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Statement of
Beyond Pesticides
on
Opt-In, Montgomery County Lawn Care Ordinance (Bill 52-14)
to
City of Gaithersburg, Mayor and City Council

July 6, 2020

Thank you for the opportunity to address lawmakers in the City of Gaithersburg. Beyond Pesticides is a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to improve protections from pesticides and promote alternative pest management strategies that reduce or eliminate a reliance on toxic pesticides. Our membership spans the 50 states, the District of Columbia, and groups around the world. We are submitting this statement on behalf of our supporters who are residents of Gaithersburg.

Beyond Pesticides Urges Gaithersburg to Opt-In to Montgomery County's Lawn Care Ordinance (Bill 52-14)

Beyond Pesticides strongly encourages the Gaithersburg City Council to opt-in to Montgomery County's Bill 52-14. This legislation will result in a shift to sustainable land management practices, ensuring that the products and practices used in Gaithersburg are compatible with the organic systems that protect people and local ecology. This approach to pesticide reform will effectively stop the unnecessary use of hazardous pesticides applied for aesthetic purposes. While addressing urgent local concerns related to public health and the environment, passing this legislation will make an important contribution to reversing the escalating crisis in biodiversity, including pollinator declines and the climate crisis—which is exacerbated by petroleum-based, synthetic pesticides, the release of carbon into the environment, and the lost opportunity to sequester carbon in organic soil systems.

By restricting pesticide use, the City will provide critical protections for community health, particularly for children, the elderly, and vulnerable population groups that suffer from compromised immune and neurological systems, cancer, reproductive problems, respiratory illness and asthma, Parkinson's, Alzheimer's, diabetes, or learning disabilities. We urge the Gaithersburg City Council to pass this measure, and meet the urgent need for hazard reduction at time of increasing awareness of the danger that pesticides pose to human health and the environment, while the federal regulatory system is undergoing a severe reduction in programmatic work, adequate scientific assessment, and, in many cases, a reversal of safety decisions that had been made by the U.S. Environmental Protection Agency (EPA) previously. This is an urgent problem, given that the state regulatory system (Maryland Department of Agriculture) relies almost exclusively on the underlying scientific determinations of EPA.

Three examples of this reversal by EPA shed light on a deeper problem that calls for local action in the absence of federal and state protections. One of EPA's first decisions under the new administration back in 2015 was to rescind a decision to ban the use of the insecticide chlorpyrifos, which is a neurological toxicant that damages children's brains.[1] That set the tone for the agency's decision to take no action on the weed killer glyphosate/Roundup, despite the independent science and the World Health Organization's 2015 finding on its cancer-causing properties, and other science on it causing liver and kidney damage and endocrine disrupting effects.[2] Lastly, managed honeybee populations in Maryland and across the country are declining at an unsustainable rate over 30% each year, and wild pollinators like ; eastern monarch butterflies have lost 80% of their population since 1990.[34] Despite these concerning statistics, the current administration plans not only to reregister neonicotinoids, the insecticides implicated in these declines, but has also approved new pesticides with similar toxicity profiles.[5] Through this legislation, Gaithersburg would directly address not only these concerning pesticides, but the myriad of other active ingredients that present similar hazards to human health and the environment.

This legislation takes on a special importance during the current public health pandemic and into the future. The chemical pesticides restricted by this legislation can contribute to underlying conditions that increase people's vulnerability to Covid-19, the coronavirus—especially those with immune and nervous system, respiratory disease, and other illnesses. Since the Centers of Disease Control and Prevention (CDC) has indicated that older people and those with co-morbidity factors are at elevated risk to Covid-19, it is critical that local jurisdictions, like Gaitherburg, take urgent steps to reduce risk factors. This is especially true where there is disproportionate risk to the essential workforce and a high number of at-risk residents.

Healthy Lawn Ordinances Gaining Momentum

Beyond Pesticides has seen firsthand the adoption of strong pesticide reform ordinances in Maryland communities and throughout the country. Beyond Pesticides' Map of Pesticide Reform Policies highlights over 180 communities that have enacted some level of lawn and landscape pesticide reduction policy.[6] The organization has been involved in implementation of the practices required by these policies by conducting soil analyses on demonstration sites to evaluate soil biology, holding training seminars to teach cultural practices and organic compatible materials (See Products Compatible with Organic Land Management[7]), and producing organic land management plans that build soil microbial life to cycle nutrients naturally. This approach supports turf systems in parks and on playing fields that are more resilient, better able to withstand stress, and less dependent on water resources.

