

Drugs, chemicals in farm sludge migrate deep in soil

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Sewage sludge used as fertilizer on farms can leave traces of prescription drugs and household chemicals deep in the soil, according to a new [study](#) by federal scientists.

The findings suggest that the widespread use of biosolids could contaminate groundwater near farms with a variety of chemicals, including antidepressants such as Prozac and hormone-disrupting compounds in antibacterial soaps.

“These compounds are not sitting in [the] top layer, we see vertical movement down through the soil, which means there’s the potential to get into the environment—groundwater or surface water,” said Dana Kolpin, a research hydrologist for the U.S. Geological Survey.

Chemicals migrated down in soil

USGS researchers tested an eastern Colorado wheat field that used treated sludge from a Denver sewage-treatment plant. Chemicals in antibacterial soaps, cleaners, cosmetics, fragrances, and prescription drugs such as Prozac and Warfarin not only persisted in the topsoil but migrated down.

The researchers looked for 57 “emerging” contaminants that are increasingly showing up in the environment. Ten were detected in the soil at depths between seven and 50 inches 18 months after the treated sludge was applied. None was in the field’s soil beforehand.

Called *biosolids*, about half of treated sewage sludge—about seven million dry tons per year—from U.S. wastewater plants is applied to farm fields because the nutrients and organic matter help plants grow. The municipal sewage has gone through mandatory primary treatment and other processes that reduce pathogens but do not remove chemicals.

Treatment plants not designed to remove chemicals

Other studies have found hormones, detergents, fragrances, drugs, disinfectants, and plasticizers in treated sludge used as fertilizer. But this is the first study to show how they can persist and move in soil.

“These are compounds that often come from us and that get sent to wastewater-treatment plants that weren’t designed to remove them,” said Tracy Yager, a USGS hydrologist in Colorado and lead author of the study.

Little is known about what potential effects traces of these compounds could have on people and the environment. Most were in low levels: in parts-per-million in the sewage and in parts-per-billion in the soil, Yager said.

Antibacterial compound had highest numbers

Triclosan was found at the highest concentrations in the deep soil, reaching 156 parts per billion in seven to 14 inches of soil.

The U.S Food and Drug Administration is concerned that triclosan and other antibacterial compounds used in soaps and body washes, toothpastes, and cosmetics could be contributing to antibiotic resistance. As a result, the agency last year proposed requiring manufacturers to demonstrate the safety and effectiveness of antibacterial soaps.

[In Canada, biosolids production, treatment, sale, and disposal is regulated under provincial (including municipal), federal (Environment Canada and the Canadian Food Inspection Agency), and territorial legislation. — GS]

Triclosan also has been linked to altered thyroid hormones and estrogen-related reproductive effects in animal studies.

Chemicals can spread to wells

As compounds migrate through soil, they can spread into aquifers used by many rural dwellers who have private wells that supply drinking water. Water from private wells is not treated or routinely monitored for contamination.

Yager said people in eastern Colorado get their drinking water from a mix of private and municipal wells. The farm for this study did not have a well available to monitor, she said.

The crops showed little uptake of any of the contaminants.

Toxins migrate even in dry soil

Rain and snow can help push compounds down in the soil, Kolpin said. Because the study took place in a semi-arid region, the findings indicate that contaminants migrate down even in relatively dry climates.

Yager said there are other sources of these contaminants. Low levels of some were found in a nearby field that wasn't treated with sewage. "Fragrances especially can get into the air from people working in the fields, or machinery that people have sat in," Yager said.

Edward Furlong, a USGS research chemist and a coauthor of the study, said the findings are important because farmers in dry areas are increasingly using sludge to add nutrients to their fields.

"We're not telling anyone what they should do, but this study gives farmers some information about what some of the impacts could be," Furlong said.

Brian Bienkowski is a staff writer for the Daily Climate and its sister publication, the Environmental Health News.

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