

The proof is in the tree bark

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A study by Indiana University researchers found the chlorinated flame retardant Dechlorane Plus in the bark of trees across the northeastern US, with by far the highest concentrations measured near the Niagara Falls, N.Y., factory where this chemical is produced.

The study, by Xinghua Qui and Ronald A. Hites of the IU School of Public and Environmental Affairs, was published online last week by the journal *Environmental Science & Technology*. Hites is a Distinguished Professor and director of the Environmental Science Research Center at SPEA; Qui is a postdoctoral research scientist.

Hites said the study demonstrates that tree bark can be used as nature's own passive sampling device for detecting the presence and relative concentrations of chemicals in the air. Rough, porous and high in lipids, tree bark soaks up airborne gases and particles, then keeps them protected from the elements.

"It's really a very convenient technique," Hites said. The sampling doesn't hurt the tree, and "you get an integrated measurement of what the tree has been exposed to over the last few years."

The study, "Dechlorane Plus and Other Flame Retardants in Tree Bark from the Northeastern United States," provides the first data on the prevalence of the chemical in the atmosphere outside of the Great Lakes area. It identifies the epicenter of DP concentrations as being near the factory where the chemical is produced by OxyChem (Occidental Petroleum Corp.).

Concentrations in tree bark within a few miles of the factory were several thousand times higher than those found in bark at more distant sampling sites, including Indiana, Virginia and Maryland.

Qui and Hites also used tree bark to sample for brominated flame retardants at northeastern U.S. locations. They found them, but at much lower levels than a previous study by Hites and Lingyan Zhu -- published in 2006 by ES&T -- that found the epicenter of brominated flame retardant concentrations to be near a factory in southern Arkansas that makes these chemicals.

The study also looked for flame retardants in bark samples from Europe and Asia. Bark from China and Korea contained Dechlorane Plus at about 10 times the lowest levels found in the northeastern U.S., suggesting there are Asian sources of this chemical, and they aren't simply reaching Asia through the atmosphere.

Dechlorane Plus has been used for more than 40 years as a flame retardant in electrical cables and wiring, and other products, but little data is available on its toxicity, according to an Environmental Science & Technology article. One of more than 175 types of flame retardants, it was developed as a substitute for the banned, highly chlorinated flame retardant Dechlorane (also known as the insecticide Mirex).

"However, the substitute might not always be as safe as hoped," Qui and Hites write. They point out that Dechlorane Plus is present in air, sediment, fishes and herring gull eggs from in the Great Lakes region, suggesting Dechlorane Plus "might be an environmental problem, especially in the lower Great Lakes region."

Hites said Dechlorane Plus has been added to the list of chemicals sampled on an ongoing basis by the Integrated Atmospheric Deposition Network. Hites heads the U.S. side of the network, a U.S.-Canadian

partnership that monitors airborne chemicals at five locations in the Great Lakes region. "The question in the medium term is, are the concentrations of this chemical going up or down -- and if so, how fast?" Hites said.

Source: Indiana University

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