A recent ruling from the Maryland Court of Special Appeals and upheld by the Maryland Court of Appeals (Maryland's Supreme Court), maintained Montgomery County's ordinance and the right of local jurisdictions to regulate pesticide use on both public and private property. Acknowledging at the beginning of its ruling the historical importance of Montgomery County's law in the context of the

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[1] Levin, Sam. 2019. Trump Administration won't ban pesticide tied to childhood rain damage. The Guardian. https://www.theguardian.com/us-news/2019/jul/18/epa-chlorpyrifos-ban-children-brain-damage-trump

[2] International Agency for Research on Cancer. 2015. Monograph on Glyphosate. https://monographs.iarc.fr/wp-content/uploads/2018/06/mono112-10.pdf

[3] Center for Biological Diversity. 2017. Iconic Butterfly Has Declined by More Than 80 Percent in Recent Decades. https://www.biologicaldiversity.org/news/press_releases/2017/monarch-butterfly-02-09-2017.php

[4] Bee Informed Partnership. National Management Survey. Total Annual Losses. https://bip2.beeinformed.org/survey/

[5] Holden, Emily. 2019. Trump administration to approve pesticide that may harm bees. The Guardian. https://www.theguardian.com/environment/2019/jul/12/bees-pesticide-trump-epa-approves-sulfoxaflor

[6] Beyond Pesticides Map of Pesticide Reform Policies. 2016. https://www.google.com/maps/d/viewer?mid=1VLpVWvifO2JOrgxf1-d1DLyDruE&ll=39.03573413957711%2C-94.19459570507814&z=5

[7] Beyond Pesticides Organic Compatible Product List. 2020. bit.ly/OrganicCompatible.

location where the law was passed, the Court of Special Appeals noted, "From 1958-1962, Rachel Carson wrote Silent Spring from her home in Silver Spring. Carson's examination of the health impacts of DDT and other pesticides galvanized the public, and the next decade saw Congress enact a broad range of statutes that are foundational to modern environmental law. Montgomery County claims, in essence, that it is following in these footsteps, but we must determine whether it has done so consistently with State law."[8] With the law affirmed, the time is right for Gaithersburg to implement these critical protections that carry on the legacy of Rachel Carson.

Restricting Hazardous Pesticide Use Promotes Environmental Justice

Earlier this year, The Black Institute, an environmental justice organization based in New York City, released a report finding significant disparities in where pesticides were applied in that city, with low income residents at greatest risk.[9] Because many low-income residents are living in apartment complexes, they have no front or back yard. Thus, they often take their children to public parks for play time. Passage of this law would protect children from exposure to pesticide use at local parks, playgrounds, and playing fields.

As the Black Institute report reads, "It is difficult to keep children happy and health on a miniscule budget. 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. The number of cancer cases being reported should be a reminder to city officials that the herbicide [glyphosate] is not safe and should not be treated as such. A chemical that disproportionately impacts people of color is an act of environmental racism. 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."[10]

Not only will this law protect low-income communities at local parks, it will also stop hazardous pesticide drift from occurring onto neighboring property, as well as in homeowner associations and condominium complexes where residents often have little say over landscaping practices.

Implementation is Successful At Encouraging Safer Practices, Protecting the Environment

In terms of implementation, our experience across Maryland and the country show organic methods of managing landscapes to be feasible and cost-effective for local governments of all sizes. (See cost comparison fact sheet)[11]. As residents and land managers learn the horticultural techniques utilized by organic land managers, including cultural practices and organic compatible products, people appreciate the benefits of moving to these common sense, sustainable approaches to land care.

While there has not been many evaluations of the changes resulting from local bans on aesthetic pesticide use, there are two Canadian studies that show a dramatic drop in the percentage of household applying pesticides and residues in the environment after the adoption of policy. A 2011 study published in Environmental Health found that the number went from 1 in 4, to 1 in 10 households applying pesticides one year after the policy went into effect.[12] Continued use was attributable to pesticide use exemptions for invasive species and compliance issues. Another study in the journal *Challenges* (2014)

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[8] Montgomery County, Maryland v. Complete Lawn Care, INC, et al. 2017. Circuit Court for Montgomery County. Case No 427200V. Reported in the Court of Special Appeals of Maryland

[9] The Black Institute. 2020. Poison Parks. https://theblackinstitute.org/wp-content/uploads/2020/01/TBI_Poison_Parks_Report._010820_FINAL.pdf

[10] Ibid

[11] Beyond Pesticides. 2020. Cost Comparison: Organic vs Chemical Land Management. https://beyondpesticides.org/assets/media/documents/documents/Cost%20Comparison.pdf

[12] Cole, D.C.; Vanderlinden, L.; Leah, J.; Whate, R.; Mee, C.; Bienefeld, M.; Wanigaratne, S.; Campbell, M. Municipal bylaw to reduce cosmetic/non-essential pesticide use on household lawns—A policy implementation evaluation. Environ. Health 2011, 10.

showed a decrease in pesticides residue in urban streams by up to 92 percent after policy adoption.[13] Lower reductions may be attributable to continued exempted use on golf courses and for invasive species control.

