

Sludge Recycling Sends Antiseptic Soap Ingredient to Agriculture

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Researchers at the Johns Hopkins Bloomberg School of Public Health measured levels of an antibacterial hand soap ingredient, triclocarban, as it passed through a wastewater treatment facility. They determined that approximately 75 percent of the ingredient washed down the drain by consumers persists during wastewater treatment and accumulates in municipal sludge, which later is used as fertilizer for crops. Their findings are presented in a study appearing in the online and print editions of the journal *Environmental Science & Technology*. More studies are underway to determine if triclocarban, which is toxic when ingested, can migrate from sludge into foods, thereby potentially posing a human health risk.

"The observed persistence of triclocarban is remarkable," said lead author, Jochen Heidler, a PhD candidate in the Bloomberg School's Department of Environmental Health Sciences. "In the plant, the chemical contained in sludge underwent biological treatment for an average period of almost three weeks, yet very little degradation took place."

Senior author Rolf U. Halden, PhD, assistant professor and co-founder of the Johns Hopkins Center for Water and Health, said, "Triclocarban does not break down easily even under the intense measures applied during wastewater treatment. Triclocarban is leading a peculiar double life. Following its intended use as a topical antiseptic, we are effectively and inadvertently using it as an agricultural pesticide that is neither regulated nor monitored."

For the study, the Hopkins researchers collected samples from a large urban sewage treatment facility in the eastern United States. Over a period of weeks, they tracked the mass of triclocarban entering the plant in wastewater and leaving it in reclaimed water and municipal sludge. **Measurements were done by isotope dilution mass spectrometry, a cutting-edge approach in environmental analytical chemistry.** Using the acquired information on chemical concentrations and flow volumes within the facility, they calculated the total mass of triclocarban entering the plant and the chemical's behavior during treatment.

According to the study, the facility was highly effective in removing triclocarban from wastewater. Only about 3 percent of triclocarban molecules entering the plant were discharged into surface water along with the treated effluent. However, very little degradation of the triclocarban occurred, due to the compound's polychlorinated aromatic chemical structure. Approximately 75 percent of the initial mass accumulated in sludge, where it remained chemically unchanged. Anaerobic digestion reduced the overall sludge volume but not the quantity of triclocarban, thereby concentrating the antiseptic agent to levels several thousand-fold higher than those found in raw wastewater. At the particular plant observed, 95 percent of the sludge is recycled for other uses, such as being sold as a soil conditioner and crop fertilizer.

"The irony is twofold," said Halden. "First, to protect our health, we mass-produce and use a toxic chemical which the Food and Drug Administration has determined has no scientifically proven benefit. Second, when we try to do the right thing by recycling nutrients contained in biosolids, we end up spreading a known reproductive toxicant on

the soil where we grow our food. The study shows just how important it is to consider the full life cycle of the chemicals we manufacture for use in our daily life."

Halden's previous research determined that triclocarban, similar to the structurally related antimicrobial triclosan, also contaminates rivers and streams across the United States.