



## Call for End to Antibiotic Use in Crop Production, as Worldwide Resistance Crisis Escalates

In a campaign to stop the use of antibiotics in U.S. crop production, Beyond Pesticides, in May, submitted comments with thousands of people and organizations, urging EPA to reject the registrations of streptomycin and oxytetracycline. Beyond Pesticides had secured an extension on the public comment period on the chemicals' registration, after the agency failed to provide adequate public notice of its deliberations.

Since the EPA's 2006 review, there has been a dramatic expansion of research into the microbiome, resulting in a better understanding of its critical roles in regulating such diverse processes as metabolism, immunity, and neuro-development. EPA does not assess risks

due to disruption of the gastrointestinal microbiome. EPA also does not comprehensively consider risks to workers.

Crucially, use of streptomycin and oxytetracycline in agriculture contributes to the growing crisis in antibiotic resistance. Many bacterial infections are becoming resistant to the most commonly prescribed antibiotics, resulting in longer-lasting infections, higher medical expenses, and the need for more expensive or hazardous medications. The development and spread of antibiotic resistance are the inevitable effect of the use of antibiotics. Bacteria evolve quickly, and antibiotics provide strong selection pressure for those strains with genes for resistance.

Spraying crops with these antibiotics promotes multiple drug resistance—making other antibiotics ineffective as well. Resistance genes may be taken up by other bacteria through a number of mechanisms, collectively known as “horizontal gene transfer.” Certified organic production does not permit the use of antibiotics in agriculture.

## Beyond Bees: Widespread Hazards Linked to Neonicotinoid Insecticides

### CONNECTION TO BREAST CANCER . . .

If the pollinator and ecosystem effects of neonicotinoid insecticides were not sufficient reason for regulatory action, a study published in *Environmental Health Perspectives* finds that environmental concentrations of thiacloprid and imidacloprid increase expression of a gene linked to hormone-dependent breast cancer. Adding to previous work in 2015, the authors of “A Potential Mechanistic Link between Neonicotinoid Insecticides and Hormone-Dependent Breast Cancer,” uncovered a pathway through which neonicotinoids stimulate excess estrogen production, known to occur during the development of progressive hormone-dependent breast cancer.

First author Elyse Caron-Beaudoin, PhD, said, “This provides in vitro evidence that neonicotinoids can be endocrine disruptors and that aromatase may be one of their targets. Importantly, the promoter switch occurs at concentrations that are highly relevant to humans.”

As broad-spectrum insecticides that are incorporated into plants through uptake into their vascular system, beneficial soil dwelling insects, benthic aquatic insects, grain-eating vertebrates, along with pollinators are victims of these systemic neonicotinoid chemicals.

### . . . AND TO WILDLIFE EFFECTS

Researchers have found that tiny amounts of neonicotinoids cause migrating songbirds to lose their sense of direction and become emaciated. Now, a two-year study, “Effects of Neonicotinoid Insecticides on Physiology and Reproductive Characteristics of Captive Female and Fawn White-tailed Deer,” published in *Nature Scientific Reports*, finds that field-relevant contamination with imidacloprid causes reduced body weight and metabolism in white-tailed deer, and mortality in fawns. The study evaluates behavioral outcomes of imidacloprid contamination in 80 white-tailed deer housed in a South Dakota State University captive research

facility. Background neonicotinoid exposure of untreated deer in the control group—attributed to background contamination of corn- and soy-based feed, and vegetation contaminated from nearby agricultural use—did not compromise the study findings. Researchers found that imidacloprid levels detected in the spleens of treated and control animals are significantly predictive of reduced thyroid hormone levels, shorter jawbones, lower activity levels, and higher fawn mortality.

The accumulating evidence of neonicotinoid-induced endocrine disruption is of particular concern, given that these insecticides are ubiquitous in the environment. A 2018 study by the U.S. Geological Survey (USGS) found neonics widespread in the Great Lakes at levels that harm aquatic insects—the foundation of healthy aquatic ecosystems. Earlier, a USGS and University of Iowa study found two metabolites of imidacloprid in drinking water that have never been detected previously.

## Rollbacks Continue at Interior and EPA

**W**ith the confirmation of David Bernhardt, a former oil and gas industry lobbyist, as Secretary of Interior in April, the agency is continuing to weaken the protection of endangered species. A month after taking the leadership position, having served as acting since January after holding lower level positions in the agency, the Center for Biological Diversity (CBD) filed four lawsuits challenging the Trump administration's failure to release a trove of documents detailing how it is regulating dangerous pesticides, especially as they relate to endangered species. Meanwhile, the U.S. Environmental Protection Agency (EPA) released a set of proposed changes to endangered species risk assessments that will dramatically reduce protections for the nation's most endangered plants and animals from pesticides known to harm them. The proposals ignore the real-world, science-based assessments of pesticide hazards, instead relying on arbitrary industry-created models.