Conclusion

In light of the success and urgent need to move towards safer land management practices, we urge the Gaithersburg City Council to opt-in to Montgomery County's Bill 52-14. In addition to protecting the residents of the city and the surrounding ecosystem that Gaithersburg shares with other communities, as lawmakers you play an instrumental role in addressing the devastating decline in biodiversity by eliminating toxic pesticides and confronting the climate crisis by supporting soil systems that sequester atmospheric carbon. For an in-depth, scientifically cited analysis of the justification for local action on pesticide reform, please continue reading through the appendices below. Thank you for consideration of our comments. We remain available to answer any questions on the hazards of pesticides or benefits of natural land care.

[13] Todd, A.; Struger, J. Changes in Acid Herbicide Concentrations in Urban Streams after a Cosmetic Pesticides Ban. Challenges 2014, 5, 138-151.

Appendix A. Benefits of Organic Management

Incentivizing a Systems Approach that Eliminates the Need for Toxic Pesticides

By limiting the use of pesticides linked to adverse health and environmental outcomes, local pesticide ordinances can incentivize land managers to transition to practices that have been shown to maintain turf expectations with *de minimis* financial implications. While conventional, chemical-intensive turf and landscape management programs are generally centered on a synthetic product approach that continually treats the symptoms of turf problems with toxic chemicals, the alternative, systems-based approach focuses on the root causes of pest problems, which lie in the soil. These cutting edge land management techniques reveal that toxic pesticides are not needed for successful turf management. Rather, this approach incorporates preventive steps based on supporting soil biology to improve soil fertility and turf grass health, natural or organic products based on a soil analysis that determines need, and specific cultural practices, including mowing height, aeration, dethatching, and over-seeding.

Research from the University of Maryland finds that proper mowing height alone can reduce weed and diseases by 50 to 80% in fescue grass.[14] In the case of mowing high, the natural system supported by this practice is an increase in the root depth of grass. Deeper roots provide greater capacity for the grass to draw water and nutrients from the soil, and stronger grass plants are better able to crowd out weeds or slough off pest pressure. Thus, the practices incorporated as part of a systems approach build resiliency, a term used to describe the ability for an environment to bounce back to its previous state after a disturbance. By fostering healthy soil biology, this approach leads to less need for outside inputs, such as synthetic pesticides and fertilizers. And when properly maintained, lawns and playing fields cared for in this way meet the same expectations of conventional, chemically managed turf.

Cost of Organic is on Par with Conventional in the Long-Term

Although there is often significant discussion over the expense of transitioning to an organic land care program, the cost of implementing an organic systems approach is not likely to be substantially more than current costs, and there is likely to be savings in the long-term. This is because chemical-intensive turf and landscape management programs are generally centered on an approach reliant on costly synthetic products that continually treat symptoms with toxic chemicals, rather than focus on the root causes of pest problems, which lie in the soil. Experience finds that an organic systems approach will build a soil environment rich in microbial diversity that will produce strong, healthy landscapes able to withstand stress from weeds, pests, fungus and other disease.

In considering cost, local governments should reflect on the externalities associated with pesticide use, including its effect to reduce the risk of exposure to carcinogens, prevent the contamination of groundwater and surface water, and the poisoning of wildlife. These are costs that residents are already paying for, through hospital visits, expensive clean-ups, and the need for species conservation and habitat restoration. An organic land care program is not only generally on par with and in the long run less expensive than a conventional chemical based program, it also reduces and in many cases eliminates costly externalities borne by the community at large.

