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Pesticides *and* You

Beyond Pesticides: Protecting Health and the Environment with Science, Policy, and Action

RETROSPECTIVE 2021: A Call to Urgent Action

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A Call to Urgent Action

This special issue of *Pesticides and You*, **Retrospective 2021**, is a look at a year of science, policy, and advocacy that informs both the problems we are facing due to toxic pesticide dependency, and solutions that can be adopted now. The information in this issue adds to the body of science that empowers action at the local, state, and federal level, and also provides a framework for challenging toxic pesticide use and putting alternatives in place. 2021 was a pivotal year in both defining the problem and advancing the solution.

This year in review reflects an accounting of scientific findings documenting serious health and environmental effects, disproportionate risk to people of color and those with preexisting conditions, regulatory failures, at the same time as it provides documentation on the viability of organic practices that offer a solution. Dependency on toxic, fossil fuel based pesticides and fertilizers contributes to the existential crises of human pesticide induced or exacerbated illness, biodiversity collapse, and the climate emergency, and calls for urgent action to eliminate their use.

The organic solutions to problems highlighted in this issue—based on the importance of healthy ecosystems—are within reach, and the data provided creates an imperative for action now that phases out pesticides within a decade, while ensuring food productivity, resilient land management, and safe food, air, and water. In the immediate-term, this issue includes the work that Beyond Pesticides and our network and allies are doing to advance change through our *Action of the Week* and hands-on community-based work.

Contributing writers to this issue include Beyond Pesticides staff (Jay Feldman, Drew Toher, and Akayla Bracey), board member and science consultant Terry Shistar, PhD, and writer Debra Simes. Design services by David Gerratt, NonprofitDesign.com.

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RETROSPECTIVE 2021: A CALL TO URGENT ACTION

By Jay Feldman

This issue of *Pesticides and You*, *Retrospective 2021: A Call to Urgent Action*, gives us an opportunity to reflect on a year's work of engaging with science, policy, and action to fight the public health, biodiversity, and climate crises that challenge our very existence. This issue is both a jarring documentation of the threats that we face from toxic, fossil fuel based pesticides and the uplifting opportunities that we have available to transition society to sustainable practices. This recounting of one year provides a framework for moving ahead with scientific analysis of the problem, oversight of regulatory failure to address the seriousness of the threats, and effective action that is critical to a livable future.

Like many, our last year was filled with zoom meetings that gave us an opportunity to participate in local meetings, city/county/town council hearings and strategy sessions that inform the changes that are required to meet the crises. We held a five-part National Forum with top scientists, medical practitioners, land managers, elected officials, and activists from across the country and have created a series of short talks (now housed on our National Forum webpage) that form the foundation for action. With this focus, we keep the information and strategic thinking flowing through our *Daily News*, *Weekly News update*, and *Action of Week*. Now, *Retrospective 2021* is a critical look back at a pivotal time to inform the path forward. *Retrospective 2021* is an empowerment tool to both scientifically and analytically define the problem and point to solutions that are already in motion, but need to increase exponentially.

Retrospective 2021 does not reflect the full body of science, but is a snapshot that should awaken those

who think we can plod along with reform proposals, regulatory restrictions, and more study, as we tweak approaches that have failed. In reading the pages of this issue, recognize that it is just one year, but is reflective of every year, which is filled with facts that make urgent change an imperative, beginning in our communities and spreading throughout the country and globe. We track all the science and regulation through the several databases on our website—*Gateway on Pesticide Hazards and Safe Pest Management*, *Pesticide Induced Diseases Database*, and *ManageSafe*.

Advocacy Backed by Science

We include hyperlinked text highlighted in the electronic edition (also noted in the print edition) so that readers can delve deeper into the referenced, independent peer reviewed scientific articles and documents. The message here is that change is grassroots generated from the bottom up; that facts are most powerful closest to the ground where neighbors talk to neighbors and local elected officials can consider the implications of toxic practices on families and communities, where individuals can make decisions that affect their family's and community's health. When we cite studies on learning disabilities and autism or the disappearing bees and butterflies, polluted recreational lakes, contaminated school yards and playing fields, pesticide-tainted food and drinking water, they support the experiences that touch people directly. When we point to the connection between pesticides and our cancer rates, diabetes, Parkinson's, Alzheimer's, and asthma, these are illnesses we see in our families and friends. As we see global catastrophes of climate events and biodiversity collapse, the science connects these to chemical-intensive practices for which fossil fuel based pesticides and fertilizers are integral.

Will Local Action Make a Difference?

Not all the problems in this issue that challenge our very existence can be solved at the local level certainly. Change in our communities does improve human and ecosystem health and charts a course for broader change statewide, nationwide, and globally. Having participated in the evolution of the organic market and then the institutionalization of organic standards in law, we know that solutions are being adopted in households, schools, food production, parks, and our communities generally. Since Beyond Pesticides' founding in 1981, organic has grown exponentially to a $60 billion industry that was unthinkable those decades ago. Now it must grow even faster with the principles and values that are codified in law. But, we don't have 40 years to meet the urgent health and environmental challenges.

Ending Toxic, Fossil Fuel Based Pesticide and Fertilizer Use by 2035

Let's take a cue from the sense of urgency behind legislation in Congress to end sales of gas powered vehicles by 2035. We can and must do the same with fossil fuel based pesticides and fertilizers. *Retrospective 2021* includes references to the viability of organic systems and the myth of pesticide benefits in chemical-intensive management systems that do not offer the return (or benefits) that their advocates profess—as alternatives do better, especially when the cost of externalities (pollution, clean-up, end of ecosystem services, sickness, etc.) are considered. We have the tools to make this change nationally and globally. It is already happening.

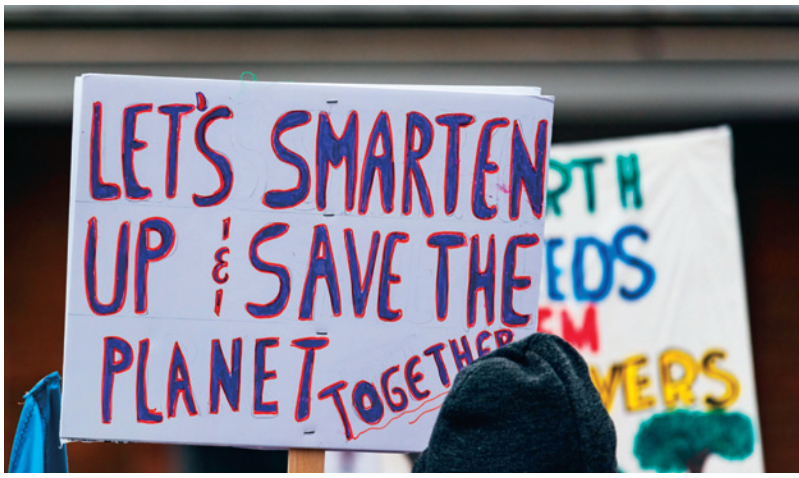
Organization of this Issue

Our approach in *Retrospective 2021* reflects the way that Beyond Pesticides takes on the daily task of empowering grassroots people and organizations to act. The issue is divided into nine categories (see table of contents) that inform strategic action—from human to environmental health, disproportionate risk and environmental justice, to local action, and sustainable organic practices and policy.

2021 as a Reset for the Future?

The inauguration of President Joe Biden in 2021 has been embraced as a critical opportunity to reverse some of the atrocities against public health and the environment by focusing the highest levels of government to take on the critical issues that go to our existence. President Biden issued an executive memorandum, *Modernizing Regulatory Review*, with the stated goal of promoting public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations. This Presidential order sets the stage for the adoption of agency policy to seriously and with urgency confront the climate crisis, biodiversity collapse, and disproportionate harm to people of color communities (environmental racism). We said at the time that these were meaningful words on a page that needed to be urgently put into action. 2021 provided an opportunity for a reset, a recognition that we needed to join together as a nation and as a part of the world community to take action.

A look back at 2021 shows that we have not yet met the moment, unfortunately. It is only one year, and there are a



lot of complex factors, but we have learned again about the culture of government and the inertia of bureaucracies, that the influence and economic interest of polluting industries is embedded in the decision-making institutions at the highest levels. We saw exposes about this and Office of Inspector General and General Accountability Office reports about this in 2021, some calling the governmental decisions outright corruption. We heard whistleblowers in 2021 telling the public that science was being ignored or manipulated at the highest levels. The pieces are referenced in this issue.

Crisis Oriented vs. Precautionary

2021 exemplifies what advocates see as irresponsible federal agencies, including the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA), falling far short, as the nation and the world sit on the brink of biodiversity collapse and deadly pesticide-induced diseases. The science shows us and decision makers in our communities that the regulations governing use of toxic chemicals harmful to people and the environment are unprotective. The findings in this issue, for just one year, show that EPA misrepresents the truth when evaluating what is known, with false assumptions in the agency's risk assessments, and misleads the public on the high degree of uncertainty in the potential harm that pesticides cause. USDA promotes industrial agriculture to the detriment of farmers, farmworkers, health and the environment.

Adopting a Holistic Response with Systemic Change

We are not asking for the elimination of one pesticide, a few pesticides, or the adoption of undefined "sustainable" or "regenerative" practices. These changes will not meet the challenges. What is needed is the adoption of whole systems changes that work with nature and effectively ban all toxic materials, under a definition of allowed materials that are compatible with ecosystem land management and is currently defined in federal organic law. We start with the understanding that soil health is foundational to healthy plants; that holistic systems cycle nutrients naturally and support balanced ecosystems that prevent the kinds of pest (insect, weed, and fungal) problems that are endemic to chemical-intensive land management.

We have learned that exclaiming the viability of alternative practices is not sufficient when we are fighting the vested economic interests of pesticide and fertilizer companies, agribusiness, and the chemical landscape and chemical pest control industry. We have to consistently bring the science to our community and marketplace conversations and decisions, as we confront the misleading positions of industry groups that hide behind a weak and unprotective EPA and state regulatory systems that, for the most part, rubberstamp EPA's failures. And we need to fight in state legislatures that have preempted the right of local governments to restrict pesticides on private property in 44 states. So, we start with public community and state lands, show that these holistic systems work better than chemical-intensive approaches in reducing costs, retaining water and moisture, and sequestering carbon over time.

There are many political and economic factors that drive pesticide dependency. But, in most cases, toxic pesticide use is not tied to a determination of real need. And the need for pesticides is created by mismanagement or chemical-dependency, which depresses or destroys ecological balance, creates pest resistance, and results in a treadmill effect of ramping up the toxicity of chemicals required. Questions about cost do not typically consider the expense of the climate emergency, the lost ecosystem services that cycle nutrients naturally, pollinate, and depress disease and infestation, and the real harm and cost to people generally and disproportionately to farmworkers and landscapers. A holistic approach builds resiliency into the system so that the vast majority of the problems typical of chemical-dependent systems do not appear.

Organic as the Solution

Too often the question from decision makers is whether a safer pesticide product can replace a hazardous one. Putting an organic compatible product into a chemical-intensive system is doomed to failure. A systems approach respects nature and soil biology with practices and materials that

enhance the natural world, as opposed to creating vulnerabilities to disease and infestation with toxic chemical use. The product substitution approach, common when pesticides are restricted, undermines the delicate balance and interwoven relationships of organisms in nature, which is so critical to the solution.

Entomologist and author David Goulson, PhD explains in his book, *A Sting in the Tale*, "We need worms to create soil; flies and beetles and fungi to break down dung; ladybirds and hoverflies to eat greenfl[ies]; bees and butterflies to pollinate plants to provide food, oxygen, fuel and medicines, and hold the soil together; and bacteria to help plants fix nitrogen and…cows to digest grass.… [Yet] we often choose to squander the irreplaceable, to discard those things that both keep us alive and make life worth living."

Organic consumers and farmers have invested in the value that we care not only about land stewardship and what we feed our children and families, but stopping farmworker exposure to hazardous materials and ending the hazards to the fenceline communities—where the toxic chemicals used in chemical-intensive land and pest management are produced.

It has become increasingly clear that to the extent we disrupt the functioning of nature, we do so at our peril. It is in this spirit, that we must end the use of toxic pesticides, which are developed to purposefully disrupt biological systems. As a part of ecosystems, our actions and policies must protect nature that sustains us, from microbial life in the soil to mayfly nymphs—the keystone species at the bottom of the aquatic food web.

Now Is the Time to Build on This Foundational Change

When we make decisions on allowed materials or substances in organic systems under organic law, we determine the future of agriculture, land management, and nature—do we want industrial agriculture—will we preserve the marine environment and virgin forests—will we stop the use of chlorine-based substances—will we eliminate hazardous inert or undisclosed ingredients. We must protect organic standards against the pressures within and outside of USDA (as discussed in this issue) that seek to weaken organic as the solution. The good news is that we have a solution in organic and we can build on this.

How do we bring all this together to effect change? The examples of local change in 2021 in this issue—from Maui, Hawai'i to Stamford, Connecticut to New York City—represent the elements of change coming together to utilize the power of science to convey the facts on the seriousness of health and ecological problems and the viability of organic solutions, coupled with the building of influence with neighbors, community members, and elected representatives. This is all advanced through a heightened advocacy that includes a respectful outrage and a deep sense of urgency.

Jay Feldman *is the executive director of Beyond Pesticides.*

Elements of an Organic Systems Approach in the Organic Foods Production Act

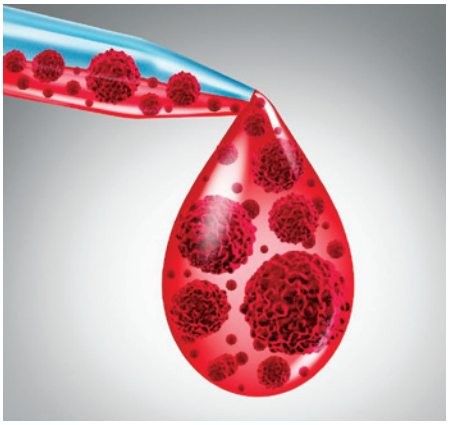
The law:

1. Establishes a systems approach to protecting and enhancing the environment. *It does not allow determinations based on relative risk.*
2. Sets restrictions that incentivize continuous improvement in organic management. *It incentivizes investment in natural materials and practices.*
3. Maintains criteria and categories of use for evaluating an allowed substance's (i) adverse effects, (ii) compatibility with organic systems, and (iii) essentiality. *It does not envision inputs/substances not required in soil systems.*
4. Evaluates cradle-to-grave effects when considering allowable inputs. *It does not ignore the full range of health and environmental impacts associated with production, use, and disposal.*
5. Identifies soil as the medium for nutrient cycling, supplying the macro and micronutrients through support of the microbiota. *The law's required systems plan does not envision a dependency on synthetic substances.*
6. Requires complete information and precaution. *It does not allow for uncertainty, incomplete information on effects, and arbitrary margins of safety.*
7. Mandates on-farm inspection and certification. *Chemical-intensive agriculture has no similar oversight.*

Pesticides Tied to Widespread Health Threats

ADDING TO THE BODY OF SCIENCE: HUMAN ILLNESS

The range of scientific studies in 2021 is a snapshot of the public health crisis associated with pesticides. The studies that are discussed and cited in this section, showing adverse health effects associated with pesticide exposure, are striking in scope. The life-threatening and debilitating effects captured in the scientific literature, subject to independent peer review, establish a range of adverse health outcomes, including the following: amyotrophic lateral sclerosis (ALS), blood and skin cancer, childhood brain cancer and leukemia, breast cancer, thyroid function and cancer, multiple myeloma (plasma cell cancer), bladder cancer, non-Hodgkin lymphoma, prostate cancer, adverse birth outcomes, uncontrolled bacterial infections, cardiometabolic disorder, endocrine system effects, gut microbiome effects, heart and metabolic disorders, infertility, chronic kidney disease, nervous system effects, chronic lung disease, obesity, preterm births and low birth weights, Parkinson's disease, autism, and vulnerability to Covid-19. The studies document broad impacts and a later section includes studies that show elevated and disproportionate risk factors across society. (See Section IV—Disproportionate Pesticide Harm Is Racial Injustice, pp. 54–63.) Of note are the studies that document effects resulting from *in utero* exposure, effects to women's health, and effects carried to future generations (multigenerational effects.) The one year covered in this section adds to the body of scientific literature that serves as a dire warning that the widespread release of toxic pesticides presents a serious threat to survival.



Study Finds Link Between Pesticide Exposure and Rare Blood Cancer Predecessor (MGUS)

JANUARY 14, 2021 | Long-term exposure to permethrin and legacy organochlorine pesticides (aldrin, dieldrin, and lindane) increase the risk of developing monoclonal gammopathy of undetermined significance (MGUS), a blood disease that likely precedes multiple myeloma (MM)—a type of blood cancer, according to research in *Environmental Health Perspectives*. Globally, cancer is one of the leading causes of death, with over eight million people succumbing to the disease every year. Notably, the International Agency for Research on Cancer (IARC) predicts new cancer cases to rise by 67.4% in 2030. Although there is a vast amalgamation of research linking cancer risk to genetic and external factors (e.g., cigarette smoke), there is increasing evidence that pesticide exposure augments the risk of developing both common and rare cancers, including MM. Study researchers state, "Our findings provide important insights regarding exposures to specific pesticides that may contribute to the excess of MM among farmers… [T]he continued widespread residential and other use of permethrin and environmental exposure to organochlorine insecticides due to legacy contamination . . . could have important public health implications for exposed individuals in the general population." [Hofmann, Jonathan et al. Lifetime Pesticide Use and Monoclonal Gammopathy of Undetermined Significance in a Prospective Cohort of Male Farmers. *Environmental Health Perspectives*. 29(1), 2021.]

Genetically Weakened Skin Barrier Allows for Easier Absorption of Toxic Chemicals

JANUARY 21, 2021 | A Swedish study in *Environmental Health Perspectives* demonstrates that individuals with genetically weakened skin barrier protection experience higher rates of toxic chemicals (e.g., pesticides) absorption through the skin. Studies provide evidence that filaggrin genetic mutations can exacerbate the impacts of chemicals on dermal (skin) exposure, causing various skin diseases like dermatitis and other chemical-related effects, including asthma and cancer. Filaggrin (FLG) is a protein that is critical to skin cell structure or epidermal homeostasis. Just as excessive exposure to UV light can cause skin discoloration and cancer, excessive dermal contact with these toxic chemicals can cause a range of adverse reactions. Dermal exposure is the most common pesticide exposure route, compromising 95 percent of all pesticide exposure incidents. Furthermore, many pesticides contain chemicals that act as sensitizers. The study's results demonstrate individuals with *FLG* null mutations (relatively common, especially among people of European descent) and low CNV (copy number variants) are more susceptible to increased dermal uptake and absorption of chemicals. Researchers find that pesticide levels are two times higher in individuals with *FLG* null mutations. [Littorin, Margareta et al. Filaggrin Polymorphisms and the Uptake of Chemicals through the Skin—A Human Experimental Study. *Environmental Health Perspectives*. 129(1), 2021.]

Vulnerability to COVID-19 May Increase with Exposure to Organophosphorus Pesticides

FEBRUARY 4, 2021 | A review in *Food and Chemical Toxicology* suggests organophosphorus pesticides (OPs) may increase the ability of SARS-CoV-2 to cause Covid-19, especially among vulnerable individuals with underlying medical conditions. Organophosphorus pesticides have a wide range of biological uses that make these chemicals ubiquitous, significantly contaminating both terrestrial (land) and aquatic (water) environments. However, OPs are highly toxic, originating from the same compounds as World War II nerve agents. Moreover, OPs are one of the leading causes of poisoning globally. Therefore, it is vital to understand how OP exposure will impact human health in conjunction with other immunologically compromising diseases like Covid-19. Considering Covid-19 and OP exposure act similarly on the respiratory system, exacerbating adverse inflammatory responses, reviews like these highlight the significance of evaluating synergism between disease and toxic chemicals to safeguard human health. Researchers in the study note, "To curb SARS-CoV-2 infection, a

healthy immune system is obligatory despite potent vaccine to alleviate morbidities in patients. But unintentional exposure to OP compounds from several sources can rupture the antiviral defense against SARS-CoV-2. Moreover, respiratory ailments may also be fueled by OP compounds. Hence, SARS-CoV-2 mediated morbidities and fatalities could be backed by unintentional exposure to OPs in patients." [Rajak, Prem et al. Immunotoxic role of organophosphates: An unseen risk escalating SARS-CoV-2 pathogenicity. *Food and Chemical Toxicology*. 149:112007, 2021.]

Genetically Weakened Skin Barrier Allows for Easier Absorption of Toxic Chemicals

FEBRUARY 18, 2021 | Research published in the journal *Toxicological Sciences* finds extended inhalation of the common agricultural herbicide paraquat causes male mice to lose some sense of smell, even at low doses. This study highlights the significance of understanding how specific chemical exposure routes can influence disease development. Olfactory (relating to the sense of smell) impairment is a precursory feature of Parkinson's disease (PD), and studies connect paraquat poisoning to PD risk. The study's researchers note, "These data support the importance of route of exposure in the determination of safety estimates for neurotoxic pesticides, such as [paraquat]. Accurate estimation of the relationship between exposure and internal dose is critical for risk assessment and public health protection." [Timothy Anderson et al. Paraquat Inhalation, A Translationally Relevant Route of Exposure: Disposition to the Brain and Male-Specific Olfactory Impairment in Mice. *Toxicological Sciences*. 180(1):175, 2021.]

Pesticide Exposure, Agricultural Work Associated with Chronic Lung Disease

MARCH 16, 2021 | Occupational and environmental exposure to pesticides and other contaminants in the environment increase the risk of developing a lung condition known as idiopathic pulmonary fibrosis (IPF), according to a meta-analysis published in *Nature Scientific Reports*. IPF is a chronic, degenerative disease with no certain cause or cure. It is estimated to affect roughly 13 women and 20 men in 100,000 adults worldwide annually, with onset averaging age 66. With the scientific literature continuously finding new connections between pesticide use and diseases that are all too common in today's world, advocates say it is critical for residents and officials at all levels to embrace safer, alternative organic methods of addressing weed and pest issues. The results indicate cause for significant concern for the lung health of those who are working in the agricultural industry and/or applied toxic pesticides throughout their lives. A considerable body of literature links pesticide use to harmful effects on lung health. Previous reports have found that 78 agricultural pesticides are directly linked to wheezing—potentially the first step toward chronic disease. A 2017 study found pesticide exposure over one's life to be associated with another degenerative lung disease, Chronic Obstructive Pulmonary Disease (COPD). "[I]t is thought that long-term exposure to pesticides increases mucus secretion and muscle contraction in the lungs, causing breathlessness, cough and wheeze," the lead researcher of that study told Reuters. A study published in July 2020 found pesticide use increased a person's risk of lung cancer. A comprehensive literature review published in October 2020, focused on lung pathologies in general, found strong correlations between pesticide exposure and various respiratory diseases. [Park, Yeonkyung et al. Occupational and environmental risk factors of idiopathic pulmonary fibrosis: a systematic review and meta-analyses. *Nature Scientific Reports*. 11:4318, 2021.]

Common Use Organophosphate Insecticides Pose a Greater Threat to Women's Health

MARCH 18, 2021 | A study published in *Environmental Toxicology and Pharmacology* finds chronic (long-term) organophosphate (OP) pesticide exposure increases adverse health and cancer risk for U.S. women relative to men. Organophosphorus chemicals have a wide range of biological uses—from insecticides to flame retardants—that make these chemicals ubiquitous, significantly contributing to ecosystem contamination. Furthermore, while organophosphates have less bioaccumulation potential, residues are consistently present in human and animal blood, urine, tissues, and milk. Although research demonstrates that OPs are highly toxic, there remains an

inadequate understanding of how OP exposure impacts the nonagricultural population in the U.S., especially women. Therefore, it is essential to investigate the sex-specific health effects chemical contaminants can produce to mitigate exposure among vulnerable populations. Study researchers note, "Given the higher burden of OP exposure and their significantly higher overall health risk, including cancer, reducing OP exposure in U.S. women needs to be prioritized." Study results demonstrate that non-smoking women with higher concentrations of OP metabolites are at greater risk of developing cardiovascular disease, bronchitis, asthma, and total cancer, including breast cancer. [Sun, Hongbing et al. Exposure to organophosphorus insecticides and increased risks of health and cancer in U.S. women. *Environmental Toxicology and Pharmacology,* 80:103474, 2020]

Bacterial Infections Spread Due to Antibiotic Resistance; Becoming a Pandemic as Groups Sue

APRIL 2, 2021 | Having raised the alarm for many years (and most recently in November 2020) on the dangers of the burgeoning antibiotic resistance crisis, Beyond Pesticides has joined a coalition of public interest groups in a lawsuit against the U.S. Environmental Protection Agency (EPA) for its use approval of the medically important antibiotic streptomycin on citrus trees. Beyond Pesticides executive director Jay Feldman comments: "It is past time to take urgent action to transition away from practices in agriculture that are dependent on antibiotics, advance organic farm management, and avoid new deadly pandemics. This lawsuit is an important action to reverse the previous administration's decision to ignore the science and allow expanded use of an antibiotic in agriculture." The wide use of antibiotics, especially for nonmedical use in agriculture, is driving antibiotic resistance to some human pathogenic bacteria. The antibiotic resistance (also referred to as antimicrobial resistance) or AMR crisis is one of human bacterial

Living Within 2.5 Miles of Chemical Farming Increases Risk of Childhood Brain Tumors

APRIL 6, 2021 | Pregnant women living within 2.5 miles of agricultural pesticide applications have an increased risk that their child will develop central nervous system (CNS) tumors, according to a study published in *Environmental Research* by ia team at University of California, Los Angeles. The results are particularly concerning as they reveal that individuals do not have to be in close contact with pesticides for risky, health-harming exposures to occur. "This transition from farmland to residential neighborhoods is abrupt across California, and, of course, constantly changing as farmland is developed," said study coauthor Myles Cockburn, PhD. "The simplest way to mitigate these risks is by reductions in exposure to pesticides, through restrictions to aerial spraying and air blast that lead to increased drift, and by farming methods that decrease reliance on pesticides." Researchers note that the present study is unique in that it was able to pinpoint the specific pesticides related to the development of specific types of tumors. To make these determinations, scientists made use of California's Cancer Registry records. Diagnosed children ages 0–5 were matched to maternal residences where pesticide applications were made within 4000 meters (~2.5 miles). Pesticide application records were obtained from data recorded by California's public agencies, as California is one of the only states that require pesticide use reporting to a centralized database. Results show that some pesticides increase the risk of certain childhood CNS tumors by 2.5 times compared to an unexposed child. [Lombardi Christina et al. Residential proximity to pesticide application as a risk factor for childhood central nervous system tumors. *Environmental Research.* 197: 111078, 2021.]

infections becoming increasingly resistant to the antibiotics most commonly prescribed by health care professionals to resolve such infections. This causes infections to be much harder to treat, to last longer, to require increased medical intervention (incurring the costs that go with that), and increasingly, a complete inability to treat life-threatening infections. This crisis is caused, inevitably, by antibiotics' very use (and too often, overuse) because they exert strong selection pressure for bacterial strains that exhibit antibiotic resistance. Bacteria can mutate quickly and take rapid advantage of mutations that make them more resistant to antibiotics; thus, resistance develops and spreads as these resistant bacteria reproduce and "thrive." [Strathdee et al. Confronting antimicrobial resistance beyond the COVID-19 pandemic and the 2020 US election. *The Lancet*. 296 (10257:1050-1053, 2020.]

Exposure to PFAS—the "Forever" Chemical—During Pregnancy Results in an Increase in Heart and Metabolic Problems Among Adolescence

APRIL 15, 2021 | Gestational (during pregnancy) and childhood exposure to per- and polyfluoroalkyl substances (PFAS) increases cardiometabolic risk, or the risk of heart diseases and metabolic disorders, later in life, according to a Brown University study published in *Environment International*. Past Studies associate exposure to chemical pollutants with increased susceptibility to adverse health effects during critical fetal and childhood developmental periods. Some of these health effects are cardiometabolic risk factors, including obesity, insulin issues, abnormal blood pressure, that increase the risk of developing cardiovascular disease (CVD) and metabolic disorders (e.g., type 2 diabetes). PFAS are of particular concern as these endocrine-disrupting chemicals are common in non-stick cookware, cleaning/personal care products, food packaging, and other consumer products. They are now being found in pesticide products. Because of their ubiquitous use in many products, studies report that PFAS compounds are detectable in infants, children, and pregnant women. Furthermore, pregnant women can readily transfer compounds to the developing fetus through the placenta. Independent research by Public Employees for

Grandmother's Pesticide Exposure Increases Granddaughters' Breast Cancer and Cardiometabolic Disorder Risk

APRIL 2, 2021 | Past maternal exposure to the pesticide dichlorodiphenyltrichloroethane (DDT) during pregnancy increases the risk of breast cancer and cardiometabolic disorders (e.g., heart disease, obesity, diabetes) for up to three successive generations, according to a study published in *Cancer Epidemiology, Biomarkers & Prevention*. Although previous studies highlight early life or *in utero* exposure to DDT increasing breast cancer risk later in life, this study is the first to note generational effects on grandchildren's health. DDT continues to adversely affect the health of the U.S. population, nearly 50 years after its ban. However, this ban is not global, as many countries still use or manufacture the chemical compound. [Cirillo, Piera et al. Grandmaternal Perinatal Serum DDT in Relation to Granddaughter Early Menarche and Adult Obesity: Three Generations in the Child Health and Development Studies Cohort**.** *Cancer Epidemiology, Biomarkers & Prevention,* 30(8), August, 2021.]

Environmental Responsibility (PEER) finds the widely used insecticide Anvil 10+10 contains high levels of PFAS from contamination. Although EPA does not regulate PFAS in pesticide formulas, EPA still lists these substances in the inert ingredient database. Many companies have patents on file for pesticide formulations containing PFAS. [Li, Nan et al. Gestational and childhood exposure to per- and polyfluoroalkyl substances and cardiometabolic risk at age 12 years. *Environment International*. 147: 106344, 2021.]

Pesticide Exposure Increases Susceptibility to Covid-19

APRIL 28, 2021 | Evidence presented at the *Experimental Biology* (EB) 2021 meeting finds that Gulf War Veterans and other individuals with prior pesticide exposures are more susceptible to Covid-19 infection. As the pandemic continues, it is critically important for researchers to better understand specific vulnerabilities in population groups in order to improve care and patient outcomes. Study coauthor, Prakash Nagarkatti, PhD at the University of South Carolina said, "This work sheds new light on exposure to pesticides and potential susceptibility to COVID-19 through altered immune response." [Mondal, Ayan et al. (R4434) Environmental organophosphate co-exposure in pre-existing systemic inflammation can Increase susceptibility to SARS-COV-2 infection in human lung epithelial cells. *Experimental Biology* 2021. August, 2021.]

Research Shows Adverse Impacts of Glyphosate on the Human Gut Microbiome

APRIL 30, 2021 | A bioinformatics tool developed by researchers at the University of Turku in Finland, published in the *Journal of Hazardous Materials,* indicates that "54% of species in the core human gut microbiome are sensitive to glyphosate." Glyphosate is the active ingredient in the herbicide Roundup. This tool may help predict which microbes in the human gut could be negatively affected by exposure to the ubiquitous weed killer. Because damage to the gut biome is linked to a variety of diseases, this information could prove critical in recognition of the role(s) glyphosate may play in the development of human diseases. The researchers' paper states, "The widespread use of glyphosate may have a strong effect on gut microbiomes as well as on human health." Gut microbiota plays a crucial role in lifelong digestive, immune, and central nervous system regulation, as well as other bodily functions. With prolonged exposure to various environmental contaminants, such as glyphosate or other pesticides, critical changes may occur in the gut microbes, influencing adverse health outcomes. [Leino, Lyydia et al. Classification of the glypho-sate target enzyme (5-enolpyruvyl-shikimate-3-phosphate synthase) for assessing sensitivity of organisms to the herbicide, *Journal of Hazardous Materials*, Volume 408, 2021.]

Breakdown Products (Metabolites) from Pesticides May Be More Toxic than Parent Compound, Study Finds

MAY 6, 2021 | Nearly half of all breakdown products (transformation products) from four common-use pesticides produce stronger endocrine (hormone) disrupting (ED) effects than the parent compound, according to research published in *Environment International*. Over 300 environmental contaminants and their byproducts—from chemicals in plastics to cosmetic/personal care products—are commonly present in waterbodies, food commodities, and human blood/urine samples. These toxicants can alter hormone metabolism, producing endocrine-disrupting

effects that put the health of animals, humans, and the environment at risk. Many ecological and health risk assessments for pesticides focus on the effects of parent chemical compound products, overlooking the potential impacts of transformation products (TPs). The researchers note, "Since an increasing number of pesticide TPs have been detected in various environmental media, a more comprehensive understanding of the ecological risk of pesticide TPs is imperative for risk assessments more extensively and regulatory policy-making on pesticide restriction in the future." [Ji, Chenyang et al. The potential endocrine disruption of pesticide transformation products (TPs): The blind spot of pesticide risk assessment, *Environment International*. 137:1054901, 2020.]

New Commercial Pesticide Toxicity Analysis Highlights Need to Shift to Organic Products

MAY 20, 2021 | Beyond Pesticides and Friends of the Earth (FOE) collaborated to analyze herbicide products at two of the most popular home and garden retailers, Home Depot and Lowe's. This *Commercial Herbicide Analysis* highlights the adverse health and environmental effects of widely available toxic pesticides while encouraging retailers to expand on—and consumers to use—safer, least/non-toxic pesticide products. According to Akayla Bracey, Beyond Pesticides' science and regulatory manager and lead researcher on the review, said, "People generally aren't aware that the pesticides widely available in garden retailers like Home Depot and Lowe's are a threat to health and the environment, and that there are safer products that are available and used in organic land management." The analysis, conducted by Beyond Pesticides, reveals that approximately half of all Home Depot herbicide products (24 of 51) and Lowe's herbicide products (23 of 40) contain ingredients considered Highly Hazardous Pesticides (HPPs). The United Nations Food and Agriculture Organization (FOA) classifies HHPs as "pesticides linked with a high incidence of severe or irreversible adverse effects on human health or the environment." The following active ingredients pose the most harm to human, animal, and ecosystem health, including cancer, reproductive harm, neurotoxicity, and hormone (endocrine) disruption: glyphosate, 2,4-D, dicamba, mecoprop, and pendimethalin. Of these five chemicals, all but dicamba are classifiable as HHPs. Only 29 percent of Home Depot (15 of 51) and 17 percent of Lowe's (7 of 40) herbicide products qualify as least-toxic or organic. [Bracey, Akayla et al. Beyond Pesticides and Friends of the Earth. 2021]

More Evidence Documents Glyphosate's Link to Adverse Birth Outcomes

MAY 25, 2021 | High levels of glyphosate in urine later in a pregnancy is significantly associated with preterm birth, according to research conducted by scientists at the University of Michigan and published in *Environmental Health Perspectives*. While awareness of the strong connection between glyphosate and certain cancers is growing among the public, the chemical's link to adverse pregnancy outcomes is beginning to receive more attention. "Since most people are exposed to some level of glyphosate and may not even know it, if our results reflect true associations, then the public health implications could be enormous," said senior author John Meeker, ScD, professor at the University of Michigan School of Public Health. This latest study is part of a cohort dubbed PROTECT (Puerto Rico Testsite for Exploring Contamination Threats), focused on investigating environmental exposures leading to preterm birth in Puerto Rico. [Silver, Monica et al. Prenatal Exposure to Glyphosate and Its Environmental Degradate, Aminomethylphosphonic Acid (AMPA), and Preterm Birth: A Nested Case–Control Study in the PROTECT Cohort (Puerto Rico). *Environmental Health Perspectives*. 129(5), 2021.]

Exposure to Certain Pesticides Increase the Risk of Thyroid Cancer

MAY 27, 2021 | Research by the U.S. National Institutes of Health (NIH), published in *Environment International*, finds exposure to lindane and metalaxyl pesticides heightens thyroid cancer risk. Both incidents of nonaggressive thyroid tumors and advanced-stage thyroid cancer are on the rise. However, researchers speculate that environmental pollutants, such as pesticides, may contribute to this increase, especially considering the pervasiveness of pesticide exposure among the general population. This study is the first to show a direct association between thyroid cancer—rather than function or disease—and specific occupational pesticides. Organochlorine pesticides (OCPs) are well-known persistent organic pollutants (POPs) banned by the Stockholm Convention treaty in 2001. [Lerro, Catherine et al. Pesticide exposure and incident thyroid cancer among male pesticide applicators in agricultural health study. *Environment International*. 146:106187, 2021.]

Women's Exposure to Environmental Pollutants Prompts Infertility and Low Egg Count

JUNE 10, 2021 | Exposure to toxic chemicals decreases egg count and increases infertility risk among women, according to a study published in *Environment International*. Since 2014, U.S. fertility rates have been decreasing, with many attributing the decline to older age pregnancies. However, several findings demonstrate that exposure to environmental pollutants, like persistent organic pollutants (POPs) from the industrial and agricultural industry, contributes to a decline in fertility rates. Scientists and health officials already associate exposure to POPs, like pesticides, with adverse impacts on male fertility, including reduced sperm count, quality, and abnormal sperm development. The researchers note that these findings should urge government and health officials to reexamine chemical safety concerning reproductive health, and "strongly encourage [them] to study mechanisms behind POP-associated infertility in women in more detail." The study results find women of all reproductive ages with higher levels of POPs in serum samples also have fewer immature eggs remaining in the ovaries. The 2001 Stockholm Convention treaty bans POPs. These pollutants have a global distribution, with evaporation and precipitation facilitating long-range atmospheric transport, deposition, and bioaccumulation of hazardous chemicals in the environment. The U.S. was a signatory to the treaty, but the U.S. Senate never ratified it, relegating U.S. officials to observer status. Some OCPs like lindane, although banned, remain active as pharmaceutical treatments for lice and scabies. Therefore, individuals can still encounter various POPs at varying concentrations. [Björvang, Richelle et al. Persistent organic pollutants and the size of ovarian reserve in reproductive-aged women. *Environment International*. 155: 106589, 2021.]

Pesticides and Other Volatile Chemicals Cause Air Pollution Linked to Premature Deaths

JULY 28, 2021 | Between 340,000 and 900,000 premature deaths each year can be linked to air pollution caused by the release of volatile organic compounds, such as pesticides, paints, and cleaning agents, from anthropogenic sources. The findings, published in

Vineyard Pesticides Linked to Parkinson's Disease

JUNE 30, 2021 | Vineyard farmers who spend more money on pesticide use are more likely to develop Parkinson's disease, according to research published by French scientists in *Environmental Research*. Although vineyards account for only 3% of French land, 20% of pesticides purchased are for vineyards. Among the pesticides used, 80% are fungicides. Fungicides have long been linked to the development of Parkinson's disease. A 2008 study by scientists at UCLA found that chronic exposure to dithiocarbamate fungicides like ziram contributed to the development of Parkinson's. A 2013 meta-analysis found that the fungicides maneb and mancozeb increased Parkinson's risk by two times. This was found to be in line with the incidence associated with paraquat herbicide exposure, which is currently the subject of an increasing number of lawsuits, due to that weed killer's strong connection to the disease. [Perrin, Laëtitia et al. Pesticides expenditures by farming type and incidence of Parkinson disease in farmers: A French nationwide study. *Environmental Research*, 197: 111161, 2021.]

Atmospheric Chemistry and Physics, were drawn from an international team of over 50 scientists, led by researchers at the University of Colorado, Boulder. Lead author of the study, Benjamin Nault, PhD, said. "[W]e're showing that if you're not getting at the cleaning and painting products and other everyday chemicals, then you're not getting at a major source." [Nault, Benjamin et al. Secondary organic aerosols from anthropogenic volatile organic compounds contribute substantially to air pollution mortality. *Atmospheric Chemistry and Physics*. *21(14)*, 11201–11224, 2021.]

296 Chemicals in Consumer Products Increase Breast Cancer Risk through Hormone (Endocrine) Disruption

JULY 28, 2021 | Research published in *Environmental Health Perspectives* finds nearly 300 different chemicals, in pesticides, consumer products, and

In Utero and Childhood Pesticide Exposure Increases Childhood Cancer Risk

SEPTEMBER 1, 2021 | A study published in *Environmental Polution* finds the risk of acute childhood leukemia (AL) increases with prenatal and newborn exposure to pesticides (i.e., insecticides and herbicides). The study results support the hypothesis that chronic environmental pesticide exposure increases childhood leukemia risk up to two times. Maternal exposure has a stronger association with leukemia than childhood exposure. Insecticides and herbicides are of particular significance in increasing leukemia risk, especially for acute lymphoblastic leukemia. Childhood AL remains the second highest cause of child mortality following physical injury. Furthermore, childhood leukemia survivors can suffer from chronic or long-term health complications that may be life-threatening. The study results identify 55 studies from over 30 countries pertaining to over 200 different pesticide exposures from over 160,000 participants. Regardless of pesticide type, leukemia type, exposure timeframe, and population group, methodological studies demonstrate pesticide exposure increases the risk of childhood leukemia, particularly for infants. Maternal exposure to pesticides during gestation results in a more elevated leukemia risk for children than childhood (postnatal) exposure. Whether pesticide exposure is occupational or mixed, parental exposure to pesticides has the highest association with AL risk, including paternal (father) exposure. Exposure during pregnancy results in a 1.5 times greater risk of developing AL, with a 2.5 times increase in risk for acute lymphoblastic leukemia. [Karalexi, Maria et al. Exposure to pesticides and childhood leukemia risk: A systematic review and meta-analysis. *Environmental Pollution*. 285: 117376, 2021.]

contaminated resources (e.g., food, water) increase breast cancer risks. Breast cancer is the most common cancer among women, causing the second most cancer-related deaths in the U.S. Genetic factors only play a minor role in breast cancer incidence, while exposure to external environmental factors (i.e., chemical exposure) may play a more notable role. Using high throughput screening (HTP) data from an *in vitro* ToxCast assay (test) developed by EPA, researchers identified chemicals that increase estradiol (a type of estrogen) or progesterone production in H295R cells responsible for hormone synthesis. [Cardona, Bethsaida and Rudel, Ruthann. Application of an in Vitro Assay to Identify Chemicals That Increase Estradiol and Progesterone Synthesis and Are Potential Breast Cancer Risk Factors. *Environmental Health Perspectives*. 129(7) July 2021]

Study Finds Recently Banned, Common Insecticide Promotes Obesity Development, and Related Illnesses

SEPTEMBER 2, 2021 | A McMaster University (Canada) study published in *Nature Communications* demonstrates exposure to the organophosphate insecticide chlorpyrifos promotes obesity development, even at low doses. Obesity generally occurs following a caloric imbalance between food intake, absorption, and energy expenditure. Although various factors can promote obesity, the study results indicate that chlorpyrifos negatively affects metabolic function, playing a role in inhibiting calorie burning or thermogenesis. The suppression of thermogenesis allows calories to accumulate in the adipose tissue rather than convert to energy. Besides genetics, exposure to obesogenic compounds like pesticides can promote obesity development. These compounds routinely cause reproductive, cardiovascular, and endocrine (hormone) issues among exposed individuals, especially farmers. Bruce Blumberg, Ph.D., professor of Developmental and Cell Biology, University of California, Irvine, defines obesogens "as chemicals that inappropriately stimulate the development of fat cells or the storage of fat into those cells, either directly by fiddling with how the cells work, or indirectly altering appetites tied to metabolism." This study is the first toxicological assessment to investigate obesity and obesity-related illnesses in rodents under thermoneutral conditions, or the temperature at which an organism does not need to regulate body heat. Thermoneutral conditions enable a better prediction of health effects among humans associated with chemical exposure. [Wang, Bo et al. The pesticide chlorpyrifos promotes obesity by inhibiting diet-induced thermogenesis in brown adipose tissue. *Nature Communications*. 12:5163, 2021.]

Endocrine (Hormone) Disrupting Chemicals, including Pesticides, Also Affect the Nervous System

SEPTEMBER 9, 2021 | A study published in *Toxicology Reports* finds the same chemicals that disrupt the endocrine (hormone) system also disrupt the nervous system. Endocrine disruptors are xenobiotics (i.e., chemical substances like toxic pesticides foreign to an organism or ecosystem) present in nearly all organisms and ecosystems. The World Health Organization (WHO), European Union (EU), and endocrine disruptor expert (deceased) Theo Colborn, Ph.D., classify over 55 to 177 chemical

compounds as endocrine disruptors, including various household products like detergents, disinfectants, plastics, and pesticides. Past research shows exposure to endocrine-disrupting pesticides adversely affects human health, from reproductive function to cancer development, and effects can span generations. The researchers establish the novel concept that endocrine disruptors are neurological disruptors (neurodisruptors) and collectively refer to these chemicals as endocrine and nervous disruptors (ENDs). Neurological diseases include amyotrophic lateral sclerosis (ALS) and Parkinson's disease, dementia-like diseases such as Alzheimer's, and other effects on cognitive function. This is in addition to the effect of these chemicals on reproductive function, metabolic/immune function, hormone-related cancers, and fetal/body development. [Seralini, Gilles-Eric, and Jungers, Gerald. Endocrine disruptors also function as nervous disruptors and can be renamed endocrine and nervous disruptors (ENDs). *Toxicology Reports*. Vol. 8:1538-1557, 2021.]

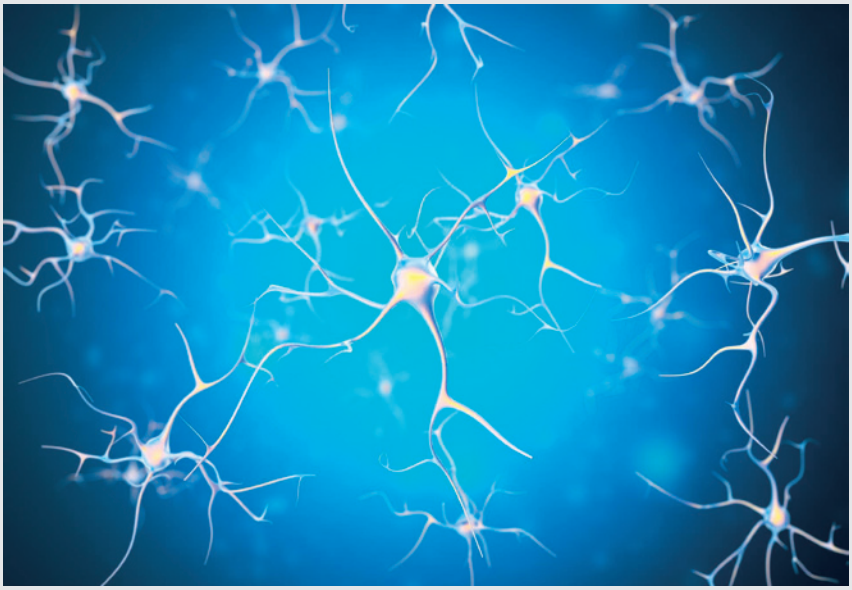
More Scientific Evidence that Endocrine-Disrupting Pesticides Disrupt Thyroid Function

SEPTEMBER 10, 2021 | Research conducted in Thailand and published in *Risk Management and Healthcare Policy*, shows that exposure to pesticides, even at low levels, impact the human endocrine system and distort

thyroid function. The study looks specifically at interactions of genetics and environment: it investigates associations between variations in genes involved in pesticide metabolism and altered thyroid function in two groups: those working on organically managed farms (216 subjects), and those working on conventional farms that use pesticides (229 subjects).This research underscores some of the complexity and difficulty of determining human vulnerability to impacts of pesticide exposures, given genetic variables. [Sirivarasai, Jintana, et al. Genetic Polymorphisms of Pesticide-Metabolizing Enzymes and Transporters in Agricultural Workers and Thyroid Hormone Levels. *Risk Management and Healthcare Policy*. 14, 3435–3451, 2021.]

