

Notes: Effects of herbicides and pesticides on birds and humans

HUMANS

IARC:

UC San Diego News Center 2017

human exposure to glyphosate, a chemical widely found in weed killers, has increased approximately 500 percent since the introduction of genetically modified crops.

The herbicide glyphosate and the insecticides malathion and diazinon were classified as *probably carcinogenic to humans* (Group 2A).

Glyphosate currently has the highest global production volume of all herbicides.

Group 2A means that the agent is ***probably carcinogenic to humans***. This category is used when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals. *Limited evidence* means that a positive association has been observed between exposure to the agent and cancer but that other explanations for the observations (called chance, bias, or confounding) could not be ruled out. This category is also used when there is limited evidence of carcinogenicity in humans and strong data on how the agent causes cancer.

Entropy **2013**, 15, 1416-1463 **Glyphosate's Suppression of Cytochrome P450 Enzymes and**

Amino Acid Biosynthesis by the Gut Microbiome: Pathways to Modern Diseases

Anthony Samsel 1 and Stephanie Seneff 2 Abstract: Glyphosate, the active ingredient in Roundup®, is the most popular herbicide used worldwide. The industry asserts it is minimally toxic to humans, but here we argue otherwise. Residues are found in the main foods of the Western diet, comprised primarily of sugar, corn, soy and wheat. Glyphosate's inhibition of cytochrome P450 (CYP) enzymes is an overlooked component of its toxicity to mammals. CYP enzymes play crucial roles in biology, one of which is to detoxify xenobiotics. Thus, glyphosate enhances the damaging effects of other food borne chemical residues and environmental toxins. Negative impact on the body is insidious and manifests slowly over time as inflammation damages cellular systems throughout the body. Here, we show how interference with CYP enzymes acts

synergistically with disruption of the biosynthesis of aromatic amino acids by gut bacteria, as well as impairment in serum sulfate transport. Consequences are most of the diseases and conditions associated with a Western diet, which include gastrointestinal disorders, obesity, diabetes, heart disease, depression, autism, infertility, cancer and Alzheimer's disease. We explain the documented effects of glyphosate and its ability to induce disease, and we show that

glyphosate is the “textbook example” of exogenous semiotic entropy: the disruption of homeostasis by environmental toxins

BIRDS

Pesticide Acute Toxicity Is a Better Correlate of U.S. Grassland Bird Declines than Agricultural Intensification Mineau, P. and M. Whiteside. 2013. **Pesticide acute toxicity is a better correlate of grassland bird declines than agricultural intensification.** PLOS One 8 (February) e75457. (Neonics)

Ibis (2004),

146 (Suppl. 2), 131–143 Evidence for the indirect effects of pesticides on farmland birds NIGEL D. BOATMAN et al

indirect effects of pesticides on bird species via impacts on chick food abundance... pesticide use can affect breeding performance of the passerine species Yellowhammer and Corn Bunting. However, studies on Barn Swallow *Hirundo rustica* showed no effects of pesticides on food taxa or foraging behaviour of this species

Environmental effects of herbicides and pesticides

SAMAN DISSANAYAKE Faculty of Agriculture Rajarata University of Sri Lanka
2012

Notes for Audubon CA Policy Team conference call 9/24/18:

Audubon News (online) 2017

1. Two Widely Used Pesticides Found to Disorient and Sicken Migrating Songbirds

A new study shows that relatively low doses of chlorpyrifos or imidacloprid can be detrimental to small birds like sparrows.