The following provide select examples of the experience of Citys and institutions with organic land care programs:

- There is report produced by nationally renowned turfgrass expert and Beyond Pesticides' board member Chip Osborne in coordination with Grassroots Environmental Education, which looks

[14] University of Maryland. 2016. Mowing/Grasscycling. https://extension.umd.edu/hgic/mowinggrasscycling-lawns

specifically at the cost of conventional and organic turf management on school athletic fields. The report concludes that once established, a natural turf management program can result in savings of greater than 25% compared to a conventional turf management program.[15]

- There is also the research from Harvard University which determined that, ultimately, total operating costs of its organic maintenance program are expected to be the same as the conventionally based program. In a 2009 *New York Times* article,[16] the school determined that irrigation was reduced by 30%, saving 2 million gallons of water a year as a result of reduced irrigation needs. The school was also spending $35,000/year trucking yard waste off site. The university can now use those materials for composting and has saved an additional $10k/year due to the decreased cost and need to purchase fertilizer from off-campus sources. [17]
- The Department of Energy and Environmental Protection in the state of Connecticut, which itself has a successful ban on pesticide use in school playing fields, notes in its information on organic lawn care that, "If your lawn is currently chemically dependent, initially it may be more expensive to restore it. But in the long- term, an organic lawn will actually cost you less money. Once established, an organic lawn uses less water and fertilizers, and requires less labor for mowing and maintenance."[18]
- The experience in South Miami, FL may also be instructive. The city completed a two-year pilot program that limited toxic pesticide use only to organic certified products, the city codified the practice into law. memorandum codifying these practices into law. A memo by the city describes the success of this approach regarding cost. It reads,"Thus-far this initiative has been a qualified success, allowing the city to cut down on its waste-footprint significantly at relatively little expense, and providing a model for other local government to use as guidance."[19]
- One year after passing and implementing an organic landscape management policy, the City of Irvine California's fields look "as pristine as ever," according to the Orange County Register.[20] It notes further, "Weeding by hand and using organic pesticides, which must be applied more frequently, will increase costs by about 5.6 percent in a $21.2 million landscaping budget, according to a city report on implementation of the program."

While a decade ago the natural systems approach required slightly increased up-front costs and saw savings in the long run, technology and practices have now progressed to the point where parity can often be achieved from the outset.

Appendix B. Key Areas of Concern with Toxic Pesticides

Pesticide-Induced Diseases

The scientific literature documents elevated rates of chronic diseases among people exposed to pesticides, with increasing numbers of studies associated with both specific illnesses and a range of illnesses. Beyond Pesticides' Pesticide-Induced Diseases Database[21] documents over 750 studies linked

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[15] Osborne, Charles and Doug Wood. 2010. A cost Comparison of Conventional (Chemical) Turf Management and Natural (Organic) Turf Management on School Athletic Fields. Grassroots Environmental Education. http://www.grassrootsinfo.org/pdf/turfcomparisonreport.pdf
[16] Raver, Anne. 2009. The Grass is Greener at Harvard. http://www.nytimes.com/2009/09/24/garden/24garden.html?_r=2
[17] Harvard University. 2009. Harvard Yard Soils Restoration Project Summary Report. http://www.slideshare.net/harvard_uos/harvard-yard-soils-restoration-project-summary-report-22509-4936446.
[18] Connecticut Department of Energy and Environmental Protection. 2016. Organic Land Care: Your neighbors will "go green" with envy. http://www.ct.gov/deep/cwp/view.asp?a=2708&q=382644#Expensive.
[19] City of South Miami. 2019. City Commission Agenda Item Report: Inter-office Memorandum. https://beyondpesticides.org/assets/media/documents/SouthMiami_FL_Organicordinance.pdf.
[20] Perkes, Courtney. 2017. Irvine Little League mom leads charge to wipe out pesticides on ball fields nationwide. Orange County Register. http://www.ocregister.com/2017/05/24/irvine-group-working-to-get-pesticides-off-city-baseball-fields-nationwide/.
[21] Beyond Pesticides. 2020. Pesticide Induced Diseases Database. http://www.beyondpesticides.org/resources/pesticide-induced-diseases-database/overview.

to human health effects. Of which, there are 359 studies on cancer; 107 studies on sexual and reproductive dysfunction; 102 studies on Parkinson's disease; 87 studies on learning and developmental disorders; 33 studies on birth defects; 32 studies on asthma; 18 studies on diabetes; and 12 studies on Alzheimer's disease.

The studies in the database show that our current approach to restricting pesticide use through risk assessment-based mitigation measures is not working. This failed human experiment must be ended. The warnings of those who have expressed concerns about risk assessment, such as U.S. Environmental Protection Agency (EPA) Administrator under Presidents Nixon and Reagan, William Ruckelshaus, have been borne out by three decades of use and study. Mr. Ruckelshaus in 1984 said, "We should remember that risk assessment data can be like the captured spy: If you torture it long enough, it will tell you anything you want to know." EPA's risk assessment fails to look at chemical mixtures, synergistic effects, certain health endpoints (such as endocrine disruption), disproportionate effects to vulnerable population groups, and regular noncompliance with product label directions. These deficiencies contribute to its severe limitations in defining real world poisoning, as captured by epidemiologic studies in the database.