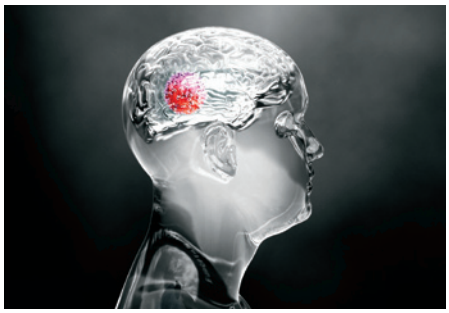
Study Adds to 40-Year Analysis Linking Brain Cancer to Pesticide Exposure

SEPTEMBER 23, 2021 | A study by Claremont Graduate University finds exposure to agricultural pesticides increases brain cancer risk up to 20 percent. This study, published in *Cancers,* expands on a 1998 study evaluating brain cancer risk among the farm population using epidemiologic studies. The study researchers note, "This comprehensive review and meta-analysis encompassing 42 years of the epidemiologic literature and updating two previous meta-analyses by 20 years supports an association between farming and brain cancer incidence and mortality.[…]Our analyses suggest that the elevated risk has been consistent over time, and the addition of newer studies (i.e., those published since 2000) does not change this conclusion." Researchers conducted a literature review using PubMed and Agricola databases to assess studies evaluating the relationship between farming and brain cancer. The researchers reviewed meta-analysis studies to



Commonly Used Neurotoxic Pesticide Exposure Increases ALS Risk to Workers and Residents

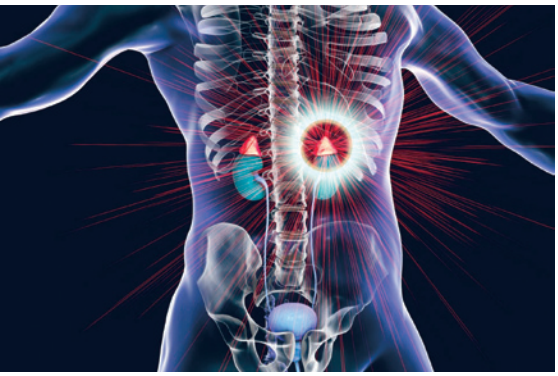
SEPTEMBER 30, 2021 | Individuals working or living in areas with frequent neurotoxic pesticide use experience a higher incidence of amyotrophic lateral sclerosis (ALS) than the general population. A study, published in *NeuroToxicology*, finds a positive association between sporadic (nongenetic, spontaneous) ALS incidents among individuals exposed to neurotoxic pesticides. Amyotrophic lateral sclerosis (or Lou Gehrig's disease) is a neurodegenerative disease that affects the nerves in the brain and spinal cord. As many as 16,000 – 20,000 Americans live with this condition, which weakens muscle/motor function leading to loss of muscle control for walking, talking, eating/swallowing, and breathing. Severe ALS progression is fatal and has no current cure. Although research finds that genetic factors play a role in disease etiology (cause), most ALS cases do not result from genetic inheritance. Several research studies demonstrate exposure to environmental or work-related toxicants (e.g., pesticides) predispose humans to the disease. With researchers predicting a global ALS incidence increase of 69% by 2040, identifying ALS's causal factors are important to future research. Researchers note, "[W]e identified pesticides applied to crops in the area of residences associated with risk of ALS in a large healthcare claims network. Our analysis identified several herbicides, insecticides, and fungicides that have been implicated in the literature as being neurotoxic as potential ALS risk factors." [Andrew, Angeline et al. Pesticides applied to crops and amyotrophic lateral sclerosis risk in the U.S**.** *NeuroToxicology*. Vol. 87, pp.128–135, 2021.]



harmonize findings published between January 1997 and August 2019. In total, researchers evaluated 52 different studies. [Gatto, Nicole et al. Farming, Pesticides, and Brain Cancer: A 20-Year Updated Systematic Literature Review and Meta-Analysis. *Cancers. 13(17):* 4477, 2021.]

Common Insecticide Malathion Linked to Chronic Kidney Disease

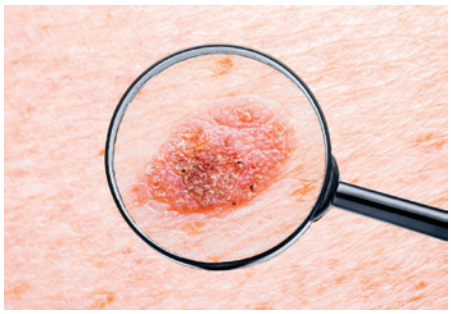
OCTOBER 19, 2021 | Exposure to the insecticide malathion increases the risk



of developing chronic kidney disease (CKD), according to a study published in the *International Journal of Environmental Research and Public Health.* According to study coauthor Nicholas Osborne, PhD, CKD is on the rise in developing countries in Southeast Asia and Central America, and "[n]early one in 10 people in high income countries show signs of CKD, which is permanent kidney damage and loss of renal function." Although CKD risk increases with age, and is associated with other health factors like smoking, heart disease, and diabetes, cases without clear cause are increasingly common, indicating that environmental factors are likely playing a role. "When malathion was up for [EPA] reregistration, when the heads of the various divisions who were looking at health effects were sitting around the table and planning to address the issue, the science adviser poked his head in the door and said, 'This is a big-ticket pesticide, and we don't want to have any problems,'" Bill Hirzy, PhD a former EPA official told *The Intercept* (in its piece, "The Department of Yes: How Pesticide Companies Corrupted the EPA and Poisoned America," June 2021). Despite strong links between malathion and a range of different cancers, EPA designated the chemical as having "suggestive evidence of carcinogenicity," not the stronger "likely carcinogen" initially proposed by EPA staff. [Wan, En-Tzu et al. Association of Pesticides and Kidney Function among Adults in the US Population 2001–2010. *Int. J. Environ. Res. Public Health, 18*(19):10249, 2021.]

Women in Agricultural Work at Increased Risk for Skin and Blood Cancers from Pesticide Exposure

OCTOBER 21, 2021 | A study published in *Environment International* finds higher rates of various cancers among agricultural workers, with multiple myeloma (blood cancer) and melanoma (skin cancer) disproportionately affecting female farmers. Although research studies link cancer risk to genetic and external factors (e.g., cigarette smoke), there is increasing evidence that pesticide exposure augments the risk of developing common cancers like melanoma and less common cancers like multiple myeloma. The authors write,



"The results suggest that agricultural workers have a lower risk of various cancers and an elevated risk of prostate cancer, multiple myeloma (female), and melanoma of skin (female) compared to the general population. Those differences and the between-cohort variations may be due to underlying differences in risk factors and warrant further investigation of agricultural exposures." [Togawa, Kayo et al. Cancer incidence in agricultural workers: Findings from an international consortium of agricultural cohort studies (AGRICOH). *Environment International.* 157: 106825, 2021.]

45 Different Cancers Associated with Work-Related Pesticide Exposure

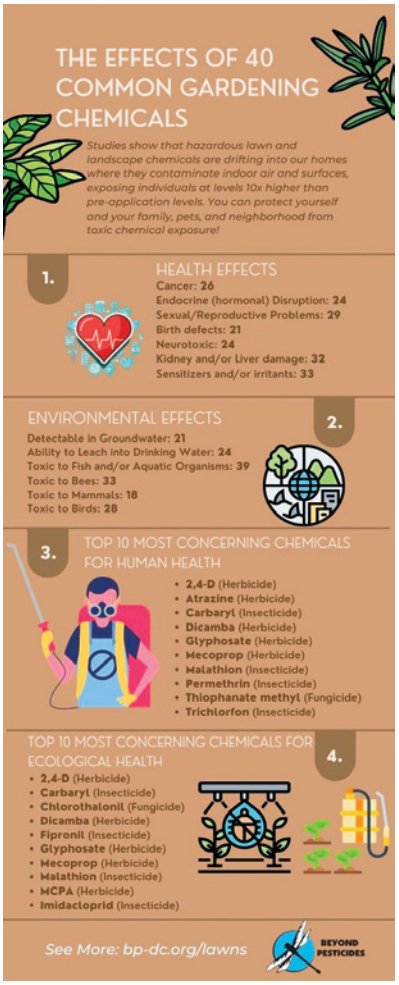
NOVEMBER 4, 2021 | A scientific literature analysis by the Federal University of Goias, Brazil, finds occupational (work-related) exposure to agricultural pesticides increases the risk for 45 different types of cancer. This analysis, published in *Environmental Science and Pollution Research International,* assesses studies from the last decade to identify cancer risk associated with occupational exposure by country, pesticide type, and methods used to diagnose disease. Many pesticides are "known or probable" carcinogens (cancer-causing agents), and widespread uses only amplify chemical hazards, adversely affecting human health. Multiple myeloma (plasma cell cancer), bladder cancer, non-Hodgkin lymphoma, and prostate cancer are the most prevalent forms of cancer. The study evaluated the scientific literature

The Health and Environmental Effects of the 40 Most Commonly Used Pesticides

Health and environmental effects disclosed on factsheets to guide community decisions on lawn and landscape management that do not poison people and contaminate the environment.

New Factsheets Alert Communities to Adverse Effects of Commonly Used Landscape Pesticides

WASHINGTON, D.C. | OCT. 14, 2021 | In October 2021, Beyond Pesticides released health and environmental effects factsheets for "40 Commonly Used Lawn Pesticides," updating and expanding on previous factsheets on 30 pesticides. These comprehensive factsheets document with scientific citations a wide range of diseases and ecological effects linked to pesticides. The underlying analysis supporting the adverse health and environmental effects identified in the factsheets are based on toxicity determinations in government reviews and university studies and databases.



See infographic: bp-dc.org/40-common

What do the factsheets disclose? Of the 40 most commonly used lawn and landscape pesticides, in reference to adverse health effects, 26 are possible and/or known carcinogens, 24 have the potential to disrupt the endocrine (hormonal) system, 29 are linked to reproductive effects and sexual dysfunction, 21 have been linked to birth defects, 24 are neurotoxic, 32 can cause kidney or liver damage, and 33 are sensitizers and/or irritants. Regarding adverse environmental effects, 21 are detected in groundwater, 24 have the ability to leach into drinking water sources, 39 are toxic to fish and other aquatic organisms vital to our ecosystem, 33 are toxic to bees, 18 are toxic to mammals, and 28 are toxic to birds. [Beyond Pesticides, 2021.]

from the Scopus® database between January 2011 and December 2020. The database contains scientific literature from over 20 nations, including the U.S., France, Brazil, and India. [Pedroso, TMA et al. Cancer and occupational exposure to pesticides: a bibliometric study of the past 10 years. *Environmental Science and Pollution Research International*. 1–12, 2021.]

Pesticide Exposure Contributes to Preterm Births and Low Birth Weight

NOVEMBER 18, 2021 | A study published in *Environmental Research* by researchers at King George's Medical University, India, finds exposure to xenobiotic substances like pesticides during pregnancy increases risks associated with preterm birth, including a rise in cesarean section (C-section) deliveries, a decrease in fetal body weight, and chronic illnesses. Birth and reproductive complications are increasingly common among individuals exposed to environmental toxicants, like pesticides. The Centers for Disease Control and Prevention (CDC) reports that the preterm birth rate is increasing annually. The study notes, "To the best of our knowledge, this was a pioneering study, and it may help to increase our knowledge with regard to xenobiotic exposure in biological systems and the need for stringent guidelines for agricultural use of pesticides." [Dwivedi, Naina et al. Assessment of genotoxicity and oxidative stress in pregnant women contaminated to organochlorine pesticides and its correlation with pregnancy outcome. *Environmental Research*, 204 (Part B):112010, 2022]

ACTIONS OF THE WEEK

Tell EPA to Reverse Approval of Highly Toxic Insecticide Aldicarb

JANUARY 25, 2021 | Aldicarb is a highly toxic, systemic carbamate insecticide that is a fast-acting cholinesterase inhibitor that permanently binds to the active site of an essential enzyme for normal nerve impulse transmission, acetylcholinesterase (AChE), deactivating the enzyme. In doing this, the chemical causes damage to the central and peripheral nervous systems, interrupting neurological activity. Aldicarb is subject to regulation under the 2004 Rotterdam Convention, an international treaty established to reduce the trade of the most globally hazardous chemicals, with over 100 countries—excluding the U.S.—banning their use.

Tell EPA and Members of Congress to Take Responsible and Immediate Action to Stop the Death of Dogs and Cats by Stopping the Sale of Seresto Flea Collars

MARCH 4, 2021 | In the face of 1,700 pet deaths linked to Seresto's flea and tick collar—as reported March 2, 2021 by *USA Today*, based on EPA records—EPA has taken no action. This unconscionable inaction is defended by an EPA spokesperson who told the media that, despite these incidents, the agency has deemed Seresto collars "'eligible for continued registration' based on best available science, including incident data.... No pesticide is completely without harm, but EPA ensures that there are measures on the product label that reduce risk."

Ban Endocrine Disrupting Pesticides Now to Protect People and Wildlife

APRIL 6, 2021 | The failure of EPA to meet its statutory responsibility to protect people and wildlife from the dire consequences of exposure to endocrine disrupting chemicals must end. Over recent decades, evidence has mounted showing that many pesticides interfere with hormones—and are therefore endocrine-disrupting chemicals (EDCs). In 1996, the promise of screening pesticides for endocrine disruption generated support from environmentalists and public health advocates for the *Food Quality Protection Act* (FQPA), which traded the absolute prohibition of carcinogens in food of the *Delaney Clause* for a risk assessment standard that is subject to manipulation and an underestimation of real-life hazards. And now, 25 years later, we have yet to see EPA use endocrine-disruption findings in pesticide registration decisions.

Tell EPA to Remove Risky Disinfectants from Its Recommended List; They're Not Necessary to Protect from Covid-19

MAY 3, 2021 | Hazardous disinfectants are not necessary for protection against Covid-19, and the Centers for Disease Control and Prevention (CDC) agree. The EPA seems to now agree, but has not changed its recommendations and listing for the public.

Advocates Call for Ban of Toxic Pesticides Linked to Deaths from Chemical Suicides

MAY 13, 2021 | Scientists are advocating for stricter pesticide bans to lower deaths from deliberate pesticide ingestion. Studies demonstrate an increased risk of developing depression, especially among agricultural workers and landscapers who use pesticides. Acute exposure to chemicals, including organophosphate and carbamate pesticides, tends to put farmers at greater risk of suicide than the general population.

Take Action: Tell EPA to Ban ALL Triazine Herbicides

JUNE 28, 2021 | The endocrine disrupting herbicide propazine (in the triazine family of frog-deforming endocrine disruptors) is set for cancellation by the EPA. The move would eliminate use of the hazardous herbicide by the end of 2022. However, all pesticides in the triazine class, including atrazine and simazine, have similar properties and should be eliminated from use. Tell EPA to finish the job by banning all triazines.

Tell EPA to Finish the Job in Banning Chlorpyrifos

AUGUST 30, 2021 | EPA's decision in 1999 to ban "residential" uses of chlorpyrifos, and it 2021 agricultural phaseout continues to allow the following uses: (i) Residential use of containerized baits; (ii) Indoor areas where children will not be exposed, including only ship holds, railroad boxcars, industrial plants, manufacturing plants, or food processing plants; (iii) Outdoor areas where children will not be exposed, including only: golf courses, road medians, Industrial plant sites; (iv) Non-structural wood treatments including: fenceposts, utility poles, railroad ties, landscape timers, logs, pallets, wooden containers, poles, posts, and processed wood products; (v) Public health uses: Fire ant mounds (drench and granular treatment); (vi) nurseries and greenhouses; and (vii) Mosquito control.

Pesticides Wreak Havoc on Ecosystems

ADDING TO THE BODY OF SCIENCE: ECOSYSTEM DECLINE

In taking a holistic approach to protecting ecosystems and the state of the environment, the question of pesticides' contribution to overall decline looms large. Studies in 2021 show a pattern of alarming adverse effects and decline. We can see this in the plummeting numbers of monarch butterflies, the decline of honey bees (2021 saw the second highest honey bee loss in 15 years) and native bees, and the diseases and ecological threats facing hummingbirds, wild and farmed salmon populations, sea lions, manatees, giant pandas, turtles, bats, soil invertebrates, and freshwater bacteria, zooplankton, and aquatic insects (threatening the freshwater aquatic food web). A study of marine life shows a direct relationship between the adverse health of marine organisms and pesticide-intensive forestry practices in coastal areas.

While it is often reported that eagles have made a comeback after the disastrous decline in their population from DDT in the 1970s, a study in 2021 unraveled a "mystery" of mass declines in bald eagles and other top-level avian predators due to vacuolar myelinopathy, a neurological illness, likely introduced by brominated herbicides that are used to manage so-called invasive species.

Scientists continue to document the devastating effects associated with neonicotinoid (neonic) insecticides, which are systemic and move

through the vascular system of plants and then are expressed through pollen, nectar, and guttation droplets, causing indiscriminate poisoning. A study documents the death of pollinators forcing farmers in Kenya to resort to hand pollinating. EPA itself published a biological evaluation that finds the three most commonly used neonic insecticides are likely causing the greatest share of harm to endangered species and their habitat. Pesticides are associated with reduced fertility in perennial plants, and the nondisclosed "proprietary" ingredients in these products are harming pollinators. Despite these ecosystem disasters, the U.S. Fish and Wildlife Service proposed dropping 1.5 tons of rodenticides on the Farrallon Islands National Wildlife Refuge off the Northern California coast to control rodents, which will unleash secondary poisonings.

Resistance is a reemerging theme that challenges the wisdom of the broad use of toxic chemicals in agriculture, forestry, and land management, with the science in 2021 documenting antibiotic resistant bacteria (greater abundance of genes associated with antibiotic resistance) in agricultural soils after being sprayed with glyphosate, glufosinate, or dicamba. These resistant bacteria move throughout the environment, ultimately creating deadly vulnerabilities for all organisms, including humans. Similarly, fungal resistance to antimicrobial pesticides is documented as raising a parallel threat. Mosquito and deer tick resistance to insecticides is resulting from pesticide use, reenforcing the shortsightedness of a toxic chemical rather than a preventive approach to insect management. Similarly, weed resistance to new herbicides has become more pervasive in chemical-intensive agriculture, forcing chemical-intensive farmers to stay on the treadmill of more toxic chemistries.

On the disposal end of synthetic pesticide and fertilizer dependency is the reporting of a predictable accident in Florida from an overflowing toxic waste lagoon, created in large part by the synthetic fertilizer industry's waste products.

Meanwhile, a study on the value of a healthy ecology shows that uncultivated field margins contain almost twice as many beneficial insects as cropped areas around farm fields. The study finds that these predators and parasitoids overwinter in diverse vegetation and provide a critical ecosystem service when spring pest imbalances emerge. The depth and breadth of the published studies documenting destruction caused by pesticides in this section offers an opportunity to see beyond the problems associated with individual pesticides, but to systems of land and insect management that effectively ignore the critical importance and economic value of healthy ecosystems to a livable future.

Long-Term Roundup Exposure Found to Harm Keystone Wildlife Species

JANUARY 6, 2021 | Long-term exposure to formulated Roundup (glyphosate) results in significant harm to wildlife species that form the bottom of aquatic food chains, according to a study published in *Microbiome* by researchers at University of Birmingham, UK. The water flea *Daphnia spp.* often functions as a keystone species in lakes and ponds, and because of its ecological importance is frequently used as an indicator species in toxicity tests performed by pesticide regulators. Coauthor Luisa Orsini, PhD notes that most of this testing is flawed by limitations in its scope. "The problem is that much of the evidence is rooted in outdated toxicity tests which only look at the number of animals that die on exposure to extremely high concentrations

of these chemicals," Dr. Orsini said. "These tests also overlook the pathological effects arising from long-term exposure to low doses. What we're proposing is that toxicity is measured by looking at what happens to the animal at a molecular and fitness level following long-term exposure, which encompasses the entire animal life cycle." Dr. Orsini and her research team exposed populations of *Daphnia magna* to the maximum contaminant level (1 mg/L), set by the U.S. Environmental Protection Agency (EPA) for both the formulated product Roundup and technical grade glyphosate over the course of the animal's life. The team then investigated a range of impacts and adverse changes that occurred as a result, including fitness burden, genotoxicity (damage to DNA), and alterations within the water flea's gut microflora. A control population received no chemical exposure. Changes in fitness were seen for every trait except mortality. Roundup delayed average age of sexual/reproductive maturity, reduced size at maturity, decreased the total number of offspring produced, and increased developmental failure—as determined by the number of aborted eggs, and juveniles borne dead. [Suppa, Antoinio et al. Roundup causes embryonic development failure and alters metabolic pathways and gut microbiota functionality in non-target species. *Microbiome*. 8(170), 2020.]

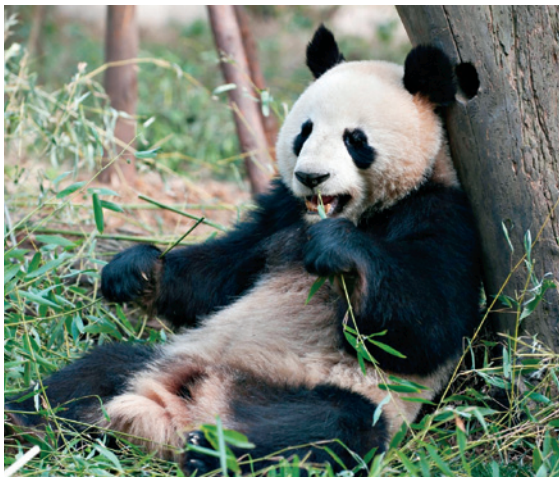
Monarch Butterfly Near Extinction–Calls for Urgent Federal Action

JANUARY 27, 2021 | Lowest ever recorded! That's the result of a yearly winter monarch count along the California coast, overseen each year by the conservation group Xerces Society. In 2020, citizen scientists counted only 2,000 butterflies. The findings indicate that many on the planet today are likely to experience, within their lifetimes, a world where western monarchs are extinct—unless the federal government acts now. Western monarchs migrate

from the Pacific Northwest to overwintering grounds along the California coast, where they remain in relatively stationary clusters that are easy to count. In the 1980s, roughly 10 million monarchs overwintered along the coast. By the 1990s, that number fell into the low single digits, roughly 1.2 million. Five years ago counts were at roughly 300,000. By 2019, numbers crashed below 30,000. [Xerces, 2021.]

Persistent Organic Pollutants like Organochlorine Pesticides Pose Health Risk to Rare Giant Panda Subspecies

JANUARY 28, 2021 | Persistent organic pollutants (POPs)—including banned pesticides—present a health risk to the endangered Qinling Panda (*Ailuropoda melanoleuca qinlingensis*), the rarest subspecies of giant pandas, according to a Chinese study published in *Environmental Pollution*. Organochlorine compounds (OCs), such as organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs), are persistent organic pollutants banned by the Stockholm Convention treaty in 2001 (U.S. is a not a signatory) and are primary pollutants of concern (UNEP, 2009) because of their persistence, toxicity, and adverse effects on environmental and biological health. Although various studies demonstrate the volatile, toxic nature of POPs, much less research evaluates the impact that POPs have on biodiversity over time. The globe is currently going through the Holocene Extinction, Earth's 6th mass extinction, with one million species of plants and animals at risk. With the increasing rate of biodiversity loss, advocates say it is essential for government agencies to research how previous and ongoing use of POPs can impact present-day species. Likewise, collaborative, global monitoring of POPs can help leaders identify the effect on vulnerable species of the chemicals' long-range transport and the most effective unified global strategy. Researchers note, "We provide data for health risk assessment that can guide the identification of priority congeners [different forms of the same chemical structure] and recommend a long-term monitoring plan. This study proposes an approach to ecotoxicological threats whereby giant pandas may be used as sentinel



species for other threatened or endangered mammals. By highlighting the risks of long-distance transmission of pollutants, the study emphasizes the importance of transboundary cooperation to safeguard biodiversity." [Zhao, Yan et al. Organochlorine compounds pose health risks to the Qinling Giant Panda (*Ailuropoda melanoleuca qinlingensis*), *Environmental Pollution*. 273:116427, 2021.]

Groups Urge Endangered Species Listing for American Bumblebee after 89% Population Decline

FEBRUARY 10, 2021 | Pollinator advocates are petitioning the U.S. Fish and Wildlife Service (USFWS) to list the American bumblebee (*Bombus pensylvanicus*) under the *Endangered Species Act*. The petitioners are the Bombus Pollinator Association of Law Students at Albany Law School and the Center for Biological Diversity. Like many other wild pollinators, the American bumblebee has undergone dramatic reductions in recent decades. According to petitioners, the last 20 years saw an 89% decline in the pollinator's population. Declines of the American bumblebee have occurred throughout its range, which encompasses 47 of the lower 48 states. However, there are also particularly hard-hit regions. In New York, for instance, the pollinators have experienced a stunning 99% decline in relative abundance. Midwestern populations are also severely affected. Losses have followed in lockstep with declines in the rusty patched bumblebee, which was listed as endangered in 2017. While the rusty patched has lost 90% of its midwestern range, the American bumblebee has experienced 83% declines. The petitioners note that the American bumblebee declined across a larger land area, and in several states where it was once the most populous pollinator. [Center for Biological Diversity, 2021.]

Aggressive Cancer in Sea Lions Linked to Ocean Pollution and Herpesvirus Precursor, Implications for Human Health

JANUARY 11, 2021 | California sea lions (*Zalophus californianus*) are experiencing high rates of urogenital carcinoma (UGC) cancer incidence from the combined effect of toxic "legacy" pesticides like DDT and the viral infection Otarine herpesvirus-1 (OtHV1), according to a study in *Frontiers in Marine Science*. Previous research documents the role herpesvirus infection, genotype, and organochlorine pesticides play in sea lion cancer development. However, synergism (collaboration) between a viral infection and toxic chemical

exposure increases cancer development odds. Pollution of the oceans with toxic chemicals lacks adequate regulation, is widespread and only getting worse. More than 80 percent of ocean pollution comes from land-based, anthropological activities. A recent study, published in *Annals of Public Health*, finds toxic chemicals from pesticides, heavy metals, plastics, and other sources readily contaminate the ocean, especially near coastal regions where chemical inputs occur in higher concentrations. Scientists for this study assess cancer incidence among 394 California sea lions for 20 years. Using a stepwise regression model, scientists find herpesvirus condition, exposure to contaminants, and blubber depth aid in UGC cancer development, but not the genotype. The risk of developing UGC is nearly 44 times higher in sea lions with herpesvirus infections. Furthermore, UGC risk increases 1.48-fold per every unit of contaminant concentration within blubber. [Gulland, Frances et al. Persistent Contaminants and Herpesvirus OtHV1 Are Positively Associated with Cancer in Wild California Sea Lions *(Zalophus californianus)*. *Frontiers in Marine Science*. December 2020.]

Herbicide Use in "Regenerative" No-Till Contaminates Waterbodies

FEBRUARY 19, 2021 | *Vermont Public Radio* (VPR) reports on revelations from a retired state scientist, Nat Shambaugh, who finds that farmers' efforts to reduce agricultural runoff from fields into waterbodies, by planting cover crops, has resulted in significant increases in the use of herbicides to kill off those crops. So as one kind of pollution is reduced, another has become intensified. In Vermont and elsewhere, there has been much attention paid to nutrient pollution of waterbodies and waterways from agricultural runoff, largely because phosphorous and nitrates from fertilizers lead to contaminated drinking water, as well as to blooms of algae (some of which have their own toxic byproducts) and hypoxic dead zones in waterbodies. The most notorious of these dead zones in North America are at the mouth of the Mississippi River, as it empties into the Gulf of Mexico, and in Lake Okeechobee in Florida. Less

attention has been given generally to the problem of pesticide residues and metabolites in agricultural runoff, which also threaten drinking water sources, ecosystem health, and biodiversity. The *report from VPR* indicates that the increases in herbicide use may well be contaminating the state's watery gem, Lake Champlain, and questions whether the state's Agency of Agriculture is acting sufficiently on its policy to reduce pesticide use. The Vermont official in charge of pesticide regulation has explained the idea behind this shift to chemical "no-till" (cover cropping plus herbicide kill-off of that crop). As dairy farmers instituted cover cropping to reduce nutrient runoff from their silage corn fields, they would adopt genetically engineered (GE) corn seed plus the herbicide Roundup, with which the GE seed must be paired, as a "trade" of one toxic chemical (atrazine) for another (glyphosate/Roundup). [Vermont Public Radio, As Farmers Plant cover Crops to Reduce Runoff, Report Says They Also Use More Herbicides, 2021.]

Hummingbirds Harmed by Pesticides Killing Off Bees, Butterflies, and Other Pollinators

FEBRUARY 23, 2021 | The same pesticides implicated in the worldwide decline of insect pollinators also present significant risks to their avian counterparts, hummingbirds. Well-known for their nectar-fueled hovering flight powered by wings beating over 50 times per second, hummingbirds display unique reactions to toxic pesticides. Researchers at the University of Toronto published in *Scientific Reports* findings that a hummingbird's exposure to systemic neonicotinoid insecticides for even a short period of time can disrupt the high-powered metabolism of this important and charismatic animal. Scientists began their experiment by trapping 23 wild ruby-throated hummingbirds and housing them in an animal care facility. One group of birds acted as a control and received no pesticide exposure, while the rest were assigned either low, middle, or high exposure (1 part per million [ppm], 2ppm, and 2.5ppm, respectively) to the neonicotinoid imidacloprid. Scientists determined these amounts based upon probable nectar contamination in the real world. The pesticide was incorporated into the sugar solution provided to the birds over the course of three days. Within two hours of exposure to the pesticides, hummingbird metabolism dropped significantly. While the control group increased energy expenditure between 1% to 7%, the low exposed group displayed a 6% average decline, the medium a 10% decline, and the high exposure group showed 25% reduced energy expenditure. [English, Simon et al. Neonicotinoid pesticides exert metabolic effects on avian pollinators. *Scientific Reports*. 11:2914, 2021.]

Glyphosate and Other Weed Killers Create Antibiotic Resistant Bacteria in Agricultural Soils

FEBRUARY 24, 2021 | Soil sprayed with weed killers *glyphosate, glufosinate,* or dicamba are likely to contain higher amounts of antibiotic resistant bacteria, according to research published in *Molecular Biology and Evolution*. Each year in the U.S., at least two million people develop an antibiotic resistant infection and over 23,000 die. Authors

of the study say widespread herbicide use is likely playing a role. "Our results suggest that the use of herbicides could indirectly drive antibiotic resistance evolution in agricultural soil microbiomes, which are repeatedly exposed to herbicides during weed control," said Ville Friman, PhD of the University of York in the United Kingdom. Scientists began their investigation by looking at changes to soil communities in soil microcosms over the course of roughly two months. Microcosms were grouped by the herbicide applied, while a control microcosm remained unexposed. Contrary to the pesticide industry's claim that these chemicals break down quickly and become inert by binding to soil particles, large proportions of the herbicides remain in the soil at the end of the 60-day experiment, stemming back from the first application. For glyphosate, 18% remained, glufosinate 21%, and dicamba 34%. Although no significant changes to bacterial diversity, abundance, or richness were observed, researchers found that herbicide-exposed soils contain a greater abundance of genes associated with antibiotic resistance, as well as a higher number of mobile genetic elements. [Liao, Hanpeng et al. Herbicide Selection Promotes Antibiotic Resistance in Soil Microbiomes**.** *Molecular Biology and Evolution*. 38(6):2337–2350. 2021.]

Implications for Human Health: Glyphosate-Related Soil Erosion Re-Releases Toxic Pesticides from Soil

MARCH 4, 2021 | A study in *Environmental Science and Technology* finds that glyphosate use stimulates soil erosion responsible for releasing the banned, toxic pesticide chlordecone (Kepone), which was used in banana production in the French West Indies (Martinique and Guadeloupe). For years, an unknown pollution source continuously contaminated water surrounding the islands. However, researchers from the University of Savoie Mont Blanc in France have found that chlordecone—extensively used on banana farms from 1972 to 1993—is the contamination culprit in combination with the most popular herbicide glyphosate, which is ubiquitous in the environment. Researchers note, "[Chlordecone] fluxes drastically increased when glyphosate use began, leading to widespread ecosystem contamination. As glyphosate is used globally, ecotoxicological risk management strategies should consider how its application affects persistent pesticide storage in soils, transfer dynamics, and widespread contamination." [Sabatier, Pierre et al. Evidence of Chlordecone Resurrection by Glyphosate in French West Indies. *Environmental Science and Technology*. 55(4):2296–2306, 2021.]

Solitary Wild Bees Harmed by Neonicotinoid Pesticides Applied by Soil Drenching

MARCH 2, 2021 | Populations of solitary ground nesting bees decline after exposure to neonicotinoid insecticides, according to a study in *Scientific Reports*. In addition to ground nesting bees, neonicotinoids have been shown to harm butterflies, hummingbirds, songbirds, aquatic species and mammals, including humans. As independent science continues to look beyond the effects of these systemic chemicals on honey bees and bumblebees, advocates maintain that it has become increasingly clear that the high hazards presented by neonicotinoids necessitate their complete elimination. "Farmers need to protect their crops from pests, but they also absolutely need to protect pollinators from the unintended effects of pesticides," said study coauthor Susan Willis Chan, PhD. "The data on this particular [neonicotinoid] product are so clear that there's really no question about what has to happen. We have to find something else." Researchers focused their investigation on how various systemic pesticides affect the hoary squash bee (*Eucera pruinosa*), a ground nesting bee found throughout North America that feeds entirely on pollen from cucurbits (including squash, cucumber, pumpkin, gourds, etc). The hoary squash bee provides essential pollinator services for these crops throughout the U.S. and Canada. Neonicotinoids and other systemic insecticides are often applied in an attempt to manage cucumber beetles, which consume these crops and can spread disease to susceptible plants. [Chan, Willis et al. Population decline in a ground-nesting solitary squash bee (*Eucera pruinosa*) following exposure to a neonicotinoid insecticide treated crop (*Cucurbita pepo*). *Scientific Reports*. 11:4241, 2021.]

Ecosystem Health: Pesticide Use from Forest Management Practices Threatens Essential West Coast Marine Organisms

MARCH 11, 2021 | A Portland State University (PSU) study, published in *Toxics*, finds that pesticides from the forestry industry threaten clams, mussels, and oysters (bivalves) along the Oregon state coast. Bivalves are excellent indicator species, signaling environmental contamination through their sedimentary, filter-feeding diet. However, continuous pesticide inputs—from various forestry management regimes—into watersheds along Oregon's coastal zone endanger these species in downstream rivers and estuaries (river mouths). Although research demonstrates many forestry practices (e.g., road building, planting, clearcutting, thinning) have cumulative effects on the ecosystem, there is a lack of studies addressing the overall impact of multiple chemical mixtures and application on watersheds and subsequent aquatic transport. The study results detect 12 different chemical compounds (two herbicides, three fungicides, and seven insecticides) in both water and bivalve samples—five of which are current-use pesticides in forest management. Although pesticide concentration and type vary by season, organism, and watershed location, 38 percent of bivalve samples harbor pesticide concentrations high enough to accumulate in tissues. *Indaziflam* (a current-use herbicide in Oregon forestry) is present in seven percent of bivalve samples. Furthermore, water samples find current-use herbicides, hexazinone and atrazine, and banned pesticides, like DDT/DDE, contribute to aquatic contamination downstream. [*Kaegan Scully-Engelmeyer*, Kaegan et al. Exploring Biophysical Linkages between Coastal Forestry Management Practices and Aquatic Bivalve Contaminant Exposure. *Toxics.* 9(3):46, 2021.]

Kenyan Farmers Are Resorting to Hand Pollination After Pesticide Use Kills Off Local Pollinators

MARCH 24, 2021 | The worst predictions of scientists and advocates are playing out in the fields of eastern Kenya, as chemical-intensive farming there threatens the future of food production. According to *Radio France Internationale* (RFI), Kenyan farmers have resorted to pollinating their crops by hand after pesticide use killed off most of the pollinators they rely on. "We are mostly affected by pesticides because they have killed most pollinators which pollinate our crops—this has affected our food production compared to previous years," said Joseph Mbithi, a farmer in Mbakoni village, Makueni County, Kenya to RFI. Crop yields in the region have have tapered off over the last two years, and farmers like Mr. Mbithi are pointing to pesticide use as the cause, citing past reliance on the herbicide Roundup (glyphosate) and the organophosphate insecticide malathion. "Pollinators such as bees and butterflies are not around due to chemicals which we spray in our farms," he told RFI. [Radio France Internationale, 2021.]

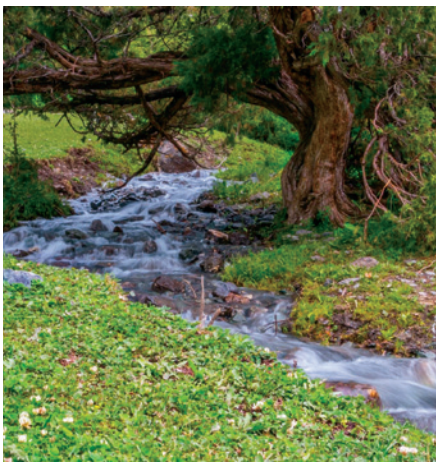
Endangered Florida Manatees Contaminated with Glyphosate/Roundup Due to Widespread Use

MARCH 30, 2021 | Florida manatees are experiencing chronic glyphosate exposure that is likely to impact their immune system and make them more susceptible to other environmental

stressors such as red tide and cold stress, according to a study published in *Environment International* by a Florida-based team of researchers, led by University of Florida PhD candidate Maite De Maria. Florida manatees, a subpopulation of the West Indian manatee, are listed as threatened under the *Endangered Species Act*, as populations are under constant threat from human activity in the freshwater ecosystems they rely on. Results find glyphosate in the bodies of 55.8% of Florida manatee samples. Most concerning, the amount of pesticide increased in a straight line over the course of the study. Scientists found no correlation between the size or sex of the manatee and its glyphosate body burden. Authors of the study indicate that it is appropriate to consider glyphosate a "pseudo-persistent" (resulting from continuous runoff or exposure) pollutant, "in which new applications of the herbicide replace the molecules that are being removed," the study reads. [De María, Maite et al. Chronic exposure to glyphosate in Florida manatee. *Environment International*. 152: 106493, 2020.]

Hazardous Pesticide Breakdown Chemicals Found in Streams Nationwide, Raising Health Concerns

MARCH 31, 2021 | Pesticide breakdown products are just as ubiquitous as their parent compounds in urban streams throughout the U.S., according to research conducted by the U.S. Geological Survey (USGS) and published in *Environmental Science and Technology*. The first of its kind findings place an important spotlight on the long-term impacts of pesticide use on health and the environment. As new analytical methods provide evidence of dangers that were until now unable to be recorded, the data point to the need for a wholescale rethinking of the way pesticide products are approved by the U.S. Environmental Protection Agency, and community-based measures to protect local waterways. Of the active ingredients sampled, at least one pesticide was detected in 418 of 442 total stream samples, representing a 95% detection rate. Breakdown products are just as widespread, with 396 out of 442—90% of streams sites showing detects. According to the study, 102 breakdown products are detected at least once, and nearly 30 are detected in over 20% of samples. Researchers specifically point out the danger of detecting transformation products in small, headwater streams throughout the country. "The presence of pesticides and TPs [transformation products] in headwater streams is of particular interest because such streams comprise the majority of river network length and have a higher proportion of biodiversity than larger water bodies," the study reads. [Mahler, Barbara et al. Inclusion of Pesticide Transformation Products Is Key to Estimating Pesticide Exposures and Effects in Small U.S. Streams. *Environmental Science and Technology*. 55(8):4740–4752, 2021.]



Invertebrates and Plants Face Increasing Threat from Pesticide Use, Despite Declining Chemical Use Patterns

APRIL 8, 2021 | Pesticide use threatens aquatic and terrestrial invertebrates and plants more than ever, despite declining chemical use and implementation of genetically engineered (GE) crops in the U.S., according to a University Koblenz-Landau, Germany study published in *Science*. Since the publication of Rachel Carson's *Silent Spring* (1962), many environmental agencies have banned the use of pesticides like organochlorines, organophosphates, and carbamates for their devastating toxic—sometimes lethal—effects, particularly on vertebrates, including humans. However, these restrictions created a pathway for a new generation of pesticides (e.g., neonicotinoids, pyrethroids) to take hold. Although these pesticides are more target-specific, requiring lower chemical concentrations for effectiveness, they have over double the toxic effects on invertebrates, like pollinators. Invertebrates and plants are vital for ecosystem function, offering various services, from decomposition to supporting the food web. Furthermore, invertebrates and plants can act as *indicator species* (bioindicators) that scientists can observe for the presence and impact of environmental changes and stressors. Therefore, reductions in invertebrate and plant life have implications for

ecosystem health that can put human well-being at risk. Study lead author Ralf Schulz, PhD *notes*, "[This study] challenge[s] the claims of decreasing environmental impact of chemical pesticides in both conventional and GM [genetically modified or genetically engineered (GE)] crops and call for action to reduce the pesticide toxicity applied in agriculture worldwide." [Schulz, Ralf et al. Applied pesticide toxicity shifts toward plants and invertebrates, even in GM crops. *Science*. 372(6537):81, 2021.]

Chemical-Intensive Land Management Contributes to Toxic Lagoons Overflowing with Synthetic Fertilizer Waste

APRIL 9, 2021 | In early April 2021, the leaking, open-air, Piney Point storage pond near Tampa, Florida forced hundreds of resident evacuations over concerns that the "reservoir" would breach and flood a three-county area with what was described as a potential "20-foot wall of water." Ultimately, controlled releases from the 480-million-gallon "pond" (into Tampa Bay) avoided such a flood, but the event underscores the "ticking bomb" nature of such open-air, toxic-liquid-waste facilities, which are used by multiple industries in the U.S. Among those are, as in this case, the phosphate mining sector, and the synthetic fertilizer industry. The latter is tied directly to the chemical-intensive agriculture crisis, and to the exact kind of waste storage facility at issue in the Florida event. As reported by *The New York Times*, the Florida storage pond contains "legacy processed water"—code for wastewater with traces of heavy metals and other toxicants—contained by walls of phosphogypsum tailings at least 70 feet high. Phosphygypsum tailings are the leftover waste when phosphate ores are processed to create phosphoric acid, an ingredient used in synthetic fertilizers. Most of the 23 million tons of phosphate mined annually in the U.S. is used in production of such fertilizers and generates enormous amounts of phosphogypsum waste. The nearly wholesale agricultural (and other land management) adoption of synthetic chemical fertilizers is contributing to multiple negative environmental and public health and safety problems. The demand for these fertilizers drives the mining of phosphate, with its toxic byproducts—toxic and radioactive waste in "process" water and phosphgypsum stacks. The processing of mined sulfur, another ingredient, causes significant emissions of sulfur dioxide into the atmosphere; this gas damages terrestrial and aquatic ecosystems through the increased acidity it causes in rainfall. Sulfur dioxide also contributes to the development and severity of human respiratory disorders. The nitrates in synthetic fertilizers degrade soil health, and are a huge cause, via agricultural runoff from fields, of nutrient deposition in waterways, which can cause multiple environmental impacts. The excess nitrogen in these fertilizers is also driving global nitrous oxide (N_2O) emissions dangerously high, exacerbating the climate crisis. Manufacturers of these fertilizers often use a nitrogen-heavy ratio of the three "NPK" inputs: nitrogen, phosphorous, and potassium. Nitrogen supports growth and photosynthesis (so plants "green up" readily), which can be achieved with organic practices.. [Tabuchi, Hiroko. "Florida Crisis Highlights a Nationwide Risk from Toxic Ponds." *The New York Times*. April 6, 2021.]

"No Pollinator is Safe"—New Evidence of Neonicotinoids Harming Wild, Ground Nesting Bees

APRIL 13, 2021 | A study is making it increasingly clear that current laws are not protecting wild, ground nesting bees from the hazards of neonicotinoid insecticides. According to research conducted under a grant from the U.S. Department of Agriculture's *Sustainable Agriculture Research and Education* (SARE) projects, Blue Orchard Mason Bees (*Osima spp*) are at particular risk from pesticide-contaminated soil they use to create their nest. Authors of the study note that with honey bees already in decline, pollination services provided by wild managed bees like Mason bees are growing in importance. "Wild bees such as Osmia are becoming increasingly popular as managed pollinators in many systems, as there is growing concern that honeybees may not be able to continue to meet the increasing demands of agricultural pollination if these trends continue," the study reads. The study found no trend to the mason bee's ability to distinguish between contaminated and uncontaminated soil. Embryos appeared to be resilient to the effects of pesticide exposure. However, female mason bees were harmed by soil contact exposure, with effects on fitness noted at each exposure level. At the highest exposure rate, researchers observed a 66% decline in nesting activity as females produced 40% fewer

offspring overall. Nesting activity was similarly reduced by 42% in the medium exposed group. For the lowest exposures at 50 ppb (the equivalent of adding 50 drops of pesticide in a 10,000 gallon swimming pool), the sex ratio for offspring was skewed toward male bees. This group had 50% fewer female bees than the unexposed control group. [*Fortuin,* Christine. Effects of Imidacloprid Soil Drench Applications on Nesting Blue Orchard Mason Bees (Osmia lignaria). Sustainable Agriculture and Education Projects, 2021.]

Roundup Shown to Kill Bees–But Not How You Might Expect

APRIL 20, 2021 | Roundup products manufactured by Bayer-Monsanto kill exposed bumblebees at high rates, according to a study published in the *Journal of Applied Ecology*, which points to undisclosed inert ingredients (those that typically make up a majority of the product formulation) as the

primary culprit. Roundup products have become synonymous with their main active ingredient glyphosate, but Bayer-Monsanto has been quietly reformulating its flagship product with different herbicides in a likely rebranding attempt, as glyphosate cancer lawsuits drag down the company. The study reveals that these new Roundup products present the same hazards to pollinators as glyphosate-based formulations, raising important questions about the pesticide regulatory process. The "no glyphosate" formulation of Roundup being sold in the UK and European Union is different than "no glyphosate" formulations being sold in the U.S. In the U.S., Bayer-Monsanto is selling a product line called Roundup® for Lawns which contains four different main active ingredients: dicamba, MCPA, quinclorac, and sulfenzatrone. The UK/EU version of the product appears to only contain acetic acid (vinegar), a least-toxic substance that presents moderate hazards to pollinators from exposure. However, the results raise the likelihood that it is primarily the so-called "inert" materials not disclosed on the Roundup label that are harming pollinators. [Straw, Edward et.al. Roundup causes high levels of mortality following contact exposure in bumble bees. *Journal of Applied Ecology*. 58:1167–1176, 2021.]

Meta-Review: Pesticides Kill or Harm Soil Invertebrates Essential to Soil Health

MAY 7, 2021 | Soil health is one of the linchpins on which the food production that sustains human life—as well as biodiversity, pollinator health, and carbon sequestration—depends. A recent meta-review in *Frontiers in Environmental Science* of nearly 400 studies finds that, in 71% of the cases reviewed, pesticides kill or otherwise harm soil invertebrates that contribute mightily to soil health. The researcher writes, "A wide variety of soil-dwelling invertebrates display sensitivity to pesticides of all types. . . . [These results] support the need for pesticide regulatory agencies to account for the risks that pesticides pose to soil invertebrates and soil health." Beyond Pesticides, concurs with that conclusion, and adds that the real solutions to noxious pesticide impacts lie in the adoption of regenerative organic approaches to all land management because they obviate any need for petroleum-based toxic chemical controls. The study also notes that research studies on pesticide impacts often "use a narrow range of surrogate species that are easy to rear, identify, or study, while smaller and more cryptic organisms are rarely analyzed. In some cases, the organisms that are the most extensively studied are known to be less sensitive to pesticides than other organisms, suggesting that we have limited knowledge of the extent of harm caused by pesticides." [*Gunstone,* Tari et al. Pesticides and Soil Invertebrates: A Hazard Assessment, *Frontiers in Environmental Science*. May, 2021.]

Ecological Mystery Unravels, With Toxic Pesticide Use at the Center

MAY 12, 2021 | In 2021, a team of scientists published in *Science* a piece that appears to solve an ecological mystery that had persisted for decades. Throughout the southeastern U.S., bald eagles and other top-level avian predators were experiencing mass deaths from a disease known as vacuolar myelinopathy (VM), a neurological ailment that causes lesions in affected animals' brains. Scientists identified the source of the exposure as a cyanobacteria growing on an invasive weed, but up until now, did not know how the bacterium caused disease. Now, scientists have determined that the chemical bromine, likely introduced by brominated herbicides in an attempt to manage invasive species, is the trigger for the production of the cyanobacteria's neurotoxin. While there are several sources of bromine (flame retardants and other industrial compounds, including fracking pollution) one of the most likely sources is the pesticide diquat dibromide. Pesticide products containing diquat dibromide are often applied in chemical-intensive control of hydrilla. [Breinlinger, Steffen et al. Hunting the eagle killer: A cyanobacterial neurotoxin causes vacuolar myelinopathy. *Science*. 371(6536), 2020.]

General Release of Honey Bees Threatens Wild Native Bee Populations and Ecosystems

MAY 12, 2021 | In a prime example of cart-before-the-horse, greenwashing, or perhaps "beewashing," a British company has badly missed the mark in its latest attempt to market a product while "doing good" and generating goodwill with customers. As *The Guardian* reports, Marks & Spencer, the giant United Kingdom (UK) retailer, is releasing 30 million managed honey bees into rural British landscapes in what the company is promoting as an effort to support biodiversity and the beekeeping sector. However, according to experts and environmental advocates, unleashing that many honey bees may well actually harm both wild native bees and honey bees themselves. Critics of the move say this means that wild bees will likely face fiercer competition for already inadequate food sources. [*The Guardian*, 2021.]