The EPA proposals would, for example, gut protections for endangered plants that are pollinated by butterflies and other insects by ignoring the fact that animals routinely move back and forth between agricultural areas and places where endangered species live.

The proposals follow intensive efforts by Secretary Bernhardt to halt federal work on protecting wildlife from pesticides. They were released over a year after a draft biological opinion that was scuttled by the Trump administration found that the loss of pollinators from the insecticide chlorpyrifos would put hundreds of endangered species on a path to extinction.



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## Funding Threatened for Children's Environmental Health Centers

**A**fter two decades of cosponsoring and co-funding research centers that do important scientific investigation related to children's health, the U.S. Environmental Protection Agency (EPA) and the National Institute of Environmental Health Sciences (NIEHS) are planning to end their support. EPA has announced that it will not renew its grants to these centers, which have operated in California, Colorado, Illinois, Michigan, Iowa, Ohio, Georgia, North Carolina, Maryland, New Jersey, New York, Rhode Island, Massachusetts, and New Hampshire.

As of July, they will lose a huge portion of the funding that has allowed them to deploy hundreds of scientists—in genetics, toxicology, and neurodevelopment—on comprehensive and longitudinal studies of the factors in children's experiences and communities that impact their health. These centers are critical in uncovering the relationships between children's exposures to toxic chemicals, including pesticides, and diseases and health anomalies

later on in their developing years.

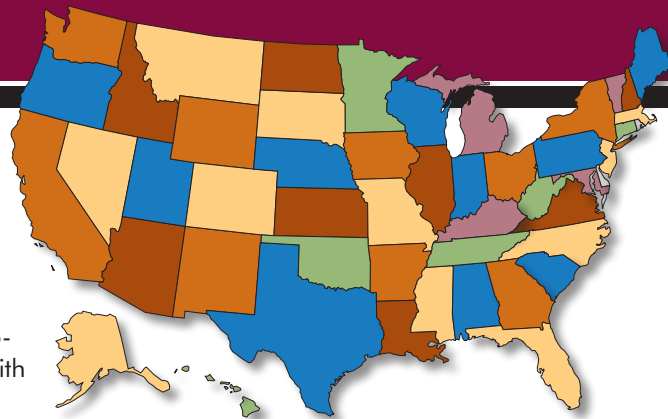
This announcement represents another attack by the Trump administration on science, public health, and children and families, as well as another wink and nod to industries whose products cause harm. Says Trac-



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ey Woodruff, PhD, who runs the University of California, San Francisco Pregnancy Exposures to Environmental Chemicals Children's Center: When EPA weighs the harms of a chemical against its benefits, this "works out perfectly for industry.... If EPA doesn't know, it counts for zero." The centers are very concerned that EPA's withdrawal of support will force them to shutter important, long-term research projects.

The studies conducted by these centers often begin before birth and follow subjects through childhood and into adulthood, yielding unusually rich data that can track, for example, environmental exposures early in life and subsequent and related health problems years later. In addition, these longitudinal studies can adapt to the changing mixes of exposure risks children may face over 20 years or so as they grow from newborns to young adults. The centers produce work that often leads to reform in policies and practices, and, ultimately, improved health outcomes.



## Local Restrictions Upheld In Maryland

A long-held democratic principle central to a constitutional democracy—the authority of local government to protect public health and safety, as communities have done historically with ordinances on recycling, smoking, zoning, and dog waste—was upheld by Maryland Court of Special Appeals. The ruling, which reverses a lower court decision in August 2017, found that Montgomery County, Maryland has the right to restrict pesticide use on private property, under its 2015 landmark law. The case was brought against the county by the landscape and chemical industry and individuals who work for the industry. The chemical industry has fought for

nearly three decades to suppress the right of local governments in the U.S. to protect public health and safety with pesticide law, having successfully lobbied 43 states to preempt their local political subdivisions' authority. Seven states uphold local authority, including the state of Maryland, which has affirmed in its legislature the rights of localities by rejecting preemption legislation on numerous occasions. A number of states are looking at reversing state preemption of local municipalities. The U.S. Supreme Court, in *Wisconsin Public Intervenor v. Mortier* (1991), affirmed local authority

to exceed state and federal standards under federal pesticide law.

“This important state court decision affirms local democratic decision making to protect health and the environment, upholding the first U.S. county law to ban toxic pesticides used on lawns on both private and public property,” said Jay Feldman, executive director of Beyond Pesticides.

