



# Studies Show Pesticide Exposure To Be Insidious

## ADDING TO THE BODY OF SCIENCE: WIDESPREAD EXPOSURE

**T**he science captures wide exposure to pesticides through a variety of scenarios, from use to disposal. However, regulators lack the clear knowledge to fully evaluate exposure for adverse effects associated with: (i) multiple chemical and cumulative exposure; (ii) endocrine disruptors at miniscule doses during critical window of vulnerability; (iii) combinations of exposure resulting in synergistic effects of multiple pesticide mixtures or pesticides and pharmaceuticals; and (iv) vulnerable populations (those with comorbidities or preexisting medical conditions, undergoing

medical treatment, in high exposure jobs, or living in fenceline communities).

One study in 2021 found estimates of 385 million unintentional pesticide poisonings worldwide, including 11,000 fatalities. The United Nations Environment Programme (UNEP), in the lead up to the fifth session of the UN Environment Assembly in February 2021, notes the global failure to live up to 2020 goals, with production and use of pesticides and fertilizers continuing to increase and combined sales growing at about 4.1% per year and projected to reach \$309 billion by

2025. UNEP also acknowledges the ubiquity of pesticides and their degradates in the global environment: “Pesticides are omnipresent in the environment, including in soils and surface and groundwater, and are frequently detected at levels that exceed legal or environmental standards.” In addition, UNEP notes the adverse impacts of pesticides on nontarget species, which exacerbate the biodiversity crisis—the subject of a UN 2019 report, the *IPBES* (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) *Global Assessment Summary for Policymakers*. [Update: New research published in *Environmental Science & Technology* in January 2022, concludes, “The cocktail of chemical pollution that pervades the planet now threatens the stability of global ecosystems upon which humanity depends.”]

The studies in this section document millions of people in the U.S. drinking pesticide-contaminated water; 100 chemicals, including pesticides, detected in pregnant women; half the arable land worldwide at risk from pesticides; contamination of recreational lakes; widespread contamination of U.S. rivers with high threats to aquatic life (according to the U.S. Geological Survey); 83% of bald eagles testing positive for toxic rodenticides; widespread contamination of biosolid fertilizer

with persistent PFAS (so-called “forever” poly- and perfluoroalkyl substances); and likely contamination, based on existing use data from 115,000 acres of Central Washington, with lead arsenate from historical orchard use.

Meanwhile, widespread spraying continues without full knowledge of the ecosystem effects on two million acres to control grasshoppers and Mormon crickets with highly toxic insecticides, including diflubenzuron. Then, in a Nebraska town whose AltEn ethanol plant burned pesticide coated seeds not regulated by the U.S. Environmental Protection Agency (EPA), researchers documented a sustained collapse of every beehive used by University of Nebraska for a research project on a farm within a mile of the plant.

A repeated finding in studies revolves around the effects of pesticide persistence, with generational exposure to organochlorine pesticides still being found in the serum and placenta of pregnant mothers, as well as multiple fetal organs, and among the coral reefs of the South China Sea. These findings capture the continuing failure of regulation and the underlying federal statute to require the full evaluation of pesticide use effects on future generations, despite a large body of scientific study that shows adverse multigenerational impacts.



## Ethanol Plant Processing Pesticide Coated Seeds Contaminates Nebraska Town

**JANUARY 13, 2021** | An ethanol processing plant located in the small village of Mead, Nebraska has been using seeds coated in bee-toxic chemicals as part of its production process, according to reporting published in *The Guardian*. The plant, owned by a company called AltEn, may be the only plant in the U.S. producing biofuels with toxic seeds. There is a reason for that,

and Mead residents are experiencing the adverse effects of the U.S. Environmental Protection Agency (EPA) not regulating treated seeds. The prevalence of the use of seed coatings in chemical agriculture has increased over the last several decades, as the pesticide industry works to increase product sales by exploiting a loophole in federal pesticide law. Under FIFRA (*Federal Insecticide Fungicide and Rodenticide Act*), a clause known as the “treated article exemption” permits seeds to be coated with highly toxic pesticides without any requirement for EPA to assess environmental or

public health effects of their use or disposal. This allows hazardous pesticides (primarily insecticides and fungicides) to be used indiscriminately with no effective oversight. Research finds that over 150 million acres of farmland are planted with toxic seeds, including nearly four tons of bee-killing neonicotinoids each year. Pollinators near the plant are dying off. Judy Wu-Smart, PhD, a bee researcher at University of Nebraska, documented a sustained collapse of every beehive used by the university for a research project on a farm within a mile of the AltEn plant. “There is a red flag here. The bees are just a bioindicator of something seriously going wrong,” Dr. Wu-Smart told *The Guardian*. She further indicated an “urgent need to examine potential impacts on local communities and wildlife.” [Gillam, Carey. “There’s a red flag here’: how an ethanol plant is dangerously polluting a US village.” *The Guardian*. January 10, 2021; Douglas, M. and Tooker, J. et al. Large-scale deployment of seed treatments has driven rapid increase in use of neonicotinoid insecticides and preemptive pest management in US field crops. *Environmental Science & Technology*. 49:5088–5097, 2015.]