Threat to Ocean Health: Pesticide Resistant Fish Lice Plague the North Atlantic Ocean

JUNE 3, 2021 | (A report published in *Royal Society Open Science* finds pesticide-resistant parasitic lice (*Lepeophtheirus salmonis*) are endangering wild and farmed fish populations in the North Atlantic. Extensive use of pesticides to rid the parasite has led to widespread resistance to multiple pesticides,

prompting increasing infection rates among North Atlantic salmon populations. Some fisheries market aquaculture practices, like fish/seafood farming, as a solution to overfishing. However, the aquaculture industry repeatedly faces sustainability issues and fails to adhere to environmental standards that threaten marine health. Over the past two decades, organophosphate and pyrethroid insecticides have been the two main chemical classes used to control parasitic salmon lice. However, laboratory studies find increasing resistance among salmon lice to these chemicals, in addition to multi-resistance after *in vitro* crossbreeding. Since laboratory studies identify that multi-resistance to both chemical classes can occur via crossbreeding, researchers suggest this same resistance transpires in the field. From 2000 to 2017, researchers sampled 1,988 lice from Northeastern wild Atlantic salmonid (salmon, sea trout, and farmed salmon) populations. Researchers analyzed parasites for genetic markers for both pyrethroid and organophosphate resistance. The study results find genetic resistance among salmon lice has a spatiotemporal (location and time) evolutionary pattern. This pattern means that lice demonstrate simultaneous resistance to organophosphate and pyrethroid insecticides across the entire North Atlantic, except Canada. The crammed, over-treated nature of farmed fish creates an environment for these parasites to persist through regular winter die-offs. Resistant lice appear

in farm pens a few years post-treatment and leak via currents through the barrier, due to their small size. All oceans connect to one another, cycling nutrients, chemicals, and organisms throughout the world. [Borretzen, Helene et al. Losing the 'arms race': multiresistant salmon lice are dispersed throughout the North Atlantic Ocean. *Royal Society Open Science*. May 2021.]

Forestry Use of Glyphosate Reduces Fertility of Perennial Flowers and May Reduce Pollination

JUNE 22, 2021 | With its use in forested areas, glyphosate persists in the environment for years and can prompt morphological changes in perennial

flowers that reduce their fertility and may make them less attractive to pollinators. These findings were published in *Frontiers in Plant Science* by researchers at the University of British Columbia. Glyphosate herbicides like Roundup and Visionmax (a Canada-registered glyphosate product produced by Bayer/Monsanto) are often applied aerially via helicopter on wide swaths of forest land known as cutblocks. Cutblocks, designated areas where coniferous trees are grown for harvest and processing, are doused with glyphosate in order to manage understory trees and shrubs that would compete with the conifers. Researchers set out to understand the nontarget impacts of this practice on the surrounding forest ecosystem. Wild prickly rose (*Rosa acicularis*) plants were collected from three different cutblocks, each sprayed with Visionmax according to label directions. A set of untreated plants were gathered outside of the cutblock to function as a control. While some morphological changes are expected given exposure to a highly toxic herbicide, what concerns scientists the most is how long the chemical's effects persist in the environment. In contrast to claims by agrichemical corporations that glyphosate breaks down quickly in the environment, wild prickly roses contained traces of the herbicide two years after initial exposure. "The changes to plants have been documented in the past, in agricultural plants, so it is not surprising to find them in forests," said Dr. Wood. "What is important is the timeline. To continue to find these effects one to two years after herbicide

Study Highlights Important Role Field Margins Play in Insect Conservation and Pest Management

JUNE 16, 2021 | Uncultivated field margins contain almost twice as many beneficial insects as cropped areas around farm fields, according to research published in the *Journal of Insect Science.* The study finds that these predators and parasitoids overwinter in diverse vegetation and can provide farmers with an important jump start on spring pest problems. "A benefit of understanding overwintering is that those arthropods that emerge in the spring may be more inclined to feed on pests when pest populations are low," said Scott Clem, PhD, coauthor of the study. "And so, they may be more likely to nip pest populations in the bud before the pest problem becomes a big deal." In total, researchers collected 4,226 insects they considered beneficial, accounting for 95 species of parasitoids and pest predators. Arthropods collected along field borders contain two times the diversity and abundance compared to the middle of crop fields. Dr. Clem continued, "[T]hese field edges are important for maintaining natural enemies of pest species. [Clem, C Scott and Harmon-Threatt, Alexandra. Field Borders Provide Winter Refuge for Beneficial Predators and Parasitoids: A Case Study on Organic Farms. *Journal of Insect Science.* 21. May 2021.]

applications, in new parts of growing plants, is noteworthy." [Golt, Alexandra and Wood, Lisa. Glyphosate-Based Herbicides Alter the Reproductive Morphology of *Rosa acicularis* (Prickly Rose). *Frontiers in Plant Science*. June 2021.]

Pesticide Contamination in Waterways Raises New Alarm for Aquatic Life, Citing Poor Regulation

JUNE 23, 2021 | Small streams are prone to excessively high levels of pesticide contamination that are even more hazardous than once thought, according to a pilot study by a team of German researchers and published in *Water Research*. The results indicate significant risks for the health of aquatic ecosystems and should be used as evidence for establishing greater protections from toxic pesticide use, researchers say. Scientists established monitoring sites at more than 100 streams through-out Germany over the course of two years. Most sites were established near farm fields, where chemical farmers will use highly toxic pesticides that often make their way into local waterways. The results are significantly worse than researchers anticipated. "We have detected a significantly higher pesticide load in small water bodies than we originally expected," said Matthias Liess, PhD, ecotoxicologist and coordinator of the water monitoring project. The regulatory standards are exceeded in 81% of streams tested. For nearly one in five streams, regulatory limits are exceeded for over 10 different pesticide compounds. For the most sensitive aquatic species, such as caddisflies and dragonflies, researchers say that these species require 1,000x lower threshold values than less sensitive animals like snails and worms. "For sensitive insect species, the pesticide concentration in the small lowland streams is the most relevant factor that determines their survival. In contrast, other environmental problems such as watercourse expansion, oxygen deficiency, and excessive nutrient content are less important. For the first time this study allows a ranking of environmental problems," the researcher said. [Liess, Matthias et al. Pesticides are the dominant stressors for vulnerable insects in lowland streams, *Water Research*, 201:117262, 2021.]

Disease Carrying Mosquitoes Developing Resistance to Widely Used Mosquito Control Pesticides

JULY 1, 2021 | Yellow fever mosquitoes (*Aedes aegypti*) are evolving resistance to the pyrethroid insecticide permethrin, according to a study published by Colorado State University researchers in PLOS Genetics, highlighting the need to adopt ecologically-based mosquito management. Widespread, intensive use of the pesticide in mosquito control has allowed genetic mutations to persist among these mosquito populations, causing subsequent resistance to permethrin. Pyrethroids are one of the few remaining classes of insecticides available to control yellow fever mosquitoes, and resistance threatens the ability to prevent disease outbreaks with chemical-intensive methods. Two common pyrethroid resistance mechanisms occur among yellow fever mosquitoes: knockdown resistance involving "amino acid substitutions at the pyrethroid target site—the voltage-gated sodium channel (VGSC); [and] enhanced metabolism by detoxification enzymes." Whether a mosquito displays a resistance or knockdown response to insecticide exposure depends on pyrethroid concentration and genetic background. [Saavedra-Rodriguez, Karla et al. Permethrin resistance in *Aedes aegypti*: Genomic variants that confer knockdown resistance, recovery, and death. *PLOS Genetics*. 17(6): e1009606, 2021

Second Highest Honey Bee Loss in 15 Years Documented

JULY 2, 2021 | The second highest bee loss in 15 years has been reported by the Bee Informed Partnership (BIP) in its *2020–2021 National Colony Loss and Management Survey*, released on June 30. For the "winter" period of October 1, 2020 through April 1, 2021, approximately 32% of managed bee colonies in the U.S. were lost. This represents an increase of 9.6% over the prior year's winter loss and is roughly 4% higher than the previous 14-year average rate of loss. For all of the past year (April 1, 2020 to April 1, 2021) the colony loss was 45.5%. Beyond Pesticides has covered the related issues of *Colony Collapse Disorder* (CCD), the ongoing

and devastating impacts of pesticides on bees and other pollinators, and the larger context of what has been called the "insect apocalypse." These recent BIP data appear to indicate that "we," writ large, are failing to remedy these problems. Three out of four food crops globally depend on pollinators, at least in part. Commercially kept bees account for a significant portion of pollination of some U.S. crops; almonds are the leading crop, followed by apples and melons. The commercial bee business is huge—a $691 million dollar industry operating across nearly 12,000 managed crop pollination businesses. *Farm Progress* writes, "Crops that need pollination in the U.S. are valued at about $81.5 billion. . . . Honey bee pollination contributes 23 percent of that value." [Steinhauer, Nathalie et al. U.S. beekeepers continue to report high colony loss rates, no clear improvement. *Science News*. June 2021.]

Chemicals, including Pesticides, in Wastewater Discharge Contaminate Oysters in Pacific Northwest

JULY 8, 2021 | A Portland State University (PSU) study published in *Marine Pollution Bulletin* finds oysters of varying distances from wastewater discharge pipes along the Oregon and Washington state coast contain low levels of chemical contaminants. Although wastewater treatment facilities clean water draining from sinks and toilets, the process does not adequately remove all contaminants. The process can leave behind pharmaceutical drugs and personal care products (e.g., shampoos, cosmetics, deodorant) residues in treated water. PSU has already found that pesticides from the forestry industry threaten clams, mussels, oysters (bivalves) along the Oregon coast. Marine ecosystem pollution is difficult to track and measure, and pesticide regulations can invoke variations in water quality requirements through discrepancies in buffer zones and application concentrations. The combined presence of pesticides, medicine, and personal care products in aquatic environments has direct implications for species and ecosystem health and indirect consequences for human well-being. Springtime oyster samples, nearest wastewater sites, contain two pharmaceuticals: miconazole (a common antifungal medication) and virginiamycin (a common-use veterinary antibiotic medication). Additionally, researchers find four alkylphenols compounds (industrial chemicals used to make detergents, cleaner, and pesticide products) present in summertime oyster samples at both aquaculture and wastewater sites: 4-nonylphenol (NP), 4-*tert*-octylphenol (OP), and 4-nonylphenol mono- (NP1EO) and diethoxylates (NP2EO). [Ehrhart, Amy and Granek, Elise. Pharmaceuticals and alkylphenols in transplanted Pacific oysters (Crassostrea gigas): Spatial variation and growth effects. *Marine Pollution Bulletin*. 170:112584, 2021.]

U.S. Fish and Wildlife Service Proposes to Drop 1.5 Tons of Rodenticide on National Wildlife Refuge

JULY 10, 2021 | The U.S. Fish and Wildlife Service (FWS) is reviving its proposal to aerially apply (by helicopter) the toxic rodenticide brodifacoum to kill house mice on the Farallon Islands National Wildlife Refuge off the Northern California coast. Globally significant wildlife

populations inhabit the Farallones, including hundreds of thousands of seabirds and thousands of seals and sea lions. According to FWS, these include: thirteen species of seabird species that nest on the islands including Leach's Storm-petrel, Ashy Storm-petrel, Fork-tailed Storm-petrel, Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Common Murre, Pigeon Guillemot, Cassin's Auklet, Rhinocerous Auklet, and Tufted Puffin; pinnipeds including Northern fur seals, Steller sea lions, California sea lions, harbor seals, and northern elephant seals that breed or haul-out onto Farallon Refuge; and endemic species including white sharks, hoary bats, and arboreal salamanders. Aerial application of brodifacoum places at risk the mammalian and avian wildlife on the Farallon Islands, as well as marine life that may be exposed when the poison washes or settles into the ocean. There is no way to limit the impact to the targeted house mouse. A 2015 study conducted after aerial drop of rodenticides on Palmyra Island off the coast of Hawaii reported: "We documented brodifacoum [rodenticide] residues in soil, water, and biota, and documented mortality of nontarget organisms. Some bait (14–19% of the target application rate) entered the marine environment to distances 7m from the shore. After the application commenced, carcasses of 84 animals representing 15 species of birds, fish, reptiles and invertebrates were collected opportunistically as potential nontarget mortalities. In addition, fish, reptiles,

and invertebrates were systematically collected for residue analysis. Brodifacoum residues were detected in most (84.3%) of the animal samples analyzed. Although detection of residues in samples was anticipated, the extent and concentrations in many parts of the food web were greater than expected." Advocates urge FWS to investigate under its environmental impact assessment requirements, the possibility of managing the mice through controlled intensified predation by providing nesting boxes for barn owls and/or kestrels.

Conservation Genomics Pinpoint Pesticides and Pathogens in Decline of Bumblebees

JULY 13, 2021 | Bumblebees exposed to pesticides and pathogens display changes in gene expression that can be pinpointed and analyzed by cutting edge research tools, according to scientists at York University, who utilized the new technique in a study published in *Molecular Ecology*. This form of next-generation gene sequencing is part of a growing field of science known as conservation genomics, in which entire animal genomes are sequenced to determine conservation problems. "Next-generation sequencing is a totally new way to think about why bees are declining, which could revolutionize conservation biology," says study coauthor Amro Zayed, PhD, associate professor in biology at York. "We're looking directly at bee tissues to try and get clues to the stressors that are affecting this bee. I think this is a gamechanger for sure. With a single study, we are able to implicate a couple of really obvious things we've talked about for years—pathogens and pesticides—in the case of *Bombus terricola*." The gene analysis was conducted, and able to qualify nearly 9,500 gene expressions in bumblebee guts. Researchers discovered 61 differentially expressed genes, including those involved in detoxification, as well as those associated with neurodegenerative disorders and immune response. Bumblebees display gene expressions that are associated with exposure to neonicotinoid insecticides, fipronil, and a range of pathogens, including deformed wing virus and sacbrood virus. [Tsvetkov, Nadejda et al. Conservation genomics reveals pesticide and pathogen exposure in the declining bumble bee *Bombus terricola, Molecular Ecology*. June 2021.]

Death of as Many as 107,000 Bumblebees from Neonicotinoid Insecticides Studied

JULY 16, 2021 | Research published in *Environmental Entomology* reviews the 2013 Wilsonville, Oregon mass bumblebee die-off from application of the neonicotinoid *dinotefuran* on 55 linden trees in a big-box-store parking lot. In that single event, the research paper estimates between 45,830 and 107,470 bumblebees from some 289–596 colonies were killed. The coauthors said: "Our study underscores the lethal impact of the neonicotinoid pesticide dinotefuran on pollinating insect populations," and, "It is likely that the vast majority of mass pesticide kills of beneficial insects across other environments go unnoticed and unreported." Dinotefuran, the neonicotinoid (neonic) that killed those Oregon bumblebees, is used against fleas, thrips, tree-boring caterpillars, emerald ash borers, hemlock woolly adelgids, and in the Oregon case, aphids. Emerging scientific consensus on central causes of bee loss

focuses on pesticide impacts and how they make bees more vulnerable to pathogens. As Beyond Pesticides wrote, *2019 Canadian research* "found that 'real life' exposures to neonicotinoid insecticides impair honey bees' ability to groom harmful mites from their bodies, thus allowing mite populations to thrive." In addition, Beyond Pesticides has discussed the correlation, during the early 2000s, of the emergence of CCD [Colony Collapse Disorder] and severe colony losses with the spike in use of neonicotinoid pesticides, particularly delivered as seed coatings. In 2014, a study from the Harvard T.H. Chan School of Public Health showed that two neonics—imidacloprid and clothianidin—significantly harm honey bee colonies during winters. [Hatfield, Richard et al. Neonicotinoid Pesticides Cause Mass Fatalities of Native Bumble Bees: A Case Study From Wilsonville, Oregon, United States, *Environmental Entomology*, 50(5)1095–1104, 2021.]

Typical Neonicotinoid Insecticides at Any Level Likely to Kill Off Wild Pollinators

AUGUST 4, 2021 | Neonicotinoid insecticides applied to nursery plants sold at garden centers kill off wild, solitary pollinators regardless of the amount applied, according to research published in the Proceedings of the Royal Society B. The news is unlikely a surprise for those tracking the science on pollinator declines, but nonetheless a

stark reminder of the lack of progress from federal regulators to stop practices that contribute to the ongoing crisis. With new science consistently showing unacceptable hazards to pollinator populations, advocates are urging Congress to take up and pass the Saving America's Pollinators Act. Since 2006, scientists and beekeepers have singled out neonicotinoids, a class of systemic insecticides, for their role in pollinator die-off and decline. Once applied onto a seed or sprayed on a plant, neonicotinoids distribute themselves throughout the plant's structure. "Neonicotinoids are often used on food crops as a seed treatment," says study author Jacob Cecala. "But they're usually applied in higher amounts to ornamental plants for aesthetic reasons. The effects are

deadly no matter how much the plants are watered." [*Cecala*, Jacob and Wilson Rankin, Erin. Pollinators and plant nurseries: how irrigation and pesticide treatment of native ornamental plants impact solitary bees. *Proceedings of the Royal Society B.* July 2021.]

Debilitating Ear Blisters Plague Long Island Turtle Populations from Pesticide Use

AUGUST 5, 2021 | A report by Turtle Rescue of the Hamptons finds Long Island, New York turtles are experiencing higher rates of deadly aural abscesses or ear blisters from pesticide use. Previous research documents the role chemical exposure from environmental toxicants

Deer Ticks Developing Resistance to Popular Tick Control Chemical: Implications for Lyme Disease

JULY 22, 2021 |A study published in the *Journal of Medical Entomology* finds black-legged ticks (*Ixodes scapulari)* in New York are developing potential resistance to widely used tick-control pyrethroid insecticide, permethrin for the transmission of Lyme disease. The study suggests continuous use of area-wide, 4-poster devices (devices that attract deer and then apply pesticide to their head, ears, and neck) to apply insecticide treatments on deer to control tick populations promotes resistance. Like mosquitoes, a subpopulation of ticks encountering chemical exposure naturally alter gene function, which results in resistance to the chemical rather than death. To assess resistance among tick populations, researchers evaluated the susceptibility of deer ticks to permethrin exposure. Deer ticks used in this study came from Shelter Island, NY, and the Cary Institute of Ecosystem Studies (CIES) in Millbrook, NY. Development of resistance is an entirely normal, adaptive phenomenon: organisms evolve, "exploiting" beneficial genetic mutations that give them a survival advantage. However, resistance is growing in all sectors of pest control. [Note: The best method to prevent tick bites and the diseases they carry is to wear appropriate clothing (light-colored that covers one's whole body), a hat, and consider tucking one's pants into socks. Most important is to conduct regular tick checks as it is critically important to detach a tick from one's skin as soon as possible after the bite to reduce the chance of disease transfer. If you have an outdoor pet, do not forget to check them as well. Safely kill tick larvae with nontoxic solutions: vacuum daily during flea season (changing bag often); groom pet daily with a flea comb (cleaning comb with soap-water between brushes); frequently bathe pets with soap and water; and frequently wash pet bedding, restricting pet to only one bed.] [Burtis, James et al. Susceptibility of *Ixodes scapularis* (Acari: Ixodidae) to Permethrin Under a Long-Term 4-Poster Deer Treatment Area on Shelter Island, NY. *Journal of Medical Entomology*. 58(4):1966-1969, 2021.]

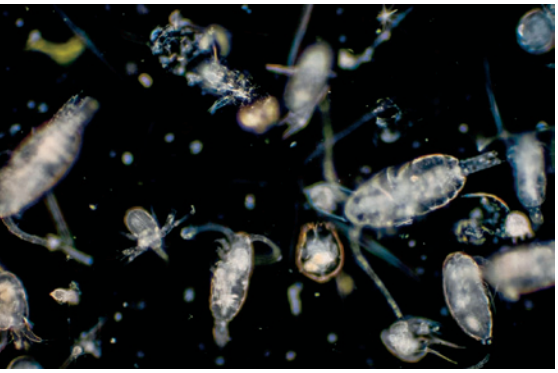
play in inner ear abscess formation among turtles. However, synergism (collaboration) between viral infection and toxic chemical exposure increases aural abscess instances. Aural abscesses are painful ear blisters that can grow as big as a golf ball. Medical intervention is necessary to remove abscesses from turtles and treat them with an antibiotic regimen to prevent death. Turtle Rescue facility workers report a staggering 50 percent of turtles currently within their care to have aural abscesses. The percentage of turtles with this diagnosis is much higher than in past years. [Turtle Rescue of the Hamptons, July 2021.]

Of Multiple Stressors, Pesticides Are the Most Harmful to Bees by Acting Synergistically to Increase Mortality

AUGUST 11, 2021 |Multiple stressors, including pesticides, parasites, and poor nutrition, act synergistically to increase the risk of bee mortality, according to a meta-analysis published in *Nature*. The findings are yet another indictment of the U.S. pesticide regulatory system's ability to protect pollinators, as the authors note that their results, ". . . demonstrate that the regulatory process in its current form does not protect bees from the unwanted consequences of complex agrochemical exposure." Scientists evaluate how combinations of multiple pesticides, parasites, and lack of floral resulted in bee death or subchronic effects that impacted overall fitness (reproductive ability, colony health, etc.), behavior, parasite load, or immune response. The effects of multiple stressors can be characterized as antagonistic when stressors cancel themselves out, additive when the impacts seen are what would be predicted when summing the individual effects, and synergistic when the effects are multiple times more harmful than what would be predicted additively. To conduct the analysis, researchers began with nearly 15,000 papers on bee health, and narrowed down their review to 90 studies that observed over 350 interactions between multiple stressors. "Our results show that although many classes of anthropogenic stressors may have additive effects on bee mortality and fitness proxies, exposure to combined agrochemicals can have synergistic effects that are more detrimental than would be predicted by independent risk assessments," the study reads. [Siviter, Harry et al. Agrochemicals interact synergistically to increase bee mortality. *Nature* 596:389–392, 2021.]

Endangered Species Likely to Be Hard Hit by Neonicotinoid Insecticides, EPA Finds

SEPTEMBER 8, 2021 | (September 8, 2021) The U.S. Environmental Protection Agency (EPA) in August 2021 released a long-overdue biological evaluation of the three most commonly used neonicotinoid (neonic) insecticides, finding that the chemicals are likely to adversely affect the lion's share of endangered species and their habitat. While the public may be most familiar with the damage neonics cause to pollinator populations, EPA's evaluation highlights the widespread, indiscriminate harm scientists throughout the world have been sounding the alarm about for years. Advocates say the findings make it clear that neonicotinoids must be immediately banned from use. Under the *Endangered Species Act* (ESA), EPA is required to consult with federal wildlife agencies and conduct a biological evaluation of the impacts a pesticide may have on endangered species and their habitats, prior to the agency formally registering the pesticide. Under EPA's current draft, each neonic is found to adversely affect over 1,000 endangered species out of 1,821 listed under the law. Specifically, the neonics are found to adversely effect nontarget endangered species: imidacloprid – 1,445 (79%), clothianidin—1,225 (67%), and thiamethoxam—1,396 (77%). Harmful effects are not limited to a specific subgroup—dozens of species are affected within all groups, including mammals, birds, amphibians, reptiles, fish, plants, and aquatic and terrestrial invertebrates. These findings are stark in the context of actions by the previous administration to weaken the biological evaluation process. [EPA, August 2021.]



Studies Show How Pesticides Harm Organisms that Form the Foundation of Freshwater Ecosystems

SEPTEMBER 15, 2021 | Toxic pesticide use, and glyphosate in particular, degrades the health of freshwater ecosystems by harming species that form the basis of aquatic food chains, according to research published by scientists at McGill University. In a series of studies, scientists investigated how freshwater bacteria and zooplankton are affected by varying levels of the weed killer glyphosate, the neonicotinoid insecticide imidacloprid, and nutrient levels. "Because plankton form the foundation of the food chain in freshwater ecosystems, it is very important to understand how plankton communities respond to widely used pesticides," said Jesse Shapiro, PhD, an associate professor in McGill's Department of Microbiology and Immunology. "Our research shows that the structure of these communities can be impaired under currently acceptable North American water quality guidelines." Zooplankton were found to be much more sensitive to pesticide exposure than freshwater bacteria. However, glyphosate was found to be the most damaging exposure within both experiments. In the zooplankton study, low levels (.3 parts per million) of glyphosate resulted in persistent declines in rotifer populations, while both pesticides harm populations of copepod crustaceans (at 3 parts per billion with imidacloprid and 5.5 parts per million with glyphosate). At higher, yet still environmental relevant rates, scientists observe synergy between the two pesticides that result in significant declines in overall zooplankton biomass. [Barbosa da Costa, *Naíla et al.* Resistance, resilience, and functional redundancy of freshwater bacterioplankton facing agricultural stress. *Molecular Ecology*. July 2021; Hébert, Marie-Pier et al. Widespread agrochemicals differentially affect zooplankton biomass and community structure. *Ecological Applications*. July 2021.]

Common Mosquito Pesticide Exacerbates Health Issues Associated with Zika Virus

SEPTEMBER 28, 2021 | A widely used mosquito pesticide may exacerbate the effect of the Zika virus on fetal brain development, according to research published by an international team of scientists in *Environmental Pollution*. Pyriproxyfen, an insect growth regulator often used as a mosquito larvicide, is registered for use in hundreds of commonly used pesticide products. Scientists have discovered that the pesticide's mode of action has the potential to worsen the public health mosquito diseases the chemical aims to control. The research reinforces the extent of unknowns associated with synthetic pesticide exposure, underscoring the need for a focus on nontoxic and ecological mosquito management. Scientists base their research on reports that in Brazil, during the 2015 Zika epidemic, certain areas of the country experienced higher rates of microcephaly. Microcephaly is a rare condition that causes a pregnant woman's fetus to develop severe cranial deformities, alongside a range of other symptoms that include vision problems, hearing loss, feeding issues, developmental delays and seizures. While the study does not provide support for the chemical increasing viral infection rates, scientists did find that exposure could exacerbate an existing infection, resulting

in more harmful health impacts when exposed to both pyriproxyfen and Zika together. [Vancamp, Pieter et al. The pyriproxyfen metabolite, 4'–OH–PPF, disrupts thyroid hormone signaling in neural stem cells, modifying neurodevelopmental genes affected by ZIKA virus infection. *Environmental Pollution,* 285: 117654, 2021.]

Conventional Agriculture Decreases Diversity of Gut Bacteria in Foraging Bats

SEPTEMBER 29, 2021 | Bats foraging in chemical-intensive banana plantations have much less gut diversity than bats foraging in organic banana fields and natural forestland, finds research published in *Frontiers in Ecology and Evolution*. Although there is increasing recognition that a diet of conventional, chemically grown food leads to adverse disruptions of the gut microbiome (also known as dysbiosis), little research has been conducted on the effect of production practices on the gut of wild foraging species. Researchers focused their investigation on Pallas's long-tongued bat (*Glossophaga soricina*), a nectar feeding bat native to Central and South America. The bat is highly adapted to human environments, sustaining populations in both conventional and organic banana plantations, as well as surrounding forest land. For the study, researchers trapped nearly 200 bats across the country of Costa Rica over a 22-month time span. After trapping,

physiological characteristics, like size and body weight, were measured, and bat guano was analyzed for its microbial population. All sampled bats were released back into their habitat. Bats that forage in agricultural land—whether organic or conventional, were found to be overall larger in size and weight than bats that live primarily in the forest. This was likely a result of a diet heavily reliant on the nectar from banana plants. However, bats in organic plantations have significantly higher levels of gut biodiversity than those in conventional plantations (based on a range of analyses, including observed amplicon sequence variants, Shannon diversity index, and Faith's Phylogenetic Diversity index). Gut diversity in organic bats is found to be similar to the diversity analyzed in forest bats. The study indicates that it is likely that organic practices are maintaining a "high diversity of commensal microbiota," while on the other hand, "less diverse gut microbiota in bats foraging in conventional monocultures may suggest that these habitats potentially have negative physiological consequences for the animals (e.g., gut inflammation and metabolic disease), and may act as an ecological trap." [Alpizar, Priscilla et al. Agricultural Fast Food: Bats Feeding in Banana Monocultures Are Heavier but Have Less Diverse Gut Microbiota. *Frontiers in Ecology and Evolution*. September 2021.]

Monoculture Agriculture Leads to Poor Soil Health

OCTOBER 5, 2021 | Soil and soil quality are declining rapidly in the U.S. and around the world, with recent data indicating that the U.S. Corn Belt has lost 35% of its topsoil. "Understanding the management practices that lead to healthier soils will allow farmers to grow the same crops while reducing costly chemical inputs (fertilizers, pesticides, herbicides) and protecting the environment," said study coauthor Lori Phillips, PhD in a study published in *Agrosystems, Geosciences and Environment*. Researchers analyzed a long-term cropping system that includes 18 years of continuously grown soy, corn, and perennial grasses. Each cropping system was evaluated for its bacterial and fungal population, as well as a test called CNPS, which measures the enzymes produced by microbes specifically related to the soil's carbon, nitrogen, phosphorous, and sulfur cycles. Researchers indicate that these measurements create "a holistic measure of biological activity." Within the perennial grasses, the community consisting of red fescue and birdsfoot trefoil (a legume) is found to contain healthier soil than a system with only tall fescue grass. Both soil organic matter and CNPS activity are higher for the grasses than for the monoculture crops by 2- or 3-fold. Microbial communities are also markedly different between monoculture crop and perennial grass soils. "Intensively managed agricultural soils, with more frequent tillage and high fertilizer inputs, tend to be dominated by bacteria. In contrast, more sustainable management practices increase the overall amount of fungi in soil," Dr. Phillips notes. [Pérez-Guzmán, Lumarie et al. An evaluation of biological soil health indicators in four long-term continuous agroecosystems in Canada. *Agrosystems, Geosciences and Environment*. June 2021]

Weeds Are Now Developing Resistance to Herbicides They've Never Been Exposed To

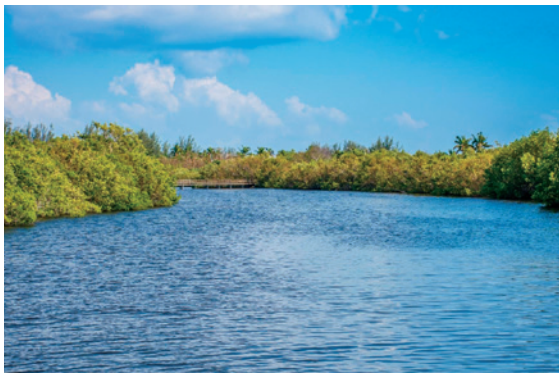
OCTOBER 13, 2021 | Pesticide use in conventional chemical-intensive farming is so pervasive that weeds are developing resistance to herbicides they have never encountered before. According to research published in *Plant and Cell Physiology* and *New Phytologist*, the notoriously difficult-to-control weed waterhemp (*Amaranthus tuberculatus*) is outpacing commercial crops in its ability to detoxify after herbicide exposure. "This is probably the first known example where waterhemp has evolved a detox mechanism that a crop doesn't have. It's using a completely different mechanism, adding to the complexity of controlling this weed," says Dean Riechers, PhD, study coauthor and professor at University of Illinois. Analyses conducted by the University of Illinois scientists determined that waterhemp developed a process completely novel and separate from how corn detoxifies the compounds. While it is usually the cytochromes P450 enzymes that break

Ag Secretary Vilsack Pushes Petroleum Farming Inputs, Fights EU's Climate-Friendly Organic "Farm to Fork" Initiative

OCTOBER 8, 2021 | U.S. Secretary of Agriculture Tom Vilsack used a September G20 summit in Italy to target the European Union's "Farm to Fork" (F2F) strategy, a part of its European Green Deal. Trump administration Agriculture Secretary Sonny Perdue said that F2F is "more . . . 'political science' than demonstrated agricultural science"; Secretary Vilsack called it "a path very different from the one the U.S. is pursuing." The F2F initiative aims to transition the EU to a sustainable food system such that it also achieves significant mitigation of climate change. But Mr. Vilsack chose to counter the F2F efforts by promoting an "alternative strategy"—under the moniker "Coalition for Productivity Growth"—through which "other nations pledge *not* to follow the European path on farm policy." He has described this alternative, U.S.-led strategy as "a market-oriented, incentive-based, voluntary system [that] is effective" at slashing agricultural carbon emissions. *Mother Jones* poses the central question in the headline of its September 30 article: "Why is Secretary Vilsack So Afraid of a Plan to Cut Pesticides and Meat?" The central F2F tenets that the secretary seems to find unnerving are those that would slash use of synthetic pesticides and fertilizers, and move one-quarter of European farmland to organic production by 2030.

Mother Jones writes, "The Farm to Fork program, part of the European Commission's response to the continent's own accelerating climate chaos and steady rise in illnesses related to highly processed food, aims to 'make food systems fair, healthy and environmentally friendly.' At its heart lies the goal of slashing farmers' reliance on water-polluting, energy-intensive agrochemicals: It requires a 20 percent drop in fertilizer use by 2030, and a 50 percent cut in pesticides. The plan . . . also mandates a 50 percent reduction [in] food waste; calls on farmers to halve their use of antibiotics for livestock, a key driver in the global crisis of antibiotic resistance in human medicine, and; aims to nudge Europeans to adopt a 'diet with less red and processed meat and with more fruits and vegetables.'" [Philpott, Tom. "Why Is Ag Secretary Vilsack So Afraid of a Plan to Cut Pesticides and Meat?" *Mother Jones,* September 10, 2021.]

down hazardous molecules, waterhemp uses different enzymes called glutathione *S*-transferases (GSTs). It is increasingly clear that herbicide use is the prevailing driver of the ever-evolving adaptability of waterhemp plants. [Strom, Seth et al. Metabolic Pathways for *S*-Metolachlor Detoxification Differ Between Tolerant Corn and Multiple-Resistant Waterhemp. *Plant and Cell Physiology and New Phytologist.* 62(11):1770–1785, 2021.]



Aquatic Wildlife Populations Take a Nosedive after Neonicotinoid Exposure

NOVEMBER 10, 2021 | The diversity and abundance of freshwater aquatic insects plunges when commonly used neonicotinoid (neonic) insecticides leach into waterways, finds research published in the *Proceedings of the National Academy of Sciences*. While this is the latest study exploring the effects of neonicotinoids in the field at real-world exposure levels, it is far from the first to show unacceptable hazards to wildlife and ecological health. To determine how neonicotinoids affect critical aquatic species near the bottom of the food chain, researchers created a series of 36 experimental ditches, split into four groups of nine. Mimicking a pulse that may come from a nearby insecticide application, each group of ditches was dosed every two weeks for a period of three months. Scientists collected over 55,000 insects over the course of the experiment. However, overall abundance, biomass, and diversity of insects collected declined in dosed ditches over the three-month

period. By the end of the study, compared to the control group overall insect biomass declined by 11, 4, and 50 percent along a gradient of increasing amounts of neonic dosing. "We saw dramatic declines in all the species groups studied, such as dragonflies, beetles and sedges," said study author Henrik Barmentlo, PhD, both in absolute numbers and in total biomass. "In the most extreme scenario, the diversity of the most species-rich group, the dance flies, even dropped to a single species." Dr. Barmentlo notes that these effects have major trophic impacts for other wildlife, like birds that rely upon these insects. "So it is quite possible that these bird species suffer from a lack of insects, or in other words: food," he said. Amphibians are likely to feel the full effect of neonicotinoid contamination, as they are not only exposed through water, but also rely upon a healthy insect population for sustenance. [Barmenio, S. Henrik et al. Experimental evidence for neonicotinoid driven decline in aquatic emerging insects. *Proceedings of the National Academy of Sciences*. 118 (44):e2105692118. 2021.]

Secret Inert Ingredient in "Bee Safe" Pesticide Found to Kill Bumblebees

NOVEMBER 11, 2021 | Evidence is building that so-called "inert" ingredients in pesticide formulations are harming pollinators and undermining regulatory determinations that designate products as "bee safe." According to a study published in *Scientific Reports,* the fungicide Amistar causes lethal and sublethal effects that can be primarily attributed not to its active ingredient azoxystrobin, but to alcohol ethoxylates, a proprietary, nondisclosed co-formulant, or inert (or other) ingredient intentionally added to a pesticide formulation—calling into question EPA's little bee icon warning on product labels and the effectiveness of its regulatory review. In the study, all positive control bees died, and all negative control bees lived. None died from benzisothiazol, and only one died from naphthalenesulfonic acid exposure. Fully formulated Amistar resulted in 23 percent mortality, while alcohol ethoxylates, and the mixture of benzisothiazol, naphthalenesulfonic acid, and alcohol ethoxylates resulted in death rates of 30 and 32 percent. Researchers find that bees that weigh more at the beginning of the study are more likely to survive. That is because alcohol ethoxylates are causing sublethal impacts that do not necessary kill every exposed bumblebee outright. [Straw, Edward and Brown, Mark. Co-formulant in a commercial fungicide product causes lethal and sublethal effects in bumble bees. *Scientific Reports*. 11(21653), 2021.]

Fungal Resistance to Antimicrobial Pesticides Leads to Deadly Infection

NOVEMBER 23, 2021 | The U.S. Environmental Protection Agency (EPA) announced in mid-October 2021 a revision of its guidance on the evaluation of antimicrobial pesticides used against *Candida auris (C. auris)*. This pathogen is a type of fungus (a yeast) that can cause serious infection and can spread readily among patients and staff in hospitals and other congregate health care settings (such as nursing homes). *C. auris* has developed resistance to what used to be the therapeutic impacts of major antifungal medications. (Resistance is a major and growing problem in health care and in agriculture, with

the latter exacerbating the former.) To be clear, it is not all isolates (strains) of *C. auris* that have developed drug resistance—yet. Beyond Pesticides wrote in 2019: "Echoing the development of resistance in bacteria, there have lately been resistant fungi showing up in hospitals and labs, adding to the already considerable worry in the medical community about how to treat people who contract infections caused by resistant pathogens. *Candida auris* can be deadly; indeed, more than one in three patients with a serious *C. auris* infection of the blood, heart, or brain die from it, and nearly half of those who contract the infection die within 90 days. Immunocompromised people and infants are at high risk of lethality from these infections. The agency has a decades-long poor track record on this front. Back in 1990, the U.S. Government Accountability Office (GAO) issued recommendations, based on its review of EPA's regulation of disinfectants, a document titled *Disinfectants: EPA Lacks Assurance They Work*. Adoption of organic agricultural practices can diminish the resistance problem, potentially helping to preserve important antibiotic and antifungal medicines for treatment of human infection. But EPA abdicates its responsibility "to protect human health and the environment" when it fails to address the issue of efficacy of pesticide products, causing downstream health, economic, and environmental harms. [Richtel, Matt and Jacobs, Andrew. "A Mysterious Infection, Spanning the Globe in a Climate of Secrecy." *The New York Times*. 2019.]

ACTIONS OF THE WEEK

Tell the U.S. Fish and Wildlife Service To List Monarch Butterflies on the List of Threatened and Endangered Species. Tell the Environmental Protection Agency To Eliminate Pollinator Poisons

FEBRUARY 1, 2021 | The yearly winter monarch count along the California coast, overseen each year by the conservation group Xerces Society, was the lowest ever. In 2020, citizen scientists counted only 2,000 butterflies. The findings indicate that many on the planet today are, within their lifetimes, likely to experience a world where western monarchs are extinct.

Help Get Congress To Support National Biodiversity Strategy Legislation

FEBRUARY 22, 2021 | Congressional Rep. Joe Neguse, Rep. Alan Lowenthal and Chair of the Natural Resources Subcommittee on Water, Oceans and Wildlife Rep. Jared Huffman have reintroduced their resolution (H.Res. 69: Expressing the need for the Federal Government to establish a national biodiversity strategy for protecting biodiversity for current and future) to create a national biodiversity strategy.

Tell Congress and EPA To Suspend Deadly Insecticide Use and Transition to Organic To Save Hummingbirds

MARCH 29, 2021 | New data on the hazards of neonicotinoid insecticides calls for urgent regulatory action. The same pesticides that are linked to the worldwide decline of insect pollinators also present significant risks to their avian counterparts, hummingbirds. Widely known for their nectar-fueled hovering flight powered by wings beating up to 80 times per second, hummingbirds display unique reactions to toxic pesticides.

Take the Ladybug Pledge; Bring Organic Landcare to Your City

APRIL 19, 2021 | In celebration of Earth Day and its fourth annual Ladybug Love campaign throughout the month of April, Natural Grocers is supporting Beyond Pesticides. The campaign celebrates insects that play a crucial role in food supply stability, and regenerative farming practices that use ladybugs and other beneficial insects instead of harmful synthetic pesticides to manage pests. Natural Grocers will donate $1 to Beyond Pesticides for each person who pledges (including renewals) "not use chemicals that harm ladybugs and other beneficial insects on their lawn or garden, and to support 100% organic produce."

The Week of June 21 Is Pollinator Week– A Time To Take Personal and Community Action

JUNE 21, 2021 | Pollinator Week reminds us that change is critical to the survival of the planet and that we can take action, both in our households and communities and in the state and federal policy arena. Here's how YOU can take action.... Create an organic habitat on your own property or a space in the community—such as the library grounds, medians, and rights-of-way. Given that plant starts in many garden centers across the country are grown from seeds coated with bee-toxic neonicotinoid pesticides, or drenched with them, Beyond Pesticides has compiled a comprehensive directory of companies and organizations that sell organic seeds and plants to the general public. Included in this directory are seeds for vegetables, flowers, and herbs, as well as living plants and seedlings.

Saving America's Pollinators Act Reintroduced, Advocates Urge Congressional Action To Stop Pollinator Decline

JUNE 24, 2021 | This Pollinator Week 2021, U.S. Representatives Earl Blumenauer (D-OR) and Jim McGovern (D-MA) are reintroducing the *Saving America's Pollinators Act* (SAPA) in an effort to reverse ongoing declines in wild and managed pollinators.

Tell Your Congressional Reps To Cosponsor Pollinator Legislation; Thank Those Who Already Have

JULY 12, 2021 | New data released in June for 2020–21 documents the second highest honey bee losses in 15 years.

Retailers Fail To Protect Pollinators . . . Badly

SEPTEMBER 17, 2021 | Against the backdrop of what *The New York Times* in 2018 called the "insect apocalypse," and the dire plight of pollinators in particular, Friends of the Earth (FOE) recently issued its retailer scorecard, which benchmarks "25 of the largest U.S. grocery stores on pesticides, organic offerings and pollinator health"—with the vast majority of retailers failing to protect pollinators.

ACTIONS OF THE WEEK

The path out of the chemical pesticide quagmire is organic: companies must do more to move suppliers to organic, regenerative production practices, and EPA should be pulling these toxic compounds from the market.

We Must End the Sixth Extinction

SEPTEMBER 20, 2021 | Scientists warn that humanity is causing the sixth mass extinction in the planet's history. A series of reports from the United Nations Environment Program (UNEP) highlights how human activities threaten the healthy functioning of ecosystems that produce food and water, as well as one million species now at risk of extinction. **Tell Congress to ratify the Convention on Biological Diversity (CBD). Tell EPA to incorporate CBD targets into its programs.** CBD has been ratified by 196 nations—all the members of the United Nations except the United States and the Vatican. The CBD includes 21 action targets to be achieved by 2030, including reducing pesticide use by two-thirds, eliminating plastic waste, and "fully integrating biodiversity values into policies, regulations, planning, development processes, poverty reduction strategies, accounts, and assessments of environmental impacts at all levels of government and across all sectors of the economy, ensuring that all activities and financial flows are aligned with biodiversity values." **Take action by urging federal agencies to address mass extinction like the crisis it is by incorporating biodiversity goals into the decision-making process for pesticide approvals.**

American Bumblebee Considered for Endangered Status, But Will "Critical Habitat" Be Defined?

OCTOBER 5, 2021 | The U.S. Fish and Wildlife Service (USFWS) will consider listing the American bumblebee (*Bombus pensylvanicus*) under the *Endangered Species Act,* according to a notice published in the Federal Register late in September 2021. **Take action by urging federal agencies to address mass extinction.**

Protect Endangered Species: Comment by End of Today–Monday, October 25

OCTOBER 25, 2021 | The U.S. Environmental Protection Agency (EPA) is requesting public comments on its draft Biological Evaluations (BEs) for neonicotinoid insecticides imidacloprid, clothianidin, and thiamethoxam by 11:59 pm (EDT) on Monday, October 25, 2021. The BEs will factor into EPA's registration review decisions on the three bee-toxic insecticides.

Stop Ag Secretary Vilsack from Undermining Climate Initiative to Transition Agriculture

OCTOBER 12, 2021 | Tell President Biden and Congress that there is no room for agriculture policies that are not in line with the Executive Memorandum and directive *Modernizing Regulatory Review*. USDA must remove all barriers to a national transition to organic agriculture. One of President Biden's first actions, on the day of his inauguration, was this Executive Memorandum and directive, requiring the heads of all executive departments and agencies to produce recommendations for improving and modernizing environmental stewardship.

California Releases Strategy for Land Management Practices that Confronts Climate Crisis

NOVEMBER 5, 2021 | In its draft Natural and Working Lands Climate Smart Strategy the California Natural Resources Agency asserts that the state's 105 million acrescan "sequester and store carbon emissions, limit futurecarbon emissions into the atmosphere, protect peopleand nature from the impacts of the climate crisis. **Tell your state legislators and governor to adopt a Natural and Working Lands Climate Smart Strategy that supports organic agriculture and land management. (CALIFORNIA RESIDENTS: Please use this form.)**

Aerial Drop of Rodenticides on Farallon Islands in California Threatens Ecosystem, Comments Due

NOVEMBER 29, 2021 | The U.S. Fish and Wildlife Service (FWS) is reviving its proposal to aerially apply (by helicopter) the toxic rodenticide brodifacoum to kill house mice on the Farallon Islands National Wildlife Refuge off the Northern California coast. Globally significant wildlife populations inhabit the Farallones, including hundreds of thousands of seabirds and thousands of seals and sea lions. **Tell the California Coastal Commission to deny the proposed aerial dispersal of the highly toxic rodenticide brodifacoum on the Farallon Islands.**

Studies Show Pesticide Exposure To Be Insidious

ADDING TO THE BODY OF SCIENCE: WIDESPREAD EXPOSURE

The 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 perfluroalkyl 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 plan 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 om 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 discovery 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 perfluroalkyl 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 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 semipervious 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.

Disproportionate Pesticide Harm Is Racial Injustice

DOCUMENTING VICTIMIZATION: STRUCTURAL RACISM

Disproportionate risk is ignored or downplayed in the regulation of pesticides, introducing racial injustice in the current allowance of harm set by the U.S. Environmental Protection Agency (EPA). This is a systemic failure that does not evaluate elevated toxic hazards to people of color communities (from occupational exposure, preexisting health conditions and comorbidities, to residential exposure in fenceline communities with exposure to chemical plants and disposal sites). Throughout 2021, the disproportionate effect of Covid-19 deaths and morbidity were shown to disproportionately affect people of color because of their disproportionate employment as essential workers. By not considering disproportionate impacts of overall pesticide exposure, this horrific situation mimics the injustice of the pesticide registration and use process.

As EPA tinkers with risk mitigation measures, such as farmworker protection under the Worker Protection Standards, the U.S. General Accountability Office concluded early in 2021 that the standards fall short. While

a court blocked some of the provisions related to the application of exclusion zones and other elements, the approach to worker protection is still in need of dramatic overhaul.

Research establishes the link between elevated breast cancer rates among African American women and pesticides, with black women 40 percent more likely to die from the disease than any other race. And while environmental exposure is widely understood to be an underlying cause, even if there is a genetic component to diseases like cancer, it is incumbent upon the regulatory process to protect those at greatest risk from the introduction of foreign toxic substances that exacerbate risks and underlying conditions.

While an African American neighborhood contaminated by the toxic wood preservative creosote (linked to the death of a 13-year-old boy from leukemia in litigation) received a visit from EPA Administrator Michael Regan on his *Journey to Justice* tour, EPA had earlier proposed reregistration to allow continued use of creosote. This disconnect reflects EPA's failure to consider cradle-to-grave effects and disproportionate impacts on people of color when it registers a pesticide. Beyond Pesticides took the disproportionate risk argument with farmworker organizations to court, with Center for Food Safety as counsel, arguing that EPA's failure to regulate glyphosate for its cancer effects hurt farmworkers first and most.

In recognition of a history of mistreatment of Black farmers by government and others, Congress passed and President Biden signed legislation that provides debt relief, grants, and loans to improve land acquisition and address heritable property issues, financial support for research, education and training, and the establishment of a racial equity commission. The administration earlier had set up the White House Environmental Justice Advisory Council, which issued a report with recommendations for systemic changes to "forward health, racial equity, and environmental justice." The President's Executive Memorandum on *Modernizing Regulatory Review* requires all agencies to "promote public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations." There is a steep road to climb in reversing and correcting the abuses that are inherent in EPA's risk calculations (risk assessments) that ignore high risk populations.

In 2021, the nation saw the reality of underlying vulnerabilities across different population groups and became sensitized, to some extent, to the groups of occupations that are at higher risk, both in the context of Covid-19. Now, it is time to apply that understanding to the daily evaluations that go into toxic chemical regulation in an effort to reform and replace the current regulatory decision-making process, which is empirically racist, with one that acknowledges and cares for those with the highest real-world vulnerabilities and exposure.