## Autism Linked to Wide Range of Commonly Used Pesticides

Exposure to commonly used pesticides in the womb and during the first year of life is linked to a higher risk of developing autism, according to the study “Prenatal and infant exposure to ambient pesticides and autism spectrum disorder in children: population based case-control study,” published in the journal *BMJ* in March. The study adds to previous findings highlighting autism risks from pesticide exposure and reinforces calls to limit pesticide exposure during early life critical windows of vulnerability. The authors note their findings “support the need to avoid prenatal and infant exposure to pesticides to protect the developing child’s brain.”

Researchers used data from California’s 1998–2010 records of autism disorder diagnosis and birth rates, a control group of approximately 35,000—adjusted for confounding factors that can influence the results, such as the mother’s age, socioeconomic status, and exposure to air pollution. Exposure data was then drawn from California’s agricultural pesticide use database, focusing on 11 pesticides (glyphosate, chlorpyrifos, diazinon, acephate, malathion, permethrin, bifenthrin, methyl bromide, imidacloprid, avermectin, and myclobutanil) applied within 1.25 miles of study subjects’ homes.

Results show modest increases in autism risk for exposure to glyphosate, chlorpyrifos, diazinon, malathion, avermectin and permethrin. For cases of autism with co-occurring intellectual disabilities, a more robust link was found for glyphosate, chlorpyrifos, diazinon, permethrin, methyl bromide, and myclobutanil. A similar link was found for exposures



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within the first year of life, with glyphosate revealing the strongest association—increasing the risk of autism by 50% for exposures occurring during infancy.

Previous studies have linked prenatal and early life pesticide exposure to autism and learning disabilities. A 2014 study found that pregnant women living less than a mile from crops sprayed with organophosphate insecticides have a 60% increased risk of their child receiving an autism diagnosis. For women in the second trimester, chlorpyrifos exposure increases autism risks by 3.3 times. Exposure to synthetic pyrethroids, such as permethrin and bifenthrin, during the last trimester of pregnancy corresponds with an 87% increased risk of an autism diagnosis. A 2017 study found that those living in zip codes where pesticides are aerially sprayed for mosquitoes with synthetic pyrethroids are 37% more likely to have higher rates of children diagnosed with autism and other developmental delays.

By passing the Healthy Lawns Act, 52-14 (2015), the Montgomery County Council acknowledged growing demand within the community for natural and organic lawn care practices and compatible products. These cost-effective lawn care methods have been shown to eliminate the need for toxic pesticide use through improvements in soil biology that support more resilient plants.

Meanwhile, a study, "Anti-community state pesticide preemption laws prevent local governments from protecting people from harm," supported by USDA's National Institute of Food and Agriculture, finds that state pesticide preemption laws "compromise public health and economic well-being" by preventing localities from enacting pesticide use restrictions on private property that are more restrictive than their state's regulations.

## States Ban Pesticide, EPA Refuses to Act

The banning of the neurotoxic insecticide chlorpyrifos in three important agricultural states shows the states filling some of the void left by EPA inaction. Hawai'i banned chlorpyrifos a year ago with a unanimous vote of the legislature. New York and California banned it in May. Other states have been pursuing bans since EPA rescinded its proposed ban in 2017.

Like other organophosphate pesticides, chlorpyrifos has been linked to damaging and often irreversible health outcomes in workers, pregnant women, and children. A widely used pesticide, agriculture companies annually spray six million pounds on crops like citrus, apples, and cherries. Chemically similar to the nerve agent Sarin gas, the substance was initially developed prior to World War II as a pesticide and chemical weapon. It overstimulates the nervous system to cause nausea, dizziness, confusion, and, in high exposure cases, respiratory paralysis and death.

In the paper, "Organophosphate exposures during pregnancy and child



Joan Cusick for Californians for Pesticide Reform

neurodevelopment: Recommendations for essential policy reforms," published in the journal PLOS Medicine, a group of leading toxics experts is calling for a ban on organophosphate pesticides. The study evaluates current science on the risks of this class of compounds, produced by Corteva Agriscience (formerly Dow AgroSciences). The authors conclude that: (1) widespread use of organophosphate (OP) pesticides to control insects has resulted in ubiquitous human exposures; (2) acute exposures to OPs is responsible for poisonings and deaths, particularly in developing countries; and (3) evidence demonstrates that prenatal exposures, even at low levels, put children at risk for cognitive and behavioral deficits, and neurodevelopmental disorders. Because of adverse effects to children, EPA negotiated a December 2001 cancellation of residential and community chlorpyrifos use, with the exception of golf course and public health mosquito uses, but retained most agricultural uses.

