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Something's Poisoning America's Land. Farmers Fear 'Forever' Chemicals.

Fertilizer made from city sewage has been spread on millions of acres of farmland for decades. Scientists say it can contain high levels of the toxic substance.



Hiroko Tabuchi traveled to Texas and Michigan and interviewed ranchers, scientists, investigators and wastewater-treatment experts for this article.

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For decades, farmers across America have been encouraged by the federal government to spread municipal sewage on millions of acres of farmland as fertilizer. It was rich in nutrients, and it helped keep the sludge out of landfills.

But a growing body of research shows that this black sludge, made from the sewage that flows from homes and factories, can contain heavy concentrations of chemicals thought to increase the risk of certain types of cancer and to cause birth defects and developmental delays in children.

Known as “forever chemicals” because of their longevity, these toxic contaminants are now being detected, sometimes at high levels, on farmland across the country, including in Texas, Maine, Michigan, New York and Tennessee. In some cases the chemicals are suspected of sickening or killing livestock and are turning up in produce. Farmers are beginning to fear for their own health.

The national scale of farmland contamination by these chemicals — which are used in everything from microwave popcorn bags and firefighting gear to nonstick pans and stain-resistant carpets — is only now starting to become apparent. There are now lawsuits against providers of the fertilizer, as well as against the Environmental Protection Agency, alleging that the agency failed to regulate the chemicals, known as PFAS.

In Michigan, among the first states to investigate the chemicals in sludge fertilizer, officials shut down one farm where tests found particularly high concentrations in the soil and in cattle that grazed on the land. This year, the state prohibited the property from ever again being used for agriculture. Michigan hasn't conducted widespread testing at other farms, partly out of concern for the economic effects on its agriculture industry.



A cattle barn in Michigan, now empty, after the land and the animals were found to be contaminated. Emily Elconin for The New York Times



One of the animals from the contaminated herd Michigan. Emily Elconin for The New York Times

In 2022, Maine banned the use of sewage sludge on agricultural fields. It was the first state to do so and is the only state to systematically test farms for the chemicals. Investigators have found contamination on at least 68 of the more than 100 farms checked so far, with some 1,000 sites still to be tested.

“Investigating PFAS is like opening Pandora’s box,” said Nancy McBrady, deputy commissioner of Maine’s Department of Agriculture.

In Texas, several ranchers blamed the chemicals for the deaths of cattle, horses and catfish on their properties after sewage sludge was used as fertilizer on neighboring farmland. Levels of one PFAS chemical in surface water exceeded 1,300 parts per trillion, they say in a lawsuit filed this year against Synagro, the company that supplied the fertilizer. While not directly comparable, the E.P.A.’s drinking-water standard for two PFAS chemicals is 4 parts per trillion.

“We were so desperate to figure out what’s going on, what’s taking our cows from us,”

said Tony Coleman, who raises cattle on a 315-acre ranch with his wife, Karen, and her mother, Patsy Schultz, in Johnson County, Texas.

“When we got the tests back, everything started to make sense,” Mr. Coleman said.

Synagro, which is owned by Goldman Sachs Asset Management, said it was “vigorously contesting” the allegations. It said its preliminary study of PFAS levels where the sludge was applied showed numbers “drastically lower” than what the plaintiffs claimed, less than 4 parts per trillion in surface water, for example.

“Synagro does not generate PFAS or use them in our processes,” said Kip Cleverley, the company’s chief sustainability officer. “In other words, we are a passive receiver, as are our wastewater utility partners.”



“Everything started to make sense,” said Tony Coleman, seen here with his wife, Karen. Jordan Vonderhaar for The New York Times

At the center of the crisis is the Environmental Protection Agency, which for decades has

encouraged the use of sewage as fertilizer. The agency regulates pathogens and heavy metals in sewage fertilizer, but not PFAS, even as evidence has mounted of their health risks and of their presence in sewage.

The E.P.A. is currently studying the risks posed by PFAS in sludge fertilizer (which the industry calls biosolids) to determine if new rules are necessary.