Federal Court Blocks EPA from Weakening Farmworker Protections

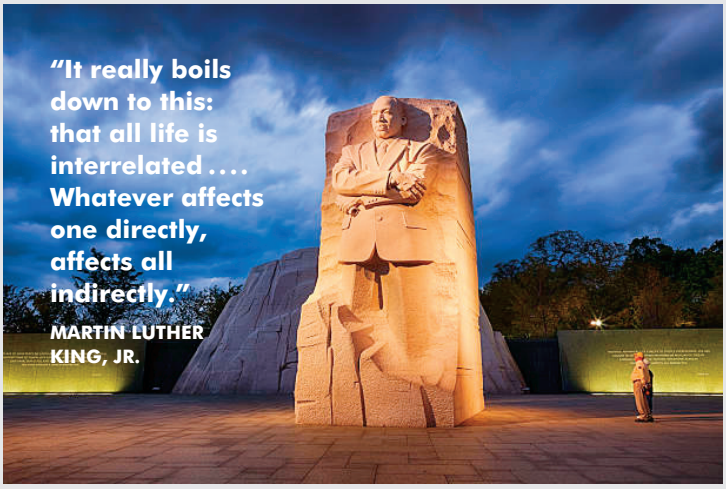
JANUARY 5, 2021 | In the waning days of 2020, a federal court provided a hint of hope that farmworkers will retain basic buffer zone protections from toxic pesticides. The District Court for the Southern District of New York issued in late December a temporary restraining order against the U.S. Environmental Protection Agency (EPA), prohibiting the agency from implementing industry-friendly rules that weaken application exclusion zones (AEZs) for farmworkers. The ruling, a result of a lawsuit brought by groups Farmworker Justice and Earthjustice, puts the onus on the Biden administration to determine the fate of the rule. Application Exclusion Zones (AEZs) are buffer zones where individuals are not permitted to enter during a pesticide application, as doing so would put one at risk of dangerous exposure. EPA's proposal, pushed forward by

We Honor Martin Luther King Today

JANUARY 18, 2021 | We honor Martin Luther King, Jr. today on Martin Luther King Day—a day of national service with volunteer opportunities across the nation. During this day of reflection, consider reading Dr. King's "I Have a Dream Speech" or listening to it here. At Beyond Pesticides, our vision and work aligns with the vision Dr. King expressed—"Injustice anywhere is a threat to justice everywhere." To that end, we seek to eliminate disproportionate risk, with elevated toxic hazards to people of color communities, with higher rates of pesticide-induced diseases among those who live in fenceline communities where chemicals are produced, among farmworkers who harvest the nation's food, and among landscapers who manage our parks and children's playing fields. We seek to transform national laws that allow risks under risk assessments that institutionalize environmental racism by allowing for this disproportionate risk. We seek to eliminate toxic pesticides production and use through the adoption of organic land management. To that end, we work with communities across the country to transition their land management to organic practices and we advance organic standards under the *Organic Foods Production Act* that have integrity and are fully enforced.

Eliminating Toxic Pesticides with Organic Transformation. Beyond Pesticides' program reflects the thinking that this is not a time to tinker with reforms, thus the call for foundational change to policy and practice. The fact that racial disparities are integral to the way we regulate the production, transportation, use, and disposal of toxic pesticides and other chemicals means the toxic pesticide industry is unsustainable. The standards in the governing laws are fundamentally flawed, resulting in unnecessary use and unacceptable disease outcomes that are high generally, but even greater for people of color. Systemic change does not occur with improved "mitigation measures" that EPA manipulates unscientifically or the banning of some chemicals or some uses. Our strategy only calls out individual chemicals and their effects—like the herbicide dicamba causing crop damage and Roundup (glyphosate) causing non-Hodgkin lymphoma or neonicotinoid insecticides indiscriminately killing pollinators—as indicative of a failed statutory and regulatory system, not just bad actor chemicals.

Advancing Systemic Change. Our work to advance systemic change seeks to identify underlying policies that codify disproportionate harm, such as federal pesticide law that is built on a foundation that allows elevated and disproportionate risk to workers. Workers



are excluded from EPA's cumulative risk assessment (under the *Food Quality Protection Act* amendments to the *Federal Food, Drug and Cosmetic Act* and the *Federal Insecticide, Fungicide, and Rodenticide Act*), which aggregates dietary and non-dietary, but explicitly not occupational, exposure to pesticides, while including a mandate to protect children. With this, the law effectively requires EPA to allow higher rates of harm for workers, particularly farmworkers, landscapers (workers who are disproportionately people of color), and others occupationally exposed to pesticides. In response, Beyond Pesticides is reimagining legislative proposals that effect a transformation to an organic society that eliminates toxic pesticides, respects the complexity of life and the ecosystems that sustain us, and put an end to institutional biases that codify environmental racism. The time for systemic change is now.

Call for Park Pesticide Ban Cites Environmental Racism. Beyond Pesticides is working with grassroots groups across the nation to ban toxic pesticides in city, town, and county parks, playgrounds, and playing fields, as part of an organic transition. We work with groups, like The Black Institute and other grassroots organizations, and elected officials to replace toxic pesticides with organic land management practices, recognizing that children and people of color face disproportionate harm from pesticide exposure. To make matters worse, the hazards associated with the toxic chemicals inflict multigenerational diseases like diabetes, asthma and respiratory illness, and learning disabilities. We join New York City Council Members Ben Kallos and Carlina Rivera in supporting organic parks legislation, citing in our press conference and testimony the wide use of the weed killer Roundup by city agencies—

"The use of this pesticide poses a health risk for anyone who frequents city parks and playgrounds, as well as city workers, including city parks employees who come into contact with glyphosate-containing chemicals while spraying."

Disproportionate Harm from Coronavirus. As the coronavirus hit, the nation quickly saw disparities in who is at highest risk of infection, not just in age groups, but along racial lines. In every state, we see that people of color suffer higher rates of infection, illness, and death than their percentage of the population. Reporting recognized that this is occurring because those with the highest disease and death rates are disproportionately "essential workers," delivering essential services with daily exposure to the virus. They are among the lowest income workers in society and, as a result, have medical comorbidities that elevate risk factors, and are most likely to have limited, if any, health insurance. For millions of people outside the black and brown community, this has raised a heightened awareness of societal inequities related to race—bringing Into focus the disproportionate effect that pesticide exposure has by elevating risk factors for Covid-19.

Beyond Pesticides Statement in Support of Black Lives Matter (June 2020). In demanding a future that transforms society to ensure equality of opportunity and respect for life, we support the leadership of Black Lives Matter in advancing systemic and institutional change in how we value each other. As an environmental and public health organization, Beyond Pesticides seeks to ensure that we put a stop to disproportionate harm to people of color because of racism and inequality. We strive for a sustainable world that, in a true sense, can only be achieved with foundational change to our social, economic, and environmental norms. In this context, we stand with those demanding an end to systemic racism, white supremacy, and violence in society, and call for a social structure and law enforcement system that honors this goal.

As Martin Luther King said in his speech, "Where Do We Go From Here?," to the Annual SCLC Convention in Atlanta, Georgia, August, 16, 1967: **"[W]e must walk on in the days ahead with an audacious faith in the future."**

Administrator Andrew Wheeler and finalized in October 2020, included a number of changes to the way AEZs would be managed. Chemical-intensive farms would no longer be required to keep bystanders out of off-site spray areas, and pesticide applications could be restarted when an individual leaves an AEZ. Current rules require farms to keep individuals out of areas where pesticides are applied, both on and off-site, and require set safety requirements about when spraying can start and stop. The Trump administration's proposal would have changed the way family members living on a farm are treated. While current rules incorporate protections for these family members, the changes would exempt immediate family members "from all aspects of the AEZ requirement," according to EPA. As explained to the public, family members could remain inside while a pesticide spraying is occurring, "rather than compelling them to leave even when they feel safe remaining inside." Health advocates indicate that such a proposal amounts to a dereliction of the agency's duty to inform farmworkers and the general public about the inherent hazards of pesticide use, as feeling safe and being safe are critically important distinctions when it comes to chemical exposure.

In an effort to stop implementation of the finalized rule, farmworker advocacy groups filed suit in mid-December. "The AEZ was enacted by EPA to protect farmworkers and frontline communities from being poisoned by the drift of sprayed pesticides at the time of application," the complaint reads. "The final rule's erosion of this protection poses an unreasonable risk of harm to human health, in violation of the *Federal Insecticide, Fungicide, and Rodenticide Act*." Shortly after the filing by advocacy groups, a coalition of five states, led by New York Attorney General (AG) Letitia James, filed a separate suit against Administrator Wheeler's EPA. New York is joined by California, Illinois, Maryland, and Minnesota. "The Trump Administration's decision to undercut existing public health protections for these workers is not only reprehensible—it's illegal. We're going to court to prove it," California AG Xavier Becerra said in a press release. Maryland AG Frosh had similarly stark words for EPA. "It is EPA's job to protect farmworkers, their families and

others who are exposed to pesticides," Mr. Frosh said in a press release. "These regulations prioritize killing bugs over protecting people."

GAO Report Identifies Need for Improving EPA Protection of Farmworkers

JANUARY 29, 2021 | More oversight is needed to ensure farmworkers are protected from toxic pesticides, according to a report published by the U.S. Government Accountability Office (GAO) (the federal agency that provides auditing, evaluation, and investigative services for Congress). Revisions to the Worker Protection Standards (WPS) governing farmworker safety were updated by the Obama administration in 2015, but GAO identified a number of shortfalls in EPA's administration of the changes. GAO focused its review on the implementation of the "designated representative" provision, which grants farmworkers the ability to task an individual they designate to request information on toxic pesticides from their employers. Providing farmworkers with a designated representative allows for the access of pesticide application and hazard information, so that they may take proper precautions or seek medical care. A farmworker may use this provision when they are no longer near the farm they worked on, or if there are language barriers. Without this provision, the information farmworkers receive would be at the whim of employers, and past incidents show that lack of information can lead to hazardous, abusive conditions for workers. The protection of farmworkers from the threats of pesticide exposures has been the subject of multiple recent developments and actions by the U.S. Environmental Protection Agency (EPA), the federal court for the Southern District Court of New York (SDNY), GAO, advocacy groups, and a coalition of five states, led by the New York State Attorney General (AG). Those actions include, respectively, a finalized rollback of aspects of EPA's pesticide Application Exclusion Zone (AEZ) rules; a temporary stay on implementation of those rule changes by SDNY; a set of recommendations from GAO to EPA; advocacy by Beyond Pesticides and others, including Farmworker Justice and Earthjustice; and litigation against EPA by the five-state coalition for the agency's retrograde October 2020 rule on AEZs. Beyond Pesticides has called attention to the inadequate state of farmworker protections from pesticides and advocated for robust regulation to ensure the health of these essential workers, including extra protections during the Covid-19 pandemic. At the center of this flurry of activity are pesticide AEZs —essentially, buffer zones in which people (other than applicators) are prohibited during pesticide applications because of the health threats of exposures. The Obama administration made revisions, in 2015, to the larger EPA Worker Protection Standard for farmworkers, including some expansion of these no-entry buffer zones. Those changes aimed to improve farmworker and farm family protections, including from significant off-site drift of aerially sprayed pesticides. However, the agrochemical-industry-friendly (and regulation averse) Trump administration changed that trajectory when, in 2019, EPA proposed, and in October 2020, finalized, a rule change on AEZs that would functionally shrink the buffer zones, thus, putting farmworkers, their families, and farm owner families (and rural residents generally) at heightened risk for exposure to toxic chemicals.

Breast Cancer Rates Higher among African American Women from Disproportionate Chemical Exposure

FEBRUARY 5, 2021 | A University of Michigan study, published in *Toxicology*, finds a link between elevated rates of breast cancer incidents and chemical exposure from pesticides among African American women. Breast cancer is the most common cancer among women, causing the second most cancer-related deaths in the United States. However, breast cancer outcomes differ significantly among women of various races/ethnicities, with African American women being 40 percent more likely to die from breast cancer than women of any other race. Furthermore, incidences of triple-negative breast cancer (TNBC)—an aggressive breast cancer subtype lacking remediation—is approximately three-fold higher in non-Hispanic Black women (NHBW) compared to non-Hispanic White women (NHWW). Although past studies suggest genetic and environmental factors interact to produce these differences in breast cancer outcomes, genetic factors only play a minor role while disparities (differences) in external factors (i.e., chemical exposure) may play a more notable role. This study highlights the significance of understanding how chemical exposure drives disease outcomes and increases disease risk,

especially for more virulent diseases that disproportionately (unequally) impact specific communities. Prior research infers differences in chemical exposure may explain racial disparities for several illnesses, and growing evidence suggests common chemical exposure patterns influence the risk of breast cancer. Therefore, advocates point to the need for national policies to assess exposure hazards' involvement in disease development and diagnosis. The researchers in the study note, ". . . African American women are disproportionately exposed to chemicals with breast cancer-associated biological activity at doses relevant to human exposure. Future studies should aim to analyze pathways and genes identified as active at biologically relevant concentrations as more (EPA) ToxCast assay data becomes available. . . . These experiments will help to inform whether [the] integration of exposure data from NHANES (National Health and Nutrition Examination Survey) with biological activity data from Toxcast is a relevant methodology to identify hazardous chemicals that may be involved in the development and prognosis of breast cancer." [Polemi, Katelyn et al. Identifying the Link Between Chemical Exposures and Breast Cancer in African American Women via ToxCast High Throughput Screening Data. *Toxicology*. 463: 152964, 2021.]

Relief Bill Seeks To Correct Injustices for Black Farmers Historically and by Modern Day USDA

MARCH 12, 2021 | The American Rescue Plan, legislation that will provide nearly $2 trillion to help a broad variety of people, state and local governments, and businesses struggling with the huge and myriad impacts of the Covid pandemic, has a number of less-touted features embedded in it. One of those is that $5.2 billion of the bill's funds will be directed to help disadvantaged farmers, 25% of whom are Black; thus,

approximately $1.3 billion will directly support Black farmers. As reported by *The Washington Post* and other outlets, advocates are calling this "a step toward righting a wrong after a century of mistreatment of Black farmers by the government and others," and a boon to Black farmers not seen since the *Civil Rights Act of 1964*. The bill, passed by the U.S. Senate and House, was signed by President Biden on March 11. It will provide a menu of benefits to Black farmers, including: debt relief; grants and loans to improve land acquisition and address heritable property issues, such as when a farmer dies intestate (without a will) and land assets are to be allotted to legal heirs; financial support for research, and education and training programs, and; establishment of a racial equity commission to address systemic racism at USDA. Given the urgency of the need to transition to organic, regenerative agriculture, and to contend with the environmental injustices imposed on communities of color, the ability for Black farmers to thrive and participate fully in these issues is critical**.** Beyond Pesticides wrote, early in March, "The greatest impediment to entering organic farming is access to land. Since organic farming requires a long-term commitment to avoiding prohibited substances, building soil, and conserving biodiversity, it is difficult to manage on rented land or land farmed on 'shares.' Black, Indigenous, and other people of color are especially disadvantaged because of institutionalized racism embodied in U.S. policies, which has either prevented access or has undermined land ownership." The support for Black farming housed within the *American Rescue Plan* has the potential to be a good beginning boost to the goals of thriving Black farmland ownership and production, and contributions to a less-toxic agricultural sector.

White House Environmental Justice Advisory Council Confronts Institutional Racism with Recommendations

JUNE 25, 2021 | A consequential report from the White House Environmental Justice Advisory Council (WHEJAC) sets out important and comprehensive recommendations that, if enacted, would put environmental justice on the front burner of national policy. The report spells out a multitude of challenges, and recommendations for addressing them, in service of advancing environmental justice (EJ) across federal agencies. Notably, the U.S. Environmental Protection Agency (EPA) is called out for, among other things, poor protection of farmworkers and their families, who

tend to be people of color, from pesticide risks. The report arises from President Biden's late January 2021 Executive Orders on: (1) tackling the climate crisis with a "whole of government" approach, with an explicit focus on EJ, and (2) recalibrating the functions of the Office of Management and Budget (OMB) to "forward health, racial equity, and environmental stewardship." That early 2021 Executive Order (EO) on climate

established the WHEJAC and the Justice40 Initiative, the latter of which aims to direct 40% of some categories of federal investment to historically underserved communities. Those investments, as reported by AgriPulse, would promote "clean energy and energy efficiency; clean transit; affordable and sustainable housing; training and workforce development; the remediation and reduction of legacy pollution; and the development of critical clean water infrastructure." The Executive Order on the OMB charged the agency's director with providing to the administration "concrete suggestions on how the regulatory review process can promote public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations. The recommendations should also include proposals that would ensure that regulatory review serves as a tool to affirmatively promote regulations that advance these values." Of particular note is language, throughout the report, that acknowledges the role of historic and current systemic racism as it has manifested in "disproportionate harm from environmental contaminants and…disproportionate risks from climate change" for disadvantaged communities. It says plainly (in Section 101), "Historically, the Federal Government has taken actions that have perpetuated, institutionalized, or defended injustices that resulted in inequality in exposure to hazardous substances and unequal access to clean water, clean air, healthy food, safe housing, transportation, and other environmental benefits."

Houston Residents Sue City, Railroad, for Poisoning and Contamination Caused by Creosote Wood Preservative

DECEMBER 2, 2021 | Thousands of residents in Houston, Texas are suing Union Pacific Railroad Company for contaminating their properties with

highly hazardous creosote wood preservatives. One of these lawsuits comes from Latonya Payne, legal guardian of Corinthian Giles, a 13-year-old boy who died of leukemia after a five-year battle with the disease. A recent report found that the community is in the midst of a childhood leukemia cancer cluster, with disease rates five times the national average. Late last month, U.S. Environmental Protection Agency (EPA) Administrator Michael Regan toured the area as part of his *Journey to Justice* tour. However, while Administrator Regan vows federal assistance with the clean-up of these long-lived chemicals, EPA is currently in the process of reauthorizing creosote use for another 15 years with the knowledge that it is virtually impossible to produce and use without causing contamination and poisoning. Some environmental advocates are suggesting that Administrator Regan take a tour of EPA's pesticide registration program and stop the unnecessary poisoning that disproportionately affects people of color and those with vulnerabilities or preexisting medical conditions that increase their vulnerability to toxic chemical exposure. While advocates say that cleaning up EPA's mess in communities is critical, they insist that it is just as important to prevent future harm by keeping hazardous chemicals out of the market. Creosote was used to treat and extend the life of railroad ties at a location in Houston's Greater Fifth Ward up until 1984, but since that time a plume of contamination in the soil has slowly worked its way through the low-income, predominantly black community currently living near the old site.

Creosote is a complex mixture of approximately 150 to 200 chemicals derived from coal. Chemical analysis of creosote shows that it is composed of approximately 85 percent polycyclic aromatic hydrocarbons (PAHs), 10 percent phenolic compounds, and five percent nitrogen-, sulfur-, or oxygen-containing heterocyclic compounds. PAHs are hazardous environmental pollutants and are well-known carcinogens and mutagens with endocrine-disrupting properties that pose a serious threat to human health. The International Agency for Research on Cancer lists creosote as a probable carcinogen (group 2A) with sufficient evidence of carcinogenicity based on animal studies. Creosote is still registered for use on railroad ties and utility poles.

Farmworkers and Conservationists Ask Court To Remove Monsanto's Roundup From the Market

DECEMBER 22, 2021 | Opening arguments and evidence were filed by a coalition of farmworkers, farmers, and conservationists last week in litigation challenging the U.S. Environmental Protection Agency's (EPA) reapproval of glyphosate, best known as the active ingredient in Monsanto's "Roundup" pesticides. The lawsuit charges that the Trump administration unlawfully ignored cancer risks and ecological damage of glyphosate.

Represented by the Center for Food Safety (CFS), plaintiffs, including the

Rural Coalition, Farmworker Association of Florida, Organización en California de Lideres Campesinas, and Beyond Pesticides, filed the federal lawsuit in the Ninth Circuit Court of Appeals in March. The groups seek to have the pesticide prohibited from use or sale because of its unlawful approval.

"Farmworkers are on the frontlines of nearly every health and environmental crisis, from the Covid-19 pandemic to climate change, and are particularly at risk of health impacts from pesticide spraying," said Amy van Saun, senior attorney at CFS. "EPA failed these essential workers. It rejected evidence that glyphosate causes cancer and entirely failed to assess the main way people are exposed at work, through their skin." The court filing includes volumes of evidence showing how EPA ignored glyphosate's health risks, including cancer risks, to farmworkers and farmers exposed during spraying. The evidence filed also shows how EPA disregarded glyphosate's ecological impacts and that EPA failed to account for the costs to farmers from glyphosate-resistant "superweeds" and off-field drift damage. "Farmworkers and farmers are the backbone of our food system. As we demonstrate in this filing, they are the first—but not the last—to bear the huge costs of EPA's deeply flawed and unlawful reapproval of glyphosate, while corporate shareholders of Monsanto-Bayer benefit," said John Zippert, chairperson of the Rural Coalition, the lead petitioner in the case.

ACTIONS OF THE WEEK

Support National Reckoning To Bridge Racial Divides with Meaningful Action

MARCH 1, 2021 | The greatest impediment to entering organic farming is access to land. Since organic farming requires a long-term commitment to avoiding prohibited substances, building soil, and conserving biodiversity, it is difficult to manage on rented land or land farmed on "shares." Black, Indigenous, and other people of color are especially disadvantaged because of institutionalized racism embodied in U.S. policies, which has either prevented access or has undermined land ownership. With deep reflection into the injustice associated with past policies, from pioneers to slaveholders, members of Congress are elevating the national discussion of policy changes and reparations to address a past of racial injustice. This discussion has taken on greater general public understanding since the killing of George Floyd, as there is more national awareness of systemic racial injustice and the deep adverse impact that it has on all aspects of life. One of those institutional effects to Indigenous, Black, and other people of color is the taking away or denying access to land ownership.

Tell your U.S. Senators and U.S. Representative to support increased equity for Black, Indigenous, and other people of color in farming. Holistic systemic change is needed to restore relationships between members of society and with the Earth. The greatest source of wisdom about living sustainably (with decisions based on their impacts on seven generations to come) on this continent—Turtle Island (as named by Native Americans and First Nations People)—has been all but eradicated through past policies of land theft and genocide. From the birth of our country to today, the United States government seized 1.5 billion acres of native land. The loss of tribal lands and mixed ownership patterns within reservation boundaries pose serious challenges to the sovereignty and self-determination of Native American nations. The three pieces of legislation in this action relate to disenfranchisement of African Americans and other people of color as the struggle continues for Native American and tribal rights to land taken from them by the U.S. government. There are several bills in Congress, which are not included in this action, to put certain lands into trust or transfer land for the benefit of various Native American tribes. The undermining of land ownership in the Black community has not been widely recognized by the general public. In 1910, one in seven farmers was African American, who held titles to approximately 16 to 19 million acres of farmland. Over the next century, 98% of Black farmers were dispossessed through discriminatory practices at the U.S. Department of Agriculture (USDA) and various federal programs.

Stop EPA's Racist Policies that Disproportionately Harm Farmworker Children's Brains: Ban Chlorpyrifos

MAY 17, 2021 | The U.S. Environmental Protection Agency (EPA) has less than two months to decide whether to cancel or modify its registration of the brain-damaging organophosphate insecticide chlorpyrifos, following a decision from a federal appeals court. The ruling comes after more than

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a decade of delay from the federal agency tasked with protecting public health and the environment from the hazards of chemicals like chlorpyrifos. The decision now falls to the Biden administration's EPA Administrator Michael Regan, after the previous administration reversed a proposal to ban agricultural uses of chlorpyrifos in 2017. Most residential uses of the chemical were banned in 2000.

Tell EPA to ban chlorpyrifos and other neurotoxic pesticides. The target of action by which chlorpyrifos and many other pesticides kill is the nervous system. It is not surprising, then, that pesticides also target the nervous system in humans. They are particularly hazardous to children, who take in greater amounts of pesticides relative to their body weight than adults, and whose developing organ systems are typically more sensitive to toxic exposures.

The body of evidence in the scientific literature shows that pesticide exposure can adversely affect a child's neurological, respiratory, immune, and endocrine systems, even at low exposure levels. Several pesticide families, such as synthetic pyrethroids, organophosphates, and carbamates, are also known to cause or exacerbate respiratory symptoms like asthma. The American Academy of Pediatrics wrote, "Epidemiologic evidence demonstrates associations between early life exposure to pesticides and pediatric cancers, decreased cognitive function, and behavioral problems."

On August 18, 2021, EPA announced that it was stopping agricultural use of chlorpyrifos in response to a federal court decision. Certain nonfood uses, excluding residential use, will be allowed to continue. (See p. 19.)

After EPA Administrator Tours People of Color Community Poisoned by Creosote Wood Preservative, A Call To Ban It

DECEMBER 20, 2021 | Despite a high-profile tour of communities affected by toxic chemicals by EPA Administrator Michael Regan, the agency still fails to make connections that could help protect against poisoning of workers, fenceline communities, and others. For example, as Mr. Regan, in November, visited Houston, Texas, where thousands of residents are suing Union Pacific Railroad Company for contaminating their properties with highly hazardous creosote wood preservatives, EPA is in the process of reauthorizing creosote use for another 15 years with the knowledge that it is virtually impossible to produce and use without causing contamination and poisoning.

Tell EPA to truly integrate environmental justice into all of its programs. Environmental justice issues arise at every stage of the cradle-to-grave life cycle of toxic chemicals, from production, transportation, handling, and use, to disposal. Petroleum refineries are likely to be sited near low-income communities composed of people of color. Mines contaminate tribal lands and poor rural communities. Manufacturing facilities are also located near low-income neighborhoods, employing their inhabitants in hazardous jobs. Pesticides are applied by farmworkers whose housing is surrounded by poisoned fields. And, coming full circle, hazardous waste "disposal" sites are surrounded by low-income communities. In April, Mr. Regan directed all EPA offices to clearly integrate environmental justice considerations into their plans and actions, saying, "Too many communities whose residents are predominantly of color, Indigenous, or low-income continue to suffer from disproportionately high pollution levels and the resulting adverse health and environmental impacts. We must do better. This will be one of my top priorities as Administrator, and I expect it to be one of yours as well." This effort follows President Biden's Executive Order, *Modernizing Regulatory Review* (January 20, 2021), which mandates the adoption of agency policy across government to seriously and with urgency confront disproportionate harm to people of color communities (environmental racism) with the directive to "forward health, racial equity, and environmental stewardship."

Tell EPA To Protect Farmworkers Now; Hear Directly from Farmworker Community Members

JUNE 1, 2021 | (Farmworkers are at greatest risk from pesticides. EPA's policies toward farmworkers comprise a blatant example of systemic racism. Although everyone suffers from pesticide poisoning, farmworkers and their families shoulder a disproportionate burden of the hazards. Agricultural justice demands that we ensure a workplace with fair wages and benefits, no discrimination or coercion, and protection from hazards, such as harmful chemicals, including pesticides. Acknowledging, respecting, and sustaining the workers who plant, cultivate, and harvest our food is central to the basic values and principles that advance sustainable practices.

Tell EPA to protect farmworkers from pesticides. Worker Protection Standards Are Inadequate To Protect Farmworkers. Worker protection standards are set by the U.S. Environmental Protection Agency (EPA) under the *Federal Insecticide Fungicide and Rodenticide Act* (FIFRA). The original standard was developed after field hearings in which EPA heard from growers, but not farmworkers. With the threat of litigation from the National Association of Farmworker Organizations and Migrant Legal Action Program looming in the late 1970s, the Carter Administration funded an effort, conducted by Beyond Pesticides' executive director, to reach out to workers and collect data on their experiences with pesticide exposure and poisoning in the fields.

Through a series of field hearings in collaboration with the nongovernmental organization Rural America, and EPA's Office of Pesticide Programs, federal and state agencies heard directly from farmworkers. Although EPA concluded in 1983 that the regulations were inadequate to protect agricultural workers, it took until 1992 to update the Agricultural Worker Protection Standards (WPS).

Those 1992 updates to the WPS were intended to eliminate or reduce exposure to pesticides, mitigate exposures that occur, and inform employees about the hazards of pesticides. Despite these intentions, the updated WPS still did not adequately protect farmworkers. These standards have been notoriously difficult to enforce and require no record keeping documenting whether the rules have been implemented and only minimal training—all of which can threaten farmworkers and their families.

On September 28, 2015, EPA finally released its new regulation regarding farmworker pesticide safety, revising the WPS, which had not been updated for more than 20 years.

Systemic Racism Is Embodied in EPA's Risk Assessments. Exposure assessments inevitably discount the impact on workers, people of color, and those with preexisting health conditions or comorbidities. For example, EPA routinely calculates worker exposure separately from other exposures. In applying aggregate exposure assessments of pesticides, EPA does not include worker exposure. Risk assessments do not include exposures to multiple chemicals—and such exposures that routinely occur to fenceline communities, farmworkers, and factory workers.

In the past, EPA has admitted that even with maximum feasible personal protective equipment (PPE) and engineering controls, including all provisions required by the WPS, risks to workers still exceed EPA's levels of concern. A 2008 study analyzing poisonings of pesticide workers between 1998 and 2005 concluded that in 30% of the cases of high levels of pesticide exposure, all labeling requirements, including those involving reentry and PPE, had been followed—clearly demonstrating that the WPS and/or labeling requirements are inadequate.

Farm work is demanding and dangerous physical labor. As the scientific literature confirms, farmworkers, their families, and their communities face extraordinary risks from pesticide exposures. Pesticide application and drift result in dermal, inhalation, and oral exposures that are typically underestimated. A 2004 study detected agricultural pesticides in homes near to agricultural fields. According to a 2010 study, workers experience repeated exposures to the same pesticides, evidenced by multiple pesticides routinely detected in their bodies. As a result of cumulative long-term exposures, farmworkers and their children, who often also work on the farms, are at risk of developing serious chronic health problems such as cancer, neurological impairments, and Parkinson's disease. Children, according to an American Academy of Pediatrics (AAP) report (2012), face even greater health risks compared to adults when exposed to pesticides.

What We Can Do. Our food choices have a direct effect on those who, around the world, grow and harvest what we eat. This is why food labeled organic is the right choice. In addition to serious health questions linked to actual residues of toxic pesticides on the food we eat, our food buying decisions support or reject hazardous agricultural practices and the protection of farmworkers and farm families. See Beyond Pesticides' guide to *Eating with a Conscience* to see how your food choices can protect farmworkers.

Regulatory and Statutory Failures Inflict Harm

DOCUMENTING GOVERNMENT CAPTURE BY INDUSTRY: GOVERNMENT NEGLECT

There is an institutional culture at the U.S. Environmental Protection Agency (EPA) that starts with the presumption that toxic pesticides are necessary for economic and quality of life purposes. Pesticides were originally recognized under the 1947 *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA) as "economic poisons" and the U.S. Department of Agriculture (USDA) then, and now EPA, embraced the notion that the benefits (defined by the marketplace demand) of these toxic substances were worth the harm associated with their use. This perspective has infected the agency until this day. This means that the Agency's decisions, as exemplified by actions in 2021, embrace a narrow approach to risk mitigation that fails to evaluate "reasonableness" of risk in light of the availability of less toxic alternative substances *and practices*. Practices are emphasized because so many pest problems are a function of management practices and the pesticide treadmill that assumes the need for pesticide dependency, even though the scientific literature and empirical evidence say otherwise.

The Office of Inspector General (OIG) pointed in 2021 to undue pressure from senior management that manipulated scientific conclusions, and whistleblowers and a

media investigation have cited agency corruption. EPA announced the establishment of Advisory Councils to Restore Scientific Integrity, which should be getting off the ground. Meanwhile, researchers at the Medical University of Vienna, Austria found that most of the studies submitted by Monsanto/Bayer to register glyphosate (Roundup) in the European Union were not "scientifically reliable" or only "partly reliable."

With the Trump administration rejecting science in favor of industry preference, several reversals by the Biden administration and court judgements vacated the previous administration's actions. However, all is not well, since EPA pushed to keep in place decisions to allow pesticides such as aldicarb, dicamba, glyphosate, paraquat, and streptomycin (antibiotic), as well as other specific chemical decisions that present serious public and environmental hazards. The agency has not acted on flea collars associated with 1,700 dog and cat deaths. EPA did propose the cancellation of the wood preservative pentachlorophenol—a highly persistent chlorinated hydrocarbon with dioxin contaminants still used on utility poles and railroad ties—only after the chemical was banned worldwide and the manufacturer could not find a site to produce it in the U.S. Then the agency is allowing a five-year phase-out, which permits another generation of exposure. EPA's decision to phase-out agricultural uses of the neurotoxic insecticide chlorpyrifos in 2021 reinstates a proposal from the closing days of the Obama administration that had been reversed by the Trump EPA. The history of agency inaction on chlorpyrifos, however, goes back decades, when EPA in 1999 removed residential uses with a full-year phase-out, knowing its severe threat to children, but left agricultural uses that were then petitioned for cancellation by farmworker groups in 2007. A federal court in 2021 said, "EPA's egregious delay exposed a generation of American children to unsafe levels of chlorpyrifos." Even so, the agency has still left uses on the market: containerized baits, outdoor areas, poles and posts, fire ants, nurseries and greenhouses, and public health mosquito control.

Another OIG report blasted EPA for not implementing a 1996 statutory requirement to regulate endocrine-disrupting pesticides, saying, "Without the required testing and an effective system of internal controls, the EPA cannot make measurable progress toward complying with statutory requirements or safeguarding human health and the environment against risks from endocrine-disrupting chemicals."

President Biden in his Executive Memorandum on *Modernizing Regulatory Review*, issued on his first day on the job, recognized the need for a holistic approach to government action, requiring agencies "to ensure that regulatory initiatives appropriately benefit and do not inappropriately burden disadvantaged, vulnerable, or marginalized communities" and "promote public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations." Yet, Secretary of Agriculture Tom Vilsack lashed out against the European Union's "Farm to Fork" sustainability transition plan to limit chemicals and fossil fuels and called for "a market-oriented, incentive-based, voluntary system [that] is effective," which sounds like business as usual in the midst of existential public health, biodiversity, and climate crises.

Trump EPA Adopts Rule To Undermine Science in Decision-Making

JANUARY 8, 2021 | In an eleventh-hour move, the Trump administration's Environmental Protection Agency (EPA) announced on January 5 the finalization of its controversial, so-called "transparency" rule. The agency claims that the rule—dubbed "Strengthening Transparency in Pivotal Science Underlying Significant Regulatory Actions and Influential Scientific Information"—which mandates that researchers provide to EPA access to their raw data, will improve the credibility of its regulations because the public would be able to validate research that influences EPA regulations. In fact, as researchers and advocates recognize, this rule will significantly restrict the scientific research EPA uses in developing regulations to protect human health. This rule will mitigate against use of the best and broadest knowledge base in developing protections for U.S. residents. In its article on the EPA announcement, *The Washington Post* explains that the rule would "actually restrict the EPA from using some of the most consequential research on human subjects because it often includes confidential medical records and other proprietary data that cannot be released because of privacy concerns."

Update: EPA removed the regulatory provisions associated with the final rule *Strengthening Transparency in Pivotal Science Underlying Significant Regulatory Actions and Influential Scientific Information*. This action effectuates the vacatur of the final rule ordered by the United States District Court for the District of Montana. It is also responsive to the Executive Order entitled "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," signed on January 20, 2021.

EPA Confirms Widespread PFAS Contamination of Pesticides, Announces "Investigation," Stops Short of Action To Protect Public

JANUARY 20, 2021 | The U.S. Environmental Protection Agency (EPA) has confirmed that PFAS (per- and polyfluorinated alykyl substances) "forever chemicals" are contaminating containers that store pesticide products, and subsequently the products themselves. The confirmation comes after preliminary testing from the watchdog group Public Employees for Environmental Responsibility (PEER) found PFAS in the widely used mosquito pesticide Anvil 10+10 (synthetic pyrethroid). In response EPA announced further investigation and said, "EPA understands the need to provide guidance to states, tribes, and other users as they prepare to purchase mosquito control products for 2021 and will provide more information as it continues its investigation. According to EPA, high-density polyethylene (HDPE) containers used to store and transport pesticides are commonly treated with fluoride in order to create a "chemical barrier" that will "prevent changes in chemical composition." The fluorinated container is supposed to be more stable, and "less permeable, reactive, and dissolvable." Earlier testing found PFAS chemicals well above safety limits established by states, as well as EPA's health advisory. Because it's a 'forever chemical,' PFAS does not break down in the environment, and any pollution becomes cumulative.

Will Biden Reverse Last Minute Trump EPA Approval of the Deadly Insecticide Aldicarb, Previously Cancelled?

JANUARY 22, 2021 | The ears and eyes of many advocates, as well as those in the agricultural community, are attuned (among myriad candidates) to the fate of the pesticide aldicarb. Although U.S. Environmental Protection Agency (EPA) registration of this terribly toxic insecticide was cancelled in 2010, various limited-use reapprovals since then have meant that the compound has found its way to increasing levels of use. On January 12, as another parting shot of midnight rulemaking, Trump's EPA approved expanded uses. The $64,000 question is whether the new administration will use its authority under the *Congressional Review Act*—which enables Congress to pass a joint resolution (then signed by the President) to overturn a new federal agency rule and prevent its reissuance in the future—to get this pesticide retired for good. Beyond Pesticides urges President Biden's EPA to do so.

Update: While the Biden EPA defended this previous action by the agency, in June the U.S. Court of

Appeals blocked EPA from approving use of the hazardous insecticide aldicarb on citrus crops in Florida.

Biden Executive Orders Set the Stage for Systemic Change, If Words Turn to Action

FEBRUARY 5, 2021 | The U.S. public has witnessed, in the barely launched tenure of President Joe Biden, a surge of Executive Orders (EOs). Based on the first flurry of orders, much of the Biden "reset" appears gauged to beat back Trump policies that worsened an already inadequate regulatory system, and to reconfigure federal operations and regulations so as to address and solve the biggest threats (beyond Covid) the country faces. Among the high-profile EOs already issued are three that stand out. One recalibrates the operations of the OMB (Office of Management and Budget) to forward health, racial equity, and environmental stewardship. A second and third seek to restore scientific integrity and elevate the role of science

across the federal government, and to tackle comprehensively the climate crisis with a "whole of government" approach. Beyond Pesticides welcomes these early efforts and maintains that vigilance and robust advocacy will be necessary to achieve needed transformational change across federal agencies, which exist to protect and support the people of the United States.

Despite 1,700 Dog and Cat Deaths from Flea Collars, EPA Silent; Children at Risk

MARCH 5, 2021 | Pet owners will be alarmed to read the report, by *USA Today*, that a popular flea and tick collar—Seresto, developed by Bayer and sold by Elanco—has been linked to nearly 1,700 pet deaths, injuries to tens of thousands of animals, and harm to hundreds of people. At the time of publication, the U.S. Environmental Protection Agency (EPA), which regulates pesticides, had issued no informational alert to let the public know about these risks to pets—despite many hundreds of incident reports in its Office of Pesticide Programs Incident Report database. Beyond Pesticides and other advocates have warned of the toxicity of pet pesticide treatments, not only to the animals themselves, but also, to children and other household members. There are nontoxic ways to protect pets from fleas and other pests, and to protect human family members at the same time. The active pesticide ingredients in the Seresto pet collars are imidacloprid and flumethrin. The neonicotinoid insecticide imidacloprid is a commonly used pesticide associated with serious health and environmental decline. It is a neurotoxicant, an endocrine disruptor, an immunosuppressant, linked to cancer, and also has negative reproductive impacts. Flumethrin is a chemical in the pyrethroid class of synthetic neurotoxic insecticides, which have been repeatedly linked to neurological issues, such as seizures and learning disabilities in children, and to gastrointestinal distress. [Hettinger, Johnathan. Midwest Center for Investigative Reporting. "Popular flea collar linked to almost 1,700 pet deaths. The EPA has issued not warning." *USA Today*. March 2, 2021.]

EPA Proposes Cancellation of Highly Toxic Wood Preservative

MARCH 9, 2021 | The Environmental Protection Agency (EPA) announced an interim decision to cancel one of the most hazardous pesticides still used in the United States, pentachlorophenol (penta). Although long overdue, health advocates are hailing the agency's action, taken due to significant risks to human health, the availability of alternatives, and the uncertain future of penta production. Many advocates hope that EPA's announcement is the start of a pivot to science-based decision-making in the best interest of health and the environment, not the pockets of pesticide industry executives. However, many point to the closing down of one of the last penta production facilities in Mexico and the inability to find a location in the U.S. as the major reason for EPA action. Cancellation of this toxic chemical will bring the U.S. into conformance with the Stockholm Convention, an international treaty to ban persistent organic pollutants (POPs) joined by over 150 countries that was never ratified by the U.S. Senate.

Update: EPA announced on February 2, 2022, but signed in December 2021, the cancellation of pentachlorophenol, with a five-year phase out of use by the utilities, which the agency says they need to transition to different wood preservatives, but will expose future generations to this persistent toxicant. Produced for its ability to preserve wood through pressure treatment, penta has been used on utility poles and railroad ties since the 1930s, before U.S. pesticide law was written. In the 1950s, it was registered for a range of pesticidal uses in addition to wood treatment, including as a fungicide, herbicide, insecticide, algaecide, disinfectant, and ingredient in antifouling paint. Its uses as a catch-all pesticide began to be restricted in the mid-1980s as EPA identified a range of acute and chronic risks from exposure, and significant contamination of penta products with hexachlorobenzene, furans, and polychlorinated dibenzo-p-dioxins, one of the most toxic substances known to humankind.

EPA Agenda Undermined by Its Embrace of Industry Influence, Article Documents

JULY 9, 2021 | The investigative online publication *The Intercept* has turned its attention to the current and historical role of industry in distorting, undermining, and outright suppressing the protective function of the U.S. Environmental Protection Agency (EPA) with regard to pesticide exposures. The subsequent reporting—"The Department of Yes: How Pesticide Companies Corrupted the EPA and Poisoned America"—is a devastating chronicle of the theme and particulars that Beyond Pesticides has covered for years. That is, that EPA has repeatedly disregarded its charge to protect human and environmental health in favor of enabling industry to continue its chemical experimentation on the populace and on the nation's multiple natural resources. This pattern must change if the agency is to enact its mission and the public is to be protected. *The Intercept* interviewed more than 24 people with expertise on the regulation of pesticides, including 14 who have worked in EPA's Office of Pesticide Programs (OPP). The chief takeaway from those interviews, as written by reporter Sharon Lerner, is that EPA "is often unable to stand up to the intense pressures from powerful agrochemical companies, which spend tens of millions of dollars on lobbying each year and employ many former EPA scientists once they leave the agency. The enormous corporate influence has weakened and, in some cases, shut down the meaningful regulation of pesticides in the U.S. and left the country's residents exposed to levels of dangerous chemicals not tolerated in many other nations."

The investigation shows that data used by EPA on chlorpyrifos—which was written by Dow Chemical Company statisticians—had left out critical information that caused resultant EPA safe exposure limits ("no observed adverse effect levels," or NOELs) to be, as Beyond Pesticides wrote, "flat out wrong." In their 2020 peer-reviewed paper, University of Washington researchers conclude that "the omission of valid data without justification was a form of data falsification." By 2020, however, massive on-the-ground damage had been done because of EPA's adoption of the NOELs "justified" by the erroneous data in that paper. And at EPA, presumably, either no one noticed, or no one cared to do anything about it.

The Intercept cites several top-level examples of EPA's failures to protect, unearthed during the research for the article:

- waiver, at industry request, of the vast majority of toxicity tests that could yield useful information on pesticide impacts;
- squelching of an internal report warning of the link between glyphosate and cancer;
- refusal to investigate evidence of carcinogenicity for another ingredient in Monsanto's glyphosate-based product, Roundup;
- failure to review evidence of brain-damaging impacts of a neonicotinoid pesticide;
- dismissal of scientific research demonstrating that malathion causes cancer.

[Lerner, Sharon. "The Department of Yes: How Pesticide Companies Corrupted the EPA and Poisoned America." *The Intercept*. June 30, 2021.]

Inspector General Blasts Trump's Politicized EPA, No Announced Plans To Reverse Unscientific Decisions

MAY 28, 2021 | A report by the Office of the Inspector General for the U.S. Environmental Protection Agency (EPA) concludes that scientific analyses by the agency were altered so as to favor top Trump administration officials' policy choices in the 2018 reapproval of the highly toxic and problematic pesticide, dicamba. The report, "EPA Deviated from its Typical Procedures in Its 2018 Dicamba Pesticide Registration Decision," was publicly released on May 24. It confirms aspects of what Beyond Pesticides and many others in the science, advocacy, public health, and environmental communities have been saying and reporting since 2016: the Trump administration executed a wholesale assault on scientific integrity in federal decision-making. As reported by *The Hill*, examples include the following: One is that after a senior management review of the 2018 reapproval of dicamba (for use on genetically engineered cotton and soybeans), the assistant administrator's office instructed scientists to use an outline it provided to them for rewriting an impact analysis document, including removal of several sections of the original document. One scientist asserted that senior management in OCSPP (EPA's Office of Chemical Safety and Pollution Prevention) told them to use industry-provided data—rather than EPA's own data—for reported damage from dicamba. Yet another was a staff scientist's claim that senior management and policymakers instructed that plant height (rather than the academic standard of "visual signs of plant injury") should be used to measure dicamba's effects. The OIG report concluded that such behaviors ultimately changed the scientific conclusions about dicamba's use.

The OIG report concluded: "We found that the EPA's 2018 dicamba pesticide conditional registration decision varied from the OPP's [Office of Pesticide Program's] written standard operating procedures, namely because EPA did not conduct the required internal peer review of scientific documents created to support the dicamba decision.... Senior leaders in OCSPP's immediate office —specifically the former deputy assistant administrator, former deputy assistant administrator for Law and Policy, and former acting principal deputy assistant administrator ("senior management")—were more involved in the dicamba decision than in other pesticide registration decisions. This led to *senior-level changes to or omissions from scientific documents, including omissions of some conclusions addressing stakeholder risks*" [emphasis by Beyond Pesticides]. The individuals in those specific EPA positions cited in the report included, respectively: Nancy Beck (former deputy assistant administrator, who previously served as a senior director at the American Chemistry Council—the trade organization for the chemical industry), Erik Baptist (former deputy assistant administrator for law and policy), and Charlotte Bertrand (former acting principal deputy assistant administrator). [Office of the Inspector General. EPA Deviated from Typical Procedures in Its 2018 Dicamba Pesticide Registration Decision. Report No. 21-E-0146. May 24, 2021; Frazin, Rachel. "Trump officials changed scientific analyses in pesticide reapproval: EPA watchdog. *The Hill*. May 24, 2021.]

Whistleblowers Say EPA Managers Engaged in Corrupt and Unethical Practices, Removed Findings and Revised Conclusions

AUGUST 6, 2021 | The organization Public Employees for Environmental Responsibility (PEER) has filed complaints with the U.S. Environmental Protection Agency's (EPA's) Office of the Inspector General (OIG) on behalf of four EPA whistleblower scientists. The scientists maintain that during the Trump administration, risk assessments for both new and existing chemicals were improperly changed by agency managers to eliminate or reduce calculations of risks; further, they assert that some of this behavior at EPA is ongoing. Beyond Pesticides recently covered a report in *The Intercept*, written by Sharon Lerner, that examined the multiple aspects of undue industry influence on the regulation of pesticide chemicals. The PEER complaints address regulation of other kinds of toxic chemicals, but Beyond Pesticides maintains that some of the problems the whistleblowers identify hold true for EPA's Office of Pesticide Programs, as well.

The four whistleblowers worked under Office of Pollution Prevention and Toxics

(OPPT) (and the New Chemicals Division (NCD), which are supposed to evaluate risk assessment studies to gauge a new (or existing) chemical's

Will Playing Fields, Parks, and Lawns Be Safe After Glyphosate in Roundup Residential Use Ends in 2023?

JULY 30, 2021 | Bayer (Monsanto), the maker of the deadly herbicide glyphosate/Roundup, after hinting in May that it would end the weed killer's residential uses in the U.S., made it official yesterday. With its announcement to shareholders, Bayer puts an end to residential uses beginning in 2023 and allocates $4.5 billion to cover "the company's potential long-term exposure" from lawsuits by those harmed by the chemical. At the same time, the company announced it is seeking a U.S. Supreme Court hearing to reverse significant jury verdicts (from $289 million to $2 billion) for individuals who have suffered health damage they tie to glyphosate exposure. Bayer claims that it will argue that federal pesticide law preempts litigation against products that it has registered with the U.S. Environmental Protection (EPA). Similar arguments have been tried before, most notably in Bates v. Dow Agrosciences (2005), and the Supreme Court has found that federal pesticide law does not protect "manufacturers of poisonous substances."

Despite the extensive scientific review (see Beyond Pesticides Gateway) of glyphosate/Roundup and a "probable" cancer causing ranking by the World Health Organization/International Agency for Research on Cancer in 2015, Bayer says, "This move is being made exclusively to manage litigation risk and not because of any safety concerns." And despite finding that glyphosate has contaminated the food supply and is found in waterways extensively, Bayer's decision does not affect agricultural uses of glyphosate.

The residential market now shifts to other toxic weed killers for glyphosate uses unless the public initiates a shift in their purchasing practices and communities decide to transition to land management practices not dependent on toxic substances. (See Beyond Pesticides' *40 Most Commonly Used Lawn Pesticides* and the health and environmental effects.)