## Millions of People Drinking Groundwater With Pesticides or Pesticide Degradates

**JANUARY 15, 2021** | A study of groundwater feeding public drinking water supplies, published in *Environmental Science and Technology*, finds pesticides

in 41% of supply wells (and a handful of freshwater springs). Two-thirds of that 41% contain pesticide compounds, and one-third contain pesticide degradates—compounds resulting from biotic (or abiotic) transformation of pesticides into other compounds. Much has been written on the health and environmental impacts of pesticide exposures and reporting on the issue of pesticide migration into [groundwater](#) and waterways. Beyond Pesticides maintains that [organic practices](#) in land management are the solution to the contamination of waterways and groundwater. Such practices, widely adopted, would have [enormous salutary effects](#) on human health and the health of ecosystems and their inhabitants. The study paper reports this research as the “first systematic assessment of raw [untreated] groundwater used for public drinking supply across the United States to include and provide human-health context for a large number of pesticide degradates.” Samples for the research were gathered across 1,204 sites—at or near the wellheads—in 23 principal aquifers whose groundwater is tapped for drinking water supply used by approximately 73 million people. The samples were analyzed for 109 pesticides and 116 degradates. [Bexfield, Laura et al. Pesticides and Pesticide Degradates in Groundwater Used for Public Supply across the United States: Occurrence and Human-Health Context. *Environmental Science & Technology*. 55(1):362-372, 2021.]

## Millions of People Poisoned by Pesticides Each Year, Underscoring Need for Organic Transition

**FEBRUARY 3, 2021** | Hundreds of millions of people are being injured by pesticides every year, according to the first global estimate of unintentional human pesticide poisoning released in three decades. The systematic review, published in *BMC Public Health* highlights the grave result of modern civilization’s reliance on toxic chemicals to



manage weeds and other pests. While international agencies like the Food and Agriculture Organization (FAO) endorse the phase out of [highly hazardous pesticides](#), advocates say that goal should be the starting point in a broader paradigm shift to global organic production. To determine the extent of unintentional poisonings, researchers reviewed scientific literature published between 2006 and 2018, including 157 publications and World Health Organization databases. The search ultimately covered 141 countries. Of these, 740,000 cases of unintentional poisoning were found, with roughly 7,500 resulting in death. Extrapolating that data, scientists estimate 385 million unintentional poisonings worldwide, including 11,000 fatalities. That number encompasses an astounding 44% of the entire global farming population of 860 million. [Boedeker, Wolfgang et al. The global distribution of acute unintentional pesticide poisoning: estimations based on a systematic review. *BMC Public Health* 20:1875, 2020.]

## Current and Projected Patterns of Global Pesticide and Fertilizer Use Are Not Sustainable, Says UN... Again

**FEBRUARY 26, 2021** | The [United Nations Environment Programme](#) (UNEP), the environment arm of the highest-profile international organization (the United Nations), has issued a [draft report](#) whose top finding is this: “The global





goal to minimize adverse impacts of chemicals and waste by 2020 has not been achieved for pesticides and fertilizers.” Increased use of pesticides and synthetic fertilizers—driven by rising demand for food, feed, fiber, fuel, and feedstock crops—is cited as causal, at least in part. Those factors no doubt contributed to the failure, but Beyond Pesticides asserts that such increased uses are symptomatic of the larger issue: in the U.S. and globally, chemical agriculture is a dangerous dead end for public and environmental health. According to Beyond Pesticides: With this dominant system in place, “reductions” in use and impact are laudable but wholly insufficient. The whole system of petrochemical farming needs to be transitioned to [organic, regenerative](#) practices in agriculture, and in all land management. Such systems do not cause health and environmental harms, but are [beneficent, viable, and profitable](#). The report warns that, going forward, “Business-as-usual is not an option.” Pointedly, the 2012 Rio+20 conference produced an outcome document, [The Future We Want](#), through which member states “reaffirmed their commitment to achieve, by 2020, the sound management of chemicals throughout their life cycle and of hazardous waste in ways that lead to minimization of significant adverse effects to human health and the environment.” The UNEP report notes the global failure to live up to these goals, given that in 2020, production and use of pesticides and fertilizers continued to increase, with combined sales growing at about 4.1% per year and projected to reach \$309 billion by

2025. It also acknowledges the ubiquity of pesticides and their degradates in the global environment: “Pesticides are omnipresent in the environment, including in soils and surface and groundwater, and are frequently detected at levels that exceed legal or environmental standards.” In addition, UNEP notes the adverse impacts of pesticides on nontarget species, which exacerbate the biodiversity crisis—the subject of a UN 2019 report, the [IPBES](#) (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) *Global Assessment Summary for Policymakers*; and the climbing rates of resistance to pesticides in organisms and weeds (as the UN has said previously), as well as fertilizers’ degradation of ecosystems, pollution of water systems from runoff, and contributions to climate change.