2. The Same Pesticides Linked to Bee Declines Might Also Threaten Birds (neonicotinoids)

Nature 2014

Declines in insectivorous birds are associated with high neonicotinoid concentrations

Judge orders California agricultural officials to cease pesticide use LA Times 2/24/18

suspend spraying pesticides on vegetation in parks, school properties and even homeowners' backyards... The agency also will have to improve its public information process, including offering more opportunities for comment. The

environmental groups that sued the California Department of Food and Agriculture documented a long-standing pattern of spraying under emergency provisions that exempted the agency from full disclosure of health risks. "The court rejected the agency's blank check to spray people's yards, exposing children and pets to a range of pesticides that can cause serious long-term problems, including cancer, asthma, and IQ loss," said Debbie Friedman, founder of MOMS Advocating Sustainability, one of the groups that sued over the program.

The groups also alleged that some of the chemicals threaten public water, endangered species and bees that pollinate crops.

"It's a real opportunity for the state of California to transition to less toxic alternatives," said Jonathan Evans, a senior attorney at the Center for Biological Diversity, which also was a party to the suit.

Conspiracies Don't Kill Birds. People, However, Do. NYT 1/17/11

Pesticides kill 72 million birds directly, but an unknown and probably larger number ingest the poisons and die later unseen. Orphaned chicks also go uncounted.

Ecological Agriculture Projects, McGill University

https://eap.mcgill.ca/MagRack/JPR/JPR_14.htm Journal of Pesticide Reform McGill University **Organochlorines The organochlorine threat to birds did not go away when DDT's registered uses were cancelled. Some organochlorine pesticides for example, the miticide dicofol which also causes eggshell thinning in birds 6 are still used in the United States, and uses of others (for example, chlordane) were restricted or cancelled much later than DDT.5**

In addition, DDT and related compounds are still used in many other countries. Birds that migrate to other countries can bring residues stored in their tissues back to the US. For example, analysis of great horned owls for organochlorine residues at the Virginia Wildlife Center found high levels of the DDT metabolite DDE, 7 and smaller amounts of dicofol and methoxychlor 8 (another organochlorine insecticide still registered for use in the US.). Although the owls do not migrate, the organochlorine residues could have come from the birds migratory prey, persistent residues from previous years carried by the longlived birds, or from current uses of dicofol and methoxychlor. It is not possible to determine the source.8

Organophosphates: Organophosphate insecticides inhibit an enzyme (acetylcholinesterase) essential for proper functioning of the nervous system. Because we all have similar mechanisms of nerve transmission, this mode of action is similar in target insects, birds, and mammals. Many organophosphates are acutely toxic to birds at very low doses. A recent compilation of acute lethal

doses (LD50s) for the mallard duck showed that 16 of 20 organophosphates were acutely toxic at doses less than 20 milligrams per kilogram (mg/kg) of body weight and the most toxic had an LD50 over twenty times smaller.⁷

Well documented bird kills have been caused by the organophosphates diazinon, isofenphos, and chlorpyrifos with one kill involving thirty to forty thousand birds.⁹ A review of aerial forestry applications showed that all four organophosphates reviewed, phosphamidon, fenitrothion, acephate, and trichlorofon, caused reductions in the abundance of singing males, the number of birds present, or the number of species present.

Carbamates: Carbamate insecticides have a mode of action similar to the organophosphates and, like the organophosphates, some kill birds at low doses. Carbofuran, which has been estimated to kill one to two million birds annually in the U.S., is probably the best known example.

Granular formulations, in which the pesticide is incorporated with a carrier into small particles slightly larger than those found in granulated sugar,⁴ have been particularly hazardous to birds. Over half of house sparrows fed granular formulations of three carbamates (aldicarb, carbofuran, and bendiocarb) were killed by ingestion of just one granule and only five to ten granules killed red-winged blackbirds.

Another carbamate, carbaryl (Sevin), has an acute toxicity to birds several orders of magnitude lower (about 2000 mg/kg³). However, a study of effects on bird populations following a forestry application found that both the abundance of birds and the number of bird species present was reduced by aerial spraying of carbaryl, and these effects persisted until the summer following the spray. Although other studies of forestry carbaryl applications found no significant effects on birds, reviewers noted~that this study lasted longer and used larger spray blocks than the studies that found no effects.