The agency continues to promote its use on cropland, though elsewhere it has started to take action. In April, it ordered utilities to slash PFAS levels in drinking water to near zero and designated two types of the chemical as hazardous substances that must be cleaned up by polluters. The agency now says there is no safe level of PFAS for humans.

The government was working “to better understand the scope of farms that may have applied contaminated biosolids and develop targeted interventions to support farmers and protect the food supply,” the E.P.A. said in a statement.

Research has shown that PFAS can enter the human food chain from contaminated crops and livestock.



A Texas field fertilized with biosolids from Synagro. Jordan Vonderhaar for The New York Times



A watering hole on the Coleman farm. Jordan Vonderhaar for The New York Times

It's difficult to know how much fertilizer sludge is used nationwide, and E.P.A. data is incomplete. The fertilizer industry says more than 2 million dry tons were used on 4.6 million acres of farmland in 2018. And it estimates that farmers have obtained permits to use sewage sludge on nearly 70 million acres, or about a fifth of all U.S. agricultural land.

Sewage sludge is also applied to landscaping, golf courses and forest land. And it has been used to fill up old mines.

"There's clearly a need to test every place where biosolids were applied," said Christopher Higgins, a professor of civil and environmental engineering at the Colorado School of Mines. "And any industrial facility that is discharging waste to the municipal wastewater facilities probably should be tested."

Scientists point out that sludge fertilizer has benefits. It contains plant nutrients like nitrogen, phosphorus and potassium. It helps reduce the use of fertilizers made from fossil fuels. It cuts down on the millions of tons of sludge that would otherwise be

incinerated, releasing pollution, or would go to landfills, generating greenhouse gases as it decomposes.

“Yet all of the chemistry that society produces, and is exposed to, is in that sewage,” said Rolf Halden, professor of environmental biotechnology at Arizona State University, among the earliest researchers to study PFAS in sewage sludge.

The smell of death



A stillborn calf found contaminated with PFAS. Jordan Vonderhaar for The New York Times

Dana Ames, an environmental crimes investigator at the Constable's Office in Johnson County, cut her teeth working missing-person cases and grisly homicides. But her first encounter with sludge fertilizer still came as a rude shock.

A farmer had applied the sludge to his fields, and two neighboring ranchers lodged a complaint about the smell. She drove out to investigate.

“I rolled down the window and I literally almost projectile vomited in my vehicle,” she said. “I’m accustomed to smelling death. This was worse than death.”

That call led to a remarkable investigation, overseen by Ms. Ames, into PFAS contamination of the sludge being spread in her county. She obtained a sample of the fertilizer and found it contained 27 different types of PFAS, at least 13 of which matched the PFAS in the soil and water samples from the two ranches.

And when a calf was stillborn at the Coleman ranch, she rushed the carcass to a lab at Texas A&M University. Testing revealed its liver to be full of PFAS: 610,000 parts per trillion.



A smell “worse than death,” Ms. Ames said. Jordan Vonderhaar for The New York Times



James Farmer has sued Synagro over PFAS in fertilizer. Jordan Vonderhaar for The New York Times

In February, Ms. Ames and other local officials called an emergency meeting about their findings. “This isn’t just isolated to this county, or even multiple counties. This is going on all over,” said a county commissioner, Larry Woolley. “And the amount of beef and milk that’s gone into the food chain, who knows what their PFAS levels are.”

This year the Colemans and their neighbors James Farmer and Robin Alessi sued the biosolids producer Synagro and also the E.P.A., saying the agency had failed to regulate the chemicals in fertilizer.

They have stopped sending their cattle to market, saying they don’t want to endanger public health. Their days are now filled with long hours of caring for a herd they don’t expect to ever ship.

To cover the costs, they work extra jobs and have dipped into their savings. They fear they have lost their livelihoods forever.

“A lot of people are still scared to talk about it,” Mr. Coleman said. “But for us, it’s all about being honest. I don’t want to hurt anybody else, even though we feel people have hurt us.”