Children's Vulnerability

Children face unique dangers from pesticide exposure. The National Academy of Sciences reports that children are more susceptible to chemicals than adults and estimates that 50% of lifetime pesticide exposures occur during the first five years of life.[22] In fact, studies show children's developing organs create "early windows of great vulnerability" during which exposure to pesticides can cause great damage.[23] For example, according to researchers at the University of California-Berkeley School of Public Health, exposure to pesticides while in the womb increases the odds that a child will have attention deficit hyperactivity disorder (ADHD).[24] Likewise, Cincinnati Children's Hospital Medical Center found a strong association between urinary concentrations of pyrethroids, a commonly used lawn care pesticide, and the development of ADHD, primarily in boys (aged 8 to 15). Any concentrations found above the level of detection corresponded to a three-fold increase in the chance of developing ADHD, when compared to boys without detectable levels.[25]

As EPA points out in its document, *Pesticides and Their Impact on Children: Key Facts and Talking Points*:[26]

- "Due to key differences in physiology and behavior, children are more susceptible to environmental hazards than adults."
- "Children spend more time outdoors on grass, playing fields, and play equipment where pesticides may be present."
- "Children's hand-to-mouth contact is more frequent, exposing them to toxins through ingestion."

[22] National Research Council, National Academy of Sciences. 1993. Pesticides in the Diets of Infants and Children, National Academy Press, Washington, DC: 184-185.
[23] Landrigan, P.J., L Claudio, SB Markowitz, et al. 1999. "Pesticides and inner-city children: exposures, risks, and prevention." Environmental Health Perspectives 107 (Suppl 3): 431-437.
[24] Marks AR, Harley K, Bradman A, Kogut K, Barr DB, Johnson C, et al. 2010. Organophosphate Pesticide Exposure and Attention in Young Mexican-American Children: The CHAMACOS Study. Environ Health Perspect 118:1768-1774.
[25] Wagner-Schuman, et al. 2015. Association of pyrethroid pesticide exposure with attention-deficit/hyperactivity disorder in a nationally representative sample of U.S. children. Environmental Health 14, 44. https://ehjournal.biomedcentral.com/articles/10.1186/s12940-015-0030-y
[26] See: https://www.epa.gov/sites/production/files/2015-12/documents/pest-impact-hsstaff.pdf.

In 2012, the American Academy of Pediatrics (AAP) released a landmark policy statement, *Pesticide Exposure in Children*, on the effects of pesticide exposure in children, acknowledging the risks to children from both acute and chronic effects.[27] AAP's statement notes that, "Children encounter pesticides daily and have unique susceptibilities to their potential toxicity." The report discusses how kids are exposed to pesticides every day in air, food, dust, and soil. Children also frequently come into contact with pesticide residue on pets and treated lawns, gardens, and indoor spaces.

Pesticides, such as glyphosate and its formulated products (Roundup) and 2,4-D, both widely used on turf and lawns, can be tracked indoors resulting in long-term exposures. Scientific studies show that pesticides, like 2,4-D, that are applied to lawns drift and are tracked indoors where they settle in dust, air and on surfaces and may remain in carpets.[28,29] Pesticides in these environments may increase the risk of developing asthma, exacerbate a previous asthmatic condition, or even trigger asthma attacks by increasing bronchial hyper-responsiveness.[30] This is especially important as infants crawling behavior and proximity to the floor account for a greater potential than adults for dermal and inhalation exposure to contaminants on carpets, floors, lawns, and soil.[31]

A study published in the Journal of the National Cancer Institute finds that household and garden pesticide use can increase the risk of childhood leukemia as much as seven-fold.[32] Similarly, a 2010 meta-analysis on residential pesticide use and childhood leukemia finds an association with exposure during pregnancy, as well as to insecticides and herbicides. An association is also found for exposure to insecticides during childhood.[33]

Prenatal exposures to pesticides can also have long-lasting impacts on infants and children. Herbicides, like glyphosate, can adversely affect embryonic, placental and umbilical cord cells, and can impact fetal development. Preconception exposures to glyphosate were found to moderately increase the risk for spontaneous abortions in mothers exposed to glyphosate products.[34] One 2010 analysis observed that women who use pesticides in their homes or yards were two times more likely to have offspring with neural tube defects than women who did not use pesticides.[35] Studies also find that pesticides, like 2,4-D, can also pass from mother to child through umbilical cord blood and breast milk.[36,37]