The decision to withdraw glyphosate from the residential market is a rerun of Dow Chemical's decision in 2000 to stop residential uses of the highly neurotoxic, brain-damaging insecticide chlorpyrifos. The chemical was removed from the residential market after extensive scientific study showed the adverse impact on children, but has remained in agricultural use for over 20 years until this day, due to EPA's sustained inaction in the face of strong science. Typically, the agency sits in the background and watches the marketplace, then codifies

voluntary decisions by manufacturers after years, even generations, of poisoning and contamination. To be fair, the agency does negotiate many of these cancellations with the manufacturers behind the scenes, but, as a result, the voluntary actions by the companies are highly compromised and do not include agency determinations or findings—allowing false claims of safety, offering a shield from liability, and permitting unencumbered international marketing. That is exactly what is playing out with glyphosate, except that much of the international community is now highly skeptical of the quality of EPA's decisions. Common compromises are contained in Bayer's announcement—a long phase-out period for cancelled uses without any warning to the user community or those exposed (many companies, distributors, and retailers engage in fire sales to sell off the products) and a large volume of retained uses (in this case most of glyphosate use), such as all or most agricultural use and other hidden exceptions that are not understood or fully disclosed to the public. With the glyphosate decision, which Bayer refers to as "risk mitigation"—that's risk to the company's profitability, economic viability, and shareholder investment—the harm inflicted by glyphosate will continue, first to those in the farm community who handle glyphosate—farmworkers and family farmers—or are exposed involuntarily to drift and contaminated waterways, and then to those who eat food that is grown in chemical-intensive agriculture.

There are lessons to be learned for policy makers, land managers, farmers, and decision makers. The federal laws that we have in place, the *Federal Insecticide, Fungicide and Rodenticide Act* and the *Federal Food, Drug and Cosmetic Act* (including the *Food Quality Protection Act*), have failed to regulate chemicals like glyphosate, chlorpyrifos, and pentachlorophenol and will continue to fail to adequately regulate 1,200 active and hundreds of "inert" (secret nondisclosed) ingredients in over 16,800 pesticide products in the interest of public health and environmental protection. The current system and reform proposals that tinker with the broken system allow the continued use of pesticides that are too dangerous and proven to be unnecessary to meet pest management, productivity, profitability, and quality of life goals. So why are they being used? Because the laws protect chemical companies, not the public. The laws protect the vested economic interests that wrote the laws, amend the laws, and fight to protect the laws, not the public who are adversely affected and suffer cancer, neurological diseases, Parkinson's, Alzheimer's, diabetes, asthma, and autism—and certainly not those in the people of color community who suffer disproportionately from many of these illnesses. (See Pesticide-Induced Diseases Database.) Similarly, the laws do not protect the ecosystems and biodiversity, which are critical to human existence. As a result, the laws do not protect pollinators, keystone species in the aquatic food web, or threatened and endangered species. That has been documented with glyphosate, as it has with toxic pesticides generally. Instead of taking preventive or precautionary action, regulators sit and watch as we move closer and closer to crises that undermine the very existence of life.

Are we happy that the residential uses of glyphosate will be removed from the market? Yes, of course. But, more than anything it is Exhibit A for the failure of policy to protect what is sacred—life–and yesterday's announcement should be a signal, an example, and a call to rise up against a system of poisoning and contamination that must stop. We can start by moving our communities to organic land management. Now!

potential risk to humans. Such assessments can lead the agency to place limits on a chemical's use or to ban it entirely. The four have reported that civil service managers at EPA, during the term of the Trump administration and continuing to today, have engaged in corrupt and unethical practices, such as regularly accessing risk assessments completed by staff scientists in order to, variously:

- remove language that identifies potential adverse effects, including developmental toxicity, neurotoxicity, mutagenicity, and/or carcinogenicity;
- revise conclusions in risk assessment reports significantly to indicate no toxicity concerns despite data to the contrary;
- reassign risk assessment work to less-experienced employees so as to remove content whose inclusion would protect human health and/or to secure sign-offs on faulty or inadequate assessments.

The whistleblowers report extreme pressure to sign off on inadequate evaluations, and say that staff are rewarded for doing so. When, as these four did, agency scientists have refused to do that, the assessments have been taken away from them and given to less experienced employees who would. In addition, staff who have "blown the whistle" by reporting incidences of what the *Whistleblower Protection Act* (WPA) specifically spells out—"violations of rules or regulations; abuses of authority; gross mismanagement; or substantial and specific danger to public health or safety"—have suffered reprisals, including functional reassignment or demotion.

Biden EPA Reapproves Paraquat with Weaker Protections than Trump Administration Proposed

AUGUST 10, 2021 | President Biden's Environmental Protection Agency (EPA), under Administrator Michael Regan, is set to reapprove the highly hazardous herbicide paraquat with fewer protections than those proposed by the Trump administration. Despite strong links to Parkinson's disease, and bans on the herbicide in the European Union, China, Brazil, and many other countries, EPA's press release inexplicably states, "No direct one-to-one alternatives to paraquat are available." The move is part of a string of actions that have pesticide reform advocates increasingly concerned that the Biden administration is not living up to its initial promises to improve health and environmental protections. Paraquat is the most toxic herbicide still on the market. As EPA readily admits, one small sip of paraquat can be fatal. Apart from its acute toxicity, chronic exposure to the herbicide is strongly linked to the development of Parkinson's disease. But its association with Parkinson's is merely the most well-known health concern—the chemical is a likely carcinogen, harms the reproductive system, and damages organs like the kidney and liver. It is hazardous to birds and bees, and prone to leaching into groundwater, where it disrupts the health of aquatic ecosystems. The Trump administration's decision to reapprove paraquat last year was characterized by Beyond Pesticides as "a broken EPA" with an "extremist pro-pesticide agenda." Like with glyphosate (Roundup), paraquat's major manufacturer—Syngenta/ChemChina—is now in court over links between its herbicide and chronic disease.

"Biopesticides," with Broad Definition, Challenged as Unsustainable

AUGUST 13, 2021 | Across the pond in the UK, two years of trials with spring and winter wheat varieties have shown, according to the Farmer Scientist Network (FSN), which conducted the study as Crop Health North, that so-called "biopesticides," alone or in combination with conventional pesticides, can be useful in generating yield and grain quality comparable to those obtained through use of conventional "crop chemistry" (aka, synthetic chemical pesticides). According to Beyond Pesticides Executive Director Jay Feldman, biopesticides are a "mixed bag," generally poorly understood, and defined differently by various entities and stakeholders. He notes that the term can be misleading and mixes contradictory approaches, adding that, "It's troublesome when we continue to look for product replacements or substitutions for agricultural practices that are clearly ineffective, and in the process avoid the changes necessary to transition to organic practices," which represent the real, long-term solution to the problems efforts such as these trials

seek to remedy. The U.S. Environmental Protection Agency (EPA) says, "Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals.... Biopesticides include naturally occurring substances that control pests (biochemical pesticides), microorganisms that control pests (microbial pesticides), and pesticidal substances produced by plants containing added genetic material (plant-incorporated protectants) or PIPs." Some categories of biopesticides may well be compatible with organic agricultural practices, while others would not be because they fail to meet the requirements of the National Organic Program, which operates within the U.S. Department of Agriculture (USDA). The USDA website explains that, "Organic producers rely on natural substances and physical, mechanical, or biologically based farming methods." Beyond Pesticides and other organic advocates recognize that some bioprotectant products may be ecologically sound and nontoxic; indeed, some fungi appear to hold great promise. But the fundamental quest ought *not* be one of seeking an endless stream of "substitute" products or controls as resistance to conventional pest controls continues to develop. Rather, the central and critical need is making the transition from conventional chemical farming to organic, regenerative agriculture—which involves shifts in both understanding and practices. [Farmer Scientist Network. Yorkshire Agricultural Society. Harrogate, UK. 2021.]

Commentary: Are Children, Agricultural Workers, and the Food Supply Safe with EPA's Chlorpyrifos Decision?

AUGUST 19, 2021 | Does a science-based, public health-oriented, occupational safety focused, children-concerned, ecologically protective society allow the use of toxic pesticides that are unnecessary to achieve land management, quality of life, and food productivity goals? Should victims of poisoning have to plead with regulators to protect them? Should organizations have to fight chemical-by-chemical to achieve basic levels of protection from individual neurotoxic, cancer causing, endocrine-disrupting pesticides? Of course not. But, the U.S. Environmental Protection Agency's (EPA) announcement that it is stopping food uses of the insecticide chlorpyrifos after being registered 65 years ago provides us with an important opportunity for reflection, not just celebration. The collective effort to remove this one chemical is a tremendous feat in eliminating one exposure to a hazardous material for children. That is the point. The action we're celebrating required an amazingly resource-intensive effort at a time in history when we are running against the clock in an urgent race to transition our society and global community away from the use of petroleum-based, toxic pesticides—to move to meaningful practices that sustain, nurture, and regenerate life.

In this context, let's put chlorpyrifos in perspective. EPA was forced into its decision by a court order that was precipitated by an agency decision to reverse course after proposing to stop food uses of chlorpyrifos in 2017. Despite a mountain of scientific data challenging chlorpyrifos's safety, it was embraced by industrial agriculture, the golf industry, and others, and deemed too valuable to the bottom line of its manufacturer, Corteva (formerly Dow AgroSciences). Pesticide manufacturers are also motivated to steer EPA away from adverse health and environmental effects findings on their products in order to avoid potential litigation by those harmed. The U.S. Court of Appeals for the 9th Circuit in San Francisco in its ruling in May, 2021, in which it mandated EPA action, said, "The EPA has had nearly 14 years to publish a legally sufficient response to the 2007 Petition [filed by environmental and farmworker groups]." The court continued, "During that time, the EPA's egregious delay exposed a generation of American children to unsafe levels of chlorpyrifos."

But before all the recent activity, in 1999, EPA had negotiated a compromise with Dow that stopped most residential uses of chlorpyrifos. Why? For the same reason that EPA finally acted on food. This neurotoxic chemical is harmful to children. That was 22 years ago and followed a campaign by Beyond Pesticides and others to remove Dursban/chlorpyrifos from the market because of indoor ambient air contamination of homes and buildings and lawn and landscape exposure. It should be noted that Dursban was viewed with promise by regulators as the alternative to the organochlorine insecticide chlordane, which Beyond Pesticides sued to remove from the termite use market—a remaining use after the agricultural, lawn, and garden uses were finally taken off the market in 1983, with decades of review by numerous agencies. Its cancer-causing properties and ecological effects could no longer be defended. The cancellation of termite use followed in 1988 after millions of homes were potentially contaminated, with high risk factors for cancer.

With all this as context for the chemical treadmill, next up after chlorpyrifos may be the insecticide bifenthrin. It too is a neurotoxic, cancer-causing, endocrine-disrupting pesticide. And if that is not enough, there are others waiting in the wings. The picture is clear. Even in a victory, like EPA's chlorpyrifos decision, the action is typically filled with exceptions that respond to vested interests seeking to ignore or deflect the science. With chlorpyrifos,

EPA, since announcing its decision in 1999 to ban "residential" uses of chlorpyrifos, continues to allow the following uses: (i) Residential use of containerized baits; (ii) Indoor areas where children will not be exposed, including only ship holds, railroad boxcars, industrial plants, manufacturing plants, or food processing plants; (iii) Outdoor areas where children will not be exposed, including only: golf courses, road medians, industrial plant sites; (iv) Non-structural wood treatments including: fenceposts, utility poles, railroad ties, landscape timers, logs, pallets, wooden containers, poles, posts, and processed wood products; (v) Public health uses: fire ant mounds (drench and granular treatment); (vi) Nurseries and greenhouses; and (vii) Mosquito control. These uses are unaffected by EPA's announcement yesterday.

Corteva's statement prior to the EPA announcement was predictable, as the company and the chemical industry generally pushes pesticide dependency: "Chlorpyrifos is a critical pest management tool used by growers around the world to manage many pests.... We will continue to support the growers who need this important product." Similarly, the pesticide industry's partner, the Golf Course Superintendents Association, stated, "Chlorpyrifos is a vital tool for controlling damaging pests on golf courses." These are self-serving statements because the industry's products create ongoing product dependency by focusing on killing organisms and life in the soil, rather than preventing pest problems with cultural practices and soil

INTERNATIONAL

In Cahoots with Pesticide Industry, Former U.S. Officials Try To Stop Mexico from Banning Glyphosate, But Fail

FEBRUARY 17, 2021 | New details are emerging around the pressure campaign Mexican President Andrés Manuel López Obrador and his administration withstood as the country moved toward banning Bayer/Monsanto's glyphosate (Roundup) herbicide. According to documents obtained by a *Freedom of Information Act* request and published in *The Guardian*, the U.S. Trade Representative, U.S. Environmental Protection Agency (EPA), and U.S. Department of Agriculture (USDA) worked in coordination with Bayer/Monsanto and the agrichemical industry umbrella group CropLife America to stop the Mexican government from embracing a precautionary approach to pesticide regulation. While the Trump administration and its collaborators were successful in a similar campaign against Thailand, there are no indications that Mexico will rescind its final decision to ban glyphosate, made at the end of last year. Health and environmental advocates want the Biden administration to not only halt the regular use of the United States' immense global power on embarrassing flacking for the agrichemical industry, but reverse course, and embrace a truly precautionary approach. CropLife and the rest of the agrichemical industry are terrified of that outcome. In a letter to the U.S. Trade Representative, copying the heads of USDA and EPA, CropLife President Chris Novak wrote of Mexico's decision, "These actions would establish a beachhead for the Precautionary Principle in the Western Hemisphere…" [Gillam, Carey. "Revealed: Monsanto owner and US officials pressured Mexico to drop glyphosate ban." *The Guardian*. February 16, 2021.]

Bayer Loses Bid To Overturn Neonicotinoid Ban in Europe

MAY 11, 2021 | Last week, multinational agrichemical company Bayer Cropscience lost its bid to overturn a 2018 ban on bee-toxic neonicotinoids throughout the European Union. The ruling from the European Court of Justice rejected all grounds on which the company filed its appeal, noting, "It must be held that the arguments put forward by Bayer CropScience cannot, in any event, succeed." In denying the appeal, the court ruled Bayer responsible for paying its own legal fees, as well as the fees of environmental organizations that intervened to defend the ban. Environmental groups are applauding the ruling, as it reinforces several important aspects of the EU's pesticide policy that favor greater public health and environmental protections. In an interview with EURACTIV, policy officer Martin Dermine at Pesticide Action Network Europe notes that the decision provides more leeway for pesticide regulators to consider new scientific evidence on pesticide hazards. "More than that," he told EURACTIV, "the Court confirms the definition of the precautionary principle: in case of doubts on the toxicity of a pesticide, the European Commission is entitled to ban it." While Europe unwinds the use of bee-toxic pesticides and has further pledged to halve its use of pesticides by 2030 in order to protect pollinators and biodiversity, the U.S. Environmental Protection Agency (EPA) has done less than the bare minimum to protect pollinators

from neonicotinoids and other hazardous pesticides. As the EU was issuing its first moratorium, EPA was denying a petition by beekeepers to recognize that honey bees face an "imminent hazard" from the continued use of neonicotinoids. As the EU was expanding its moratorium, EPA was being cited by internal watchdogs for its failure to provide basic oversight of voluntary state pollinator protection plans the agency claimed would be adequate to protect bees without regulatory intervention.

Canada Quietly Bans Chlorpyrifos, while EPA's 60-Day Deadline for Action Rapidly Approaches

MAY 19, 2021 | Last week, Health Canada quietly announced its intent to cancel all remaining registrations of the brain-damaging insecticide chlorpyrifos. The decision by Canada's federal pesticide regulators comes shortly after a U.S. federal court gave the U.S. Environmental Protection Agency (EPA) a 60-day deadline to make a final decision on whether to amend or cancel the chemical's registration. With Europe and now Canada eliminating use of this hazardous insecticide, advocates are urging that the Biden administration, under EPA Administrator Michael Regan, finally put an end to the decades of harm caused after chlorpyrifos was first registered in 1965. Up until recently, Canada and the U.S. had relatively similar provisions regulating chlorpyrifos use. Officials in both countries eliminated homeowner use and tightened up on agricultural uses in the 2000s and early 2010s, requiring additional personal protective equipment and drift mitigation measures. However, Health Canada began to look at significant restrictions on chlorpyrifos in 2019, when it proposed eliminating a range of uses that threaten environmental health. Under its draft decision, regulators planned to eliminate all uses except for mosquito control, structural pest control, outdoor ornamentals, and greenhouse ornamentals. Certain agricultural uses were provided an extended phase-out period with additional risk mitigation measures.

Switzerland To Hold Landmark Vote on Nationwide Ban of All Synthetic Pesticides June 13

JUNE 11, 2021 | On Sunday, June 13, Switzerland will hold a national vote on two landmark initiatives related to pesticide use (as well as several referenda). The vote on one initiative, dubbed by advocates "For a Switzerland Free of Synthetic Pesticides" (FSFSP), will determine whether or not the country will ban synthetic pesticides. If it does, it will become the first European nation to do so. The other initiative, which aims to eliminate direct subsidies of farmers who use synthetic pesticides or antibiotics for livestock, is focused on improving the quality of Switzerland's drinking water and food supply**.** Beyond Pesticides covered the grassroots origin of the Swiss "no synthetic pesticides" initiative in 2018 and sees potential passage of both it and the water quality initiative as a watershed moment in the protection of health and the environment. These measures would go a long way to protecting and improving the health of humans and ecosystems, and the food supply, as well as protecting biodiversity in Switzerland. It could also—as advocates hope—encourage other European countries to follow suit. While there is significant support among farmers, the majority oppose the initiative. The clean water initiative, in addition to proscribing the use of pesticides and of antibiotics for livestock, would prevent farmers from using imported animal feed (which could easily contain pesticide residues). In addition, it would limit the numbers of cows, pigs, and chickens being raised in the country in order to reduce all the problems associated with their manure, including contaminated drinking water. Pascal Scheiwiller, an endorser of the clean water initiative—which estimates that a million Swiss residents drink contaminated water—commented, "People have been sold a romantic image of farming in Switzerland, which is far removed from reality."

Update: The initiative failed.

supplements that work in concert with nature and create resiliency.

Local governments are intervening to stop toxic pesticide use on their public lands and, in cases where they are not preempted by state law, on private property. The nationwide momentum is leading the nation from the grassroots in proving that toxic pesticides and fertilizers are not necessary in land management.

The history of chlorpyrifos is a shining example of the failure of pesticide law and policy, which has set a course for the nation that is inherently destructive of life. The good news is that we have the tools to course correct at a time when pesticides, like chlorpyrifos, not only have direct adverse health effects but are contributing to the climate crisis, biodiversity collapse, and disproportionate levels of illness in people of color communities.

Inspector General Rips EPA for Failure To Test Pesticides for Endocrine Disruption

AUGUST 20, 2021 | The Office of the Inspector General (OIG) for the U.S. Environmental Protection Agency (EPA) has issued a damning report on the agency's progress in protecting the population from potentially damaging endocrine-disruption impacts of exposures to synthetic chemical pesticides (and other chemicals of concern). The report's summary statement says, "Without the required testing and an effective system of internal controls, the EPA cannot make measurable progress toward complying with statutory requirements or safeguarding human health and the environment against risks from endocrine-disrupting chemicals." This OIG report identifies and details the failings that Beyond Pesticides covered in an April 2021 Daily News Blog article, and many more—the net of which is that "we have yet to see EPA use endocrine-disruption findings in pesticide registration decisions." The OIG report chronicles a litany of failures. It finds that EPA's Office of Chemical Safety and Pollution Prevention (OCSPP), which is responsible for testing all pesticide chemicals for endocrine-disrupting activity in humans, has failed to do so. Specifically, it has not implemented a section of the *Federal Food, Drug, and Cosmetic Act* (FFDCA), as amended by the 1996 *Food Quality Protection Act*—the legislation that requires such testing. In addition, the report states that OCSPP's Office of Pesticide Programs (OPP) has not implemented a 2015 recommendation that 17 pesticides undergo additional testing for endocrine disruption (ED) in wildlife so that an ecological risk assessment could be effectively conducted.

EPA Urged To Stop Use of Misbranded "Minimum Risk" Pesticides

SEPTEMBER 22, 2021 | Health and environmental organizations are urging the U.S. Environmental Protection Agency (EPA) and state pesticide regulators to immediately stop the use and sale of dangerous and misbranded Eco-MIGHT and W.O.W. (Whack Out Weeds!) products, falsely labeled as [FIFRA 25(b)] minimum risk. Recent laboratory testing by the state of California found the presence of hazardous pesticides, including glyphosate, bifenthrin, permethrin, cypermethrin, and carbaryl in these products. "From organic farmers to municipal landscapers and home gardeners, consumers employing minimum risk

products are working intentionally to avoid the dangers associated with toxic pesticide exposure," said Jay Feldman, executive director of Beyond Pesticides. "It is critical that EPA and state regulators coordinate to ensure the integrity of the minimum risk program." Coordination is critical, yet reports indicate that EPA is falling down on the job. The issue first came to light in late July, when the California Department of Food and Agriculture's (CDFA) State Organic Program issued a Stop Use Notice to farmers alerting them to adulterated Eco-MIGHT and W.O.W products. The products make a range of claims, marketed as "organic," "natural," "glyphosate-free," and "non-toxic and safe." As CDFA Secretary Karen Ross noted, "It is imperative that we alert California organic growers that these EcoMIGHT products contain substances that are prohibited in organic production, in order to preserve the integrity of the California organic label and to protect our growers," said CDFA Secretary Karen Ross. At the same time as CFDA's Stop Use Notice, the California Department of Pesticide Regulation (the state's primary enforcement agent for pesticides) sent a warning letter to EcoMIGHT LLC, the parent company that produces both of the products in question, alerting them that they may be in violation of state law. EPA sent a similar advisory letter to the company indicating that it may be in violation of the *Federal Insecticide Fungicide and Rodenticide Act* (FIFRA) by misbranding, selling an unregistered pesticide (given the presence of ingredients disallowed in 25(b) minimum risk products), and false

and misleading label statements. While those actions do show a degree of coordination to protect California growers and consumers, these warnings are not reaching other state regulatory agencies.

EPA Decisions Lacking Scientific Integrity Still in Place under Biden Administration, Say Whistleblowers

OCTOBER 1, 2021 | With this article, Beyond Pesticides rounds out its coverage of recent revelations about compromised science integrity at the U.S. Environmental Protection Agency (EPA). As Sharon Lerner reports in her September 18, 2021 (and third in a series) article in *The Intercept*, new documents and whistleblower interviews reveal additional

means by which EPA officials have gone out of their way to avoid assessing potential health risks of hundreds of new chemicals. Ms. Lerner writes that "senior staff have made chemicals appear safer—sometimes dodging restrictions on their use—by minimizing the estimates of how much is released into the environment." Beyond Pesticides regularly monitors and reports on scientific integrity at EPA, including two recent articles that reference Ms. Lerner's *The Intercept* reporting; see "EPA Agenda Undermined by Its Embrace of Industry Influence," and "Whistleblowers Say EPA Managers Engaged in Corrupt and Unethical Practices, Removed Findings, and Revised Conclusions." In February 2021, a small group of agency scientists reviewed EPA's "safety" thresholds for every one of the 368 new chemicals submitted to the agency in 2020. They found that more than half of the chemicals could pose health risks—including chemicals whose exposure potentials had already been deemed "expect[ed] to be negligible," and thus, for which specific risk calculations had not been done. Once more, the scientists brought this issue to New Chemical Division (NCD) managers, explained their analysis, and requested that the use of these thresholds be terminated. The response from division managers? Crickets. As *The Intercept* writes, "Seven months later, the thresholds remain in use and the risk posed by chemicals deemed to have low exposure levels is still not being calculated and included in chemical assessments."

Ag Secretary Vilsack Pushes Petroleum Farming Inputs, Fights EU's Climate-Friendly Organic "Farm to Fork" Initiative

OCTOBER 8, 2021 | Taking a page from the playbook of Trump administration Secretary of Agriculture Sonny Perdue, the current secretary, Tom Vilsack, used a September G20 summit in Italy to target the European Union's "Farm to Fork" (F2F) strategy, a part of its European Green Deal. Mr. Perdue had said that F2F is "more . . . 'political science' than demonstrated agricultural science;" Secretary Vilsack called it "a path very different from the one the U.S. is pursuing." The F2F initiative aims to transition the EU to a sustainable food system such that it also achieves significant mitigation of climate change. But Mr. Vilsack chose to counter the F2F efforts by promoting an "alternative strategy" —under the moniker "Coalition for Productivity Growth"—through which "other nations pledge *not* to follow the European path on farm policy." He has described this alternative, U.S.-led strategy as "a market-oriented, incentive-based, voluntary system [that] is

effective" at slashing agricultural carbon emissions. Climate, pesticide, organics, and other environmental and health advocates, including Beyond Pesticides, are troubled by these actions. *Mother Jones* poses the central question in the headline of its September 30 article: "Why is Secretary Vilsack So Afraid of a Plan to Cut Pesticides and Meat?" The central F2F tenets that the secretary seems to find unnerving are those that would slash use of synthetic pesticides and fertilizers, and move one-quarter of European farmland to organic production by 2030. *Mother Jones* writes, "The Farm to Fork program, part of the European Commission's response to the continent's own accelerating climate chaos and steady rise in illnesses related to highly processed food, *aims* to 'make food systems fair, healthy and environmentally friendly.' At its heart lies the goal of slashing farmers' reliance on water-polluting, energy-intensive agrochemicals: It requires a 20 percent drop in fertilizer use by 2030, and a 50 percent cut in pesticides. The plan . . . also mandates a 50 percent reduction [in] food waste; calls on farmers to halve their use of antibiotics for livestock, a key driver in the global crisis of antibiotic resistance in human medicine; and aims to nudge Europeans to adopt a 'diet with less red and processed meat and with more fruits and vegetables.'" [Philpott, Tom. "Why Is Ag Secretary Vilsack So Afraid of a Plan to Cut Pesticides and Meat?", *Mother Jones*. September 30, 2021.]

ACTIONS OF THE WEEK

Tell President-elect Biden and Congress to clean up the corruption of science at EPA and set a moratorium on future pesticide registrations–until the agency can assure the public that the chemical manufacturers' science supporting pesticide registrations is not corrupt.

JANUARY 11, 2021 | Treatment of chemical companies as clients rather than regulated entities is not new at the U.S Environmental Protection Agency (EPA), but corruption reached new highs during the Trump administration. With a new administration, it is time to end the rule of corporate deception at EPA. This goes beyond the use of the *Congressional Review Act* to reverse individual rules (adopted in the last six months) that defy scientific findings and compliance with environmental and public health standards. We can no longer rely on bad science and unscrupulous chemical manufacturers that put profits above concerns for the health of people and the environment. EPA must audit pesticide registrants for integrity to scientific process and set a moratorium on future pesticide registration until the agency can assure the public that their science is not corrupt, as it has been in the past.

EPA: Reverse Approval of Highly Toxic Insecticide Aldicarb on Oranges

JANUARY 25, 2021 | First registered in 1970 and voluntarily cancelled in 2010, aldicarb (Temik™) was being manufactured in Bhopal, India in 1984 when a leak of a precursor—methyl isocyanate (MIC)—spread over the city, ultimately killing more than 25,000 people and leaving more than 120,000 people who still suffer from severe health problems as a result of their exposure. In 1989, Union Carbide Corporation—the manufacturer of aldicarb at the time—paid $470 million (equivalent to $860 million in 2019) to settle litigation stemming from the disaster. Aldicarb, now made by Bayer, has been allowed by the outgoing Trump EPA for use on oranges.

Tell Agencies New Executive Order Requires Bold Regulatory Action

FEBRUARY 8 22, 2021 | Immediately following his inauguration, President Biden issued an Executive Order (EO) directing the heads of all executive departments and agencies to produce recommendations for improving and

modernizing regulatory review, with a goal of promoting public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations. This Executive Order, if effective, will reverse the historical trend of status quo regulatory reviews that typically support vested economic interests of polluters (e.g., petroleum-based pesticide and fertilizer manufacturers), required by the White House Office of Management and Budget (OMB). Instead, the President's EO, Modernizing Regulatory Review, sets the stage for the adoption of agency policy across government to seriously and with urgency confront the climate crisis, biodiversity collapse, and disproportionate harm to people of color communities (environmental racism). Key agencies that can have a systemic effect in meeting these existential challenges are the Environmental Protection Agency (EPA), Department of Interior (DOI), Department of Agriculture (USDA), and Department of Labor/Occupational Safety and Health Administration (DOL/OSHA). But, the EO will remain words on a page unless we all across the country exercise our voice and advocate for the changes necessary to end our reliance on hazardous chemicals and immediately embrace the viability of nonpolluting alternatives, like organic agriculture and land management. No one expects the polluting corporations to shrink in the face of a shift to a green economy—which makes our voice and oversight all that more important.

EPA Must Consider Cutting-Edge Science

JUNE 14, 2021 | More than 50 pesticide active ingredients have been identified as endocrine disruptors that mimic the action of a naturally-produced hormone, such as estrogen or testosterone, thereby setting off similar chemical reactions in the body; block hormone receptors in cells, thereby preventing the action of normal hormones; or affect the synthesis, transport, metabolism, and excretion of hormones, thus altering the concentrations of natural hormones. Endocrine disruptors have been linked to attention deficit hyperactivity disorder (ADHD), Parkinson's and Alzheimer's diseases, diabetes, cardiovascular disease, obesity, early puberty, infertility and other reproductive disorders, childhood and adult cancers, and other metabolic disorders. Similar effects are found in other species. In spite of legal requirements and the flood of research, EPA issues Proposed Interim Decisions (PIDs) on pesticide registrations making no human health or environmental safety findings associated with the potential for endocrine disruption, or identifying additional data needs to satisfy Endocrine Disruptor Screening Program requirements in the PIDs. EPA cannot make findings of no unreasonable adverse effects without findings concerning endocrine disruption. EPA continues to register pesticides posing unreasonable health effects.

Biden EPA Must Hold Pesticide Manufacturers Accountable for Poisoning

AUGUST 9, 2021 | The failure of EPA to meet its statutory responsibility to protect people and wildlife from the dire consequences of exposure to endocrine-disrupting chemicals must end. The Office of the Inspector General (OIG) for the U.S. Environmental Protection Agency (EPA) has issued a damning report on the agency's progress in protecting the population from potentially damaging endocrine-disruption impacts of exposures to synthetic chemical pesticides (and other chemicals of concern) that shows the situation to be even worse than previously reported. The OIG's summary statement says, "Without the required testing and an effective system of internal controls, the EPA cannot make measurable progress toward complying with statutory requirements or safeguarding human health and the environment against risks from endocrine-disrupting chemicals." As a result, according to the OIG, "We have yet to see EPA use endocrine-disruption findings in pesticide registration decisions."

Tell EPA Misleading Biopesticide Classification Must Be Redefined

AUGUST 23, 2021 | "Biopesticides"—widely regarded as an alternative to chemical pesticides and hence given a special status in regulation—need a better definition. "Biopesticide" is generally poorly understood, and defined differently by various entities and stakeholders. The term can be misleading and mixes contradictory approaches. It is troublesome when we continue to look for product replacements or substitutions for agricultural practices that are clearly ineffective, and in the process avoid the changes necessary to transition to organic practices, which represent the real, long-term solution to concerns among chemical-intensive farmers that they are losing pesticides in their arsenal, either to organism resistance or regulatory restrictions. **Tell EPA it's time to redefine "biopesticide." It is deceptive and misleading. The definition should not include genetically modified organisms or synthetic analogs of naturally occurring biochemicals.**

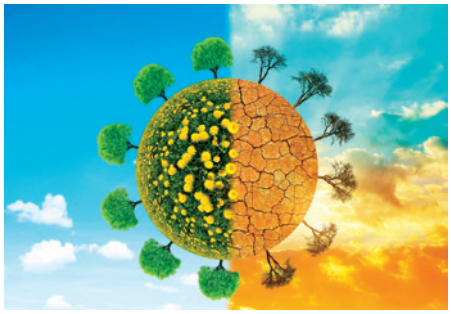
Tell EPA and Congress To Protect the Integrity of Minimum Risk Pesticides

OCTOBER 3, 2021 | Recent findings of high levels of toxic pesticides in products permitted to be used as "minimum risk pesticides" point to the need for greater oversight of these products and more severe penalties for violations. Pesticides classified as minimum risk are allowed under Section 25(b) of the *Federal Insecticide, Fungicide, and Rodenticide Act* (FIFRA) [40 CFR 152.25(f)] to be used without going through EPA's pesticide registration process. These products are limited to a specific list of ingredients, and all ingredients, including "inert" ingredients, are required to be listed on the label.

Minimum risk pesticides are used by organic growers, municipalities, and others who are not permitted to use, or choose to avoid, toxic chemicals.

EPA To Create Advisory Councils To Restore Scientific Integrity in Pesticide/Chemicals Division

OCTOBER 20, 2021 | The U.S. Environmental Protection Agency (EPA) announced plans in October to establish a new position and two advisory councils in order to enhance scientific integrity within the agency's Office of Chemical Safety and Pollution Prevention (OCSPP). The move is being widely seen as a response to recent reporting over how EPA has allowed the chemical industry to distort and unduly influence its process for reviewing and approving toxic pesticides and other chemicals. "Scientific integrity is the backbone of the work we do to ensure the safety of chemicals used in our everyday lives," said assistant administrator for the Office of Chemical Safety and Pollution Prevention Michal Freedhoff, PhD. "Strong, sound science underpins confidence in our decision-making among the public that we serve. Today's announcements are the latest in a series of steps OCSPP is taking to reaffirm our commitment to scientific integrity and restore the public trust." EPA will create a new internal advisory group called the OSCPP Science Policy Council "to provide advisory support and recommendations on science policy and scientific integrity issues that arise within its Office of Pollution Prevention and Toxics and Office of Pesticide Programs." The chair of this advisory group will be a new position, a science policy advisor, who will report to the EPA assistant administrator. In addition to providing "guidance on emerging science policy and scientific integrity matters," the new science policy advisor will also be named the deputy scientific integrity official for OSCPP. EPA imagines the OCSPP Science Policy Council as providing an "advisory perspective" on scientific integrity, looking at issues of "broad interest within OCSPP for informal review" while also fostering informal opportunities for scientific collaboration.



Groups Tell EPA's Pesticide Program It's a Failure, Call for Immediate Reforms

OCTOBER 26, 2021 | The Office of Pesticides Programs within the U.S. Environmental Protection Agency has become so captured by industry that it has lost sight of its health and environmental mission, according to a scathing critique issued today by 37 environmental, public health, and sustainable agriculture groups, including beekeeper councils. Led by Public Employees for Environmental Responsibility (PEER) and Beyond Pesticides, the groups are urging the Biden administration to adopt reforms within EPA's Office of Pesticide Programs (OPP) to ensure pesticide approval and use decisions are science-based. OPP has registered more than 18,000 separate pesticide products—far more than any other country—and more than two billion pounds of pesticides are sold annually in the U.S. They are used yearly over roughly 250 million acres of farmland, across millions of acres of urban and suburban lands, and inside millions of homes, schools, and other buildings. Industry has been forced to pay out billions of dollars for damage claims over OPP-approved products. The groups also point to the decline of pollinators—the key to U.S. food security—due to the indiscriminate application of highly potent pesticides. The health of nontarget wildlife, as well as our soil and waters, is under chemical siege. Even pets are at risk from irresponsibly approved flea and tick control products.

Review Shows that Monsanto/Bayer Claims of Glyphosate Safety Not Supported by Credible Science

DECEMBER 21, 2021 | A research team at the *Institute of Cancer Research* at the Medical University of Vienna in Austria found in a review of industry-conducted glyphosate safety studies submitted to EU (European Union) regulators that most of the research fails to meet current international standards for scientific validity, according to *The Guardian*. The researchers find that of the 11 reviewed studies, which were submitted to regulators by Bayer AG (now owner of the Monsanto "Roundup" brand of glyphosate herbicide) and several other chemical companies, only two are scientifically "reliable"; six others are deemed "partly reliable," and the remaining three, "not reliable." Regulators, whether in the UK, the U.S., or anywhere else, ought not be relying solely and without adequate auditing on industry-generated and -funded safety research in making safety determinations that underlie regulations impacting the well-being of millions of people (and other organisms), never mind the environment writ large. The report is timely: the European Food Safety Authority (EFSA) and European Chemicals Agency (ECHA) are currently considering whether or not to renew EU approval of glyphosate when the existing license expires in December 2022. In 2017, glyphosate was granted, by a narrow vote margin, a five-year renewal following the European Parliament's vote against renewal. [Nersesyan, Armen and Knasmueller, Siegfried. Evaluation of the scientific quality of studies concerning genotoxic properties of glyphosate. Institute of Cancer Research, Department of Medicine I, Medical University of Vienna, Austria. March 2021.]

Localities and States Face Challenges Ignored by Fed

TAKING PROTECTIVE ACTION: LOCAL EMPOWERMENT

Local and state action to regulate pesticide use is essential in the absence of an adequate federal response to the hazards of pesticides and the related cross-cutting crises of public health threats, biodiversity collapse, and the climate emergency. There is a history of actions at the local and state level that precede state action going back to the banning of pesticides like DDT, 2,4,5-T, chlordane, alar, and others. In 2021, New York State banned glyphosate on state land and Florida's Commissioner of Agriculture and Consumer Services, an elected Democrat, put a stop to the spraying of the highly toxic aldicarb on citrus. Maine banned consumer use of neonicotinoid insecticides with some exceptions, while the governor there vetoed a bill banning the aerial spraying of glyphosate and other herbicides. California released a draft strategy for climate action that focuses on the state's 105 million acres to sequester carbon and build resilience. Advocates want the plan to move the state's agriculture away from harmful synthetic pesticide use.

The transformational action is happening at the local level, where communities are

embracing an approach to land management that stops toxic pesticide use and establishes an allowed list of organic-compatible materials. This approach recognizes that the continued focus on banning individual chemicals will not meet the urgency of the moment that requires the adoption of practices that eliminate fossil-fuel based pesticides and fertilizers. Maui, Hawaii adopted comprehensive legislation that allows only those materials permitted under federal organic law on "any County highway, drainageway, sidewalk, right-of-way, park, building, community center, or other facility." The New York City Council passed legislation on Earth Day 2021 that also only permits organic-compatible materials on parks, playground, and public spaces. The sponsor of the bill, Council Member Ben Kallos said, "All families should be able to enjoy our city parks without having to worry that they are being exposed to toxic pesticides that could give them and their families cancer." A strong advocate of the legislation, The Black Institute, pointed out at a press conference on the legislation that, based on findings in their report *Poison Parks*, pesticide use in the parks results in disproportionate harm to people of color neighborhoods in New York City and city landscapers who handle dangerous pesticides are almost all black and brown people. Other successful examples of efforts that have led to the adoption of local policies to transition to organic management of public land is growing nationwide with examples in Stamford, Connecticut and Los Alamos, New Mexico.

The pressure on state government and corporations heated up in California. Action in California state courts have struck down the state's program that conducts pesticide spraying for invasive species nearly anywhere—in backyards, on school and recreational grounds, on organic farms, on public lands, and sometimes, across entire neighborhoods—without any analysis of the health and environmental impacts of those applications, or any notice to the public or opportunity to comment on the program. The case was remanded to the lower court to take action. Also in California, the State Supreme Court upheld the $87 million award in one of the glyphosate damage cases. Another one of the glyphosate cases is headed to the U.S. Supreme Court.

New York State Bans Glyphosate/ Roundup on State Land, while Advocates Push for Organic Land Management

JANUARY 12, 2021 | New York State is set to prohibit on December 31, 2021 the use of glyphosate on all state property after Governor Andrew Cuomo signed bill S6502A/A732b late last year. The state legislature passed the legislation in July, 2020. The move is an important recognition by the nation's fourth most populous state that the U.S. Environmental Protection Agency (EPA) is not adequately protecting people and the environment from hazardous pesticides (pesticide is an umbrella term that includes insecticides, herbicides, fungicides, etc.). However, the law's ability to improve these protections will depend significantly upon the management approach that replaces glyphosate use. "A transition away from Roundup and other glyphosate-based pesticides must reject the use of regrettable substitutes, and embrace sound organic principles and practices," said Jay Feldman, executive director of Beyond Pesticides. In pest and weed management, regrettable substitutions occur when one toxic chemical is banned or restricted, and

another hazardous pesticide is simply used in its place. The substitution may have a different chemical formulation, mode of action, and set of health and environmental impacts, but nonetheless fills the same role as Roundup/glyphosate when it comes to weed management. When the answer to eliminating glyphosate is to switch to another herbicide like 2,4-D, glufosinate, triclopyr, or dicamba, the message is not getting across, and more education and advocacy is needed, advocates say. A chemical-intensive approach focuses on treating symptoms—pests and weeds, but ultimately undermines a land manager's capacity to address these problems naturally. This is because synthetic pesticides (and fertilizers) harm soil life, while an organic approach to land management focuses on enhancing soil health by nurturing soil biology.

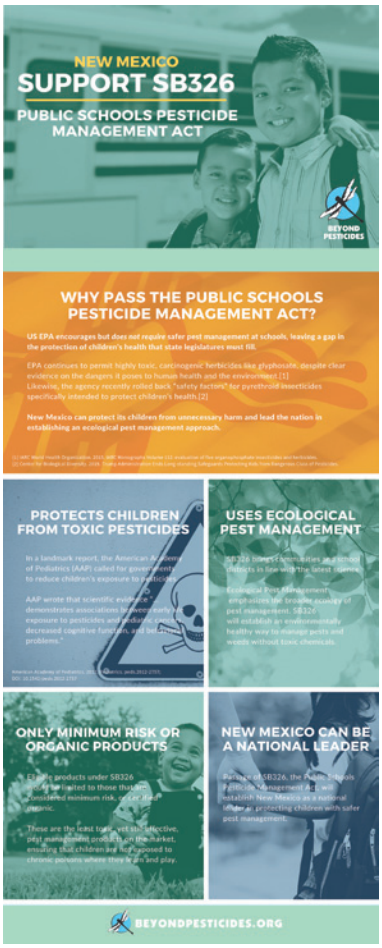
New Mexico Bill Will Protect Children from Toxic Pesticides Where They Learn and Play

FEBRUARY 11, 2021 | New Mexico State Senator Brenda McKenna introduced the *Public Schools Pesticide Management Act* (PSPMA) (SB 326) in order to protect school children from exposure to toxic pesticides where they learn and play. The legislation advances ecological pest management, an environmentally healthy way to protect children and the public from weeds and insects, within all schools, classrooms, community parks, and playgrounds in the state. Under PSPMA, only organic and minimum risk pesticides, the least-toxic, yet still-effective products on the market will be allowed. Toxic pesticide use will be permitted only under a defined public health emergency, as determined by a public health official. The law does not address the use of pesticides in farming or agriculture. "All children in New Mexico have the right to a safe environment where they learn and play," said State Senator Brenda McKenna. "This legislation embraces an environmentally healthy approach to pest management, so families do not have to worry about the use of toxic pesticides in schools and communities."

Update: The legislation did not move to passage.

TAKE ACTION

If you are resident of New Mexico, tell your elected state senator and representative to support pesticide protections where children learn and play . . . AND share our infographic on the Public Schools Pesticide Management Act with your social networks to generate even more support!



See the infographic: bp-dc.org/nm-schools

Massachusetts Regulators Restrict Consumer Use of Bee-Toxic Neonicotinoid Pesticides

MARCH 3, 2021 | Earlier this week, pesticide regulators in the Commonwealth of Massachusetts voted to restrict outdoor consumer uses of neonicotinoid insecticides. The move is the result of sustained advocacy from a broad coalition of individuals and organizations focused on protecting pollinators and ecosystem health. While advocates are pleased that the Pesticide Board Subcommittee made Massachusetts the first state in the country to restrict neonicotinoids through a regulatory process, they note this is only the first step in eliminating these hazardous insecticides. "This marks an incremental victory which took us 6 years to land, and it only happened because of immense, ongoing grassroots action and legislative allies who are willing to hold state regulators accountable," said Martin Dagoberto, policy director of the Northeast Organic Farming Association, Mass. Chapter in a press release. "We still have a monumental endeavor ahead if we are to reduce toxins and rein in the toxic influence of the chemical lobby," Mr. Dagoberto added. Advocates had been pushing the legislature to pass *An Act to Protect Massachusetts Pollinators*, sponsored by pollinator champion Representative Carolyn Dykema, since 2014. Following several failures by state lawmakers to bring the bill over the finish line, efforts in 2019 resulted in a literature review on the impacts of neonicotinoids on pollinators. The literature review

found the vast majority of studies showing neonicotinoids contributing to pollinator declines. It notes that the only studies minimizing pollinator impacts are those conducted by the pesticide industry, and that "the authors" analyses relied heavily on unpublished reports published by these manufacturers, which limits third-party review of the underlying studies."

Vermont Committee Recommends Mosquito Spray Program Needs Special Permit To Operate

MARCH 19, 2021 | As reported by *VTDigger*, Vermont's Endangered Species Committee recently took action to uphold the state's endangered species law. The committee announced that a mosquito control program in the Champlain Valley, which uses the toxic pesticides malathion and permethrin, is threatening five species of endangered bats—all of which are on Vermont's list of threatened and endangered species. The committee voted unanimously to recommend to the state Secretary of the Agency of Natural Resources that the spraying program in the Brandon–Leicester–Salisbury–Goshen–Pittsford–Proctor Insect Control District be allowed only via special permit. Learn about safer mosquito management and insect-borne diseases at Beyond Pesticides website pages. The bats inhabit the Insect Control District's six towns, which are host to important feeding habitat for these creatures, as well as maternal roosting colonies where baby bats are born and raised during the months when the pesticides are typically sprayed. In addition, the nighttime spraying of these compounds along 190 miles of road in these communities hangs in the air for hours, putting nocturnally active bats—who fly through the toxic mist or consume insects contaminated with the chemicals—at risk. Mason Overstreet of Vermont Law School's Environmental Advocacy Clinic asserts that the mosquito spraying violates the state's *Protection of Endangered Species Act,* saying: "The *Act* prohibits activities that create a 'risk of injury' to wildlife. It also allows for a permitting process for economically important activities to continue—albeit with modifications to mitigate the risk to endangered species. The legal conclusion is that the district must apply for this 'incidental take permit' to continue spraying in order to minimize risk to wildlife."

Arkansas Plant Board Takes First Step To Roll Back Crop Damage Protections from Dicamba/ Herbicide Drift

MARCH 23, 2021 | Earlier this month, the Arkansas State Plant Board (ASPB) voted to loosen regulations curtailing use of the highly drift-prone herbicide dicamba. With an 8-7 vote, ASPB eliminated measures advanced in 2016 that protect growers from dicamba drifting off of genetically engineered (GE) soybean fields. Farmer, health, and environmental advocates are encouraging groups and individuals to submit testimony in opposition to the changes should the state's governor advance the proposal to a 30-day comment period. Dicamba has been the subject of intense debate and scrutiny over the last several years—most prominently in Southern and Midwestern states where extensive cotton and soybean monocultures are grown. Due to rampant weed resistance to glyphosate herbicides in GE crop fields, Bayer/Monsanto developed new seeds capable of growing into plants that can withstand repeated sprayings of both glyphosate and dicamba. The company released these new seeds in the mid-2010s without waiting for the U.S. Environmental Protection Agency (EPA) to approve a corresponding herbicide formulation Bayer/Monsanto claimed would reduce drift problems. Farmers began using older, unapproved dicamba formulations, but ultimately even after receiving approval, new formulations proved too drift-prone and problematic to be used without incident.

Florida Officials Put a Stop to Trump Era Proposal To Spray Highly Toxic Insecticide in Citrus Groves Rejected in Florida

APRIL 27, 2021 | The Florida Department of Agriculture and Consumer Services (FDACS) is denying a chemical company's application to use a highly toxic insecticide on the state's citrus crops due to the risks the chemical poses to human health and the environment, according to a statement from FDACS released last week. At issue is aldicarb, a carbamate class insecticide that was cancelled in the U.S. over a decade ago. "While there are promising new horizons for fighting citrus greening, like recent

breakthroughs at the University of Florida on genetic resistance, aldicarb poses an unacceptable risk to human, animal, and environmental health in Florida, is one of the world's most toxic pesticides, and is banned in more than 100 countries," said Florida Commission of Agriculture and Consumer Services Nikki Fried. "The registrant's application does not meet the requirements of state law, and we must therefore deny the registration of aldicarb for use in the State of Florida." At the end of the Trump administration, the U.S. Environmental Protection Agency (EPA) took "aggressive actions" by announcing it was registering aldicarb and the antibiotic streptomycin for use against citrus greening, a disease that is damaging Florida's citrus industry. The registration provided for a supplemental label allowing use on over 100,000 acres of citrus groves until April 2023. In its announcement, EPA proclaims that human health evaluation for aldicarb "…are complete and present no risks of concern, including to young children." The agency claimed that "ecological risks to birds, mammals, aquatic organisms, and honey bees are the same as aldicarb's existing uses and registrations." The statements flew in the face of the agency's own declarations about aldicarb. Over a decade ago, Bayer, the prime registrant for aldicarb, initiated a voluntary cancellation of the chemical. At the time, EPA wrote the chemical, "may pose unacceptable dietary risks, especially to infants and young children."