The [draft UNEP reports assert](#) that, given the projected growth of markets for pesticides and fertilizers, as well as prevailing deficiencies in current management systems, adverse impacts of the use of these products will continue to increase unless “a fundamental change in the course of action takes place.” [It summarizes its recommendations with this](#): “To achieve a chemical-safe future with minimal adverse impacts from pesticides and fertilizers, both incremental and transformative actions are required that tackle root causes and shift market demand, coupled with supportive and enabling measures. While stakeholders in the value chain and agri-food system are contributing to minimize adverse effects of pesticides and fertilizers, there is further need to scale up their commitment through targets and road maps.”

## Over 100 Chemicals Detectable in Pregnant Women, Including 98 “New” or Unknown Compounds

**MARCH 25, 2021** | A University of California San Francisco (UCSF) study, published in [Environmental Science and Technology](#), finds over 100 chemicals present in U.S. pregnant women’s blood and umbilical cord samples. This dis-



covery ignites concerns over prenatal exposure to chemicals from consumer and industrial products and sources. Furthermore, 89 percent of these chemical contaminants are unknown sources and uses, lacking adequate information, or are not previously detectable in humans. The [National Health and Nutrition Examination Survey](#) (NHANES) finds U.S. pregnant women experience frequent exposure to environmental pollutants that pose serious health risks to both mother and newborn. Many known environmental pollutants (e.g., heavy metals, polychlorinated biphenyl, and pesticides) are chemicals that can move from the mother to the developing fetus at higher exposure rates. Hence, prenatal exposure to these chemicals may increase the prevalence of birth-related health consequences like [natal abnormalities](#) and [learning/developmental disabilities](#). Current chemical biomonitoring methods only analyze a targeted few hundred chemicals—a small portion of the over 8,000 chemicals the U.S. manufactures and imports. However, this study employs new technology that identifies a more comprehensive range of industrial chemicals. The study detects 109 chemicals in blood samples of mothers and newborns, including pesticides, plasticizers, compounds in cosmetics and consumer products, pharmaceuticals, flame retardants, and per- and polyfluoroalkyl substances (PFAS) compounds. Of the 109 chemicals, 55 lack preceding reports on their presence in humans, and 42 chemical compounds have little to no information regarding chemical classification, use, and source of con-



## Pesticides Are More Widespread in Both Conventional and Organic Agricultural Soils than Previously Thought

**APRIL 1, 2021** | A legacy of toxic pesticide use in agriculture is showing up as residues on organic farms, emphasizing the threat of a history of weak regulatory standards that has left farmland poisoned and the urgent need to transition to organic. A study, published in *Environmental Science & Technology*, documents the findings of pesticide residues on organic farmland and shows a decrease in residues after transition, with effects lingering for decades. Some banned pesticides like organochlorines (e.g., DDT and chlordane) are stable, as research demonstrates these chemicals can bind to and linger in the dirt for decades. However, other current-use pesticides also pose a soil contamination risk due to drift, runoff, and leaching. Researchers gathered soil samples from 100 fields in 60 agricultural sites conventionally managed with chemical-intensive practices and 40 organically managed throughout Switzerland. Using the Swiss Soil Monitoring Network, researchers selected 46 modern pesticides to analyze (16 herbicides, eight herbicide transformation products, 17 fungicides, seven insecticides). Researchers measured soil physicochemical properties, including organic carbon, texture, pH, and soil nutrients (nitrogen, potassium, and phosphorus) using the Swiss Federal Agricultural Research Station. The study finds pesticide residues are present in soils on both conventional and organic agricultural sites. Conventional, chemical-intensive sites have twice as many pesticide residues, and pesticide concentrations are nine times as high as organic sites. Although the amount of synthetic chemical residues decreases significantly with the duration of organic management practices, residues remain in organic soils for decades after the last application. In fields with high levels of pesticides, researchers witness a reduction in microbial abundance and beneficial microorganism concentrations that can have implications for soil health. [Riedo, Judith et al. Widespread Occurrence of Pesticides in Organically Managed Agricultural Soils—the Ghost of a Conventional Agricultural Past?, *Environmental Science & Technology*. 55(5):2919–2928, 2021.]

tamination. Study coauthor, UCSF professor Tracey J. Woodruff, PhD, concludes, “It’s very concerning that we are unable to identify the uses or sources of so many of these chemicals.... EPA must do a better job of requiring the chemical industry to standardize its reporting of chemical compounds and uses. And they need to use their authority to ensure that we have adequate information to evaluate potential health harms and remove chemicals from the market that pose a risk.” [Wang, Aolin et al. Suspect Screening, Prioritization, and Confirmation of Environmental Chemicals in Maternal-Newborn Pairs from San Francisco. in *Environmental Science and Technology*. 55(8):5037–5049, 2021.]