Biomonitoring testing has also documented pesticide residues in children. Residues of lawn pesticides, like 2,4-D and mecoprop, were found in 15 percent of children tested, ages three to seven, whose parents had recently applied the lawn chemicals. Breakdown products of organophosphate insecticides were present in 98.7 percent of children tested.[38] In one study, children in areas where glyphosate is

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[27] Roberts JR, Karr CJ; Council On Environmental Health. 2012. Pesticide exposure in children. Pediatrics. 2012 Dec; 130(6):e1765-88.
[28] Nishioka, M., et al. 1996. Measuring lawn transport of lawn-applied herbicide acids from turf. Env Science Technology, 30:3313-3320.
[29] Nishioka, M., et al. 2001. "Distribution of 2,4-D in Air and on Surfaces Inside Residences. Environmental Health Perspectives 109(11).
[30] Hernández, AF., Parrón, T. and Alarcón, R. 2011. Pesticides and asthma. Curr Opin Allergy Clin Immunol.11(2):90-6.
[31] Bearer, CF. 2000. The special and unique vulnerability of children to environmental hazards. Neurotoxicology 21: 925-934; and Fenske, R., et al. 1990. Potential Exposure and Health Risks of Infants following Indoor Residential Pesticide Applications. Am J. Public Health. 80:689-693.
[32] Lowengart, R. et al. 1987. Childhood Leukemia and Parent's Occupational and Home Exposures. Journal of the National Cancer Institute. 79:39.
[33] Turner, M.C., et al. 2010. Residential pesticides and childhood leukemia: a systematic review and meta-analysis. Environ Health Perspect 118(1):33-41.
[34] Arbuckle, T. E., Lin, Z., & Mery, L. S. (2001). An Exploratory Analysis of the Effect of Pesticide Exposure on the Risk of Spontaneous Abortion in an Ontario Farm Population. Environ Health Perspect, 109, 851–857.
[35]Brender, JD., et al. 2010. Maternal Pesticide Exposure and Neural Tube Defects in Mexican Americans. Ann Epidemiol. 20(1):16-22.
[36] Pohl, HR., et al. 2000. Breast-feeding exposure of infants to selected pesticides. Toxicol Ind Health. 16:65-77.
[37] Sturtz, N., et al. 2000. Detection of 2,4-dichlorophenoxyacetic acid (2,4-D) residues in neonates breast-fed by 2,4-D exposed dams. Neurotoxicology 21(1-2): 147-54.
[38] Valcke, Mathieu, et al. 2004. Characterization of exposure to pesticides used in average residential homes with children ages 3 to 7 in Quebec. National Institute of Public Health, Québec.

routinely applied were found to have detectable concentrations in their urine.[39] While glyphosate is excreted quickly from the body, it was concluded, "a part may be retained or conjugated with other compounds that can stimulate biochemical and physiological responses." A 2002 study finds children born to parents exposed to glyphosate show a higher incidence of attention deficit disorder and hyperactivity.[40]

Pesticides and Pets

Studies find that dogs exposed to herbicide-treated lawns and gardens can double their chance of developing canine lymphoma (1) and may increase the risk of bladder cancer in certain breeds by four to seven times (2).

(1) Scottish Terriers exposed to pesticide-treated lawns and gardens are more likely to develop transitional cell carcinoma of the bladder, a type of cancer.[41]
(2) "Statistically significant" increase in the risk of canine malignant lymphoma in dogs when exposed to herbicides, particularly 2,4-D, commonly used on lawns and in "weed and feed" products.[42]

Adverse Effects to Wildlife

While the data is pouring in on intersex species in waterways that surround urban and suburban areas and there are certainly a mix of factors, the contribution of runoff from suburban landscapes are seen as an important contributor. In *Suburbanization, estrogen contamination, and sex ratio in wild amphibian populations,* the authors from Yale University's School of Forestry and Environmental Studies and the U.S. Geological Survey (USGS) find the following: "While there is evidence that such endocrine disruption can result from the application of agricultural pesticides and through exposure to wastewater effluent, we have identified a diversity of endocrine disrupting chemicals within suburban neighborhoods. Sampling populations of a local frog species, we found a strong association between the degree of landscape development and frog offspring sex ratio. Our study points to rarely studied contamination sources, like vegetation landscaping and impervious surface runoff, that may be associated with endocrine disruption environments around suburban homes."[43]