Maine Bans Consumer Use of Neonicotinoid Insecticides, with Some Exceptions

JUNE 18, 2021 | As the U.S. Environmental Protection Agency (EPA) continues to drag its feet on protective regulation of neonicotinoid pesticides, states continue to step up to restrict their use. In April, the Maine legislature passed, and Governor Janet Mills has now signed, a new law that will prohibit use of neonicotinoid pesticides with the "active ingredient[s] dinotefuran, clothianidin, imidacloprid or thiamethoxam used for application in outdoor residential landscapes such as on lawn, turf or ornamental vegetation." Though short of an outright ban, this law is a solid step forward for Maine in reining in use of these compounds, which are neurotoxicants widely implicated in pollinator (and other insect, bird, and mammal) harm or decline. Until a federal ban happens, Beyond Pesticides offers guidance on avoiding use of neonicotinoid pesticides through its fact sheet, *Managing Pests Safely Without Neonicotinoids*, and its Bee Protective web pages. This new Maine law does, however, include exemptions for wood preservation, indoor pest control,

New York City Council Passes Landmark Law Eliminating the Use of Toxic Pesticides in City Parks and Playgrounds, Stipulates List of Allowed Materials

APRIL 23, 2021 | On Earth Day, the New York City Council passed landmark legislation to eliminate the use of toxic pesticides in parks and playgrounds. This new law eliminates the use of toxic pesticides, like glyphosate/Roundup, codifying a ban on pesticides with an allowance for only those permitted under federal organic standards. A few hours before passage of the bill, Intro. 1524 (see factsheet, p. 86), the measure's sponsor, Council Member Ben Kallos, and the Speaker of the Council, Corey Johnson, were joined at a press conference by: Bertha Lewis, president of The Black Institute; those who began the movement for the legislation, retired teacher Paula Rogovin and some of her former students from Public School (PS) 290 in Manhattan; Jay Feldman, executive director of Beyond Pesticides; and Patti and Doug Wood, executive director and program director, respectively, of Grassroots Environmental Education. "Parks should be for playing not pesticides," said Council Member Ben Kallos. I look forward to working with all of our city agencies to ban toxic pesticides and keep our children safe." "We no longer burn coal in our buildings, we don't light our offices with gas lamps, and we shouldn't be using toxic and dangerous chemicals in our public spaces," said Council Speaker Corey Johnson ahead of the vote. "Our NYCHA [New York City Housing Authority] residents and our families enjoying a day in the park deserve better. New Yorkers deserve better." "This legislation goes beyond banning a specific pesticide and recognizes that toxic pesticides across the board have no place in our municipal parks and playgrounds and that alternative practices and products are available for effective and resilient land management," said Mr. Feldman. In its report, *Poison Parks*, The Black Institute, points out the disproportionate harm to people of color neighborhoods in New York City, and documents that the city landscapers who handle dangerous pesticides are almost all black and brown people. Ms. Lewis pointed out that this disproportionate harm is a classic example of environmental racism.

FACTS-AT-A-GLANCE

Intro 1524: Protecting New York City Residents from Toxic Pesticides

(See factsheet at bp-dc.org/nyc-intro-1524-factsheet.)

Intro 1524, introduced by City Councilmember Ben Kallos, will safeguard New York City (NYC) residents by eliminating the use of toxic pesticides on all NYC property. These protections are critical for vulnerable populations like children, elderly, and pregnant mothers. Those exposed to toxic pesticides in city parks as residents and as city workers managing sites are disproportionately people of color. While existing Local Law 37 made important progress in reducing some dangerous pesticides on the market, it continues to permit a range of synthetic chemicals linked to chronic health effects in people and population declines in wildlife like bees, butterflies, and birds. There is now greater understanding of pesticide dangers, and the healthy, sustainable practices and products that can successfully replace all toxic pesticide use. Intro 1524 restricts the use of toxic pesticides on NYC property in favor of materials regulated as organic or designated minimum risk—the least-toxic on the market. Intro 1524 is an opportunity to improve the health and safety of NYC workers, residents, and their pets, improve the city's air and water quality, protect threatened wildlife populations like pollinators, and fight the climate crisis.

Background on Current Practices

- Local Law 37, passed in 2005, restricts the use of pesticides identified as carcinogenic or developmental toxicants, yet it continues to permit a range of synthetic chemicals that present hazards to human health and the environment.
- In 2018, there were over 284,000 applications of more than 156,000 lbs. of toxic pesticides to NYC properties. Each application puts both applicators and the public at risk.
- Although the use of carcinogenic glyphosate has declined, it accounted for 41% of all liquid herbicide use in NYC in 2018. With continued use, Council action is needed to protect at-risk people and communities.

Improving Protections

- Intro 1524 brings NYC in line with the latest science on pest management, thereby eliminating the dangers that pesticides pose to residents.
- Intro 1524 will incentivize land and pest managers to embrace safer, cost-effective, organic methods of addressing insect and weed problems by focusing on prevention, rather than product use after pests have already become a problem.
- A waiver provision will allow pesticide use only in emergency situations. This will ensure toxic pesticides are used only as a last resort when there is a threat to public health or it is required by state or federal law.

Addressing Long-standing, Disproportionate Harm to NYC Communities of Color

- *Poison Parks*, a report from NYC-based environmental justice organization The Black Institute, finds significant disparities regarding where pesticides are applied in the City, with low-income people of color communities at greatest risk.
- For low-income residents living in apartment complexes, public parks are often the only place to take children for play time. NYC school children use the parks for recreation. As the *Poison Parks* report explains, "Poisoning parks with toxic chemicals is yet another strike against the Black and Brown community. Enjoying a free, public space should not carry unexpected consequences."
- Glyphosate, identified as a carcinogen by international agencies, is sprayed at much higher rates in parks within communities of color. "A chemical that disproportionately impacts people of color is an act of environmental racism," finds the *Poison Parks* report "When Black and Brown families that are economically disadvantaged must bear the burden of toxic exposure at a higher rate than white families, there is no argument that can change the racist nature of the subject."

Health Effects of Pesticides on Children

- In a landmark report, the American Academy of Pediatrics (AAP) called for governments to reduce children's exposure to pesticides. AAP wrote that scientific evidence ". . . demonstrates associations between early life exposure to pesticides and pediatric cancers, decreased cognitive function, and behavioral problems."
- Children take in more pesticides relative to their body weight than adults and have developing organ systems that are more vulnerable and less able to detoxify harmful chemicals.
- Pesticides increase the risk of developing asthma, exacerbate a previous asthmatic condition, or even trigger asthma attacks in susceptible children.

- Children with elevated levels of commonly used pyrethroid insecticides, applied to manage common pests, are more likely to have ADHD (learning disabilities), and other behavioral issues. Pyrethroids were applied roughly 100,000 times in NYC in 2018, accounting for 61% of all insecticide use.

Tracking State and Local Reform, and Legal Liability

- Over 150 communities throughout the U.S. have passed policies that restrict the use of toxic pesticides.
- Major urban areas in the U.S. are increasingly passing laws that take protective steps for local residents in light of inaction by the U.S. Environmental Protection Agency. South Portland and Portland (Maine), Baltimore (Maryland), and Montgomery County (Maryland) have all enacted laws with criteria similar to the pesticide restrictions in Intro 1524 that allow the use of organic compatible products authorized by federal law.
- Increasingly, communities are looking to eliminate toxic pesticide use in light of recent court decisions and legal liability concerns regarding the herbicide glyphosate, including multimillion dollar awards resulting from a California school groundskeeper's cancer diagnosis.
- Organic land management is an important piece of a city's environmental strategy to become carbon neutral, eliminating petroleum-based pesticides and fertilizers.

use on pets, treatment of structure foundations, and controlling invasive insect pests, such as the Asian longhorned beetle, emerald ash borer, and hemlock wooly adelgid. The statute leaves other large loopholes that will permit continued use of neonicotinoids (neonics) as seed coatings, as well as the sale of nursery stock that has been treated with neonic insecticides. Neonics are used widely as seed coatings, particularly for corn, soybeans, and other commodity crops. The Minneapolis *Star Tribune* reports that nearly all corn seed in the U.S. and as much as 50% of soybean seeds are coated with a neonicotinoid—thiamethoxam, imidacloprid, or clothianidin; it also notes that all three of these are banned in Europe for outdoor use.

Maine Aerial Forestry Spray Ban of Glyphosate and Other Herbicides Vetoed by Governor, Override Effort Begins

JUNE 29, 2021 | Maine Governor Janet Mills (D) vetoed legislation prohibiting the aerial use of glyphosate and other dangerous herbicides in forestry practices. LD125, *An Act To Prohibit the Aerial Spraying of Glyphosate and Other Synthetic Herbicides for the Purpose of Silviculture*, was supported by a wide range of health and conservation groups, and aimed to bring the state in line with best practices for public health and the environment. With Maine recently passing one of the strongest consumer bans on pollinator-toxic neonicotinoids, advocates are dismayed by the setback from the Governor's office. In a statement to Maine Public Radio, Senate President Troy Jackson said that Governor Mills should stop referring to herself as an environmentalist. "The science across the country, across the world, says that this stuff kills people, kills wildlife," Mr. Jackson says. "And all that it is a giveaway to the large landowners so they can maximize their profits off the lives of the people in Maine and the wildlife in Maine." Senator Jackson's words are

stern yet factual. Glyphosate has been identified by the World Health Organization as a probable human carcinogen. Monsanto, now owned by Bayer, has been the subject of high profile lawsuits that have been so successful, the company has set aside $10 billion to resolve existing claims. In addition to cancer, the chemical has been linked to changes in DNA function, adverse birth outcomes, and antibiotic resistance. Forestry applications also put the environment at risk. Runoff pollutes groundwater, which can run into local rivers, lakes, and streams. Erosion caused by glyphosate use can release legacy pesticides back into the environment, quickly multiplying problems from chemical mixtures. Glyphosate has been found to harm keystone wildlife species that comprise the bottom of the food chain. Likewise, certain glyphosate formulations have been found to harm pollinators directly, but the entire range of herbicides used in forestry will eliminate the floral diversity on which pollinators rely. A Canadian study found that the use of glyphosate in forestry practices prompts morphological changes that may make them less attractive to pollinators.

Stamford, CT Passes Organic Land Ordinance Restricting Toxic Pesticide and Fertilizer Use on Public Property

SEPTEMBER 14, 2021 | Last week, Stamford, CT became the latest U.S. City to pass an organic community ordinance, restricting toxic pesticide use on public

spaces in favor of safer, natural land care practices. The ordinance, championed by Nina Sherwood of the Stamford Board of Representatives with strong support from Stamford Mayor David Martin, is an outgrowth of years of research and coordination within city government. Advocates note that strong support from both national, state, and local groups like Pollinator Pathway Stamford helped make the case at public hearings. "By garnering support for the public hearing, many Stamford Pollinator Pathway members, Stamford residents and organizations from around the country let their voices be heard," said Melanie Hollas, co-chair of Pollinator Pathway Stamford and a Stamford Parks and Recreation Commissioner. "Today, I am proud to be a Stamford resident and want to thank everyone, including Beyond Pesticides, for all their hard work to make this goal achievable." Ms. Hollas describes the ordinance as, "a comprehensive easy to use system to help employees shift from long-term usage patterns of chemicals to products, and more importantly practices, that create a healthy ecosystem along with beautiful landscaping and usable sports fields." The ordinance recognizes the dangers of non-organic pesticides registered by the U.S. Environmental Protection Agency (EPA) with glaring data gaps, little oversight, and an increasing lack of public accountability. In the face of EPA inaction to protect local communities from toxic pesticides, Stamford's ordinance allows only the use of materials permitted within the U.S. Department of Agriculture's National Organic Program to be used on publicly owned property. These products represent the least-toxic, yet still effective, materials on the market. In further recognition of EPA's lax approach to pesticide regulation, Stamford established a list of "permanently banned products" that include the highly toxic substances glyphosate, 2,4-D, 1,3-D, the neonicotinoids, and chlorpyrifos, none of which are allowed under federal organic law. The ordinance provides for few exemptions. City employees may apply to the Director

Maui Prohibits Toxic Pesticides and Fertilizers on County Land, Allows Only Organic-Compatible Materials

AUGUST 27, 2021 | On August 24, as reported by *The Maui News*, the Maui (Hawai'i) County Council approved legislation that will stop use of toxic pesticides and fertilizers in county land management practices, allowing only those materials permitted under federal organic law. The approach set out in the bill is the creation of a comprehensive list of such materials that will be either allowed or prohibited for use, as the legislation indicates, on "any County highway, drainageway, sidewalk, right-of-way, park, building, community center, or other facility." This decision comes on the heels of years of grassroots work and advocacy, including that of Beyond Pesticides director of Hawai'i Organic Land Management Program Autumn Ness. The legislation (CR 21-56), which passed with a vote of 8–0 (with one member excused), will regulate pesticide and fertilizer use on county properties broadly, but will not affect property managed by the state or private owners, county agricultural parks, or county property used for agricultural purposes. The new ordinance will take effect for most county parcels one year from the August 24 approval date; the effective date for Maui's War Memorial Stadium Complex and Ichiro "Iron" Maehara Baseball Stadium is two years from approval, and for the Waiehu golf course, three years hence. The legislation sets out the stipulations of the federal National Organic Program (NOP), asserting that no synthetic pesticides and fertilizers may be used unless they are compatible with organic systems as permitted under NOP, with some specific exemptions. (The sections of the federal code cited in the legislation, which detail such compatible materials, are found under the Title 7 Code of Federal Regulation.) At the county council meeting, community members gave testimony in support of the legislation, citing worries about impacts of synthetic pesticide and fertilizer use on young people who use county sports fields and parks, and about environmental impacts, including those on marine life. (Maui County has numerous oceanfront parcels under its management.) Council Member Shane Sinenci, who introduced the legislation, said of its final passage, "This shows that we are very responsible stewards for our keiki [children], kupuna [ancestors], and the kai [sea]."

of Operations to apply a prohibited pesticide but must show that: i) attempts to address the pest problem have already utilized organic products, ii) the attempt was unsuccessful, and iii) a prohibited product will be effective. If approved to use a prohibited product, the applicant must also have a plan to prevent recurrence of the pest problem utilizing an organic approach. Otherwise, prohibited products can only be used in the case of an imminent threat to public health or the environment, as determined by the city's Director of Health. Products listed as "permanently banned" are only permitted to be used at the city's municipal golf course, by the fire department when engaging in public safety activities, and to manage invasive species under state law.

Appeal Court Strikes Down Hazardous Statewide California Pesticide Spray Program

OCTOBER 22, 2021 | The California Court of Appeal (Third District, Sacramento) has ruled that a statewide pesticide spraying program violates state law. The court found that the program, launched in 2014 and administered by the California Department of Food and Agriculture (CDFA), contravenes California's landmark 1970 *Environmental Quality Act* (CEQA). It does so, the court found, by failing to: assess and reduce damages of pesticide applications to bees, other pollinators, and waterbodies; conduct site-specific environmental reviews, and; notify the public before spraying is conducted. This decision is a victory, and a step toward a less-toxic California, say plaintiffs and many health and environmental advocates, including Beyond Pesticides. The history of CDFA's actions in the state is riddled with invocations of emergency provisions of California's Food and Agriculture Code. These emergency declarations have allowed CDFA to conduct pesticide spraying for invasive species nearly anywhere—in backyards, on school and recreational grounds, on organic farms, on public lands, and sometimes, across entire neighborhoods—without any analysis of the health and environmental impacts of those applications, or any notice to the public or opportunity to comment on the program. From 2014 to 2018, CDFA conducted more than 1,000 such pesticide applications. Petitioners before the Court of Appeal comprise two groups: those from the original case that was adjudicated in 2018 by Sacramento County Superior Court, and the additional parties in the current case—an appeal of that 2018 decision by CDFA. Plaintiffs in the original case included the City of Berkeley, Environmental Working Group (EWG), Center for Biological Diversity (CBD), Beyond Pesticides, California Environmental Health Initiative, MOMS Advocating Sustainability, Center for Food Safety, Pesticide Action Network North America, Center for Environmental Health, Environmental Action Committee of West Marin, Californians for Pesticide Reform, and Safe Alternatives for our Forest Environment. Additional petitioners in the appeal case are North Coast Rivers Alliance, Pesticide Free Zone, Inc., Health and Habitat, Inc., Californians for Alternatives to Toxics and Gayle McLaughlin (former mayor of Richmond, California).

The petitioners sought writs of mandate challenging the CDFA pesticide program's environmental impact report (EIR). A writ of mandate is a procedure in California that allows superior courts, courts of appeal, and the state Supreme Court to command lower courts and state agencies to take, or not take, specific actions. When a writ is issued, the responsibility for enacting the content of the writ falls to the lower body. In this case, this means that, although the appeal court agreed with a host of the petitioners' claims, it did not explicitly set aside the program's EIR or tell CDFA to stop carrying out the program. Rather, it will send its ruling back to the lower court, which by law should issue orders consistent with the appeal court's decision. Unfortunately, this means that CDFA can continue this pesticide spraying program until the lower, trial court issues such orders. The CDFA pesticide program at issue uses—on public and private property, on agricultural lands, and even on wild lands—pesticides known to be carcinogenic and teratogenic (causing birth defects), and toxic to, especially, bees, birds, fish, and butterflies.

California Releases Strategy for Land Management Practices that Confronts Climate Crisis

NOVEMBER 5, 2021 | Once again earning its environmental leadership reputation, California has released a draft strategy document designed to catalyze near- and long-term climate action through focused attention on the state's natural and working lands, and on nature-based solutions. The California Natural Resources Agency (CNRA) announced the draft Natural and Working Lands Climate Smart Strategy in mid-October. In the announcement, CNRA asserts that the state's 105 million acres can "sequester and store carbon emissions, limit future carbon emissions into the atmosphere, protect people and nature from the impacts of climate change, and build resilience to future

climate risks." The agency also notes that the plan would secure food and water supplies, improve public health and safety, and forward equity. It has invited public comment, and a coalition of California (and national) nonprofit advocates is delivering a letter that calls on the agency to include, in the plan, ambitious targets to move the state's agricultural sector away from the use of harmful synthetic pesticides. Beyond Pesticides will sign on to the letter. This "natural and working lands" document will inform California's 2021 State Adaptation Strategy and the 2022 Scoping Plan—master documents guiding the state's climate action during the coming years. As the document notes, "According to the Intergovernmental Panel on Climate Change . . . reducing emissions in transportation, industry and buildings are [sic] not enough to avert catastrophic climate change—lands must be part of the climate solution."

ACTION: Tell your state legislators and governor to adopt a Natural and Working Lands Climate Smart Strategy that supports organic agriculture and land management. (California Residents: Please use this form.) California state agencies, led by the California Natural Resources Agency (CNRA), released a draft Natural and Working Lands Climate Smart Strategy to guide and accelerate near- and long-term climate action across key California landscapes. All states need such strategies, and to be effective, they must be backed by ambitious targets focused on reduction of pesticides and support for organic agriculture.

Bug Bombs, Prone to Exploding, Are Target of Legislation To Ban Their Use

NOVEMBER 17, 2021 | An effort is underway in New York State to restrict, and in certain cases ban, "bug bombs," led by State Senator Zellnor Myrie (D-NYC). Total release foggers, more aptly referred to as bug bombs (because in

some cases, they literally blow up), are dangerous indoor devices that release an aerosolized plume of toxic pesticides and unknown inert (or other) ingredients in an overpowered, ineffectual attempt to manage common pest problems. As Senator Myrie notes in his legislative justification for the bill, S.7516, "This is an environmental justice issue disproportionately affecting lower-income individuals, as bug bombs are a relatively inexpensive pest management solution. As a result, individuals living in older, larger multi-dwellings, who also suffer from adverse health outcomes like asthma at higher rates, are disproportionately exposed to the harmful effects of bug bombs." While eliminating consumer use by restricting the devices to certified pesticide applicators would be an important step forward, there is considerable evidence to justify an all-out ban that extends beyond multi-family units. Problems with these devices stretch far back. In spite of over 450 bug bomb related illnesses between 2001-2006 in the U.S., EPA rejected a petition from the NYC Department of Health (DoH) in 2009, claiming that incidents were "overwhelmingly minor in nature," resulting from "a few basic errors" and concluded that "label improvements can mitigate these risks." EPA subsequently introduced new labels, this time with comic-book style pictures indicating the steps required to use the products. Almost a decade later, in 2018, CDC officials published a new report on the revised labels, determining that EPA's actions represented a public health failure. Between 2007 and 2015, CDC cataloged 3,222 illnesses caused by bug bomb use. This nearly 8-fold increase in reported incidents reveals that EPA's new labels caused more problems and confusion than the previous labels already determined to be deficient. The main cause of poisoning was a failure to leave the premises. The CDC report also notes, "Some users ventilated treated premises for the recommended length of time or longer, but still became ill, suggesting that ventilation might be inadequate or the recommended period might be insufficient to fully eliminate TRF [total release fogger] residuals before occupancy."

ACTION: Urge your governor (Mayor for DC residents) to ban bug bombs in your state! Bug bombs are small cans primarily comprised of an insecticide, often a synthetic pyrethroid, a synergist such as piperonyl butoxide (PBO), and an aerosol propellant. In addition to the explosion/fire risk, if the aerosol product is used in an unattended home near a pilot light or other spark-producing appliance, both synthetic pyrethroids and PBO pose acute and chronic human health risks. PBO is added to pesticide formulations to increase the toxicity of synthetic pyrethroids, and has been linked to childhood cough. Peer-reviewed research associates synthetic pyrethroids with behavioral disorders, ADHD, and delayed cognitive and motor development, and premature puberty in boys. Not only can bug bombs acutely poison, but once applied these chemicals can persist in the home for over a year, putting individuals and families at risk of chronic exposure and subsequent health issues.

CA Supreme Court Upholds $87M Award in Glyphosate Damage Lawsuit, Bayer/Monsanto Challenge Fails

NOVEMBER 30, 2021 | The chronicle of developments in the glyphosate saga has just grown longer: the California Supreme Court has rejected a request

by Bayer AG for review of the August 2021 First District Court of Appeal (San Francisco) ruling, for the plaintiffs, that Monsanto knowingly marketed a product—Roundup—whose active ingredient (glyphosate) could be dangerous. The $87 million in damages awarded to the plaintiffs in the litigation, Alberta and Alva Pilliod, has thus survived Bayer's challenge. This highest state court decision racks up another loss for Bayer (which now owns the Monsanto "Roundup" brand)—despite its dogged insistence, throughout multiple lawsuits (with many more still in the pipeline), that glyphosate is safe.

Glyphosate has been the subject of a great deal of public, advocacy, and regulatory attention, as well as the target of thousands of lawsuits—particularly since the 2015 declaration by the IARC (International Agency for Research on Cancer) that the compound is a likely human carcinogen. In June 2020, facing approximately 125,000 suits for Roundup's role in cancer outcomes, Bayer announced a $10 billion settlement to resolve roughly 75% of current and potential future litigation; claimants who signed on to the settlement were to receive compensation and were not to pursue any additional legal action. That said, roughly 30,000 complainants ultimately did not sign on to the settlement, so the queue of potential lawsuits is still potentially enormous. Seeing the writing on the wall, Bayer tried for a second settlement (of roughly $2 billion) to handle any future claims, but in 2021, a U.S. District Court judge (for the Northern District of California) rejected Bayer's settlement proposal, saying that it was inadequate for future victims diagnosed with cancer after using the herbicide. Still, Bayer has never acknowledged any harm caused by glyphosate. Indeed, the company responded to the California Supreme Court's decision with this: "We continue to stand strongly behind the safety of Roundup, a position supported by assessments of expert regulators worldwide as well as the overwhelming weight of four decades of extensive science." Fast forward to late July 2021, when Bayer announced its plan to end sales of its glyphosate-based herbicides (including its flagship product, Roundup) in the domestic U.S. residential lawn and garden market in 2023.

Community Pesticide Use Restrictions Expand; Organic Takes Root Across the Country

DECEMBER 17, 2021 | (December 17, 2021) Los Alamos, New Mexico is the latest locality to act on some degree of protection of the community from pesticides. Its County Council passed a proposal on December 15 that will ban use of glyphosate-based herbicides on county properties, among other provisions. Cities, towns, and counties (and occasionally, a state) across the U.S. are moving to protect their parks, playing fields, other green spaces, and the communities broadly from the harms of synthetic pesticide and fertilizer use. The approaches vary: sometimes comprehensive, though often piecemeal, i.e., tackling the problem one compound, one category of pesticide, or one or two kinds of properties at a time. Beyond Pesticides endorses comprehensive approaches that embrace the transition to organic land management. Because these can sometimes be more challenging for localities to enact, Beyond Pesticides has announced its program—Parks for a Sustainable Future—that helps localities learn about, secure training in, and

benefit from the guidance of experts on, organic land management. Synthetic pesticides and fertilizers are used widely in agriculture, but also, in a large variety of public spaces—on and in playgrounds, parks, and playing/recreational fields and courts; along roads, sidewalks; hiking and bike trails; next to fences of all kinds, and; in many other locations. In these green spaces and corridors, use of herbicides to control growth of weeds, invasive species, and/or those considered "noxious" (such as poison ivy, oak, or sumac, or giant hogweed) is very common. These land areas may be managed by municipalities, counties, state agencies, water districts, transportation authorities, utility companies or entities, or others. For larger expanses of turf, such as playing fields, golf courses, and parks, herbicides are often "spot" applied, and use of synthetic fertilizers is routine, as managers and the public have come to expect such fields to be a perky, bright green all the time. This expectation runs counter to how plants actually behave in most circumstances; most plants have cycles of decline and dormancy, followed by renewal and growth. But in many places, the expectation is that the baseball field or the golf course or the park has to look 100% all the time—a notion that helps drive use of high-nitrogen, synthetic, petrochemical fertilizers. Organic land management can meet community expectations, while ensuring that people and pets can live in an environment that is safe for all.

Courts Serve as Venue for Corporate and Government Accountability

ACTING IN THE PUBLIC INTEREST: LEGAL REDRESS

Litigation is a critical tool in holding corporations and government accountable to standards of safety. Litigation in 2021 reflects the broad array of cases that are necessary to ensure compliance with the law and compensation for those harmed by toxic chemical exposure.

Because of a long history of EPA's failure to fully comply with the *Endangered Species Act* (ESA) when registering or reregistering pesticides, many cases attack this critical problem. A court settlement in 2021 requires EPA to review how the most widely used neonicotinoid insecticide, imidacloprid, could harm wildlife and their habitat. [Update: EPA has said recently that it has established a new process for ensuring that the agency, in compliance with ESA, conducts biological opinions in consultation with the U.S. Fish and Wildlife Services (as required by law) going forward, but has not set a schedule due to "resource constraints" and is not clear about applying this policy to previous decisions that are out of compliance.] Defending a Trump EPA decision to allow the use of the hazardous insecticide aldicarb on citrus in Florida, the

Biden EPA lost a case filed by farmworkers and conservation groups. This followed the Florida Agriculture Commissioner's decision not to approve use.

Several California families sued Corteva (formerly DowDupont), charging that the use of the insecticide chlorpyrifos around their homes resulted in birth defects, brain damage, and developmental problems in their children. As the glyphosate (Roundup) damage cases against Monsanto/Bayer pile up, estimated at 125,000, the company tried again to put a cap on the amount of money going to 30,000 litigants whose cases have not been resolved. So far, the settlement in these remaining cases has been rejected by the judge in the case. Cases have also been filed against Syngenta/Chem China for Parkinson's disease that litigants say was caused from exposure to the herbicide paraquat. There are numerous studies linking paraquat to Parkinson's.

Misleading labeling and advertising can drive the market away from legitimate consumer choices to protect the environment and public health and shift society away from reliance on chemical-intensive practices. To stop this fraudulent behavior by companies, Beyond Pesticides engages in consumer products litigation under the District of Columbia *Consumer Protection Procedures Act*. A case against Sargento Foods, Inc. for a false product label claims of "no antibiotics" was settled, with the company agreeing to remove the claims by the end of 2022.

Court Settlement Requires EPA to Review How Bee-Killing Pesticide Harms Endangered Species

FEBRUARY 2, 2021 | The U.S. Environmental Protection Agency (EPA) will evaluate the effect of the neonicotinoid insecticide imidacloprid on endangered species, after an agreement was reached between the agency and the Natural Resources Defense Council (NRDC). Imidacloprid is one of the most commonly used insecticides in the world today and, like other neonicotinoids in its chemical class, has been linked to a range of adverse impacts on wildlife and their habitat. While the agreement to assess effects on endangered species is important, advocates note that EPA should already have conducted this review, and further, that imidacloprid and other neonicotinoids should already be banned. NRDC's successful lawsuit follows a separate legal challenge by the Center for Food Safety, Beyond Pesticides, beekeepers, and other environmental organizations which was settled in 2019. The judge in that case, focused on the neonicotinoids clothianidin and thiamethoxam, did not order EPA to consult with the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (which is required when registering a pesticide in order to mitigate risks to endangered species). Instead, she directed the parties, including the plaintiffs, defendant EPA, and intervenor Bayer CropScience (the manufacturer of neonicotinoids), to move forward with a settlement conference to resolve the disputes. The end result requires EPA to remove 12 products containing neonicotinoid active ingredients. Under the settlement reached with NRDC, EPA is required to publish a biological evaluation on imidacloprid's effect on Endangered species and allow time for public comment and review. The agency will then be required, by June 2022, to provide an "effects determination." Under the *Endangered Species Act*, further regulation is required on a pesticide that may affect an endangered species or the habitat it relies upon. An effect determination will therefore guide a regulatory response by the agency.

NRDC remains in discussion with EPA regarding outstanding claims against two remaining neonicotinoids, dinotefuran and acetamiprid. While regulators in the European Union and Canada have made determinations that resulted in meaningful bans against neonicotinoid use, EPA has consistently dragged its feet. Over the last four years, the agency consistently sided with the agrichemical industry over the health of the general public and the ecosystems upon which life depends. But troubles with EPA did not start four years ago, compounding the challenge for health and environmental advocates.

Proposed Bayer/Monsanto Settlement for Roundup Victims Offers Payments and Challenges

FEBRUARY 9, 2021 | Multinational agrichemical corporation Bayer/Monsanto released a proposal to provide up to $200,000 per claimant in compensation to future victims of its Roundup weed killer, according to Reuters. The proposed settlement, agreed to with lawyers representing victims, continues Bayer/Monsanto's attempts to limit the spiraling cost of Roundup lawsuits, which have awarded individual victims millions of dollars in damages. The company appears to consider the proposal a good investment, as it has announced no plans to stop sale and production of its carcinogenic weed killer. However, under the current proposal, plaintiffs would be forced to go through a compensation fund and could seek additional punitive damages through a separate suit. As the attorney for Roundup victims, Elizabeth Casbraser, of Lieff Cabraser Heimann & Bernstein, told the *The Wall Street Journal*, "It's really about options, and it's really about choice. I think it's a great option that offers predictability and transparency for people who don't want to wait, who want to be compensated." To stop the surge of cancer victims—comprising roughly 125,000 lawsuits—from further damaging the company financially, Bayer/Monsanto last year proposed a $10.9 billion settlement with current litigants. Unresolved future claims were part of this proposal. The company had asked the judge to allow a panel of experts to review cancer claims and determine whether a causal connection exists. But the judge rejected this idea. Bayer/Monsanto has been in talks with plaintiff lawyers.

Bayer/Monsanto has fought and lost several rounds of legal battles up until this point. Its first major loss centered around California school groundskeeper Dewayne "Lee" Johnson, who won an initial $289 million jury verdict against Monsanto in 2018 after developing non-Hodgkin lymphoma (NHL) from exposure to Roundup. The first $39 million was awarded for compensation, while $250 million in punitive damages came after a finding that Monsanto acted with "malice or oppression" by suppressing the link between its product and cancer. That amount was later amended by a judge to $78 million. The second case, again in California, found unanimously in favor of the plaintiff, Edwin Hardeman. Mr. Hardeman told the jury he had used Roundup since the 1980s to spray poison oak and weeds around his property, resulting in his NHL diagnosis in 2014. He was awarded $5.27 million, while his punitive damages were ultimately reduced from $75 to $20 million. The third major glyphosate trial concerned the Pilliods, a California couple who had used Roundup for more than 30 years to kill weeds on properties they owned. The couple was originally awarded a staggering $2.055 billion by the jury in 2019, which was ultimately reduced to $87 million.

UPDATE: The Hardeman case, *Monsanto v. Hardeman*, is now before the U.S. Supreme Court, where Monsanto/Bayer is arguing that the litigation is preempted by federal pesticide law (*Federal Insecticide, Fungicide and Rodenticide Act*) by virtue of glyphosate having been registered and permitted for sale by EPA.

Lawsuits Mount for Syngenta/ChemChina Over Claims Paraquat Herbicide Causes Parkinson's

APRIL 14, 2021 | Litigation on the highly toxic herbicide paraquat may soon move into its next phase as lawyers representing victims recently requested that cases be consolidated in the U.S. District Court of Northern California. Over a dozen lawsuits have been filed against the Swiss-based agrichemical corporation Syngenta in several states throughout the U.S. The complaints allege that exposure to Syngenta herbicides containing paraquat resulted in their diagnosis of Parkinson's disease. Paraquat dichloride (paraquat) is a highly toxic herbicide that has been registered for use in the United States since 1964. Although not permitted for residential use, the product is registered on a wide range of agricultural land, from row crops to vegetables and trees, and on non-farm areas, including airports, certain industrial sites, and commercial buildings. It can be used as a preemergent, post-emergent, and post-harvest as a desiccant or harvest aid in the field. The lawsuits target both Syngenta and Chevron corporation, which previously held the rights to sell paraquat in the 1960s under an agreement with a company that was eventually purchased by Syngenta. Syngenta itself, while still headquartered in Switzerland, is now owned by the Chinese National Chemical Corporation (ChemChina) after a 2016 merger. Despite significant ongoing use in the

U.S., concentrated in the South, Central U.S., and California's central valley, the pesticide has been banned in many other countries, including the EU in 2007 and Brazil in 2020. Switzerland banned the chemical as far back as 1989, and China's ban came into effect last year.

Paraquat presents a range of health concerns. Recent research shows that inhalation of low doses can disrupt one's sense of smell, and past research has found the chemical may result in adverse respiratory health among farmers who apply it. However, there are two primary concerns related to this hazardous chemical. The first concern is the rampant poisonings and suicides that have occurred as a result of the fast action and high toxicity of paraquat. Less than a shot glass of the pesticide is enough to kill a grown adult, and there have been far too many instances of accidental poisonings. A recent report from *The Intercept*, in coordination with French newspaper *Le Monde* and *Unearthed*, reveals in the *Paraquat Papers* insider information on how the company worked to cover up its failure to deter these avoidable poisonings.

The second primary concern with paraquat is strong evidence linking the use of paraquat to the development of Parkinson's disease. Research finds that cumulative exposures over one's life increases the risk of developing Parkinson's disease, and other factors, such as genetics and exposure to other chemicals, further elevate the threat. Recent studies show that one's zip code and proximity to paraquat use in agriculture likely plays an important role in an individual's risk of developing Parkinson's. "The data is overwhelming" regarding the link between paraquat and Parkinson's, said Samuel M. Goldman, MD, an epidemiologist in the

San Francisco Veterans Affairs Health System to *The New York Times* in 2016. Another expert interviewed by *The New York Times*, Freya Kamel, PhD, with the National Institutes of Health, said the connection was "about as persuasive as these things get."

Judge Rejects Bayer Proposal To Settle Future Roundup Claims

JUNE 2, 2021 | U.S. District Court Judge Vince Chhabria for the Northern District of California rejected a proposal from multinational agrichemical company Bayer (Monsanto) to settle future court claims around the company's flagship Roundup/glyphosate herbicide. In making his decision, Judge Chhabria asserted that the corporation's proposal was inadequate for future victims diagnosed with cancer after using the herbicide. The decision has Bayer scrambling for a way out, and it indicated in a "Five Point Plan" released after the ruling that it will "discuss the future of glyphosate-based products in the U.S. residential market."

Bayer's rejected proposal would have established a $2 billion fund, split between future claimants (who would receive between $5,000 and $200,000), and the cost to cover cancer monitoring, lawyers' fees, and an advisory panel to review claims. Bayer has agreed to a separate $9.6 billion agreement to settle existing lawsuits, having lost several rounds of litigation where juries found in favor of plaintiffs who showed that their use of Roundup resulted in their development of non-Hodgkin lymphoma. Recently, in mid-May, Bayer lost an appeal of the *Hardeman vs. Monsanto* case, as a three-judge panel upheld a $25 million award. Prior to rejecting the proposal on future claimants, the judge questioned why Monsanto (which Bayer purchased for $63 billion in 2018) never added a warning label to its Roundup products. "For years I've been wondering why Monsanto wouldn't do that voluntarily to protect itself," said Judge Chhabria of the label, according to Reuters. The judge was particularly concerned about individuals who are currently healthy, but likely to be diagnosed with cancer after using Roundup in the future. He noted that current healthy users may not adequately review or understand the proposal provided to them. Judge Chhabria expressed concern that Bayer could bring the case to the U.S. Supreme Court and receive a favorable ruling that the *Federal Insecticide Fungicide and Rodenticide Act* (FIFRA), the nation's pesticide law, prohibits lawsuits claiming a corporation did not adequately warn consumers about health dangers. Ultimately, Judge Chhabria determined that Bayer's proposal had "glaring flaws" that would not benefit future victims. "If a settlement that reasonably protects the interests of Roundup users who have not been diagnosed with NHL (non-Hodgkin lymphoma) can be reached, that agreement must be presented on a new motion for preliminary approval," said Judge Chhabria. "The attorneys pushing this deal repeatedly intone that it will be difficult for Roundup users who are diagnosed with NHL in the future to get a trial, given the limited capacity of courts and given that many plaintiffs will be 'in line' ahead of them," he continued.

Court Blocks Trump-Era, Toxic Citrus Pesticide, Defended by Biden EPA

JUNE 9, 2021 | The U.S. Court of Appeals for the District of Columbia blocked the U.S. Environmental Protection Agency (EPA) from approving use of the hazardous insecticide aldicarb on citrus crops in Florida. The decision comes shortly after Nikki Fried, Florida's Agriculture Commissioner, denied a state-level registration for aldicarb, which was cancelled in the U.S. over a decade ago due to risks to children and water

contamination. Health, conservation, and farmworker advocates who brought the suit are praising the court's decision.

"We applaud this decision by the court whose ruling confirms what we already knew—that there is no place for a toxic pesticide like aldicarb to be used on crops in Florida where our workers and our water would be at grave risk," said Jeannie Economos, coordinator of the Pesticide Safety and Environmental Health Project at Farmworker Association of Florida in a press release. "Farmworkers can breathe a bit easier knowing that this neurotoxin will not be used on the citrus crops they harvest. We are grateful to Florida Commissioner of Agriculture Nikki Fried for refusing to allow this toxin to poison our communities, our food and our environment. This decision sends a message to EPA—protecting people and the environment must be their top priority." Shortly before the end of the last administration, former EPA Administrator Andrew Wheeler provided one last handout to the agrichemical industry by approving aldicarb for use on Florida's citrus groves. The move came after a meeting between Mr. Wheeler, regional EPA staff, and the Florida Fruit and Vegetable Association in October 2020, where the industry group urged EPA to reregister the banned chemical. Although the chemical was approved quickly, advocacy groups responded in kind by placing pressure on EPA and filing a legal challenge to the decision. By April, Commissioner Fried had heard from both sides, and the Florida's Department of Agriculture and Consumer Services rejected state-level approval of the hazardous insecticide. "While there are promising new horizons for fighting citrus greening, like recent breakthroughs at UF/IFAS on genetic resistance, aldicarb poses an unacceptable risk to human, animal, and environmental health in Florida, is one of the world's most toxic pesticides, and is banned in more than 100 countries," said Commissioner Fried. "The registrant's application does not meet the requirements of state law, and we must therefore deny the registration of aldicarb for use in the State of Florida." In rejecting EPA's approval of aldicarb, the court cited the state's denial, and found that EPA did not comply with *Endangered Species Act* requirements prior to registration.

"We're thrilled the court has rejected use of one of the most dangerous pesticides in history on Florida oranges and grapefruit," said Nathan Donley, PhD, environmental health science director at the Center for Biological Diversity. "This important decision is a sharp rebuke of the EPA's pesticide office, which even under the Biden administration chose to dismiss science and the law to protect profits at the expense of farmworkers, children and endangered species."

Parents of Harmed Children Sue Manufacturer of Brain-Damaging Insecticide Chlorpyrifos

JULY 14, 2021 | Corteva (formerly DowDupont) is facing a potential class-action lawsuit after several California families filed suit claiming that the use of the insecticide chlorpyrifos around their homes resulted in birth defects, brain damage, and developmental problems in their children. Chlorpyrifos is an organophosphate insecticide that has been linked to a range of health ailments, posing significant hazards particularly for pregnant mothers and their children. The lawsuits come as the U.S. Environmental Protection Agency (EPA) approaches a court-imposed 60-day deadline to decide the fate of

the pesticide's registration. Attorneys for the court cases, filed on behalf of individuals located in four California communities (Fresno, Kings, Medera, and Tulare counties), indicate they intend to pursue class action status, which would allow additional injured parties to join the lawsuit. The plaintiffs argue that the effects of chlorpyrifos exposure lingers in the agricultural communities where they reside. "We have found it in the houses, we have found it in carpet, in upholstered furniture, we found it in a teddy bear, and we found it on the walls and surfaces," said Stuart Calwell, lead attorney for the plantiffs. "Then a little child picks up a teddy bear and holds on to it." Ultimately, 100,000 people in California's farming regions may need to remove items in their homes that were contaminated by chlorpyrifos, attorneys say.

Each of the four plaintiff families have children with developmental disabilities that they indicate were caused by chlorpyrifos exposure. This real-world occurrence is supported by the scientific literature. Studies find that children exposed to high levels of chlorpyrifos experience psychological development delays, attention problems, attention-deficit/hyperactivity disorder problems, and pervasive developmental disorders at three years of age.

Concentrations of chlorpyrifos in umbilical cord blood were also found to correspond to a decrease in the psychomotor development and a decrease in the mental development in three year olds. Additional research reinforces these findings, with evidence that children

with high exposure levels of chlorpyrifos have changes to the brain, including enlargement of superior temporal, posterior middle temporal, and inferior postcentral gyrus bilaterally, and enlarged superior frontal gyrus, gyrus rectus, cuneus, and precuneus along the mesial wall of the right hemisphere.

Although Corteva has dropped out of the chlorpyrifos market, it is not supporting the cancellation of the chemical, and other manufacturers continue to produce it. Three years ago, Hawaii became the first state to begin to phase out chlorpyrifos use. In New York, a law passed by the state legislature implementing a ban prior to Hawaii's was vetoed by Governor Cuomo (D) and shunted to a slower state rulemaking process. California has likewise initiated rulemaking to ban the chemical, but minor uses are likely to remain.

Bayer Files "Hail Mary" Petition With U.S. Supreme Court After Losing Jury Verdicts on Cancer Causing Roundup/Glyphosate

AUGUST 18, 2021 | Multinational chemical company Bayer filed a petition with the U.S. Supreme Court, seeking a reversal of a lower court verdict that established Bayer's liability for damages from the use of its weed killer Roundup. After purchasing Roundup-maker Monsanto in 2018, Bayer has been mired in a deluge of court battles from injured customers throughout the country who assert that their use of the glyphosate-based herbicide resulted in their cancer diagnosis. Bayer, for its part, has consistently lost these court cases. The company's Supreme Court petition is now regarded as its best and last chance to avert responsibility for the ongoing harm to public health caused by its carcinogenic herbicide. Bayer's Supreme Court challenge pertains to the *Hardeman v. Monsanto* case. In that suit, a California court found unanimously in favor of the plaintiff, Edwin Hardeman. Mr. Hardeman told the jury he had used Roundup since the 1980s to spray poison oak and weeds around his property, resulting in his diagnosis of non-Hodgkin lymphoma in 2014. He was awarded $5.27 million, while his punitive damages were ultimately reduced from $75 to $20 million. Bayer is bringing two main arguments to the Supreme court. First, the company is making a preemption argument, saying that U.S. federal pesticide law, the *Federal Insecticide Fungicide and Rodenticide Act* (FIFRA), preempts state-level "failure-to-warn" claims that act as the basis for the Hardeman suit. To prevail under California's failure-to-warn law, plaintiffs must prove that the product had knowable risks, the risks presented were substantial if used in a reasonably foreseeable manner, consumers would not have recognized those risks, defendants failed to warn consumers, and consumers were thus injured as a result.

On this issue, the U.S. Ninth Circuit Court of Appeals affirmed a lower court ruling that state failure-to-warn claims were "equivalent to" and "fully consistent with" FIFRA and that, because the company had the ability to comply with both FIFRA and California law, FIFRA did not

preempt plaintiff claims. Bayer's argument to the Supreme Court rests upon the cover that the U.S. Environmental Protection Agency (EPA) provided the company over the years. Bayer argues that because EPA did not approve labels with a cancer warning, and the agency has repeatedly said that such a label was not appropriate, failure-to-warn claims should not apply. Bayer's second argument focuses on the Ninth Circuit's admission of expert testimony, which the company says violates court precedent and federal rules. The Ninth Circuit held that a district court applied the correct standards in admitting expert testimony in the Hardeman case. This issue centers significantly around causation, experts' use of epidemiological evidence, a strong and growing body of literature linking glyphosate to cancer, which EPA and pesticide manufacturers have regularly discounted. In apparent attempts to calm the market, the company has gamed out scenarios where it does and does not win at the Supreme Court. Prior to filing the petition, Bayer announced that it would end sales of Roundup to residential consumers, as part of a "five-point" plan aimed solely at averting litigation risk—not in order to protect U.S. residents from its hazardous product. Mr. Hardeman's lawyers told U.S. Right to Know (USRTK) they were prepared for this fight. "While paying out billions of dollars to settle claims, Monsanto continues to refuse to pay Mr. Hardeman's verdict. That doesn't seem fair to Mr. Hardeman. Even so, this is Monsanto's last chance Hail Mary," attorney Aimee Wagstaff told USRTK. "We are eager and ready to beat Monsanto at the Supreme Court and put this baseless preemption defense behind us once and for all."

Beyond Pesticides Successfully Challenges Company for False "No Antibiotic" Claim

NOVEMBER 19, 2021 | Beyond Pesticides reached a settlement agreement resolving a lawsuit filed against Sargento Foods, Inc. in January, 2021 for misleading its customers with false product label claims of "no antibiotics." The lawsuit alleged that Sargento's cheese products are made with milk from cows raised with antibiotics and that antibiotics can be found in some of the company's finished food. By the end of 2022, packaging for Sargento's products will no longer include the statements "no antibiotics" or "made from milk that does not contain antibiotics."

The use of antibiotics in agriculture is contributing to a "looming potential pandemic" worldwide, resulting from a "rise in multidrug-resistant bacterial infections that are undetected, underdiagnosed, and increasingly untreatable, [which] threatens the health of people in the USA and globally," according to *The Lancet*, a prestigious medical journal, in September. The World Health Organization has declared that, "AMR [antimicrobial resistance] is one of the top 10 global public health threats facing humanity." The primary contributors to AMR identified in the scientific literature are antibiotic uses in agriculture and overuse in medicine.

"This lawsuit is motivated by the urgent need to transition away from practices in agriculture that are dependent on antibiotics, advance organic farm management, and avoid new deadly pandemics," said Jay Feldman, executive director of Beyond Pesticides. "One way to do this is to ensure truthful labeling so that consumers can make informed and responsible choices in the marketplace," he said.

Because toxic chemical dependency and management practices result in ecosystem imbalance in chemical-intensive (or conventional) agriculture, antibiotics become necessary in both livestock and crop production. Antibiotics are used extensively in factory-style dairy production because the treatment and conditions to which cows are subjected impair their health and cause infections. The majority of dairy cows in the U.S. are confined indoors and do not graze on pasture. Teat trauma caused by milking machines, genetic selection for high milk yields, and unsanitary conditions make cows susceptible to clinical mastitis from pathogenic bacteria, which is the most commonly reported health problem in the dairy industry.