## Toxic Pesticides Are Polluting Over Half of Arable Land, Reinforcing Need for Global Organic Transition

**APRIL 7, 2021** | Toxic pesticides are putting more than half of the Earth’s farmland at risk of pesticide pollution that contaminates water, harms biodiversity, and ultimately undermines food security, according to research published in *Nature Geosciences*. While there is firm understanding that environmental crises like climate change are affecting the entire globe, the impacts of pesticide pollution are often thought of as local, or regional issues. This study, led by researchers based at the University of Sydney, Australia, underscores the wide-ranging effects of modern civilization’s global dependence on toxic pesticide use. “Although protecting food production is essential for human development, reducing pesticide pollution is equivalently crucial to protect the biodiversity that maintains soil health and functions, contributing towards food security,” said lead study author Fiona Tang, PhD. To better understand pesticide risks at a global scale, scientists sectioned a world map into 10×10 kilometer (6.2×6.2 mile) squares that were



assessed for their pesticide risk. The map also included data relating to water scarcity, biodiversity, and national income, to better determine trends and hot spots of concern. Scientists evaluated 92 different pesticide active ingredients and determined their risk within each square on the map based upon information derived from global databases. Scientists determined that 75% of global agricultural land is at risk, with 31% at high risk. Considering the additive effects of pesticide use, researchers found that 64% of agricultural land is at risk from more than one of the 92 pesticide active ingredients evaluated. Shockingly, 21% of farmland is at risk by more than 10 pesticides. “We urgently recommend that a global strategy is established to transition towards sustainable agriculture and sustainable living with low pesticide inputs and reduced food loss and food waste to achieve responsible production and consumption in an acceptable, profitable system,” the study reads. [Tang, Fiona et al. Risk of pesticide pollution at the global scale. *Nature Geosciences*. 14:206–210, 2021.]

## Study Finds Eagle Populations Experiencing Widespread Rodenticide Exposure

**APRIL 21, 2021** | The vast majority of bald and golden eagles in the U.S. are contaminated with toxic anticoagulant rodenticides, according to research published in *PLOS One*. Although eagle



## Pesticide Pollution in Recreational Lakes Documented

**APRIL 16, 2021** | Research published in *Environmental Pollution* examines levels and persistence of pesticide pollution in recreational lakes. The study finds: (1) concentrations of the neonicotinoid imidacloprid at levels exceeding ecotoxicity limits for aquatic invertebrates in a recreational lake that receives predominately urban runoff; and (2) pesticide residues persist in the studied lakes throughout the growing season. Based on their findings, the scientists emphasize the importance of stricter regulation of insecticide compounds, and of better education about their impacts. The study evaluates potential ecosystem exposure to pesticide contamination in Midwestern recreational lakes, as well as the persistence of pesticide residues in those waterbodies over the course of the growing season. Study authors hypothesize that watersheds with significant agricultural land uses would have higher concentrations of pesticides compared to largely urban and herbaceous watersheds. This research, at University of Nebraska–Lincoln and University of Kentucky, looked to evaluate the occurrence of neonicotinoid and organothiophosphate insecticides, and some fungicides, in three lakes with differing dominant land uses in watersheds of Nebraska’s Lower Platte River Basin. The land uses of the three watersheds were classified as: herbaceous (mostly grassy prairie, shrubs, and open vegetated areas, and excluding forested or woody areas); urban (primarily residentially developed areas); and agricultural (largely production fields planted with soybeans and corn). The finding of higher concentrations in the urban watershed was unexpected by the researchers and did not support their working hypothesis that agricultural watersheds would evidence the highest pesticide concentrations. The coauthors wrote: “Overall, the urban watershed was the primary pesticide contributor per unit area. We hypothesize that this is likely due to limited pesticide outreach programs for homeowners regarding ideal timing and quantity of biocide applications along with absent regulations for pesticide applications in nonagricultural areas.” They added specificity: “Directly upstream to the urban lake was a dog park and next to the urban lake there was a golf course. Imidacloprid is used in flea prevention treatment for dogs, rapidly metabolized, and excreted primarily through urine.” [Satiroff, Jessica et al. Pesticide occurrence and persistence entering recreational lakes in watersheds of varying land uses. *Environmental Pollution*. 273:116399, 2021.]