Appendix C. The Failure of EPA's Regulatory System

Pesticides are, by their very nature, poisons. The Federal Insecticide Fungicide and Rodenticide Act (FIFRA), the law governing pesticide registration and use in the U.S., relies on a risk-benefit assessment, which allows the use of pesticides with known hazards based on the judgment that certain levels of risk are acceptable. However, EPA, which performs risk assessments, assumes that a pesticide would not be marketed if there were no benefits to using it and therefore no risk/benefit analysis is conducted or evaluated by the agency "up front." Registration of a pesticide by EPA does not guarantee that the chemical is "safe," particularly for vulnerable populations such as pregnant mothers, children, pets, and those with chemical sensitivities. Below are examples of concern within the pesticide registration

[39] Acquavella, J. F., et al. (2004). Glyphosate Biomonitoring for Farmers and Their Families: Results from the Farm Family Exposure Study. Environ Health Perspect. 112(3), 321-326.
[40] Cox C. 2004. Journal of Pesticide Reform. Vol. 24 (4) citing: Garry, V.F. et al. 2002. "Birth defects, season of conception, and sex of children born to pesticide applicators living in the Red River Valley of Minnesota." Environ. Health Persp. 110 (Suppl. 3):441-449.
[41] Hayes, H. et al., 1991. "Case-control study of canine malignant lymphoma: positive association with dog owner's use of 2,4-D acid herbicides," Journal of the National Cancer Institute, 83(17):1226.
[42] Glickman, Lawrence, et al. 2004. "Herbicide exposure and the risk of transitional cell carcinoma of the urinary bladder in Scottish Terriers," Journal of the American Veterinary Medical Association 224(8):1290-1297.
[43] Lambert, M.R., Giller, G.S.J., Barber, L.B., Fitzgerald, K.C., Skelly, D.K., 2015. Suburbanization, estrogen contamination, and sex ratio in wild amphibian populations. Proc. Natl. Acad. Sci. 112, 11881e11886.

process. These factors should give pause to lawmakers tasked with protecting public and environmental health, and supports action to prohibit toxic pesticides and, in so doing, encourage alternatives.

Conditional Registration. EPA will often approve the use of a pesticide without all of the necessary data required to fully register the chemical, and will assign it a "conditional" registration. The agency assumes that while it waits for additional data the product would not cause adverse impacts that would prevent an eventual full registration. A recent report (2013) from the Government Accountability Office, entitled *EPA Should Take Steps to improve Its Oversight of Conditional Registrations,*[44] strongly criticizes this process, citing poor internal management of data requirements, constituting an "internal control weakness." The report states, "The extent to which EPA ensures that companies submit additional required data and EPA reviews these data is unknown. Specifically, EPA does not have a reliable system, such as an automated data system, to track key information related to conditional registrations, including whether companies have submitted additional data within required time frames." However, these recommendations do not go far enough. Pesticides without all the data required for a full understanding of human and environmental toxicity should not be allowed on the market. Several historic examples exist of pesticides that have been restricted or canceled due to health or environmental risks decades after first registration. Chlorpyrifos, an organophosphate insecticide, which is associated with numerous adverse health effects, including reproductive and neurotoxic effects, had its residential uses canceled in 2001. Others, like propoxur, diazinon, carbaryl, aldicarb, carbofuran, and most recently endosulfan, have seen their uses restricted or canceled after years on the market due to unreasonable human and environmental effects. Recently, a product manufactured by DuPont, Imprelis, with the active ingredient aminocyclopyrachlor, was removed from the market only two years after EPA approval under conditional registration.[45] Marketed as a broadleaf weed killer, Imprelis was found to damage and kill trees. However, in EPA's registration of the chemical, the agency noted, "In accordance with FIFRA Section 3(c)(7)(C), the Agency believes that the conditional registration of aminocyclopyrachlor will not cause any unreasonable adverse effects to human health or to the environment and that the use of the pesticide is in the public's interest; and is therefore granting the conditional registration."[46]

Failure to test or disclose inert ingredients. Despite their innocuous name, inert ingredients in pesticide formulations are neither chemically, biologically, or toxicologically inert; in fact they can be just as toxic as the active ingredient. Quite often, inert ingredients constitute over 95% of the pesticide product. In general, inert ingredients are minimally evaluated, even though many are known to state, federal, and international agencies to be hazardous to human health. For example, until October 23, 2014,[47] creosols, chemicals listed as hazardous waste under Superfund regulations and considered possible human carcinogens by EPA,[48] were allowed in pesticide formulations without any disclosure requirement. EPA recently took action to remove cresols and 71 other inert ingredients from inclusion in pesticide formulations as a result of petitions from health and consumer groups. However, numerous hazardous inerts remain. For example, a 2009 study, entitled *Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells*,[49] found that an inert ingredient in