Mountains of sludge



A Synagro processing facility in Fort Worth. Jordan Vonderhaar for The New York Times

When the E.P.A. started promoting sludge as nutrient-rich fertilizer decades ago, it seemed like a good idea.

The 1972 Clean Water Act had required industrial plants to start sending their wastewater to treatment plants instead of releasing it into rivers and streams, which was a win for the environment but also produced vast new quantities of sludge that had to go somewhere.

It also meant contaminants like PFAS could end up in the sewage, and ultimately in fertilizer.

The sludge that allegedly contaminated the Colemans' farm came from the City of Fort Worth water district, which treats sewage from more than 1.2 million people, city records show. Its facility also accepts effluent from industries including aerospace, defense, oil and gas, and auto manufacturing. Synagro takes the sludge and treats it (though not for PFAS, as it's not required by law) then distributes it as fertilizer.

Wastewater treatment involves many stages, including the use of bacteria that eliminate contaminants. The plant checks for heavy metals and pathogens that can be harmful to health. Yet conventional wastewater plants like these were not designed to monitor or remove PFAS.

Steven Nutter, environmental program manager at Fort Worth's Village Creek Water Reclamation Facility, said the plant followed all federal and state standards. "The ball is in E.P.A.'s court," he said.

Sewage on the journey to becoming sludge fertilizer in Texas. Jordan Vonderhaar for The New York Times

E.P.A.'s own researchers have found elevated levels in sewage sludge. And in the agency's most recent survey of biosolids, PFAS were almost universal. A 2018 report by the E.P.A. inspector accused the agency of failing to properly regulate biosolids, saying it had "reduced staff and resources in the biosolids program over time."

Synagro acknowledges in its latest sustainability report that PFAS are a problem. "One of our industry's challenges," it says, "is the potential of unwanted substances in biosolids, like per- and polyfluoroalkyl substances," or PFAS.

Yet banning sludge fertilizer isn't the way forward, biosolids industry groups say. Maine's ban has only caused the state to truck more sewage out of state, because local landfills can't accommodate it, said Janine Burke-Wells, executive director of the North East Biosolids & Residuals Association, which represents producers.

She said regulators should focus on curbing the PFAS entering wastewater by banning use in consumer products or requiring industries to clean their effluent before sending it to treatment plants. "There's not enough money in the world to take it out at the end," she said.

Figuring out how to deal with this crisis is a challenge now facing many states. Maine, along with its ban on fertilizer sludge and its testing of farmland, is also offering financial assistance to affected farmers and helping them shift from growing food. Using the land to grow other crops, like flowers, or to install solar panels are some of the options being promoted.

Michigan has taken a different approach.

Jason Grostic, who lost his family's cattle business. Emily Elconin for The New York Times

Hawkeye, Mr. Grostic's dog, with cows from the contaminated herd. Mr. Grostic can't sell the animals and

doesn't want to cull them. Emily Elconin for The New York Times

There, regulators have tested only 15 or so farms that had received fertilizer sludge known to have been contaminated. Instead, Michigan has focused on working with companies to bring down levels of PFAS in their wastewater and has banned the use of sludge with high levels of the chemical.

The state acknowledges the risk of more testing to the livelihoods of its farmers. "We're very, very conscious about the consequences of doing testing and potentially hurting a farm's economic success," said Abigail Hendershott, who heads Michigan's PFAS Action Response Team. "We want to make sure we've got really good data before we go out and start disrupting things."

That's small consolation to Jason Grostic, a third-generation cattle farmer in Brighton, Mich., whose property was found to be contaminated by sludge fertilizer in 2020. The state placed a health advisory on his beef, dooming his ranch overnight.

"This stuff isn't just on my land," Mr. Grostic said. "People are scared to death that they're going to lose their farm, just like I did."

Hiroko Tabuchi covers pollution and the environment for The Times. She has been a journalist for more than 20 years in Tokyo and New York. [More about Hiroko Tabuchi](#)

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