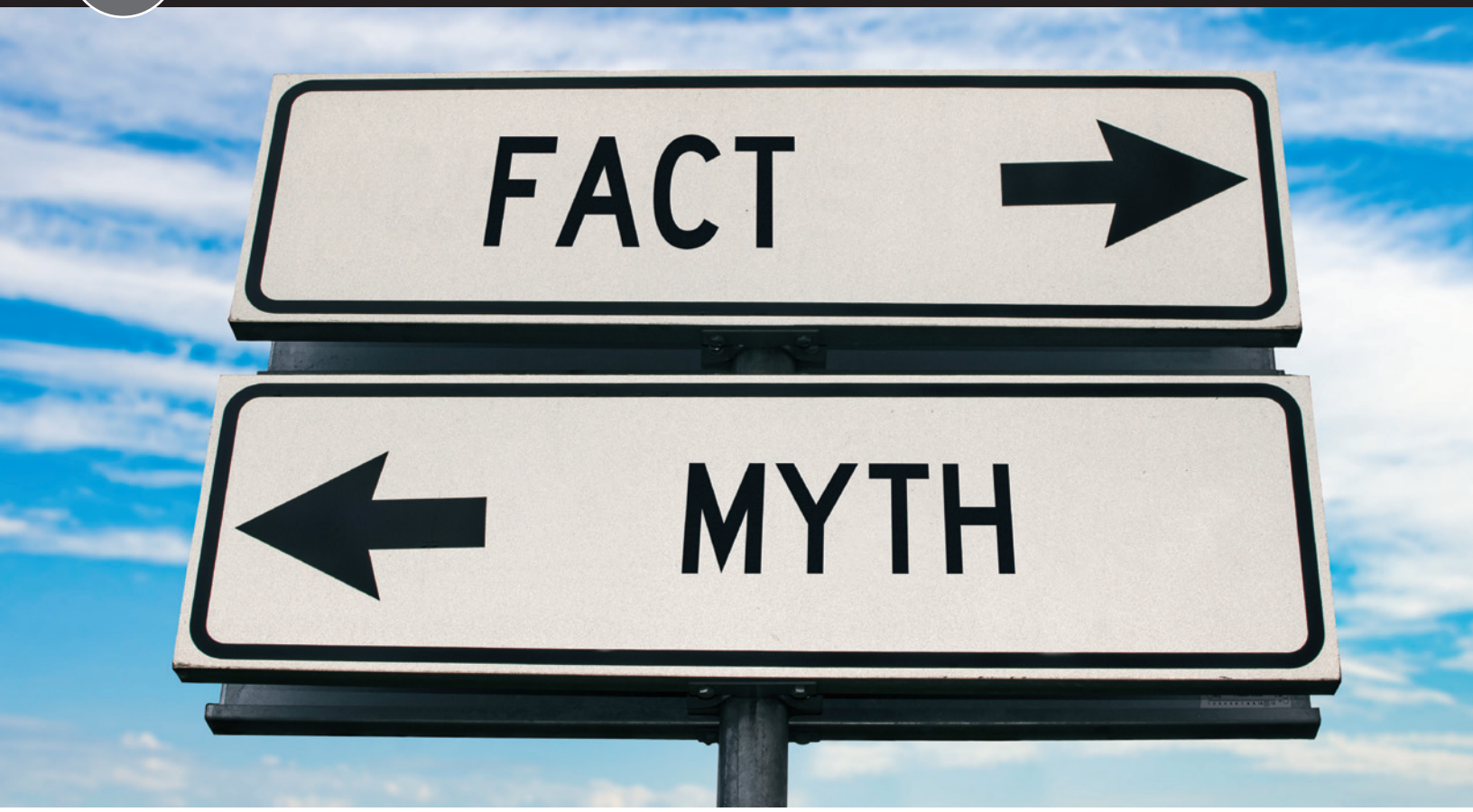
Antibiotics are also used widely as additives in animal feed to ward off any potential infections and to promote unnaturally rapid growth (the latter of which translates to higher profits), rather than being used to treat bacterial infections. Both of these objectives compensate for the overcrowded and unsanitary conditions of concentrated animal feeding operations (CAFOs). However, use of antibiotics is prohibited in all certified organic production, which incentivizes access to pasture, rotational grazing, and soil management. Although the standards of the National Organic Program require the treatment of sick animals, the dairy, meat, and other products from such animals cannot be sold with the certified organic label. Organic certification bans antibiotics in crop production, while its uses continue in conventional fruit production, some vegetables, and citrus (grapefruits, oranges, and tangerines).

An FDA (Food and Drug Administration) ban on the use of antibiotics as growth promoters in livestock, which went into effect on January 1, 2017, was confounded later that year by USDA's rejection of World Health Organization guidance on limiting antibiotic use in animal feed. USDA asserted that treating, controlling, and preventing" disease under veterinary supervision constitutes "appropriate use"—undercutting the ban on antibiotics for growth promotion because, when used in feed for disease prevention, antibiotics also promote growth.

"In addition to direct ingestion of antibiotic residues, resistant bacteria move from farms to families, through the environment to the human population, known as 'horizontal gene transfer,'" said Mr. Jay Feldman, executive director of Beyond Pesticides. Additionally, he said, "Beyond the threat from antibiotic-resistant infections, the ability of antibiotics to disturb or kill the gut microbiota in humans can lead to or exacerbate autoimmune and other 21st century diseases, including diabetes, obesity, food allergies, heart disease, cancer, asthma, autism, irritable bowel syndrome, multiple sclerosis, rheumatoid arthritis, celiac disease, inflammatory bowel disease, and more."

The authors of *The Lancet* article also indicate that the AMR phenomenon can exacerbate Covid-19 risks. They observe that, across five countries, Covid-19 diagnoses are associated with bacterial infections (with 3.5% diagnosed concurrently and 14.3% post-Covid-19). The prevalence is higher in patients who require intensive care. The authors note that, "72% of Covid-19 patients received antibiotics even when not clinically indicated, which can promote AMR."

Beyond Pesticides was represented by Richman Law and Policy, based in Irvington, New York. The action is brought under the District of Columbia *Consumer Protection Procedures Act* ("CPPA"), D.C. Code § 28-3901, *et seq.*



Research Shatters Myth of Pesticide Benefits

DOCUMENTING UNREASONABLE RISKS: SUSTAINABLE ALTERNATIVES

The presumption that pesticides have benefits is not independently evaluated by the U.S. Environmental Protection Agency (EPA). Instead, the agency assumes that pesticide users would not buy pesticides if they did not perform as intended. How can the agency determine that a pesticide's risks are reasonable under federal law without evaluating chemical efficacy, especially after pest resistance appears, or as new products and practices emerge on the market that present no or a much-reduced hazard? Moreover, because farmers know that, if their pesticide fails, they will be allowed to use another pesticide not currently registered for use on their crop under an emergency exemption, the agency disincentivizes the adoption of alternative practices and products.

When determining the economic benefit of pesticides, the true cost of pesticide use must be a part of the overall benefit calculation. However, many of these costs are not borne by the pesticide user, but by society or taxpayers who pay for cleanup, lost ecosystem services such as pollinators, water purification, and the cost of fighting climate-induced fires and flooding. A study in this section "connects financial outcomes with ecological, human, and socio-economic well-being." The authors, in their study *A Tale of Two Food Chains*, say that in the conventional food supply chains "the many hidden costs are cumulative and have broad

deleterious consequences; however, in the regenerative, organic food value chains, pollution is shunned and "taxed," and sustainability, as a public good, is rewarded by sequestering greenhouse gas emissions and maintaining biodiversity, living soil, as well as clean air and water."

The most heralded chemical-intensive practice that is often characterized as a pesticide-reduction strategy, Integrated Pest Management (IPM), was studied, with authors concluding that it has not achieved its goals, including a significant reduction of synthetic pesticide use, and health, environmental, and ecosystemic benefits. The research team, all of whom have worked as IPM scientists and proponents, conclude that IPM has "lost its way over the decades—moving from ecological and health concerns as primary to its current state in which (usually chemical) control methods are central."

Pesticide dependency has real costs, as discussed in a paper by the French-based Bureau for the Appraisal of Social Impacts, which writes: "While the profits of [the agricultural] sector are becoming increasingly concentrated in the hands of a few multinationals, society faces a considerable bill to pay each year to cover the costs linked to pesticide use. But even those amounts will not be able to repair the irreversible damage caused to humans and the environment. In contrast, the varied agroecological models have proven to be more sustainable. While transition to these also requires investments, the latter will be smaller and above all more sustainable." The Rockefeller Foundation in its report, *The True Cost of Food,* says, "The sum of all the externalized costs that are not covered in the price of food was roughly $2.1 trillion." [2019]

Working with nature and deriving the benefits as ecosystem services is well-researched. While institutions teach the pesticide "toolbox" and regulators accept this as conventional wisdom, numerous studies are reaching similar conclusions to the ones covered in this section, in which researchers find that a diverse population of fungi in soils is highly likely to be effective in managing nematodes that may threaten crops—thus eliminating among the most toxic fumigants and chemicals known to humankind.

Eliminating Pesticides Increases Crop Yields, Debunking Myth of Pesticide Benefits

FEBRUARY 12, 2021 | Being many decades down the path of chemical-intensive agriculture, growers and other land managers (and all the industries that influence them) have come largely to ignore the efficacy of healthy, functioning natural systems to maintain ecological equilibrium, i.e., not letting any one pest or disease proliferate. Recent research points to an example of such ecosystem efficacy. The study, by researchers in California and China, sought to evaluate whether increased population densities of fungi might be suppressing nematode populations in California production fields frequently planted with the cole crops (such as brussels sprouts and broccoli) they favor. The research finds that a diverse population of fungi in soils is highly likely to be effectively killing nematodes that threaten such crops.

Thirty years ago, these nematodes were dealt with by application of soil fumigants and nematicides, because at sufficient population levels, the nematodes can destroy cole crops. During the following three decades, state-mandated monitoring showed that use of those chemical controls was diminishing and, by 2014, had been

eliminated—even as yields rose. The coauthors point out that it is California's relatively robust pesticide-use reporting program that surfaced information on the amounts of fumigants and nematicides used to control cyst nematodes since the early 1990s. The plummeting use of these compounds during that period suggested to the scientists a decline in nematode disease pressure and prompted them to investigate why this unusual trajectory was happening. The study evaluated nematode populations in 152 crop fields in 2016, finding that 62% of the soils harbored no detectable cyst nematodes, and only a few samples reached populations sufficient to cause any crop damage. The researchers used cyst nematodes as bait and determined that broadly present hyperparasitic fungi were likely biologically suppressing the nematodes below a damaging level. [Chen, Ying-Yu et al. Detection of Nematophagous Fungi from Heterodera schachtii Females Using a Baiting Experiment with Soils Cropped to Brassica Species from California's Central Coast. *PhytoFrontiers*. 1:4-12, 2021.]

Report Finds True Cost of Food in 2019 Was $2.1 Trillion in Adverse Health, Environmental, and Other Effects

JULY 23, 2021 | The Rockefeller Foundation report, *True Cost of Food: Measuring What Matters to Transform the U.S. Food System*, identifies the real-but-under-recognized downsides of the U.S. food system. The report notes that, for all its reputed bounty, the food system "comes with hidden costs—to our health, to our climate," and to the many people who make sure that food reaches the population. According to the report, "The sum of all the externalized costs that are not covered in the price of food was roughly $2.1 trillion. [2019]" The report calls for a true accounting of the costs of food in the U.S. Beyond Pesticides welcomes the broad framework of the report, but notes that a true accounting would necessarily include the costs of the externalities of conventional agriculture, including those related to pesticides: the costs of pollution and its cleanup (when that even happens), of lost pollination and biodiversity, of lost productivity from illness, and of health care costs related to pesticide use. Remarkably, for all its repetition of deleterious impacts on climate, biodiversity, and health, the report barely mentions either pesticides' roles in causing such impacts, or the clear solution to so many of the negatives in the food system—organic, regenerative agriculture. The report's economic analysis applies a true cost accounting (TCA) framework to assessing the real costs and impacts of the current system. It asserts, "Our food system is failing us, and too few people understand the true cost of the food we consume, and lack clear incentives to change a system that is costing us dearly. That's why accounting for the true cost of the food we eat is the first, necessary step towards remaking the incentive structure that drives our food system today."

The report identifies primary areas impacted by food production and consumption: environment, human health, biodiversity, livelihoods, and the economy. By its own admission, the report's analysis focuses only on primary impacts of the food system; thus, it did not include downstream impacts, such as secondary impacts on the environment, national security, or educational outcomes (due to nutrition insecurity). It also sought to explore the impacts of both animal welfare and resilience, and to examine ways in which equity issues impact true costs. The report says that communities of color bear disproportionately the costs of the food system, particularly in health outcomes related to pollution, nutrition insecurity, and environmental injustices. It notes that black and brown Americans, who work disproportionately in the food system, shoulder greater proportional burdens related to exposures to pesticides and synthetic fertilizers, and bear greater economic impacts related to livelihoods (e.g., lower typical wages than for white Americans), as well as discriminatory impacts of agricultural subsidies. [The Rockefeller Foundation. True Cost of Food: Measuring What Matters to Transform the U.S. Food System. July 2021.]

Study Underscores Chemical-Intensive Farming Hazards and Need To Shift to Regenerative Organic Models

AUGUST 31, 2021 | To ensure long-term ecological, human health, and socioeconomic benefits, food production, distribution and consumption must transition from conventional to regenerative, organic food value chains, as outlined in research published in *Productions and Operations Management*. "We are paying a high price for a lack of transparency in our food supply and realize that taking shortcuts, or efficiencies, is not sustainable," said Aleda Roth, PhD, study coauthor and professor in the Wilbur O. and Ann Powers College of Business at Clemson University.

"We need to look at multiple performance outcomes, and in doing so, it will become evident that a regenerative, socially responsible approach to agriculture is imperative to a sustainable food supply, but it also extends across other business sectors." This research is the latest to underscore the importance of revamping the U.S. food system toward a focus on organic practices that account for externalities and provide multiple add-on benefits for society at large.

To make the case, Dr. Roth and her coauthor Yanchong Zheng, PhD, an associate professor in the Sloan School of Management at MIT, define and contrast conventional and regenerative, organic food value chains, with an eye toward "quadruple aim performance (QAP)." This is defined as a supply chain outcome that synergizes positive financial results with benefits to human, ecological and socioeconomic well-being. A range of deleterious "upstream" production practices are identified within each QAP component. To begin, the authors make the case that "squeezing market prices and rising expenses" within conventional chemical agriculture are causing significant financial strain on most farmers. The data show that the wealthy top 1% of farmers accepted nearly $2 million in federal subsidies on average while the bottom 80% garnered an average of only $8,000. Genetically engineered crops are singled out for their poor financial record with farmers, noting that patent holders, not farmers, own GE seeds, and must repurchase them every year, putting most farmers in a "financial straight jacket." Further, farmers that develop a pesticide-induced disease after growing pesticide-tolerant GE crops are unlikely to find quick financial restitution and thus are likely to suffer lost income, increased health care costs, and other expenses.

In outlining the human and ecological impacts of conventional chemical food production, Rachael Carson is used to frame the discussion, highlighting the prophetic nature of her work and the frustrating reality that the situation today is in many ways worse than in Ms. Carson's era. Excessive use of nitrogen fertilizers and significant release of greenhouse gasses, the rampant poisoning of the earth through toxic pesticide use, contributing to a worldwide insect decline are cited as evidence that, "Time is running out, as we cannot escape the accelerated rate and magnitude of conventional farming on the destruction of our planet's natural ecosystem." It is noted that the discussion around pesticide impacts in conventional agriculture pit federal regulators and the chemical industry against public health scientists and the nonprofit sector. Federal regulators are cited for allowing a range of pesticides restricted in other countries, as well as chemicals like glyphosate, putting human health at increased risk. [Roth, Aleda and Zheng, Yanchong. A Tale of Two Food Chains: The Duality of Practices on Well-being. *Production and Operations Management*. November 2020.]

IPM (Integrated Pest Management) Fails To Stop Toxic Pesticide Use

OCTOBER 15, 2021 | Integrated Pest Management (IPM) is a 60-year-old approach to agricultural practice that, when first conceived and implemented, had among its goals a significant reduction of synthetic pesticide use, and the health, environmental, and ecosystemic benefits that would flow from that. However, as a study published in *Agronomy for Sustainable Development* concludes, IPM has overall been unsuccessful in achieving those goals. The researchers propose to replace IPM with "Agroecological Crop Protection [ACP]," the application of agroecology to protecting crops from damage (usually by insects or weeds). Beyond Pesticides has long embraced the foundations of ACP, which focus on cooperation with natural systems that keep all organisms in healthy, dynamic balance (and avoid overpopulation and trophic cascades). The research was conducted by scientists from France, Cambodia, and Vietnam.

The authors offer myriad reasons for their conclusion that, "More than half a century after its conception, IPM has not been adopted to a satisfactory extent and has largely failed to deliver on its promise.... Despite six decades of good intentions, harsh realities need to be faced for the future.... IPM has arguably reached its limits." The research team, all of whom have worked as IPM scientists and proponents, seems to mourn that IPM has "lost its way" over the decades —moving from ecological and health concerns as primary to its current state, in which (usually chemical) control methods are central. They note, "In cases where the concept of ecology is used in IPM, environmentalism is referenced more often than ecology, i.e., the aim to reduce negative environmental impacts, rather than using ecological processes to replace chemical pesticides."

The explanations for IPM's failure to be adopted effectively and to achieve its goals, as yielded by their research, include: (1) the plethora of definitions of IPM has meant confusion and varying interpretations of the concept by practitioners; (2) there have been inconsistencies between IPM concepts and practices, and public policies; (3) commonly, there is a lack of basic understanding by farmers of the ecological concepts behind IPM; (4) in many IPM programs, chemical controls remain a cornerstone, and that use as a "last resort" is rarely adopted by farmers; (5) IPM research has been paltry, both in scientific and programmatic realms; and (6) "ecology" has been inadequately

prioritized in IPM. Other factors contributing to IPM's poor record include termination of programs that trained, supported, and guided practitioners; industry meddling; farmer perception of IPM as risky (and therefore not adopting it and/or returning to intensive chemical inputs); lack of effective decision thresholds established for specific crops in specific geographic and pest contexts, and; shifting political realities. Overall, once supportive training and funding disappears, the authors assert, pesticide use again surges. The researchers also write, "In settings with resource-poor smallholders, subsistence farming systems, no organic certification schemes, or lagging demand for high-value commodities, the availability of cheap pesticides hinders adoption of IPM."

There have been some successes with IPM, such as Southeast Asian farmer training programs yielding a 92% pesticide reduction in rice production in Bangladesh, and a 50–70% reduction in tea and cabbage in Vietnam (in the early 2000s). In 2014, research showed that in 500+ IPM programs across the globe, 13% increases in crop yields and 19% increases in farm profits were realized. Although many years ago, Beyond Pesticides was prepared to consider IPM a tool in the kit bag of reducing pesticide use, even then it recognized the problem of "varied [IPM] definitions and policies . . . numerous perspectives, and critical disagreements among public health and environmental advocates, regulators, and the pesticide and pest management industry." But currently, given what the study authors call "a quasi-infinite number of definitions and interpretations" of IPM, this absence of any standardized definition for IPM means that in the U.S., *any* registered pesticide can be used and the management system can still be considered "IPM."

Organic agriculture, on the other hand, operates within the codified organic regulations of the National Organic Program (NOP), is bound by a plan and the National List of Allowed and Prohibited Substances, and is subject to inspection to ensure compliance with NOP standards. Beyond Pesticides understood years ago, and continues to maintain, that organic land management and agriculture are the solution to the agrochemically induced crises—in health, in ecosystem degradation, in biodiversity loss and potential pollinator collapse, in depleted soils, and in water, air, and soil pollution, among others. [Deguine, Jean-Philippe et al. Integrated pest management: good intentions, hard realities. A review. *Agronomy for Sustainable Development.* 41(38), 2021.]

The Expense of Pesticides Significantly Outweighs Economic Benefits

DECEMBER 9, 2021 | The cost to maintain crops using conventional pesticides outweighs the economic benefits from crop production and yield, according to a report, which concludes that pesticides "cost double the amount they yield," by the French-based organization Bureau for the Appraisal of Social Impacts for Citizen Information (BASIC). Moreover, the annual cost of increasing organic farms three-fold by 2030 is less than the cost of pesticides to society (i.e., adverse health and ecological effects from pesticide use and contamination). However, the price to pay from pesticide use encompasses much more than the products themselves. Researchers point to the need for government and health officials to consider the billion-dollar costs associated with adverse health effects from pesticide use, especially as studies confirm that pesticides cause cancer, Parkinson's, and other diseases that are increasing. Thus, this report adds to the growing body of research demonstrating the unsustainability of conventional, chemical-intensive agricultural practices. The National Academy of Sciences identifies four goals of sustainable agriculture—productivity, economics, environment, and social well-being for future generations. However, current chemical pesticide use threatens sustainable agriculture. Although the primary concerns about

pesticide usage centers on health and ecological concerns, including food security, this report provides an economic assessment that offers an important holistic perspective on real costs and food sovereignty.

The report notes, "In a few decades, and thanks to the constant support of public authorities, the agricultural world has invested massively in the use of pesticides. While the profits of this sector are becoming increasingly concentrated in the hands of a few multinationals, society faces a considerable bill to pay each year to cover the costs linked to pesticide use. But even those amounts will not be able to repair the irreversible damage caused to humans and the environment. In contrast, the varied agroecological models have proven to be more sustainable. While transition to these also requires investments, the latter will be smaller and above all more sustainable. . . . [I]n 2022, Member States [in the EU] will have to assume their responsibility and choose between a costly, polluting model concentrated in the hands of a few players whose decision-making centers are outside Europe, and a sustainable agro-ecological model championed by citizens and farmers. It is the future food sovereignty for the EU—and, more broadly, for the planet—that is at stake." The study offers insight into the social and economic costs and benefits of the pesticide industry (i.e., production and use). BASIC investigates the current agricultural model that relies on

conventional toxic chemical use involving four primary manufacturers: BASF, Bayer/Monsanto, Corteva, Syngenta/ChemChina. Although the study's focus is the European market, pesticide exposure is widespread, and residues can travel across the globe. Thus, researchers analyze new pesticide data to evaluate the repercussions on the ecosystem, including effects on species health, diversity, and services (e.g., pest control, pollination, water/soil/climate regulation). The researchers then establish the cost from pesticide use and paid for by European citizens regarding these repercussions. Lastly, the organization evaluates the profits of the four major pesticide producers through pesticide use. The United Nations' 1987 report, *Our Common Future* (the Brundtland Report), outlines the benefits of sustainable agriculture in protecting the Earth's natural resources for future generations, advancing equal income allocation from food production, and supporting small-scale farming. The report emphasizes the challenges of sustainable agriculture, highlighting, "[it] is to raise not just average productivity and incomes [from resources], but also the productivity and incomes of those poor in resources.... Land use in agriculture and forestry must [use] scientific assessment of land capacity, and the annual depletion of topsoil, fish stock, or forest resources must not exceed the rate of regeneration." [Bureau for the Appraisal of Social Impacts (Basic). Pesticides: A model that's costing us dearly. Paris, France. November 2021.]

ACTIONS OF THE WEEK

Shift to Organic Farming, Not Carbon Trading, Is Critical To Thwart the Climate Crisis and Biodiversity Collapse

FEBRUARY 16, 2021 | The climate crisis, with unprecedented temperature shifts, storms, and wildfires, and the devastating decline in biodiversity are escalating as a result of uncontrolled and unnecessary reliance on toxic chemicals. These existential crises that threaten life, to be successfully thwarted, require a meaningful holistic strategy that commits our nation to ending our fossil fuel-based economy and use of petroleum-based materials that release harmful levels of carbon and noxious gases (including greenhouse gases/GHG) into the environment. The proposals now in Congress and the administration require close attention and scrutiny if we are to meet the urgency of the moment. The carbon market approach embodied in the *Growing Climate Solutions Act* and President Biden's Climate 21 Project does not adequately and comprehensively respond to the current and looming interconnected threats to public health and the environment.

The focus on carbon to the exclusion of a holistic approach that addresses complex life-supporting biological communities allows the continuation of disproportionate hazards to people of color and communities living adjacent to toxic sites. The mechanisms of carbon trading or the purchasing of carbon offsets under consideration do not establish an end date for admittedly unacceptable materials and practices, nor do they ensure a transition to life-sustaining practices. Just as there are proposals to end production of the combustion engine and move to electric vehicles, we must demand that agriculture—across the board and on an expedited five-year schedule—shift to organic practices, whose standards are already codified in federal law. Organic production and handling practices have a proven, commercially viable, track record and both sequester carbon and eliminate petroleum-based pesticides and synthetic fertilizers. And, importantly, the data shows that this sector of agriculture is now operating without sacrificing productivity or profitability. The only problem: the vested economic interests in the petroleum and chemical industry are holding on to the status-quo. The good news: there are good jobs and money to be made in a green economy. **Tell your Congressional Representatives and Senators to support a holistic approach to the existential threats of the climate crisis and biodiversity collapse.**

Take Action: Tell EPA Not To Allow Unnecessary Pesticide Risks

JULY 26, 2021 | Despite federal law that directs the U.S. Environmental Protection Agency (EPA) to register pesticides only if they do not cause unreasonable adverse effects on humans or the environment, EPA allows pesticides known to cause many adverse effects in humans and the environment. These include health effects such as asthma, autism and learning disabilities, birth defects and reproductive dysfunction, diabetes, Parkinson's and Alzheimer's diseases, and several types of cancer—and environmental effects such as decimation of pollinator populations, direct

and indirect killing of wildlife, reducing carbon sequestration in the soil, and poisoning air, water, and land. The risks are particularly high for farmworkers and fenceline communities. Why does EPA consider these effects "reasonable" when the pesticides are not necessary to achieve pest management or prevention goals?

Tell EPA not to allow unnecessary pesticide risks. When evaluating pesticide registration applications, EPA does not require data demonstrating "benefits" against which these risks may be weighed. That kind of calculation only takes place years down the line, if EPA believes there is reason to consider canceling a pesticide's registration. On the other hand, the existence of organic producers fueling $62 billion in organic sales in the U.S., with virtually all commodities being now grown and processed without toxic pesticides, indicates that a true cost accounting of pesticide use would find these risks unreasonable. This month, the Rockefeller Foundation released a report estimating that the true cost of food is about three times the $1.1 trillion that consumers pay annually. The report says, "Of the impact areas we assessed in our study, the costs related to human health were by far the most significant driver of unaccounted-for costs, at roughly $1.1 trillion per year. That figure alone nearly doubles the cost of our food system—our national 'bill' for the diet-related disease is equal to all the money we currently pay for the food itself." An additional $100 billion is attributed to the "unaccounted livelihood costs" to the "food workers and producers—who are overwhelmingly from marginalized communities, and in particular from communities of color." The report also calculates that the "unaccounted costs of the food system on the environment and biodiversity add up to almost $900 billion per year. These costs are mainly attributable to two areas: greenhouse gas (GHG) emissions and biodiversity costs." Although not all of the unaccounted costs identified by the Rockefeller Foundation are directly attributable to pesticide use, many are and should factor into EPA's pesticide registration process. That process should compare those costs, as well as those already identified by EPA, to the organic farming alternative. If the risks can be eliminated by organic farming, then they are unnecessary—and, therefore, unreasonable.

The United Nations Environment Program Summary for Policy Makers

- Summary for Policy Makers, January 27, 2021
- Excerpts from Environmental and health impacts of pesticides and fertilizers and ways of minimizing them

The report acknowledges the global goal to minimize adverse impacts of chemicals and waste by 2020 was not achieved for pesticides and fertilizers.

Pesticide use efficiency has not improved
While global pesticide use has steadily increased during the past decades, both in total volumes and the amounts applied per hectare of cropland, pesticide use per unit crop output has remained unchanged. This indicates that pesticide use efficiency has not improved at the global level even though modern pesticides are more biologically active per gram of active ingredient applied.

Significant amounts of nutrients are lost to the environment
Nutrient use efficiencies are less than 40–65 per cent for nitrogen, 15–25 percent for phosphorus and 30–50 per cent for potassium in the first year of application. Subsequent crops benefit from some of the fertilizer nutrients left in the soil by the first crop. For example, most of the phosphorus applied can be used by subsequent crops. However, nutrients are lost to the environment and may result in environmental and health impacts and economic losses to farmers. During the past decades nitrogen use efficiency has improved in some countries, but has declined in others.

Global instruments and agreements
[T]he conventions [Stockholm Convention, the Rotterdam Convention and the Basel Convention] cover a limited number of chemicals, while effective implementation of codes presents challenges with respect to addressing all important aspects of managing pesticides and fertilizers and minimizing their adverse environmental and health impacts.

Priority transformative actions
- Incentivize healthy and sustainable consumer choices and consumption
- Fundamentally change crop management and adopt ecosystem-based approaches
- Use economic instruments to create a level playing field for greener products and approaches
- Promote the use of direct finance to encourage sustainable agriculture
- Adopt integrated and life cycle approaches for sound pesticide and fertilizer management
- Strengthen standards and adopt corporate policies for sustainable supply chain management

Organic Management Practices Ensure a Sustainable Future

FIGHTING FOR A LIVABLE PLANET: ECOSYSTEM CONSERVATION

What sets organic apart from current conventional thinking and practice is its systems approach. As a land management practice, it relies on an appreciation and understanding of the value of soil health and biodiversity. With methods that incorporate the importance of soil organic matter and the role of soil organisms in breaking it down to produce nutrients for the plant, the organic system is resilient, retains moisture, and sequesters carbon. Only soil supplements and pest management materials or substances are allowed to be introduced into the system under federal organic standards if they are evaluated as compatible with the soil system, do not endanger health, and are deemed essential. In this context, new products (whether biological or synthetic) cannot be used as substitute inputs in an otherwise conventional system that does not implement an ecological-based approach to soil management.

The studies in this section address a range of scientific reviews over 2021 that explore the various dimensions of organic, with significant research on emerging biological controls. Studies range from the health of the environment to

human health and diet. One study finds that organic food consumption among children is associated with higher scores measuring fluid intelligence (problem solving and abstract thinking) and working memory.

Because "sustainable" agriculture is not defined with the legal restrictions of certified organic, research on the use of glyphosate-based herbicides (GBHs) provides an important framework for measuring whether inputs like these fit into a sustainable system. According to researchers, "[W]hether or not GBHs are viewed as essential or unessential to contemporary agriculture, and notwithstanding their role in non-tillage agriculture, this study shows that glyphosate-based herbicides do not reach the bar of agricultural sustainability, with respect to humans and the environment, making the system they are part of unsustainable." Applying these findings more broadly, this research suggests that many self-identifying their practices as "regenerative agriculture" are not sustainable, unless they adhere to organic methods.

Organic is continually improving and being challenged. A summary of a lawsuit is included in this section about USDA allowing certain hydroponic systems to be labeled organic. To many, if not most, among the early adopters and pioneers in organic, it is counterintuitive to call a soil-less system organic, no matter what materials are used. That is not to say, that these hydroponic systems do not have value. However, because the soil system and goal of enhancing biodiversity are central to the underlying values and principles of organic, a different label seems warranted. If nothing else, existing hydroponic crops that display the organic seal should be fully transparent with supplemental labeling so that consumers can make informed choices in the marketplace.

Organic standard setting was envisioned as providing for continuous improvement, democratic input, and full transparency. There are important opportunities for the public to engage with the organic rulemaking process to ensure that the National Organic Standards Board and the USDA National Organic Program uphold the values and principles of organic. Visit Beyond Pesticides' *Keeping Organic Strong* webpage at *bp-dc.org/keepingorganicstrong* to plug into the issues before the Board.

With ongoing developments, such as new research on nontoxic methods to manage fungus, as referenced in this section, and given the existential crises on the horizon, EPA must evaluate the reasonableness of using toxic chemicals and fossil fuel-based materials when evaluating pesticide registrations. EPA can evaluate systems in which pesticides are used and with the available science determine whether there is an unreasonable built-in pesticide dependency resulting in adverse health and environmental effects that can be replaced by an organic system without the harm.

Researchers Find Nontoxic Method Kills a Problematic Fungus When It Least Expects It

MARCH 17, 2021 | Ultraviolet radiation (UV-C) applied at night can successfully kill powdery mildew in farm fields, providing a potential route to significantly reduce the use of toxic fungicides, new research published in the *Plant Disease* finds. "UV treatments applied once or twice weekly were as effective as the best available fungicides applied on similar schedules for control of strawberry powdery mildew," study author Natalia Peres, PhD, of the University of Florida, said. "It's not a one-time fluke." The results are encouraging and have the potential of reducing fungal pressure through nontoxic means, but like all pest management tools should be

used as part of a system that focuses first and foremost on fostering healthy soils and biodiversity.

Powdery mildew is a fungal pathogen that can infect a range of plants, from cucurbits to grapes, apples, onions, and cannabis. For the study, the primarily Florida-based researchers focus on the state's $300 million strawberry industry. Powdery mildew is often facilitated by high humidity and can be exacerbated when crops are grown in tunnels or other enclosed areas due to lack of airflow and poor ventilation. The fungus presents as a white powder on the surface of plant leaves and can spread through the production of asexual spores. There is a range of methods currently in use to fight powdery mildew. Conventional

fields are more likely to apply synthetic fungicides such as myclobutanil, quinoxyfen, or azoxystrobin. Organic growers often use softer, less hazardous products like horticultural oils and bicarbonates. All growers are generally encouraged to plant cultivars that have been bred to be more resistant to powdery mildew. Although small scale farmers and gardeners have a better opportunity to practice mechanical and cultural controls, such as removing diseased leaves and thinning out susceptible plants, these approaches can be more difficult to implement on a larger scale.

Researchers tested the efficacy of UV-C light by affixing a series of light panels to a platform that was pulled behind a tractor over rows of strawberry plants. The light applications took place at night, because powdery mildew evolved to withstand the UV rays within natural sunlight. However, it seems as though that adaptation also made the pathogen more susceptible to UV light at night. [Onofre, Rodrigo et al. Use of Ultraviolet Light to Suppress Powdery Mildew in Strawberry Fruit Production Fields. *Plant Disease*. 105(9):2402-2409, 2021.]

Court Rules Soil-Less Hydroponics Allowed under Organic Standards, Organic Farmers/Consumers Say No

MARCH 26, 2021 | Certified organic, soil-based growers were dealt a blow on March 22 when a U.S. District Court in San Francisco ruled that soil-less hydroponic growing operations can continue to be eligible for USDA (U.S. Department of Agriculture) organic certification within the National Organic Program (NOP). According to the Center for Food Safety (CFS), the judge ruled that USDA's exemption of hydroponics from the "soil fertility requirement mandatory for all soil-based crop producers was permissible because the *Organic Foods Production Act* did not specifically prohibit hydroponic operations." The litigation was brought by eight organic producers and asked that the court prevent USDA from allowing hydroponically grown crops to be sold under the USDA certified organic label. Beyond Pesticides has advocated against allowing soil-less crop production to be certified as organic under NOP because doing so "undermines the authenticity of organic farming, and creates unequal competition, market instability, and consumer distrust in organic certification." The coalition of plaintiffs in the suit includes some long-standing U.S. organic farms, such as Swanton Berry Farm, Full Belly Farm, Durst Organic Growers, Terra Firma Farm, Jacobs Farm del Cabo, and Long Wind Farm, in addition to organic stakeholder organizations, such as organic certifier OneCert and the Maine Organic Farmers and Gardeners Association.

Basic definitions are in order: USDA's National Organic Program is the federal program that develops and enforces standards for organically produced agricultural products. The National Organic Standards Board (NOSB), a committee appointed by the Secretary of Agriculture, is tasked with helping develop standards for what can and cannot be used in organic production, and to advise the Secretary of Agriculture on implementation of the *Organic Foods Production Act* (OFPA). The National Organic Standards (NOS) are those developed by NOSB to regulate certified organic production practices. OFPA is the statute that authorizes both the NOP and NOSB. Also: hydroponic "farming" systems grow plants in water-based nutrients rather than in soil. Aquaponic systems combine hydroponics and aquaculture (fish/shellfish farming) in a symbiotic system in which plants are fed, in part, the aquatic animals' waste.

The District Court's ruling by Chief Judge Richard Seeborg means that USDA can continue its permitting of organic certification of hydroponically produced crops. The question of hydroponic and aquaponic eligibility for organic certification has been very controversial, and centers on the very definition of organic production, which recognizes the foundational role of regenerative practices that improve soil health and promote ecological balance. Advocates for soil-based organic agriculture decry soil-less farming as violative of not only the dictates of the National Organic Standards, but also, the long-acknowledged principles of the organic movement.

Glyphosate-Based Herbicides and Sustainable Agriculture Do Not Mix!

APRIL 29, 2021 | Glyphosate-based herbicides (GBHs) are incompatible with sustainable agriculture goals, according to a recent scientific literature analysis in *Sustainability* by scientists at Tufts University. Glyphosate is the most commonly used pesticide active ingredient worldwide, appearing in many herbicide formulas, including Bayer's (formerly Monsanto) Roundup™. The use of this chemical has been increasing since the inception of crops genetically modified to tolerate glyphosate. However, studies demonstrate glyphosate is the main contributor to human, biotic, and ecosystem harms as toxicities from herbicides are now double what it was in 2004. The National Academy of Sciences identifies four goals of sustainable agriculture—productivity, economics, environment, and social well-being for future generations. However, pesticides like glyphosate are ubiquitous in the environment, putting the health, economy, and food/resources for future generations at risk. Therefore, research like this is vital to understanding how chemical use can undermine sustainable agriculture goals to protect humans, animals, and environmental health.

Researchers note, "[W]hether or not GBHs are viewed as essential or unessential to contemporary agriculture, and notwithstanding their role in non-tillage agriculture, this study shows that glyphosate-based herbicides do not reach the bar of agricultural sustainability, with respect to humans and the environment, making the system they are part of unsustainable."

Researchers thoroughly examined ~3,000 scholarly sources to analyze whether GBHs meet sustainable agriculture goal standards. Scientists noted any impacts GBHs applications have on human health, non-tillage agriculture, soil quality, aquatic ecosystems, and beneficial/non-target species. Researchers used various viewpoints on agricultural sustainability as a guide for sustainability standards:

- "Promoting agroecology [ecological processes in agriculture systems].
- Protecting the resource base of natural systems for future generations, including and especially the soil.
- Protecting biodiversity.
- Enhancing the quality of life and health of farmers, farmworkers, and society as a whole."

This paper finds that GBHs do not contribute positively to sustainability, violating enough criteria to make conventional agricultural systems using GBHs unsustainable. Studies regarding "glyphosate toxicology" have been increasing since 2005. According to the International Agency for Research on Cancer (IARC), glyphosate is "probably carcinogenic in humans," therefore, GBH use decreases the quality and health of farmworkers and society. Although studies demonstrate the starkest example of GBH toxicity among animals, indicating a risk to humans, many *in vitro* studies provide evidence that GBHs are toxic to human cells. Further, the review finds ingredients in Roundup™ are just as toxic as glyphosate itself, causing DNA damage at low concentrations. Thus, various formulas of GBHs can have devastating effects on human health. [Krimsky, Sheldon. Can Glyphosate-Based Herbicides Contribute to Sustainable Agriculture? *Sustainability*. 13(4):2337, 2021.]

Conventional Meats Contaminated with Multidrug Resistant Bacteria at Significantly Higher Rates than Organic Meats

MAY 18, 2021 | Organic meat is far less likely to be adulterated with multidrug resistant bacteria (MDRB) than conventional meat, according to a study in *Environmental Health Perspectives*. The research by experts at Johns Hopkins Bloomberg School of Public Health is the latest news on the health and safety benefits of choosing organic, which prohibits the regular use of risky antibiotics, for one's food purchases. Scientists indicate that contaminated foods pose serious dangers for consumers, public health, and the economy at large. "The presence of pathogenic bacteria is worrisome in and of itself, considering the possible increased risk of contracting foodborne illness," senior author Meghan Davis, PhD, associate professor at the Bloomberg School said. "If infections turn out to be multidrug resistant, they can be more deadly and more costly to treat." To determine the level of contamination in various packaged meats, scientists turned to the National Antimicrobial Resistance Monitoring System (NARMS), a collaborative program between the U.S. Centers for Disease Control and Prevention, the U.S. Food and Drug Administration (FDA), and the U.S. Department of Agriculture. For a five-year period spanning 2012–2017, NARMS collected meat products (chicken breast, ground beef, ground turkey, and pork chops) from 19 different U.S. states. Within each state, NARMS selected a random food retailer within 50 miles of their lab and collected 40 samples each month. In sum, 39,349 meat samples were analyzed for the study, encompassing 216 conventional meat processors, 123 processors that split their operations between organic and conventional, and 3 fully organic processing facilities. Roughly 8% of tested samples were organic, while the rest were conventional. Of the nearly 40,000 samples analyzed, 1,422 (3.6%) were contaminated with MDRB. Organic meats had 29 of their 3,235 samples contaminated (.9%), while with conventional produce 1,393 out of 36,114 samples (3.9%) contained dangerous antibiotic resistant bacteria. This translates to organic certified meats being 56% less likely to be contaminated with MDRB. A deeper look into the data shows overall contamination lower at facilities that split conventional with organic production, when compared to those that only process conventional meats. Conventional meats from pure conventional facilities were likely to be contaminated with pathogenic bacteria roughly a third of the time (34.1%), while conventional meats from split facilities only had a roughly one in four chance (24.1%). "The required disinfection of equipment between processing batches of organic and conventional meats may explain our findings of reduced bacterial contamination on products from facilities that process both types of meats," Dr. Davis notes. Organic is not safer by chance, but by design. Organic standards, governed by the *Organic Foods Production Act of 1990*, were crafted with the goal of protecting public health and ecosystem services. Organic standards prohibit the use of antibiotics in poultry after their first day of life. Antibiotics for the purpose of stimulating the growth or production of organic livestock are prohibited. If an antibiotic is used to restore an animal to health, that animal cannot be used for organic production or be sold, labeled or represented as organic. (Livestock in herds newly converted to organic management may have been treated up to the third trimester.) Organic certified meats are also required to follow a stricter processing protocol, and in split operations organic meats cannot be processed on the same equipment as conventional meats without first undergoing cleaning and disinfecting. [Innes, Gabriel et al. Contamination of Retail Meat Samples with Multidrug-Resistant Organisms in Relation to Organic and Conventional Production and Processing: A Cross-Sectional Analysis of Data from the United States National Antimicrobial Resistance Monitoring System, 2012–2017. *Environmental Health Perspectives*. 129(5), 2021.]

Coffee Leaf Rust Hits Hawai'i, Emergency Fungicide Approved, Hyperparasite Biocontrol Possible

MAY 26, 2021 | Coffee leaf rust, caused by a fungus that can devastate fields of coffee plants, and the coffee industry of entire countries, was recently detected on the Hawaiian Islands for the first time. The U.S. Environmental Protection Agency (EPA) acted quickly to approve the emergency use of a synthetic fungicide, but new research conducted in the fungus's home range shows the promise of a hyperparasite biocontrol. Caused by the fungus *Hemileia vastatrix*, coffee leaf rust was first documented in its home range of Africa in the 1860s. By the later part of that decade, it had spread to Sri Lanka, and destroyed the country's monoculture coffee plantations, which were subsequently replaced with tea cultivation. The disease has now

been found in every coffee producing country, but up until late last year, it had never been seen on the Hawaiian Islands.

Thus, Hawaiian coffee farmers are rightly concerned about the disease. In response, EPA permitted the use of a product called *Priaxor Xemium*, a fungicide consisting of the active ingredients fluxapyroxad and pyraclostrobin, which has been linked to birth and developmental effects, and presents significant hazards to birds and aquatic organisms. "Hawai'i coffee growers now have an added method to combat the coffee leaf rust, which is extremely difficult to manage," said Phyllis Shimabukuro-Geiser, chairperson of the Hawai'i Board of Agriculture. But while conventional chemical growers may opt to spray hazardous pesticides, organic farmers will look toward less toxic methods of management.

A new study published by researchers from Sweden and Ethiopia in *Agriculture, Ecosystems & Environment* identifies a potential biological control of *H. vastatrix* in Southwestern Ethiopia, the home range of Arabica coffee and its fungal disease. Sixty sites, consisting of 50 by 50m (164 x 164 ft) plots, were analyzed in the region over the course of three years. The sites varied in the level of management intensity, amount of shade provided the coffee plants, and the ecological characteristics surrounding the farmland. Researchers aimed to catalog the interaction between *H. vastatrix* and another fungus known as *Lecanicillium lecanii*. *L lecanii* is considered a "hyperparasite," in that it is a parasite that attacks another parasite. Scientists know that the hyperparasite controls the rust fungus, but are not aware how widespread it is distributed, the conditions in which it thrives, and whether it may be able to play a role in suppressing the rust in commercial production. [Zewdie, Beyene et al. Temporal dynamics and biocontrol potential of a hyperparasite on coffee leaf rust across a landscape in Arabica coffee's native range, *Agriculture, Ecosystems & Environment,* Volume 311:107297, 2021.]

Kids Who Eat Organic Food Score Higher on Cognitive Tests, Study Finds

JULY 7, 2021 | Organic food consumption among children is associated with higher scores on tests measuring fluid intelligence and working memory, research published in the *Environmental Pollution* finds. The study, conducted by Spanish researchers based at the Barcelona Institute for Global Health, took an exposome approach to environmental exposures, looking at a totality of all environmental hazards that children encounter, rather than investigating individual lifestyle factors one by one. As study coauthor Jordi Júlvez, PhD, notes, "Healthy diets, including organic diets, are richer than fast food diets in nutrients necessary for the brain, such as fatty acids, vitamins and antioxidants, which together may enhance cognitive function in childhood."

Researchers began their study by selecting mother-child pairs enrolled in the Human Early-Life Exposome (HELIX) Project, a pan-European study with projects in multiple European countries. Nearly 1,300 healthy children aged 6–11 were included in the study, as researchers already had pregnancy data and urine samples stored on the participants. To determine other environmental exposures, home addresses were evaluated for their level of pollution and proximity to natural spaces, and children and their mothers were given tests that included a questionnaire on lifestyle factors, including parents smoking and alcohol use, the indoor environment, the child's diet, physical activity, and other habits. Both computer and clinical tests were conducted to determine fluid intelligence, attention function, and working memory, scored together as cognition.

Researchers find that children who eat organic food display higher scores measuring fluid intelligence and working memory. Lower scores on fluid intelligence tests were associated with children's fast food intake, house crowding, and exposure to tobacco smoke. Lower scores on working memory tests were associated with exposure to poor indoor air quality. [Julvez, Jord et al. Early life multiple exposures and child cognitive function: A multi-centric birth cohort study in six European countries, *Environmental Pollution*, 284:117404, 2021.]

Multi-Crop (Mixed Culture) Farming Practices Promote More Fruitful Farmland than Single-Crop (Monoculture)

JULY 15, 2021 | A study published in *Nature Plants* finds multi-crop (mixed culture) farmlands, which include a diverse array of crops, produce higher biomass and seed yields than single-crop farms (monocultures). Monocultures are most prevalent among arable farmland, as commercial industrial farming uses this practice to increase sowing, managing, and harvesting efficiency for higher yields. However, lower crop diversity leads to higher, more intensive pesticide use as pests favor the consistent food availability monocultures provide. An increase in toxic chemical use threatens human, animal, and environmental health, as well as food security. Ecological research already finds a positive association between plant diversity and biomass productivity in grasslands and meadows. In addition, a University of California, Santa Barbara study demonstrates that crop diversity in commercial agriculture is just as essential to supporting a stable biological system as plant diversity on non-commercial landscapes (i.e., grasslands/meadows). Therefore, this research highlights the need to develop policies that help farmers and global leaders make more knowledgeable decisions regarding crop diversity to sustain yield without toxic pesticides. The researchers note, "While crop diversification provides a sustainable

Researchers Develop Pesticide-Free, Mosquito-Proof Clothing

JULY 27, 2021 | Researchers at North Carolina State University reported in a study in *Insects* that they have developed pesticide-free clothing able to prevent 100% of mosquito bites for the wearer, and published proof of the garment's effectiveness. If able to be scaled at a commercial level, the fabrics have the potential to transform personal protective measures for mosquitoes, which often includes well-meaning consumers spraying toxic pesticides like DEET and permethrin on their body and clothing. "The fabric is proven to work—that's the great thing we discovered," said study coauthor Andre West, associate professor of fashion and textile design at NC State and director of Zeis Textiles Extension for Economic Development, in a press release. "To me, that's revolutionary. We found we can prevent the mosquito from pushing through the fabric, while others were thick enough to prevent it from reaching the skin." To create the mosquito-proof fabric, scientists turned to physics and mathematical models, rather than looking for new killer chemistries. "Our premise here is: why do we need an insecticide-treated textile when you can do it, now that you know a mathematical formula, without chemistry?" said Michael Roe, PhD, an N.C. State professor of entomology, to the *News and Record*. Scientists analyzed the mosquito's morphology, looking for weaknesses that could be addressed by various textiles. Measurements were taken on the mosquito's head, antenna, proboscis, and other mouth parts. Then, textile models with differing pore sizes and thicknesses were developed to address different aspects of the mosquito's morphology. One had pores small enough to stop the proboscis from entering the skin, another stopped the mosquito from getting its head close enough to the skin, and the third had larger pores but was thick enough to stop skin contact.