populations have largely recovered from their lows in the 1960s and 70s, the study is a stark reminder that human activity continues to threaten these iconic species. “Although the exact pathways of exposure remain unclear, eagles are likely exposed through their predatory and scavenging activities,” author Mark Ruder, PhD, assistant professor at the University of Georgia, told [CNN](#). Eagle carcasses were retrieved from the University of Georgia’s ongoing Southeastern Cooperative Wildlife Disease Study. Eighteen state wildlife agencies and the U.S. Fish and Wildlife Service all sent in specimens from a period spanning 2014 to 2018. In total, 116 bald eagle and 17 golden eagle carcasses had their livers tested for the presence of anticoagulant rodenticides. Out of the 116 bald eagles tested, 96, or 83% were exposed to toxic rodenticides. Forty of the eagles (35%) were exposed to more than one rodenticide compound. Thirteen out of 17 golden eagles were contaminated with rodenticides, with four exposed to a single rodenticide and nine exposed to more than one. The second-generation anticoagulant rodenticide [brodifacoum](#) was the most detected compound in sampled eagles. In sum, researchers identified 12 eagles (4%) that had died specifically from toxicosis caused by rodenticide exposure. It is not just eagles and birds of prey that are threatened by these compounds. Bobcats, fishers, mountain lions, owls, hawks, and other critically important predators are important at the top of

their food chain. Ultimately, it is by embracing and encouraging the growth in their numbers that addresses the excess of pests in human built environments. [Niedringhaus, Kevin et al. Anticoagulant rodenticide exposure and toxicosis in bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) in the United States. *PLoS ONE*. 16(4):e0246134, 2021]

## Pesticide Pollution Continues Unabated, According to New Data

**JUNE 4, 2021** | The release of the most recent [U.S. Geological Survey](#) (USGS) study of pesticide contamination of rivers on the U.S. mainland finds that degradation of those rivers from pesticide pollution continues unabated. USGS scientists looked at data from 2013



to 2017 (inclusive) from rivers across the country and offered these top-level conclusions: “(1) pesticides persist in environments beyond the site of application and expected period of use; and (2) the potential toxicity of pesticides to aquatic life is pervasive in surface waters.” USGS writes: “Unlike agricultural use, for which we have a reasonable estimate, the amount of a pesticide applied in an urban setting is not possible to estimate, as few records of use in this setting are available.... Elevated surface water concentrations, particularly of insecticides like [fipronil](#), [diazinon](#), and [carbaryl](#), have been documented in rivers draining [urban] watersheds.” At least one pesticide is detected at 71 of the 74 sampling sites; an average of 17 discrete pesticides are found

at each site, and; 75% of the detected pesticides have not been measured in previous USGS national-scale assessments. Herbicide and fungicide use intensity is significantly higher in the Midwest than in the other regions, and intensity of use is significantly greater in the South, Midwest, and Pacific regions than in the Northeast and West. Although agricultural pesticide use is at least 2.5 times greater in the Midwest than in any other region, and the number of pesticides detected in Midwest samples is 1.5 times greater, potential toxicity results are distributed more evenly across regions. [The coauthors write](#): “The high number of chronic benchmark exceedances indicated that the threat of pesticides to aquatic life across the [mainland U.S.] can be persistent. Even with limited sampling, our benchmark exceedance analysis indicated that transient high pesticide concentrations can result in the exposure of aquatic organisms to acutely toxic conditions across all regions of the [conterminous U.S.]”

USGS undertakes periodic assessments of the presence and toxicity of pesticides in the country’s surface waters under the agency’s National Water-Quality Assessment Program. Recent news from these studies has not been good. In September 2020, [Beyond Pesticides](#) reported on another, related USGS survey, which found that nearly 90% of U.S. rivers and streams are contaminated with mixtures of at least five or more different pesticides. A March 2021 [Beyond Pesticides Daily News](#) article noted that USGS research demonstrated that, of 422 water samples taken from streams across the U.S. over a five-year period, 95% showed contamination by at least one pesticide. As the number of pesticides in waterways increases, it has detrimental impacts on aquatic ecosystem health, especially as some pesticides have synergistic impacts in combination, amplifying negative effects. In addition, many aquatic organisms, such as algae and fish, are threatened even at low levels of pesticide exposure. [Stackpoole, Sarah et al. [Pesticides in US Rivers: Regional differences in use, occurrence,](#)

and environmental toxicity, 2013 to 2017. *Science of The Total Environment*. 787:147147, 2021.]