Herbicides While it might be expected that herbicides in general are less acutely toxic to birds (and other animals) than insecticides, some herbicides are lethal to birds in small doses. Dinoseb, a dinitrophenol herbicide that interferes with the basic energy metabolism in both plant and animal cells, kills wild birds at doses of 7 mg/kg and is as acutely toxic to birds as some of the most toxic insecticides.

Pesticides: Not for the Birds!

Pesticides will continue to kill birds, reduce their food resources, and disrupt their normal behaviors as long as pesticides continue to be used. The only way to eliminate the effects that pesticides have on birds is to use nonchemical resource management techniques. On farms, in forests, on lawns, and elsewhere that pesticides are used, managers are finding that these techniques

work well and make economic sense. Our job is to see that they are implemented more widely.

Mother Jones Feb. 2018

Neonics may impair bird migrations. Lots of bird species scavenge seeds for their meals. And these days, many of those seeds are coated in neonics. In a [study](#) published last fall, Canadian researchers dosed white-crowned sparrows—a seed-eating, migrating songbird—with the insecticides at various levels. They found that just four seeds coated with imidacloprid, consumed over three days, was enough to cause “significant declines in fat stores and body mass” in the bird and a reduced ability to navigate.

The tendency of neonics to end up in water is also bad news for birds. In a great [Audubon magazine piece](#) from last year, Elizabeth Royte profiles one of the authors of the sparrows study, Christy Morrissey, a wildlife ecotoxicologist at the University of Saskatchewan. She tells Royte that only about 5 percent of the neonics in seed coatings are taken up by the plant. The rest, Royte writes, “leaches off the seed, accumulates in soil, and sluices via snowmelt, rain, and groundwater seepage into ponds and wetlands, where insects like midges and caddis flies—a staple for billions of grassland birds—start their lives.”

Ecological Impacts of Pesticides in CA Pesticide Action Network Kegley et al. 1999

Sublethal exposure = chronic effects behavior, reproduction, nervous system
Most bird kills undocumented

Independent UK March 2018

'Shocking' decline in birds across Europe due to pesticide use, say scientists
New figures reveal decline in farmland birds at a 'level approaching an ecological catastrophe'

Grist March 2012 <https://grist.org/business-technology/scotts-miracle-gro-pleads-guilty-to-selling-poisoned-bird-seed/>

Scotts Miracle-Gro pleads guilty to selling poisoned bird seed

Audubon Plants for Birds <https://www.audubon.org/news/how-make-your-yard-bird-friendly-0>

5. Caring for Your Garden

Steward your native plant habitat with tender loving care—but don't be too neat.

- **Weed:** Remove non-native and invasive weeds. Weeding is often maligned as a "chore"... but it's also a great excuse to spend time in your garden and get to know its wildlife.
- **Don't rake:** Fallen leaves and woody debris are an important habitat layer, and serve as a natural mulch. They will reduce unwanted weed growth, keep your plants' roots cool and moist—and provide habitat for insects and the pupae of moth caterpillars, a favorite of baby birds.
- **Leave the seeds:** Don't "dead-head" all of your flowering plants after they bloom, as those seedheads can be an important source of food during the fall and winter.
- **Spare your back:** In forested areas, leave dead trees and branches. Fallen trunks and branches support the entire forest food web as they decay into rich soil. Standing tree trunks may provide homes for many cavity-nesting species: Woodpeckers often create or enlarge the cavities, but many species will nest in them, including chickadees, titmice, nuthatches, bluebirds, Tree Swallows, Great-crested Flycatchers, Wood Ducks, and American Kestrels.
- **Build a brush pile:** Enhance your garden area by [creating a brush pile](#) to provide shelter for birds and other wildlife.
- **Lay off the pesticides:** A bird-friendly garden is a bug-friendly garden. A diversity of native plants will also attract wildlife that will keep your plant-eating bugs in check: Not only birds but also frogs, toads, bats, and insect predators such as dragonflies, praying mantises and lady bugs will help keep your garden in a healthy balance. Read more about pesticides, and some low-impact alternatives, [here](#).