While the campaign to remove chlorpyrifos and other specific pesticides, like glyphosate (Roundup), from the market eliminates a hazardous exposure to vulnerable population groups and workers, the industry typically shifts to other equally hazardous pesticides allowed under weak federal and state

pesticide laws, according to advocates. As a result, communities across the country have adopted or are considering local ordinances that put organic land management practices in place.

## Nutrient Runoff, Aquatic Weed Killers, and Florida's Red Tide Collide in Public Debate

After a brief hiatus, the Florida Fish and Wildlife Conservation Commission (FWC) is continuing use of aquatic herbicides, including glyphosate, for invasive species management. Public pressure and feedback caused FWC to take a temporary pause from spraying while the commission collected public comment through public hearings and emails from late January through February. FWC ultimately decided to resume spraying invasive species, and points to its improved integrated management system as reducing overall herbicide use.

Glyphosate, one of the 17 aquatic herbicides that FWC uses regularly, has sparked opposition from environmentalists and the general public due to its wide usage and known adverse effects. According to FWC data, 12,263 pounds of glyphosate-based herbicides



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were used on Florida's Lake Okeechobee in 2017.

About 175,000 people have signed a North Palm Beach petition entitled "Stop the State-Sanctioned Poisoning of Our Lakes and Rivers!" The petition decries the use of glyphosate to kill invasive aquatic plants and warns of subsequent nutrient pollution caused by decay. An excess of nutrients (e.g., nitrogen and phosphorus) from synthetic fertilizers in water bodies contribute to algal blooms. Eutrophication can eventually result in oxygen depletion and thereby decrease biodiversity. FWC denies that the invasive species management program

contributes to either red tide (discoloration caused by an explosion of algae) or blue/green algae buildup, citing lack of evidence and asserting that keeping low populations of the plant reduces buildup of decaying plant material.

Those who use alternatives say that employing nonchemical strategies requires different approaches than chemical-intensive strategies. For example, timing of harvesting and the use of biological controls becomes an important factor in efficacy of these nonchemical approaches.

## Fungicides Linked to Disease Resistance and Adverse Effects

Long known to be among the most hazardous pesticides, a widely used agricultural fungicide worldwide is being restricted in Europe. Fungicide use on farms is being linked to the threat of the deadly fungal pathogen, *Candida auris*, which is advancing across the globe.

### DEADLY RESISTANCE EMERGING

Dutch researcher Jacques Meis, M.D., Ph.D., Department of Medical Microbiology and Infectious Diseases, Canisius Wilhelmina Hospital, says that drug-resistant fungi are developing because of heavy use of fungicides on crops. He first saw the resistance and agricultural link when a patient in the Netherlands died in 2005 from the fungus *Aspergillus*, which proved resistant to the antifungal itraconazole—that compound being a virtual copy of the azole fungicides used worldwide to treat crops, and accounting for more than one-third of all fungicide sales. (See PAY, p. 9.)

### EUROPE BANS CANCER CAUSING, FROG-KILLING FUNGICIDE

Contamination of drinking water with toxic breakdown products and risks to fish and amphibians have led to a ban on the fungicide chlorothalonil in the European Union (EU). Tens of millions of pounds will continue to be sprayed throughout the U.S. "The [chlorothalonil ban] is based on EFSA's [the European Food Safety Authority's] scientific assessment, which concluded that the approval criteria do not seem to be satisfied for a wide range of reasons," a spokeswoman for the European Commission told *The Guardian*.

EFSA's review of chlorothalonil categorized it as a 1B carcinogen, meaning it "may cause cancer," with the most significant risk found for kidney cancer based on laboratory animal

studies. Further research is needed into many of the metabolites (breakdown substances) created when chlorothalonil degrades. However, regulators determined that enough data was present to conclude that these breakdown substances may be genotoxic, with the potential to damage DNA and lead to cancer.

European regulators also identified a high acute risk to amphibians, and chronic risks to fish from chlorothalonil-contaminated water. However, many European advocates are concerned that the assessment did not adequately characterize the risks that the fungicide poses to wild pollinators. EFSA found low risks to honey and bumblebees at both acute and chronic doses, but advocates say these data should have precipitated follow-up tests on wild pollinators. Matt Shardlow, of the European environmental non-profit Buglife, told *The Guardian*, "[T]he EU process failed to apply the EFSA guidance on assessing risk to bees, so there were no bumblebee safety tests."

Prior research backs up Buglife's concerns. A 2018 study found that pollinators display an attraction to chlorothalonil. Research at Cornell University in 2017 singled out chlorothalonil as a contributing factor to the ongoing decline of pollinators. A 2016 study found that chlorothalonil alters the microbiome of honey bees, and a 2015 study showed reduced bumblebee colony size and health after exposure to the fungicide.