## Sewage Sludge Fertilizers Sold at Hardware Stores Found To Be Contaminated with PFAS Chemicals

**JUNE 8, 2021** | Biosolid-based fertilizer products like Milorganite, often sold to consumers as “organic,” are contaminated with dangerous PFAS chemicals, according to a study published by [Sierra Club and Ecology Center](#). Biosolids, also known as sewage sludge, have been found in the past to contain residues of hazardous pesticides, heavy metals, antibiotics and other pharmaceuticals, personal care products, and a [range of other toxicants](#). While the latest news may not be surprising for careful shoppers who have long avoided biosolid fertilizers, none of these risks are relayed to consumers on fertilizer packages. With fertilizer regulations failing the U.S. consumer, it becomes more important than ever to seek out [certified organic fertilizer products](#). The Sierra Club and Ecology Center looked at nine fertilizer products, each produced from the sewage sludge of a particular American city. For instance, Milorganite, perhaps the most well-known biosolid sludge fertilizer, is derived from the Milwaukee, Wisconsin sewage treatment system. Other

products were derived from locations including Sacramento, CA (Synagro); Tacoma, WA (TAGRO); Madison, GA (Pro Care); Las Vegas, NV (Ecoscraps); Eau Claire, WI (Menards Premium Natural Fertilizer); Jacksonville, FL (Greenedge); North Andover, MA (Earthlife); and Washington, DC (Cured Bloom).

As the report notes, many of these products advertise themselves as “organic,” “natural,” or “eco-friendly.” But with these products, “organic” does not mean the same as certified organic products, which prohibit the use of fertilizers containing biosolids. PFAS—poly- and perfluoroalkyl substances—is a moniker representing a wide range of fluorinated synthetic chemicals. These chemicals have been linked to cancer, liver damage, birth and developmental problems, reduced fertility, asthma and a range of increasingly common health conditions. Of utmost concern is that PFAS are considered “forever chemicals,” as there is little indication that these substances break down into a state in the environment in which they do not remain toxicologically active. While there is growing recognition from the Biden administration that action must be taken on PFAS, the range of new products and places in which the substances are being found highlights the extent of the challenge, and regulators’ collective mistake in allowing these substances to enter the market in the first place. [Sierra Club. *Sludge in the Garden: Toxic PFAS in Home Fertilizers Made From Sewage Sludge*. 2021.]

### Fertilizers Compatible With Organic Landscape Management

See [bp-dc.org/organiccompatible](https://bp-dc.org/organiccompatible) for an article on organic compatible fertilizers and an accompanying list.

## Millions of Acres in West To Be Sprayed with Toxic Insecticides for Grasshoppers

**JULY 21, 2021** | Western states experienced in summer 2021 one of the [largest pesticide spray campaigns](#) in recent history, targeting native grasshopper species on more than two million acres



of rangeland with highly toxic insecticides, including diflubenzuron. Grasshopper populations exploded in 2021 due to the West’s ongoing drought, and government officials at the U.S. Department of Agriculture (USDA) believed the hazardous pesticide use was necessary to stop the voracious winged insects from consuming forage used by cattle operations. Environmental groups urged program changes by USDA, which has conducted insecticide campaigns against the native grasshoppers since the 1930s. “Aerial application of insecticides on this scale will eliminate millions of insects that pollinate, recycle plant nutrients and perform natural pest control,” said Sharon Selvaggio, Pesticide Program Specialist with the Xerces Society. “Insecticide sprays on this scale across native ecosystems are short-sighted and unsustainable.” According to a June 2020 [press release](#), USDA’s Animal and Plant Health Inspection Service (APHIS) is spending \$5.3 million dollars of taxpayer money in order to conduct what it calls “suppression treatments.” APHIS claims the \$5.3 million will protect \$8.7 million worth of agricultural resources, but advocates



## Past Use of Lead Arsenate Pesticides Continue To Contaminate Residential Areas 70 Years Later—Presenting a Legacy of Toxics

**JUNE 17, 2021** | Lead arsenate pesticides continue to contaminate Central Washington residential areas that were once tree fruit orchards. Although these toxic legacy pesticides have not been in use for almost 70 years, a [Chelan County \(WA\) Department of Natural Resources report](#), funded by the Washington State Department of Ecology, finds lead arsenate soil concentrations above the Washington State cleanup levels. It is well-known that traces of [legacy \(past-use\) pesticides](#), like organochlorine and arsenic, remain in the environment for decades—possibly centuries, post-final application. However, these chemicals have profound adverse impacts on human health, with links to cancer, reproductive and endocrine (hormone) disruption, and birth/developmental abnormalities. Current-use pesticides also contaminate the ecosystem via drift, runoff, and leaching. Therefore, the impact of both current and past use of pesticides on human, animal, and environmental health, especially in combination, is critical to any safety analysis.

The researchers note, “Historical application of lead arsenate (LA) pesticides on tree fruit orchards has resulted in the accumulation of lead and arsenic in shallow soil at concentrations above Washington State cleanup levels. These are levels that may be harmful to human health when properties are used for activities other than agricultural or industrial land uses. This report outlines a recommended approach for managing and mitigating LA pesticide soil contamination, as well as educating impacted people and communities about the issue.”