<https://www.audubon.org/news/bird-friendly-plants-faq#20>

20. What can I do about bugs that are eating my plants?

A bird-friendly garden is one that provides the resources that birds need to thrive—and that includes bugs! Insects are an important element of many birds' diets, and are particularly critical for baby birds: 96% of land birds feed insects to their chicks. As you get to know the insect life in your garden, you may be amazed at the varied assortment of fascinating creatures you find there. A diversity of native plants will also attract wildlife that will keep your plant-eating bugs in check: Not only birds but also frogs, toads, bats, and insect predators such as dragonflies, praying mantises and lady bugs will help keep your garden in a healthy balance. Pesticide use should be avoided as much as possible, to allow all the life in your garden to flourish. If bugs are persistently devouring a favorite plant, however, some low-impact alternatives are available. Choose organic products that break down quickly in the environment such as insecticidal

soap, neem oil, or pyrethrum, and apply sparingly and according to instructions. If your garden is suffering from a larger-scale pest problem such as a non-native gypsy moth caterpillar infestation, you may want to contact your local or state environmental agency for advice.

21. What do I need to know about neonicotinoids when I'm purchasing plants?

Neonicotinoids are a class of insecticides chemically related to nicotine that target certain kinds of receptors in the nervous system. They were first approved for use in the 1990s and have become popular in pest control due to their water solubility, which allows them to be applied to soil and be taken up by plants. They are an example of a "systemic pesticide": one that is absorbed by the plant and retained in its tissues for some time, as opposed to staying just on the plant's surface. Some plants available in the nursery trade have been treated with neonicotinoids to make them less susceptible to insect damage. A growing number of studies have shown that [neonicotinoid pesticides harm birds](#), in addition to a wide range of insect pollinators—both by leaching into the soil and causing neurological effects, and by killing off insects that some species rely on for food.

In the last few years, growing attention has been brought to bear upon neonicotinoid-treated plants—particularly milkweed—sold expressly to help and attract pollinators. Many—but not all!—nurseries that supply native plants expressly do not carry plants that have been treated with neonicotinoids. We have not been able to verify that every nursery listed in our database does not carry plants that have been treated with neonicotinoids or other insecticides. For your own information and peace of mind, you should ask your supplier—if you locate it through our database or some other way—whether or not the plants they carry have been treated with insecticides. It's important that both small retailers and larger chains hear from consumers that carrying neonicotinoid-treated plants is not acceptable. Home Depot, for example, has committed to "phasing out the use of neonics on our plants by the end of 2018," thanks to such pressure.

If you'd like to learn more, the Xerces Society has an excellent set of [online resources](#) related to the effects of neonicotinoids on bees and other insect pollinators.

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Partners from Non Toxic Neighborhoods in Irvine took Irvine mayor and supervisors to DC last week to lobby Committee on Agriculture, Nutrition, and Forestry and legislators

I'm lobbying Mike for Aud CA to send a letter to committee, senators urging rejection of a section of farm bill – in words of non toxic neighborhoods partner:

This bill is threatening our local control to have the power to protect families and pets from hazardous pesticides where they play.

We believe parents and city leaders, not pesticide corporations, or federal legislators, should be able to protect children and our wildlife from exposure to hazardous pesticides.

Section 9101 of the House version of the farm bill will institute federal preemption of local pesticide policies, a move that will overturn a decades-old Supreme Court decision and prevent cities from adopting protective laws that meet the needs of their residents. This ill-advised provision directly threatens the City of Irvine's and other organics-first landscaping policies.

The City of Irvine demonstrated you can have beautiful parks, athletic fields, and open space, that meet community expectations, without the use of toxic pesticides.