farm.

The vision was to use the money to make a commercially viable compost that could be used in county parks. But the grant expired before the county could check all the regulator boxes to secure it. Composting is a complicated business, falling under a number of agencies. Its classified as a solid waste operation that can only happen on industrial-zoned land, even through the end product is designed to be used in farming and gardening. There are also environmental questions about impacts on ground water and other potential public health issues.

In a statement issued through the mayor's office, the county said the timeline for the grant didn't align the county's review of the nascent

composting industry. Over the course of the next year, the statement said the county planned to bring "further code and regulatory changes" to accelerate composting opportunities for agricultural businesses. In December, the Miami-Dade County Commission passed a legislative item calling for the mayor to draft a report and recommendations on composting.

"Composting has been very neglected in this county," Eileen Higgins, the commissioner sponsoring the legislation, said. "I wanted to make sure the mayor was paying attention to this as she brings forward the solid waste plan."

A USDA spokesperson said that over the course of six months, the agency met multiple times with the county to discuss adjustments. "Ultimately, the county was unable to arrive at a final proposal before funds expired," the spokesperson wrote in a statement to the Herald.

Sobel sees the lost grant as part of long pattern of resistance. "What ended up happening is they said they would change the code to make it more permissible for companies like us to compost, and they didn't even do that," she said.

A few weeks after the Herald asked about the grant issues, Sobel also received a warning notice citing a DERM visit to her site 10 months ago. They're giving her 30 days to submit an "Agriculture Use Plan" to prove the farm is beneficial and not a threat to public health.

In 2010, Sobel worked with the county on a pilot composting project financed by an EPA grant that brought food from hotels to a mulching facility in Virginia Key. It was just a six-week effort, she said, but it took 18 months to secure a permit. Sobel said that even though it was successful, the program never got more funding.

"We can't keep doing business as usual," Sobel said. "These landfills are just holding cells."

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Citation: Waste-eating worms could help reduce damaging greenhouse emissions from dumping food waste into landfill (2024, January 15) retrieved 28 April 2024 from <https://phys.org/news/2024-01-worms-greenhouse-emissions-dumping-food.html>

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