The Washington State Department of Ecology examined lead arsenate pesticide contamination in areas of Central Washington from historical tree fruit orchard practices. There are increasing concerns over health risks to residents living in areas of past pesticide use, especially for those unaware of possible contamination. Therefore, the department established the Legacy Pesticide Working Group (LPWG) in 2019 to include stakeholders throughout Central Washington state “to address the complex issues surrounding lead and arsenic contamination on former orchard lands.”

The report finds approximately 115,000 acres of Central Washington has possible lead arsenate contamination from historical orchards, including existing and developing residential (i.e., single-family homes, apartment buildings) and commercial (i.e., malls, schools,



parks) areas. From this data, the LPWG set up a “Dirty Alert” map highlighting historic orchards and possible lead arsenate contamination. Property owners can use the map to assess whether they reside in an area of contamination based on previous orchard locations.

**For those living on contaminated sites**, the report contains a number of possible cleanup technologies, including soft capping (adding at least 6 inches of soil), hard capping (at least 3 inches of impervious or semipermeable material), excavation (removing 2 to 3 feet of soil). It also includes the following “best management practices for residents: Wash hands with soap after working or playing in the dirt • Remove shoes prior to entering the home • Wash children’s toys and pacifiers frequently • Wear shoes and gloves when gardening and working outdoors • Wash all fruits and vegetables before eating • Wash dirt off pets frequently • Create children’s play areas (for example, raised sandboxes or rubber mats below play areas) • Vacuum and dust the home at least weekly.

New development will be handled through the building permit and construction development process. This process will investigate, approve a plan for clean-up and manage the lead arsenate contamination in compliance with Washington State *Model Toxics Control Act (MTCA)*. [Chelan County Department of Natural Resources, Final Report: Recommended Approach for Managing Lead Arsenate Legacy Pesticide Contamination on Historical Orchards in Central Washington, 2021.]

argue that the agency has failed to meet the “level of economic threshold” required under federal law to justify spraying. Calculations indicate that spraying costs between roughly \$2 to \$45 per acre, while the American taxpayer generates roughly \$0.17 per acre from grazing leases that charge ranchers a mere \$1.35/month to place cattle on public lands in the West.

Moreover, APHIS’s justification of the expense does not include an evaluation of the ecological costs of the spray campaign. The agency assumes the spray campaign will adequately address the grasshopper infestation, but fails to account for the value of natural predators. Indiscriminate pesticide spray applied across large swaths of land are sure to kill off natural enemies of grasshopper species that may help to otherwise control the animals and could prevent future infestations. [Brown, Mathew. “Hungry grasshoppers spurred by US drought threaten rangeland.” Associated Press. June 24, 2021.]



## Study Identifies the Presence of Organochlorine Pesticides among South China Sea Coral Reefs

**AUGUST 12, 2021** | A recent study published in *Chemosphere* identifies the concentration, consequences, and potential sources of 22 organochlorine pesticides (OCPs) among corals in the South China Sea (SCS) for the first time. SCS corals exhibit a higher affinity toward bioaccumulation of OCPs, which

are legacy persistent organic pollutants (POPs) under the [Stockholm Convention](#)—a global treaty to eliminate POPs. The study finds the distribution of OCPs in coral tissue matches that of the surrounding oceanic air samples. Hence, atmospheric concentrations of OCPs— influenced by continental air masses— migrate from the atmosphere to seawater through gas exchange. Coral reefs are one of the largest ecosystems in the ocean, sustaining marine biodiversity and providing many goods and services. However, living coral populations are rapidly declining due to ocean acidification, oceanic warming, habitat destruction, and pollution from human activity across the globe. From [rare corals](#) off the coast of Florida to [well-established hard corals](#) in the Great Barrier Reef, these communal organisms are sensitive to various environmental stressors that threaten biodiversity. The study results indicate 17 of the 22 OCPs are detectable in seawater, and all 22 OCPs are detectable in ambient air samples from the SCS. The most prominent chemicals amid air and water samples are chlordane compounds, hexachlorobenzene compounds, DDTs, and Drins (aldrin, dieldrin, and endrin). Although coastal corals have higher chemical concentrations than offshore species, the chemical composition is similar, with DDT and chlordane compounds dominant among tissue samples. Researchers attribute the difference in OCP concentration among coastal and offshore corals to oceanic currents and storms influencing pollution distribution. Long-range atmospheric transport and condensation are significant contributors to the global contamination of environmental pollutants like OCPs. Most concerning are the persistent properties of OCPs that allow these substances to remain in the environment long after use. Some of these long-lived chemicals include regionally banned pesticides that are highly toxic to humans and animals: DDT, heptachlor, and lindane. These pesticides cause various adverse effects, from respiratory issues, nervous system disorders, and birth deformities

to various common and uncommon cancers. [Kang, Yaru et al. First report of organochlorine pesticides (OCPs) in coral tissues and the surrounding air-seawater system from the South China Sea: Distribution, source, and environmental fate. *Chemosphere*, 286 (Part 2): 131711, 2022.]