Scientists then developed three fabrics based on the models to test in the real world. One was a superfine knit, another was knit, double layered and bonded, and the last fabric was a knit three-dimensional fabric, and thus thicker than the other two. Lab testing found that the fabrics developed by researchers provided bite resistance of 95% or greater. Scientists then compared the success of their model textiles to the use of permethrin-treated clothing, a common insecticide that, despite being classified as having suggestive evidence of carcinogenicity, is often impregnated in or sprayed on to clothing in an attempt to ward off mosquitoes. Results show that while the pesticide-free woven textiles maintain bite resistance to 95%, permethrin treated clothing's bite resistance was as low as 80%. Although more mosquitoes landed on the woven clothing, fewer were able to penetrate and reach the skin. [Luan, Kum et al. Mosquito-Textile Physics: A Mathematical Roadmap to Insecticide-Free, Bite-Proof Clothing for Everyday Life. *Insects*. 12(7):636, 2021.]

measure of agricultural intensification, the use of currently available cultivars [(plant varieties for selective breeding)] may compromise larger gains in seed yield. We, therefore, advocate regional breeding [programs] for crop varieties to be used in mixtures that should exploit complementarity [(harmonization)] among crop species."

It is critical for plants to allocate resources for reproduction or seed-bearing. This allocation of resources for reproduction is a trait known as the harvest index in the agricultural context, which determines how plant biomass converts to seed yield. Hence, this study aimed to assess seed yield and biomass differences between monoculture and mixed culture farming. To do this, researchers replicated a general garden experiment in Switzerland and Spain at two soil fertility levels (unfertilized and fertilized) and four plant diversity levels. Researchers tested eight annual grain crop species: wheat, oat, quinoa, lentil, blue lupin, camelina, linseed, and coriander. The seeds of each crop were planted in alternating, parallel rows 12 centimeters apart and grown without pesticides. Researchers compared the results of 24 different two-species and 16 different four-species mixed cultures to monocultures and a singular, isolated plant. Overall, the results demonstrate that mixed cultures produce higher yields than monoculture farming. In mixtures of two crops, seed yields increase by 3.4 percent in Spain and 21.4 percent in Switzerland. In four-species combinations, seed yield increases 12.7 percent and 44.3 percent in Spain and Switzerland, respectively. Although seed yield was lower than expected relative to vegetative biomass in Spain, seed production remains higher among mixed cultures. [Chen, Jianguo et al. Diversity increases yield but reduces harvest index in crop mixtures. *Nature Plants.* 7: 893–898, 2021.]

Nematodes Show Promise as Biological Control Agent for Non-native Fire Ants

AUGUST 3, 2021 | Research published in *iScience* outlines a promising, pesticide-free approach to manage non-native fire ants that have invaded many coastal communities along the eastern U.S. As unabated climate change rapidly warms the planet, shifting wildlife habitat, and increasing the rate of intense storms and other natural disasters, pest insects like the fire ant are finding favorable conditions for their expansion into new areas. With pressure growing on land managers to resort to highly toxic pesticides to manage stinging and biting pests, it is increasingly important to invest in and emphasize new biological-based approaches. Scientists from the University of Maine focused in on a strain of fire ants known as *Myrmica rubra*, native to Europe and Asia and commonly known as the European fire ant. The ant is highly aggressive, attacking humans or other animals when disturbed, and boasts a powerful sting. In Europe, the ant plays an ecological role in conserving an endangered species of *Maculinea sp*. butterflies. The butterfly larvae send out chemical signals that mimic a queen ant, and the fire ants take the larvae into their nest. There, the larvae are protected from predators, and often are provisioned by or feed on ants in the colony. However, in the U.S., there is no similar ecological role for the ants to play, making them a troubling hazard for those wishing to enjoy the outdoors peacefully. *M. rubra* fire ants were first discovered in the U.S. in the early 1900s, but have increased significantly over the last 100 years, and rapidly over the last two decades as climate change creates more favorable habitat conditions.

During surveys of ant populations along the Maine coast, researchers noticed that many of the dead ants dissected in the lab contained a nematode known as *Pristionchus entomophagus*. *P. entomophagus* is a necromenic nematode—it enters its host while the host is alive, and then remains in stasis until the host dies, at which time it begins its reproductive cycle. While scientists indicate *P. entomophagus* nematodes may be trending toward parasitism from an evolutionary standpoint, they currently feed on a range of bacteria and are not specifically selecting for bacteria that would kill off the ants. Thus, scientists see value in exploring nematode transmission of bacteria as a biocontrol agent for fire ant management. [Ishaq, Suzanne et al. Bacterial transfer from *Pristinonchus entomophagus* nematodes to the invasive an *Myrmica rubra* and the potential for colony mortality in coastal Maine*, iScience*. 24(6): 102663, 2021.]

Socioeconomic and Environmental Benefits in Organic Farming Exceed Chemical Practices

AUGUST 24, 2021 | Organic agriculture provides multiple ecosystem functions and services at greater economic benefit to farmers than conventional, chemical-intensive cropping systems, according to research published in *Science Advances*. The study, conducted by a team of scientists based in Switzerland, goes beyond farming evaluations based solely on ecosystem services to include socio-economic elements. "We did this because agroecosystems also have a socioeconomic dimension for producers and policy makers," the authors note. While it is unsurprising based on prior research that organic practices provide greater

environmental and economic benefits, the study lays bare the true cost of policies that myopically focus on yield, while ignoring other factors.

Researchers conducted their study using data derived from a long-running Farming System and Tillage Experiment (FAST) based in Switzerland. FAST tracked four types of cropping systems: conventional intensive tillage, conventional no tillage, organic intensive tillage, and organic reduced tillage. Cropping systems were evaluated based on four broad categories, including provisioning (i.e., food production), regulating (i.e., water, air, and soil management), and supporting (i.e., biodiversity and soil health) ecosystem services, as well as socioeconomic well-being. These categories were subsequently broken down into nine assessments: soil health preservation, erosion control, biodiversity conservation, water and air pollution control, food production, income, work efficiency, and financial autonomy. Organic farming significantly increased soil health preservation and erosion control when compared to intensively tilled conventional systems.

These benefits are primarily seen in the organic reduced tillage approach, highlighting the benefits of that practice. Researchers find that yields drop from conventional to organic systems, although differences are seen between particular crops—with less pronounced disparities between legume crops compared to corn. Organic systems also result in higher income, due to the higher price organic products command in the marketplace. [Wittwer, Raphael et al. Organic and conservation agriculture promote ecosystem multifunctionality. *Science Advances*. 7(14), 2021.]

Slugs and Snails Controlled With Bread Dough, Really

AUGUST 25, 2021 | Extension Service scientists at Oregon State University (OSU) have found a highly effective bait for slugs and snails: bread dough. Although not quite as exciting as the slug-liquefying nematodes, the OSU research team published data showing that bread dough has the potential to revamp mollusk management, particularly in developing countries where resources are limited. "Bread dough is a nontoxic, generic, and effective tool that could be used in the detection and management of gastropods worldwide," said study lead author Rory McDonnell, PhD in the journal *Insects*. "It represents a tool to aid in managing pest gastropod infestations, either using baited traps or in attract-and-kill approaches. It could also be incorporated into existing baits to improve their attractiveness."

Critically, bread dough was found to be a more effective bait than commercial attractants like the product Deadline® M-Ps™, which contains the hazardous compound metaldehyde. To test effectiveness, researchers began by making the bread dough using a combination of flour, water, and yeast. In a lab setting, slugs were starved for 24 hrs, and then given the option of either bread dough or water. (Water was used as a control to test if the slugs were simply attracted to humidity.) Researchers determined through this trial that slugs are most attracted to bread dough aged between 2 and 8 days. A similar setup compared the attractiveness of bread dough against Deadline® M-Ps™, using the common garden snail *C. aspersum*. Of 20 slugs tested, 14 went for the dough, three went for the commercial bait, while three were unresponsive. Field trials were then established to determine real world efficacy. The traps employed, including the Snailer**,** which allows entry but bars exist, as well as a simple Petri dish, were loaded with bread dough, and a liquid form of metaldehyde was added

to the bottom. A control using water and liquid metaldehyde was also used. Slugs and snails overwhelmingly chose to feed on the bread dough baited traps. At one site, on mining reclamation land infested with the land snail *X. obvia*, researchers were able to trap over 18,000 over the course of two days. Only roughly 850 snails were collected in control bait.

"We gave them a choice of food and they consistently went for the bread dough," Dr. Mc Donnell said. "They really, really like it. They went bonkers for it. Bread dough outperformed everything." Although researchers used toxic metaldehyde to kill slugs when they got to the bait, discretely located traps can ensure that a pesticide is not used in a broadcast manner and disposed of properly. However, many traps and baits, such as the Snailer, will work with bread dough and water without the need for additional pesticide, as they bar pests from exiting and cause the slug or snail to drown. Use of metaldehyde should generally be discouraged as the chemical is a suggestive carcinogen, with evidence of neurotoxicity, kidney and liver damage, and reproductive harm. Although the National Organic Program permits the use of the iron phosphate in slug and snail control, its efficacy relies on a synergy between iron phosphate and a so-called "inert" ingredient known as EDTA. In 2014, Beyond Pesticides called on the National Organic Standards Board to delist iron phosphate slug products due to the risks EDTA poses to soil organisms, as well its ability to contaminant soil, sediment and local waterways. [Veasey,

Study Finds Packaged Organic Foods Are Healthier Than Conventional Products

SEPTEMBER 21, 2021 | Processed organic foods are healthier than their conventional, chemical-intensive counterparts in important ways, according to a peer-reviewed study published in *Nutrients* and led by scientists at the Environmental Working Group. While a steady diet of whole, unprocessed foods is ideal, packaged foods are ubiquitous in U.S. supermarkets and often unavoidable. In addition to eliminating concerns over highly toxic pesticide use, according to this new research, choosing packaged organic is an effective means of avoiding highly processed ingredients associated with adverse health outcomes. Researchers began with a food product dataset including over 72,000 conventional and 8,000 organic packaged foods, representing 85% of all food products sold to U.S. consumers. These products and their ingredients were then classified into four groups corresponding with the amount of processing, with one being unprocessed or minimally processed and four being ultra-processed. A statistical analysis was then conducted on a range of product variables to differentiate various health concerns between organic and conventional products. Results show that organic packaged foods present far fewer health concerns than conventional products. Processed organic products were likely to have lower amounts of salt, saturated fat, sugar and added sugar. According to the analysis conducted by researchers, for every ultra-processed ingredient in a product, the likelihood of that product being organic declined by 32%. The same held for a range of concerning factors—the odds of a product being organic likewise decreased as sugar, salt, and trans fats were added to conventional foods. On the other hand, organic products are associated with higher amounts of potassium in processed foods. "Here, with the finding that the odds of being labeled organic decreased as the ultra-processed ingredient number or cosmetic additive number increased, we show that organic product certification can be a proxy for less ultra-processed and thus more healthful products," the study reads. These conclusions appear to line up with research published in November 2020, finding that eating organic food lowers risk of developing type 2 diabetes. While there is ample evidence to relate this finding to the use of toxic, endocrine-disrupting pesticides in conventional agriculture, the present study shows that the ingredient label is also playing an important role. [Meadow, Aurora et al. Packaged Foods Labeled as Organic Have a More Healthful Profile Than Their Conventional Counterparts, According to Analysis of Products Sold in the U.S. in 2019–2020. *Nutrients.* 13(9);3020, 2021.]

Robin et al. Fermenting Bread Dough as a Cheap, Effective, Nontoxic, and Generic Attractant for Pest Snails and Slug. *Insects.* 12:328, 2021.]

Unless You Go Organic, Switching to "Healthier" Mediterranean Diet Increases Pesticide Exposure Threefold

NOVEMBER 9, 2021 | Replacing a modern, "western" diet of highly processed foods with a Mediterranean diet filled with conventional, chemically-grown fruits and vegetables triples exposure to toxic pesticides, according to research in *The American Journal of Clinical Nutrition*. However, this disturbing change can be eliminated by eating a Mediterranean diet consisting entirely of organic food, which is not treated with synthetic pesticides. The advantages of the Mediterranean diet, often ranked as the "best diet" and emphasized by medical practitioners for its health benefits, now appear to depend on the production practices involved in the meals an individual eats. "There is growing evidence from observational studies that the health benefits of increasing fruit, vegetables and wholegrain consumption are partially diminished by the higher pesticide exposure associated with these foods," said study coauthor Per Ole Iversen, MD. "Our study demonstrates that consumption of organic foods allows consumers to change to a healthier diet, without an increased intake of pesticides." Researchers conducted a randomized

trial consisting of 27 adults, all of whom were postgraduate foreign student volunteers in a study abroad course in Greece. The experiment lasted a total of five weeks, including a two-week intervention in the middle, where the students' "western" food diet was switched for a defined Mediterranean diet. Before the intervention, students ate their normal "western" diet, which includes all conventional foods. For a typical "western" diet, think burger and French fries, while researchers served for instance, a Greek salad, sweet and sour chicken and vegetables, and whole grain rice for the Mediterranean diet. The study finds that switching from a "western" to a Mediterranean diet increases pesticide levels in urine by three-fold. For organophosphate insecticides in particular, levels increased nearly 4x (from 7 to 25 μg/d). Between the organic and conventional Mediterranean diet, individuals who eat organic have 91% lower pesticide residue than those consuming foods only produced through conventional chemical farming practices. Researchers find that pesticide residues primarily come from chemically grown fruit, vegetables, and whole grain cereals. As the study authors note, such major disparities could have significant impacts on health. "Many of the synthetic pesticides detected in both food and urine samples in this study are confirmed or suspected endocrine-disrupting chemicals (EDC)," noted study coauthor Carlo Leifert, PhD. [Rempelos. Leonidas et al. Diet and food type affect urinary pesticide residue excretion profiles in healthy individuals: results of a randomized controlled dietary intervention trial. *The American Journal of Clinical Nutrition*. October 2021.]

Organic Takes on Existential Health and Environmental Crises, while Some Critics Lack Context (Response to New Yorker piece)

NOVEMBER 12, 2021 | Omnivorous readers may have encountered an article, in the November 15 issue of *The New Yorker* magazine, titled—at best misleadingly, and certainly sensationally—"The Great Organic-Food Fraud." The subhead comports with the tone of the headline: "There's no way to confirm that a crop was grown organically. Randy Constant exploited our trust in the labels—and made a fortune." The piece, by Ian Parker, tells a complex tale of the machinations of dishonest and greedy people who saw, in the commerce in organic grains, an opportunity to misrepresent nonorganic crops as organic and make a boatload of money in doing so. What the article fails to do is render any comprehensive picture of how National Organic Program certification and inspection work, and the underlying principles, values, and standards in federal law (the *Organic Foods Production Act*), nor does it review either the benefits of organic agriculture broadly or the massive harmful impacts of conventional, chemical-intensive agriculture in the U.S. Beyond Pesticides provides ballast, in its Daily News Blog article, to the failings of *The New Yorker* article and the damage it might do to the organic movement. It is worth noting that Mr. Parker seems to cast a slightly jaundiced eye on the whole organic enterprise, as evidenced by his comment: "In 2000, organic sales in ordinary supermarkets exceeded, for the first time, sales in patchouli-scented health-food stores. During the next five years, domestic sales of organic food nearly doubled, to $13.8 billion annually. The figure is now around sixty billion dollars, and the industry is defined as much by large industrial dairy farms, and by frozen organic lasagna, as it is by the environmentalism and the irregularly shaped vegetables of the organic movement's pioneers."

Although Mr. Parker's article seems to imply that the nefarious activity of Randy Constant, the primary "bad guy" in his story, is somehow a function of the organic sector itself, this is a claim without context. There are plenty of examples of greed, malfeasance, and shady business dealings to go around; these are hardly confined to the organic food system.

As Beyond Pesticides Executive Director Jay Feldman points out, "This [article] is a piece about scammers and greedy people who knew they were violating the law. But is that any different than in conventional agriculture, or in other areas of society? Yes, we can strengthen inspections, recordkeeping, and enforcement, but as with all law and policy, there will be people who care more about their profits than about the intention and purposes of the laws they are violating. For perspective, the author should have given readers a true sense of the conventional chemical-intensive side of agriculture—all the contamination and poisoning that go on, and the undercurrent of fraud and abuse. Were we to consider just litigation that Beyond Pesticides has brought, which is only a tip of the iceberg—against General Mills, TruGreen, Sargento, and others—we would find companies that have been forced to change their fraudulent misrepresentation of their products as safe or natural. And those are just about corporate advertising!"

Researchers Find Nonchemical Biological Control when "Tree of Heaven" Is Being Managed

DECEMBER 22, 2021 | A promising new biocontrol agent for the tree of heaven (*Ailanthus altissima*)—considered an invasive species in the U.S. and Europe

by some—was recently discovered by French-based scientists at the U.S. Department of Agriculture. The finding centers on a small mite of the Eriophyidae family, *Aculus mosoniensis*, which has been found to feed on tree of heaven. The finding, published in Phytoparasitica, is encouraging for the future management of this species in conjunction with balanced ecosystems. "In Europe, this Eriophyid mite is considered one of the most promising biological control agents of tree-of-heaven," said Javid Kashefi, senior support scientist at the European Biological Control Laboratory (EBCL) in France. "This finding provides encouraging evidence that the geographic occurrence of this species is expanding in the continent." Tree of heaven is a fast-growing deciduous tree native to Asia that has spread throughout Europe and North America. First introduced in the 1700s as a shade tree, it was appreciated for its quick growing ability and low propensity for insect damage and is often labeled as "invasive." Researchers analyzed mite infested leaves on tree of heaven found in France in mid- to late-2020, after first finding presence of the insect farther east in Hungary and Italy near the end of the last decade. Positive identification based on various characteristics confirmed the presence of *Aculus mosoniensis,* an herbivorous mite native to tree of heaven's home range that forms dense populations on the underside of young plant leaves. Affected trees experience leaf curl, yellowing, and premature leaf loss. Heavily infested trees also experience limb drying. These findings represented the first evidence for the presence of this mite in France, and scientists see this insect as a potential biocontrol agent to replace toxic chemical use. The mite's ability to expand geographically and close association with its target plant covers two important characteristics of a potential biocontrol: wide dispersal and host-specificity. [Kashefi, Javid et al. Occurrence of *Aculus mosoniensis* (Ripka, 2014) (Acari; Prostigmata; Eriophyoidea) on tree of heaven (*Ailanthus altissima* Mill.) is expanding across Europe. First record in France confirmed by Barcoding. *Phytoparasitica*. November 2021.]

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USDA Must Complete Rulemaking Initiated by the National Organic Standards Board

MAY 10, 2021 | USDA is dragging its heels in completing rulemaking recommended by the National Organic Standards Board (NOSB)—including recommendations passed as early as 2001 and including those concerning both materials and organic practices. This threatens organic integrity and public trust in the process governing the USDA organic label. When the *Organic Foods Production Act* (OFPA) was passed in 1990, supporters had grave mistrust of the commitment of the U.S. Department of Agriculture (USDA)—a department that had embraced chemical-intensive agriculture and promoted the dependence on pesticides and chemical fertilizers. Therefore, Congress built into the law protections by assigning a major role to the NOSB—an advisory board comprised of representatives of all the stakeholders including producers, processors, retailers, certifiers, consumers, scientists, and environmentalists. Not only must the NOSB vote on allowed synthetic materials used in organic production, but USDA must also consult with the NOSB on all aspects of the National Organic Program (NOP).

Tell USDA that NOSB recommendations must be proposed as regulations. Crucial to organic practices, and written into OFPA, is the concept of continuous improvement. The importance of this concept is most apparent in materials review, which includes a sunset provision that requires all synthetic materials used in crop and livestock production and non-organic ingredients used in processing to be reconsidered every five years. If organic producers no longer need those materials or new issues of concern have been identified, they should no longer be allowed. However, continuous improvement extends to all aspects of the organic program, including regulations governing organic practices.

USDA has had difficulty with the concept of continuous improvement because it requires flexibility that is unusual in regulatory programs across government. The biggest obstacle, according to USDA, is the Office of Management and the Budget (OMB). Ever since the Reagan administration, regulatory review by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and the Budget (OMB) has prevented agencies from promulgating new regulations based on new science and technologies that are more protective of health and the environment—the argument being that it causes economic dislocation for the regulated industry. OIRA acts as a gatekeeper to new regulations and has generally resisted changes to the status quo—even in regulations designed to adapt to new science and technology.

Immediately following his inauguration, President Biden issued an Executive Order (EO) directing the heads of all executive departments and agencies to produce recommendations for improving and modernizing regulatory review, with the goal of promoting public health and safety, economic growth, social welfare, racial justice, environmental stewardship, human dignity, equity, and the interests of future generations. This Executive Order reverses the historical trend of status-quo regulatory reviews required

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by the White House Office of Management and Budget (OMB) that typically support vested economic interests of polluters (e.g., petroleum-based pesticide and fertilizer manufacturers). Instead, the President's EO, *Modernizing Regulatory Review*, sets the stage for the adoption of agency policy across government to seriously and with urgency confront the climate crisis, biodiversity collapse, and disproportionate harm to people of color communities (environmental racism). It allows—even promotes—the policy of continuous improvement.

Ensure Regenerative Agriculture Incorporates Organic Standards in Order to Fight Climate Change

MAY 24, 2021 | Agriculture is a major contributor to climate change. In a recent article in *Science*, Clark et al. show that even if fossil fuel emissions were eliminated immediately, emissions from the global food system alone would make it impossible to limit warming to 1.5°C and difficult even to realize the 2°C target. According to the International Panel of Climate Change, agriculture and forestry account for as much as 25% of human-induced greenhouse gas (GHG) emissions. The contribution of animal agriculture has been estimated at 14.5% to 87% or more of total GHG emissions. These estimates include emissions of carbon dioxide, methane, nitrous oxide, and ammonia. The carbon dioxide contribution largely comes from converting land from natural forest to pasture or cropland.

"Regenerative" agriculture is widely considered to be a solution for reducing or even reversing these impacts. Unfortunately, a movement by promoters of chemical-intensive agriculture has fooled some environmentalists into supporting toxic "regenerative" agriculture. The so-called "regenerative agriculture" promoted by these groups ignores the direct climate impacts of nitrogen fertilizers, the damage to soil health caused by pesticides and chemical fertilizers, and the fact that pesticide and fertilizer manufacturing is dependent on fossil fuels—as key ingredients as well as for the heat and energy driving chemical reactions. It is important to see through this deception.

Regenerative agriculture must be organic. Organic agriculture practices reduce greenhouse gas (GHG) emissions.

Reducing Emissions of Nitrogen Oxides. Excessive use of nitrogen fertilizers in chemical-intensive agriculture is driving global nitrous oxide (N2O) emissions higher than any projected scenario, putting the world at greater risk of a climate catastrophe. According to research published by an international team of scientists in the journal *Nature*, failure to adequately address nitrous oxide emissions has the potential to impede the ability for the world to keep warming below the 2°C target established under the Paris Climate Agreement, necessitating further cuts in other greenhouse gasses.

A 2018 study from the University of Virginia and The Organic Center found that "reactive" nitrogen, in the form readily available to be taken up by plants, is conserved in organic systems. Jessica Shade, PhD of The Organic Center noted that the research was "significant and timely because its findings show that many common organic farming practices—like composting and the use of manure fertilization in place of synthetic fertilizers—can recycle reactive nitrogen that is already in the global system, rather than introducing new reactive nitrogen into the environment, and thus have a much smaller environmental impact."

Organic practices sequester carbon. Organic systems sequester significant amounts of carbon from the atmosphere into on-farm soil carbon. A report from the Rodale Institute expounds on these benefits. It reads, "Simply put, recent data from farming systems and pasture trials around the globe show that we could sequester more than 100% of current annual CO_2 emissions with a switch to widely available and inexpensive organic management practices, which we term "regenerative organic agriculture." These practices work to maximize carbon fixation while minimizing the loss of that carbon once returned to the soil, reversing the greenhouse effect."

Organic practices preserve natural lands and biodiversity. Natural forests are more effective than tree plantations in sequestering carbon. Preserving natural land increases biodiversity, which also reduces dependence on petroleum-based pesticides. Organic farms are required to "comprehensively conserve biodiversity by maintaining or improving all natural resources, including soil, water, wetlands, woodlands, and wildlife, as required by § 205.200 of the regulations and per the § 205.2 definition of Natural resources of the operation."

It is crucial, as we move forward with a plan to harness agriculture in the fight against climate change, that we not be misled into promoting the same practices that have created the problem. As aptly stated by Jeff Moyer of the Rodale Institute, "We believe that in order to be regenerative, you have to start by being organic. It's a little disingenuous to say you can regenerate soil health and sequester

carbon and still use nitrogen fertilizers and synthetic pesticides. What you're really saying is equivalent to saying 'I want to be healthy as a person, but I still want to smoke cigarettes.'" **Tell EPA and USDA that "regenerative" agriculture must be organic.**

Tell Home Depot and Lowe's to Promote Herbicide Alternatives; Organic Is Focus of June 8 Forum

JUNE 7, 2021 | Beyond Pesticides and Friends of the Earth (FOE) collaborated to analyze herbicide products at two of the most popular home and garden retailers, Home Depot and Lowe's. This new *Commercial Herbicide Analysis* highlights the adverse health and environmental effects of widely available toxic pesticides while encouraging retailers to expand on—and consumers to use—safer, least/nontoxic pesticide approaches.

Tell Home Depot and Lowe's to remove toxic herbicides from their shelves and replace them with products that promote least-toxic practices. According to Akayla Bracey, Beyond Pesticides' science and regulatory manager and lead researcher on the review, "People generally aren't aware that the pesticides widely available in garden retailers like Home Depot and Lowe's are a threat to health and the environment, and that there are safer approaches that are available and used in organic land management."

Are Big Dairies Undercutting Organic Milk Producers and Organic Integrity—and What Can We Do About It?

JULY 6, 2021 | ACT NOW: Public Comment Period Ends July 12, 11:59pm (eastern). A new proposed rule on the "origin of livestock" is intended to undo nearly two decades of regulatory failure by the USDA. Organic dairy producers have suffered economic harm and many organic milk consumers have been drinking substandard milk, while the National Organic Program (NOP) failed to promulgate a Final Rule on the issue of transitioning non-organically certified dairy bovine animals to organic production. The public comment period on this rule closes on July 12, 2021 at 11:59pm (eastern). We all have a stake in growing the organic marketplace by supporting the transition from conventional chemical-intensive practices to clearly defined sustainable and regenerative practices that support family farmers and a production system that confronts the climate crisis, biodiversity decline, and rising public health threats. We do this by supporting transition and then continually improving standards to ensure a robust and healthful organic sector. The issues challenging organic dairy production are a part of the continuous efforts of Beyond Pesticides to ensure organic integrity, while growing the organic market.

Tell NOP to adopt an origin of livestock rule that protects dairy farmers and consumers. When the organic rules were first issued, there were no organic animals, so there had to be a way for organic dairies to get started. The National Organic Program (NOP) made an allowance for farmers to convert, over a year with organic management, a distinct conventional herd to organic milk production. This enables farmers to get started in organic dairy by converting from their existing herds. However, over the years some operations, principally large dairies, have used a lack of specificity in the rule to continually bring transitioned conventional animals onto their farms as replacement animals or for expansion. This undercuts dairy farmers who operate with integrity, raising their baby calves from birth organically, and threatens consumers who depend on the wholesomeness of organic milk.

Take Action: Schools Must Provide and Encourage Organic Food

JULY 19, 2021 | As yet another study, "Early life multiple exposures and child cognitive function: A multi-centric birth cohort study in six European countries," draws attention to the benefits of organic food for the learning young mind, it is important that schools provide organic food to students. The study, conducted by Spanish researchers based at the Barcelona Institute for Global Health, looks at a totality of all environmental hazards that children encounter, rather than individual lifestyle factors. As study coauthor Jordi Júlvez, PhD notes, "Healthy diets, including organic diets, are richer than fast food diets in nutrients necessary for the brain, such as fatty acids, vitamins and antioxidants, which together may enhance cognitive function in childhood."

Tell your governor and USDA/Food and Nutrition Service to provide organic school lunches and information for parents. Researchers find that children who eat organic food display higher scores measuring fluid intelligence and working memory. Lower scores on fluid intelligence tests are associated with children's fast food intake, house crowding, and exposure to tobacco smoke. Lower scores on working memory tests are associated with exposure to poor indoor air quality. This study adds to prior research findings that eating a conventional, chemical-intensive diet increases the presence of pesticides and their

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metabolites in an individual's urine, including higher pesticide body burden from eating foods grown in chemical-intensive systems. In fact, because of their smaller size, children carry higher levels of glyphosate and other toxic pesticides in their body.

Tell USDA to Ensure that Organic Farming Protects Ecosystems!

AUGUST 2, 2021 | One reason to eat organic food is to join with a crucial national and global campaign to eliminate toxic, petroleum-based pesticides and fertilizers and protect ecosystems in the urgent fight to curtail the climate crisis and biodiversity decline—in addition to local and immediate health and environmental benefits. Despite an important and timely vote by the National Organic Standards Board (NOSB) in 2018 to protect native ecosystems as a critical tool in sequestering carbon and improving environmental resiliency, and despite the Biden administration's stated commitment to fighting the climate crisis, the U.S. Department of Agriculture and its National Organic Program (NOP) have not acted to put this recommendation in force. As our understanding of the connection between protecting intact ecosystems and combating climate change has grown, the urgency to implement this recommendation cannot be overstated. We must act now!

Sign the petition to tell the National Organic Program (NOP) to take action to finalize the National Organic Standards Board (NOSB) recommended rulemaking that will protect Native Ecosystems and thereby preserve the integrity of the organic seal, help reverse the biodiversity crisis, and reduce global climate change. *Sign by September 20, 2021.*

Last Chance to Protect Organic this Fall– Submit Comments by September 30!

SEPTEMBER 27 2021 | The National Organic Standards Board (NOSB) is receiving written comments from the public through September 30. This precedes the upcoming public comment webinar on October 13-14 and online meeting October 19-21—in which the NOSB deliberates on issues concerning how organic food is produced. Written comments must be submitted through Regulations.gov. As always, there are many important issues on the NOSB agenda this Fall. For a complete discussion, see Keeping Organic Strong (KOS) and the Fall 2021 issues page. In the spirit of "continuous improvement," we urge you to submit comments (please feel free to use our comments on the KOS page) that contribute to an increasingly improved organic production system. The *Organic Foods Production Act* (OFPA) requires that all synthetic materials used in organic production be approved by the NOSB, included on the National List, and reassessed every five years. Among the issues up for consideration at this meeting is a material that the National Organic Program (NOP) has taken off the NOSB's sunset agenda for several years—sodium nitrate. There are also issues affecting organic integrity that need to be addressed—systemic fraud and plastic—as well as decisions about other materials that are described on the Fall 2021 issues page. We earlier conducted an action on priority issues.

Save Organic Dairy, Family Farms and Consumer Support for Organic!

SEPTEMBER 7, 2021 | If regulations concerning "origin of organic livestock" and "access to pasture" seem beyond your comprehension as an organic consumer, think again. Lacking enforcement of strong regulations on these topics, organic dairy is in imminent danger. Multinational food conglomerate Danone, owner of Horizon Organic, has just sent notice to 89 organic milk producers in Maine, Vermont, New Hampshire and at least three counties (Clinton, Franklin and Saint Lawrence) in New York that it is cancelling their contracts. While this action is devastating to the affected farms and the economies of those states, it has much broader implications. Why is Danone cancelling contracts as organic milk production in the Northeast is increasing? In Danone's words, the company "will be supporting new partners that better align with our manufacturing footprint." Ed Maltby, executive director of the Northeast Organic Dairy Producers, explains this "footprint," with reference to low cost, ultra-pasteurized milk that is easily transported and warehoused, which has become a staple on the organic shelf. More importantly for the future of organic dairy is the expectation that USDA will promulgate a weak regulation on origin of livestock—that "will allow the massive loophole of being able to sell or transfer transitioned animals as certified organic." Such a regulation, in combination with the continued failure to enforce rules requiring organic livestock to have access to pasture, makes it profitable to produce "organic" milk in industrial confined animal feeding operations (CAFOs), where cows are fed cheap imported "organic" grain instead of pasture. Organic consumers do not want CAFO [concentrated animal feeding operation] milk, but

many will have no other choice without strong regulations. **Tell USDA that strong regulations are essential to protect organic dairy and consumer support for organic.**

Organic Must Lead the Way in Environmental and Health Protection

SEPTEMBER 13, 2021 | The National Organic Standards Board (NOSB) is receiving written comments from the public through September 30. This precedes the upcoming public comment webinar on October 13-14 and online meeting October 19–21—in which the NOSB deliberates on issues concerning how organic food is produced. Written comments must be submitted through Regulations.gov. As always, there are many important issues on the NOSB agenda this Fall. For a complete discussion, see Keeping Organic Strong (KOS) and the Fall 2021 issues page. In the spirit of "continuous improvement," we urge you to submit comments (please feel free to use our comments on the KOS page) that contribute to an increasingly improved organic production system.

The *Organic Foods Production Act* (OFPA) requires that all synthetic materials used in organic production be approved by the NOSB, included on the National List, and reassessed every five years. Among those up for sunset review this Fall are some controversial materials—copper sulfate, carrageenan, and list 3 "inerts." In addition, the NOSB is once more considering a petition to allow the antibiotic kasugamycin in fruit production.

Copper sulfate is used in organic rice production to control algae and an invertebrate known as tadpole shrimp. It poses health threats, particularly to workers—including damage to the gastrointestinal tract, liver, kidneys, and the immune system resulting from inhalation exposure. Respiratory effects have been seen in animals exposed to copper sulfate aerosols (such as might be experienced by workers). Copper is considered the etiologic agent in the occupational disease referred to as "vineyard sprayer's lung." Copper sulfate is also a reproductive toxicant. Copper sulfate is hazardous to aquatic plants, animals, and aquatic ecosystems. This is particularly important in rice production, where rice paddies replace natural wetlands and provide alternative habitat for animals threatened by the loss of wetlands. For example, one animal inhabiting rice paddies is the western toad (*Bufo boreas*). Tadpoles of the western toad feed on filamentous algae, detritus, and may even scavenge carrion. Application rates of copper sulfate exceed levels that are lethal to tadpoles of *Bufo boreas* by up to two orders of magnitude. Other amphibians at risk are the bullfrog and Pacific treefrog, whose tadpoles consume algae, organic debris, and small aquatic invertebrates. The negative impacts on amphibians found in rice fields not only have a negative impact on biodiversity, but they also reduce possibilities for biological control of algae and tadpole shrimp. Thus, the use of copper sulfate in an aquatic environment like a rice field is inconsistent with a system of organic and sustainable agriculture. In addition, since copper sulfate is water soluble, when the fields are drained, it is released through drainage ditches to streams, and ultimately, the ocean.

The NOSB has previously discussed alternative growing systems that would eliminate the need for copper sulfate and made such alternatives a research priority. Most of the world transplants rice seedlings into paddies. Dryland rice is also grown. Neither of these systems requires killing algae and tadpole shrimp—in fact tadpole shrimp are regarded as a biological control for algae. It is time to eliminate the use of copper sulfate, bringing organic rice production in line with organic principles.

List 3 "inerts" (of "unknown toxicity") should be removed from the National List. One of the most egregious failures of the National Organic Program (NOP) has been its repeated lack of action on so-called "inert" ingredients. Because of that failure, every sunset brings to a new NOSB a listing that has not been changed in response to over a decade of NOSB recommendations. Fifteen years ago, EPA stopped updating the "inerts" lists upon which the NOP relies. Ever since EPA's action in 2006, the NOSB has been recommending the review of individual "inert" ingredients, but has instead been given the option by NOP of relisting the outdated lists.

In 2012, the NOSB has already recommended an expiration date for these chemicals, but NOP refused—in violation of the law—to codify this recommendation. The NOSB identified the "inerts" formerly on List 3 that were covered by this listing. They are BHT (antioxidant), 2-Hydroxy-4-n-octyloxybenzophenone (UV absorber), and 2-(2-Hydroxy-3-tert-butyl-5-methylphenyl)-chlorobenzotriazole (UV stabilizer). In addition to the three List 3 "inerts" identified in 2012, a fourth chemical formerly on List 3 has been identified as being in use in passive pheromone dispensers in organic production—benzaldehyde, CAS #100-52-7. Benzaldehyde is not approved for food use. It is approved for nonfood use and as a fragrance in

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nonfood uses. The addition of another chemical to the known List 3 "inerts" used in organic production shows a hazard of delaying the review of these chemicals as recommended by the NOSB. The NOSB must insist that List 3 "inerts" be delisted and that the individual chemicals be specifically reviewed.

Carrageenan is a controversial food additive that most organic processors have removed from their products. The NOSB voted in 2016 to remove carrageenan from the National List. In 2018, NOP announced that it was refusing to remove carrageenan. The *Organic Foods Production Act* (OFPA) §6517(d)(1) requires that, "The National List established by the Secretary shall be based upon a proposed national list or proposed amendments to the National List developed by the National Organic Standards Board." The National List is not "based on" the recommendations of the NOSB if it is directly contradictory to those recommendations. NOP based its decision on testimony received by the NOSB and should not be second-guessing the advisory board for which establishing the National List is an expressly stated statutory responsibility. The NOSB should insist that carrageenan be removed from the National List. The evidence summarized by the 2015 Technical Review came up with a verdict of mixed results on virtually every issue regarding food grade (high molecular weight) carrageenan. However, there is widespread agreement that poligeenan, which contaminates food grade carrageenan at unknown and uncontrollable levels, does cause adverse effects, including cancer. The production causes adverse environmental impacts. And it is not necessary–organic processors have been moving away from the use of carrageen because of consumer pressure since it was last considered for sunset. This is made more urgent by the fact that NOP ignored the recommendation of the NOSB in spring of 2012 to remove carrageenan from infant foods, as well as the 2016 recommendation to remove carrageenan from the National List altogether.

Kasugamycin is an antibiotic used in fruit production. The NOSB is considering a petition to allow it to be used in organic apple and pear production. Earlier NOSB members struggled long and hard to erase the stigma of antibiotic use in organic fruit production—something that was left over from the transition of so many chemical-intensive fruit orchards after the Alar "scare" in which apple and apple products were contaminated with the cancer-causing plant growth regulator daminozide. Do we now want to step on that treadmill again? The reasons for rejecting the kasugamycin petition are the same as the reasons for eliminating the antibiotics streptomycin and tetracycline in crop production.

Now that we have learned what a pandemic looks and feels like, with the astounding levels of infection, hospitalization, and death from Covid-19, we must take serious steps to prevent another pandemic on the horizon—this one tied to bacterial resistance to antibiotics. An important article in *The Lancet* points to a "looming potential pandemic" resulting from a "rise in multidrug-resistant bacterial infections that are undetected, underdiagnosed, and increasingly untreatable, [which] threatens the health of people in the USA and globally."

When streptomycin and tetracycline were presented for their final votes by the Crops Subcommittee, the committee was unanimous that the antibiotics needed to go—the question was how fast. How fast could growers of these crops get over their dependence on these antibiotics that pose threats to human health and the environment and are unpopular with organic consumers? Streptomycin and tetracycline are gone, and we do not need another antibiotic. We said "No!" to antibiotics in organic fruit, and now we must affirm that we mean it. Kasugamycin does not meet any of the OFPA criteria for the National List—it poses health and environmental dangers, is not necessary, and is incompatible with organic practices.

UPDATE: While the NOSB rejected the petition to allow the antibiotic kasugamycin, it allowed the continued use of copper sulfate, reversed an earlier 2016 decision to remove the food additive carrageenan (which many food manufacturers have stopped using), and did not make progress on the list 3 inert ingredients in pest control products.

Stopping the Use of Toxic Pesticides in State Parks and Transition to Organic Land Management

OCTOBER 18, 2021 | The most recent science on pesticides raises serious health and environmental effects associated with pesticide use for lawn and landscape management. While the data is often not assembled in one place, updated factsheets bring together the science on the 40 commonly used pesticides used for conventional landscape management. Governors have the authority to stop the use of these hazardous materials that are used on parks and playgrounds, either by executive order or through their work with their state legislature, and transition land management to organic practices. **Tell your governor to stop hazardous pesticide use on state lands and transition to organic land management.**

Call on USDA to Provide Organic School Lunches to Fight Childhood Obesity

NOVEMBER 15, 2021 | A recent hearing in the U.S. Senate Agriculture Subcommittee on Food and Nutrition, Specialty Crops, Organics, and Research, subcommittee chair Senator Cory Booker (D-NJ) stressed the failures of the U.S. Department of Agriculture's (USDA) food and nutrition programs, saying, "Our food system is not a "free market," we are picking winners and losers, and it's consumers, family farmers, and food workers who are losing." **Tell USDA's Food and Nutrition Service to require organic school lunches.**

Keep Antibiotics Out of Organic–Keep Organic Strong on Range of Issues; Comment by April 5

MARCH 22, 2021 | The National Organic Standards Board (NOSB) is receiving written comments from the public through April 5. This precedes the upcoming public hearing on April 20 and 22—concerning how organic food is produced. Also, by April 5, sign up to speak (3 minutes) at the virtual NOSB hearing. Written comments must be submitted through Regulations.gov. As always, there are many important issues on the NOSB agenda this Spring. For a complete discussion, see Keeping Organic Strong and the Spring 2021 issues page. The National Organic Standards Board (NOSB) is considering a petition to allow the antibiotic kasugamycin to be used in organic apple and pear production. Earlier NOSB members struggled long and hard to erase the stigma of antibiotic use in organic fruit production—something that was left over from the transition of so many chemical-intensive fruit orchards after the Alar "scare" in which apples and apple products were contaminated with the cancer-causing plant growth regulator daminozide. Do we now want to step on that treadmill again? The reasons for rejecting the kasugamycin petition are the same as the reasons for eliminating the antibiotics streptomycin and tetracycline in crop production. Now that we have learned what a pandemic looks and feels like, with the astounding levels of infection, hospitalization, and death from Covid-19, we must take serious steps to prevent another pandemic on the horizon—this one tied to bacterial resistance to antibiotics. An important article in *The Lancet* points to a "looming potential pandemic" resulting from a "rise in multidrug-resistant bacterial infections that are undetected, underdiagnosed, and increasingly untreatable, [which] threatens the health of people in the USA and globally."

Biodegradable Biobased Mulch Film (BBMF) was approved by the NOSB for use in organic production in October 2012, and the listing was finalized September 30, 2014 as "Biodegradable biobased mulch film as defined in §205.2. Must be produced without organisms or feedstock derived from excluded methods." The definition required that BBMF meet specific requirements for compostability, biodegradation, and biobased content. Subsequently, the Organic Material Research Institute (OMRI) found that there are no products meeting all of the requirements set by the board. The NOSB is now considering a proposal to change the definition to allow BBMF that is not 100% biobased. BBMF is not removed from the field by the grower, but is tilled into the soil. The tillage process purposefully creates microplastics, with the intention that the action of soil organisms will degrade these small particles. However, as reported in OMRI's 2016 Supplemental Technical Review, many growers report that fragments persist in the soil. OMRI reports research showing that the BBMFs do not completely degrade and may degrade more slowly when tilled under the surface, that they contain components that may be hazardous, and particles may adsorb persistent toxicants. Microplastics may be incorporated into plant and animal tissues. Organic mulches have always been a central aspect of organic production, and reliance on synthetic mulches for functions that can be performed by organic mulch is not compatible with organic production. The NOSB should not redefine BBMF in a way that encourages microplastic contamination of the soil.

Ion exchange is a reaction in which an element from the treated substance is removed and replaced by a different element. Although the most familiar example of ion exchange is water softening, in which the "hard" minerals calcium and magnesium are replaced with sodium, the technology is widely used in food processing. Food processors run liquids, such as sugar cane juice, through a column of plastic beads charged with a substance that replaces an undesirable substance in the liquid with a different chemical. Ion exchange produces a chemical change in the food, which can subsequently only be regarded as synthetic under organic rules—and, therefore, be limited to less than 5% in food labeled "organic." Products treated with ion exchange must be treated as synthetic substances. Resins and recharge chemicals must be on the product label.

UPDATE: The Board allowed biodegradable Biobased Mulch Film with allowable residues in the soil, and required ion exchanges materials to be subject to National List review as a synthetic process.

Show Your Commitment to a World Free of Harmful Pesticides!

Display a Ladybug, Bee, or Organic Yard Sign

Make your yard, local park, and school a "Pesticide Free Zone" and show your neighbors that pesticide-free lawns are important for the health of your family the environment and the community. At 8" in diameter, these painted metal signs will not rust and will retain their bright colors for years. The sign comes with valuable information on organic lawn and garden management, pollinators, and how to talk to your neighbors about pesticides. Cost: $13 each ($10 plus shipping for 10 or more).

Distribute Doorknob Hangers

The Safe Lawn Doorknob Hanger is a tool to help spread the word about the dangers of lawn pesticides and the ever-increasing availability of alternatives. It's an easy, non-confrontational way to approach neighbors that may be using pesticides. Request a free pack of 25 doorknob hangers by emailing your name and address to **info@beyondpesticides.org**.

Order yard signs, doorknob hangers, and more online at
shop.beyondpesticides.org

Charity Navigator is America's premier independent charity evaluator. They help charitable givers make intelligent giving decisions by providing in-depth, objective ratings and analysis of the financial health and accountability and transparency of America's largest charities. Charity Navigator awarded Beyond Pesticides four out of a possible four stars, indicating that Beyond Pesticides adheres to good governance and other best practices that minimize the chance of unethical activities and consistently executes its mission in a fiscally responsible way.

Beyond Pesticides believes that people must have a voice in decisions that affect them directly. To assist in this effort, Beyond Pesticides maintains several online database resources, which can be accessed at bp-dc.org/resources

Gateway on Pesticide Hazards and Safe Pest Management
Lists the health and environmental effects of nearly 400 registered pesticide active ingredients and is searchable by chemical name, product name, or health and environmental effects.

Eating with a Conscience
Designed to link purchasing decisions on food to their production effects on workers and the environment, the database includes information on all of the pesticides that have registered tolerance (legal residue) allowances by specific crop on over 80 crops.

What the Science Shows
Database of more than 282 studies that identifies adverse effects to bees and pollinators from pesticides. Information also promotes biodiversity, organic practices, and local policies.

Pesticide-Induced Diseases Database
Presents more than 1,174 epidemiologic and laboratory studies based on real world exposure scenarios that link adverse human health effects to pesticides.

40 Commonly Used Pesticides: Health and Environmental Effects
Evaluates landscape pesticides for adverse health and environmental outcomes.

ManageSafe™
Organized by pest, this database provides all of the resources needed to manage pests in the home and garden without using harmful pesticides.

Seven Powerful Ways

You Can Engage and Support Beyond Pesticides

1. Become a Member

There is strength in numbers. As a Beyond Pesticides member, support our mission to protect healthy air, water, land, and food—protecting ourselves and future generations from the devastation of toxic pesticides and fertilizers. Join now: **bp-dc.org/join**

2. Take Action

Our *Action of the Week* gives you one concrete action you can take every week to raise your voice. Sign up to get action alerts emailed to you: **bp-dc.org/sign-up**

3. Stay Informed

Sign up to get our *Weekly News Update* to ensure you stay up-to-date with the latest research and news on the health and environmental hazards of pesticides, pesticide regulation and policy, and sustainable practices. **bp-dc.org/sign-up**

4. Become a Community Advocate

We have all the tools you need to organize your community against toxic pesticide use and promote organic land management. Use our Tools for Change: **bp-dc.org/tools**

5. Become a Parks Advocate

Our program *Parks for a Sustainable Future* provides in-depth training to assist community land managers in transitioning public green spaces to organic land management. Sign up to be a Parks Advocate to help set up pilot sites in your community: **bp-dc.org/sustainable-parks**

6. Follow Us on Social Media

We're on Facebook, Twitter, LinkedIn, Instagram, and more to help keep you informed. Share our posts to your own networks and expand our reach.

7. Give

Without committed people like you, our vital work for a livable future would not be possible. Consider setting up a recurring monthly contribution to have a bigger impact. Give now: **bp-dc.org/donate**

More ways to give:

- **AmazonSmile:** If you shop with Amazon, sign up for AmazonSmile and designate Beyond Pesticides as your charity of choice. Sign up today: **Smile.Amazon.com**.
- **Stock gifts, honorary gifts, inheritance or legacy gifts, IRA gifts, donor advised funds (DAF)** and other tax-deductible options will help you support our mission. Contact Jeff France at 202.543.5450, **jfrance@beyondpesticides.org** for assistance.
- **Workplace giving:** We participate in several pre-tax payroll giving programs, including EarthShare.

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Transition Your Community Parks to Organic with Our Unique Program!

Envision an organic community where local parks, playing fields, and greenways are managed without toxic pesticides, where children and pets are safe to run around on the grass, and bees and other wildlife are safeguarded from toxic chemicals. At Beyond Pesticides, this is the future we envision and are working to achieve. But we need your help!

Our Parks for a Sustainable Future program can help your neighborhood make the transition to organic land management. Get started today at bp-dc.org/sustainable-parks.

Stay Connected with Beyond Pesticides

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