Honey can reveal clues about environmental pollution near you

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A study of 260 honey samples from across the U.S. found regional differences in toxic metal distribution, a finding that highlights the sweet treat's potential as a tool for monitoring environmental pollution. (Photo by Shutterstock)

Inside every jar of honey is a taste of the local environment, its sticky sweet flavor enhanced by whichever nearby flowers bees have decided to sample. But a new study from Tulane University has found that honey can also offer a glimpse of nearby pollution.

The study, published in *Environmental Pollution*, tested 260 honey samples from 48 states for traces of six toxic metals: arsenic, lead, cadmium, nickel, chromium and cobalt. None of the honeys showed unsafe levels of toxic metals – based on a serving size of one tablespoon per day – and concentrations in the United States were lower than global averages. However, researchers found regional differences in toxic metal distribution: the highest arsenic levels were found in honeys from a cluster of states in the Pacific Northwest (Oregon, Idaho, Washington and Nevada); the Southeast tested highest for cobalt levels, including Louisiana and Mississippi; and two of the three highest lead levels were found in the Carolinas.

Overall, the study highlights a potential dual role for honey as both a food source and a tool for monitoring environmental pollution.

"Bees act as passive samplers, picking up contaminants from the air, water and plants while foraging. These contaminants end up in honey, offering us a snapshot of an area's environmental pollution," said lead author Tewodros Godebo, assistant professor of environmental health sciences at the Celia Scott Weatherhead School of Public Health and Tropical Medicine at Tulane University.

The study is the first to test honey from across the country for the presence of toxic metals and used only single-source honeys that listed their origin.

Researchers could only speculate as to the causes of the pollution trends. The high arsenic levels found in Washington (170 µg/kg), Oregon (130 µg/kg) and Idaho (47.8 µg/kg) could point to pollution from historical agricultural pesticide use or industrial sources. The higher presence of lead in honeys from North Carolina and South Carolina – 451 µg/kg and 76.8 µg/kg respectively – could be from mining, soil contaminated from legacy traces of leaded gasoline and paint, or combustion of lead-based aircraft fuel.

Definitively connecting the pollution found in honeys to their sources would require further study. Godebo said he hopes these findings spur further research into the

sources of toxic metal pollutants, adding, "The environment can have more of these metals than what shows up in bees' honey."

"What we found is that this appears to serve as a good proxy for uncovering regional contamination patterns," Godebo said. "But there's a lot we may still learn from bees about what pollutants are present in the environment and how those relate to nearby community health outcomes."

Tewodros Godebo, assistant professor of environmental health sciences at the Celia Scott Weatherhead School of Public Health and Tropical Medicine at Tulane University, said bees are the perfect proxy for environmental monitoring since they are passive samplers of nearby air, water and plants. (Photo by Kenny Lass)