## Persistent Organic Pollutants, including Banned Pesticides, Remain Present in All Fetal Organs Regardless of Maternal Chemical Contamination

**SEPTEMBER 16, 2021** | A study published in *Chemosphere* finds persistent organic pollutants (POPs), including organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), and polybrominated diphenyl ethers (PBDEs), are present in the serum and placenta of pregnant mothers, as well as multiple fetal organs. Many [studies](#) indicate prenatal and early-life exposure to environmental toxicants increases susceptibility to diseases, from learning and developmental disabilities to cancer. However, this study is one of the first to demonstrate the presence of chemical toxicants in fetal tissue that are not present in maternal serum or placental samples. Prenatal development is one of the most vulnerable periods of exposure when the fetus is most susceptible to the harmful effects of chemical contaminants. Therefore, studies like these help government and health officials better identify fetal exposure contaminants

and subsequent health concerns otherwise missed by current chemical monitoring methods. The researchers note, “These findings call for further evaluation of the current matrices used to estimate fetal exposure and establish a possible correction factor for a more accurate assessment of exposure *in utero*. We disclose the full data set on individual exposure concentrations to assist in building *in silico* models for

prediction of human fetal exposure to chemicals.” All 22 POPs are detectable in fetal fatty tissue samples regardless of chemical detection in the mother. Chemical concentrations are highest among later gestations (pregnancy), male infants, and pregnancies with standard placental function. Of chemical measurements, organochlorine pesticides are present in the highest amount in tissue and blood serum

samples, followed by PCBs and PFAS. Adipose (fatty) tissue within the fetal organs has the highest chemical burden, while the brain has the lowest. Overall, more chemicals are detectable in fetal tissue samples than maternal blood/placenta samples. [Björvang, Richelle et al. Mixtures of persistent organic pollutants are found in vital organs of late gestation human fetuses. *Chemosphere*. 283: 131125, 2021.]



## ACTION OF THE WEEK

### Tell FDA and USDA To Get Heavy Metals Out of Baby Food

A staff report produced for the Subcommittee on Economic and Consumer Policy of the Committee on Oversight and Reform of the U.S. House of Representatives has documented substantial levels of the heavy metals arsenic, lead, cadmium, and mercury in infant foods. The researchers examined organic as well as nonorganic brands, finding contamination of both. They found that heavy metals were present in both crop-based ingredients and additives. However, many unknowns remain regarding the precise origin of the metals.

Two U.S. Senators (Amy Klobuchar, D-MN and Tammy Duckworth, D-IL) and two U.S. Representatives (Raja Krishnamoorthi, D-IL and Tony Cardenas, D-CA) have [drafted legislation](#) to strengthen regulations for infant food safety, but meanwhile want the Food and Drug Administration (FDA) to use existing authority to take immediate action. The National Organic Program should also take action to ensure that parents can depend on organic baby food to be the best possible.

### Letter to FDA Commissioner

Because heavy metal contamination occurs in organic as well as non-organic baby foods and in food ingredients as well as additives such as vitamin mixtures, it is important to discover the sources from which heavy metals enter the food. Some sources are known—it is known that some vitamin mixes are contaminated. It is known that rice—especially brown rice—contains arsenic as a result of historical use of arsenic pesticides and the fact that rice concentrates arsenic. Other sources are more speculative, but there are three main possible sources—pesticide residues in agricultural products, food contact with processing machinery and containers, and food additives. Growing food organically eliminates additions to the heavy metal burden of soils but does not eliminate existing residues. Organic processing standards have not yet caught up with the problems of food contact contaminants and contaminated additives and rely to some extent on FDA standards.

It is important to motivate those involved in baby food manufacture—from farmers to processors and packagers—to eliminate known sources of contamination. This can be accomplished with strict FDA regulations on heavy metal concentrations in finished products. I urge you to take these steps to protect children from hazardous heavy metals:

**Establish aggressive targets:** Set a goal of having no measurable amounts of cadmium, inorganic arsenic, or lead in baby and children’s food.

**Create and enforce benchmarks:** To reach its goals in baby and children’s food, FDA should insist that manufacturers follow recognized best practices and set incremental targets for industry to meet along the way.

**Finalize existing proposed guidelines:** FDA should limit inorganic arsenic in apple juice to 10 ppb and revise existing guidance for lead in fruit juice to reduce the limit from 50 to 5 ppb.