[44] Government Accountability Office. August 2013. EPA Should Take Steps to Improve Its Oversight of Conditional Registrations. GAO-13-145. http://www.gao.gov/products/GAO-13-145.
[45] Environmental Protection Agency. June 2012. Imprelis and Investigation of Damage to Trees. http://www.epa.gov/pesticides/regulating/imprelis.html.
[46] Environmental Protection Agency. August 2010. Registration of the New Active Ingredient Aminocyclopyrachlor for Use on Non-Crop Areas, Sod Farms, Turf, and Residential Lawns. http://www.regulations.gov/contentStreamer?objectId=0900006480b405d8&disposition=attachment&contentType=pdf.
[47] Environmental Protection Agency. October 2014. EPA Proposes to Remove 72 Chemicals from Approved Pesticide Inert Ingredient List. http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/3397554fa65588d685257d7a0061a300!OpenDocument.
[48] Environmental Protectin Agency. October 2013. Cresol/Cresylic Acid. http://www.epa.gov/ttnatw01/hlthef/cresols.html.
[49] Benachour and Seralini. 2009. Glyposate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells. *Chemical Research and Toxicology. http://pubs.acs.org/doi/abs/10.1021/tx800218n.*

formulations of the weed killer Roundup (glyphosate), polyethoxlated tallowamine (POEA), is more toxic to human cells than the active ingredient glyphosate, and, in fact, amplifies the toxicity of the product – an effect not tested or accounted for by the pesticide registration process. A 2014 study, *Major pesticides are more toxic to human cells than their declared active principle*, found inert ingredients had the potential to magnify the effects of active ingredients by 1,000 fold.

Pesticide manufacturers argue against the disclosure of inert ingredients on pesticide product labels, maintaining that this information is proprietary. Limited review of inert ingredients in pesticide products highlights a significant flaw with the regulatory process. Rather than adopt a precautionary approach when it comes to chemicals with unknown toxicity, EPA allows uncertainties and relies on flawed risk assessments that do not adequately address exposure and hazard. Then, when data becomes available on hazards, these pesticides, both active ingredients and inerts, have already left a toxic trail on the environment and people's well-being.

Label Restrictions Inadequate. From a public health perspective, an inadequate regulatory system results in a pesticide product label that is also inadequate, failing to restrict use or convey hazard information. While a resident may be able to glean some acute toxicity data, chronic or long-term effects will not be found on products' labels. Despite certain pesticides being linked to health endpoints, such as exacerbation of asthma,[50] learning disabilities,[51] or behavioral disorders,[52] this information is not disclosed on the label. Furthermore, data gaps for certain health endpoints are also not disclosed.

Mixtures and Synergism. In addition to gaps in testing inert ingredients and their mixture with active ingredients in pesticide products, there is an absence of review of the health and environmental impacts of pesticides used in combination. A study by Warren Porter, PhD., professor of zoology and environmental toxicology at the University of Wisconsin, Madison, examined the effect of fetal exposures to a mixture of 2,4-D, mecoprop, and dicamba exposure —frequently used together in lawn products like Weed B Gone Max and Trillion— on the mother's ability to successfully bring young to birth and weaning.[53] A 2011 study, entitled *Additivity of pyrethroid actions on sodium influx in cerebrocotorial neurons in primary culture,*[54] finds that the combined mixture's effect is equal to the sum of the effects of individual pyrethoids. This equates to a cumulative toxic loading for exposed individuals. Similarly, researchers looked at the cumulative impact the numerous pesticides that may be found in honey bee hives in the 2014 paper *Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae*.[55] The findings of the study send no mixed messages —pesticides, whether looked at individually, in different combinations, or even broken down into their allegedly inert component parts have serious consequences on the bee larvae survival rates. The synergistic effects in most combinations of the pesticides amplify these mortality rates around the four-day mark.

Research by Tyrone Hayes, PhD, professor of integrative biology at UC Berkeley has compared the impact of exposure to realistic combinations of small concentrations of pesticides on frogs, finding that

[50] Hernandez et al. 2011. Pesticides and Asthma. *Current opinion in allergy and clinical immunology*. http://www.ncbi.nlm.nih.gov/pubmed/21368619.
[51] Horton et al. 2011. Impact of Prenatal Exposure to Piperonyl Butoxide and Permethrin on 36-Month Neurodevelopment. *Pediatrics*. http://www.ncbi.nlm.nih.gov/pubmed/21300677.
[52] Furlong et al. 2014. Prenatal exposure to organophosphate pesticides and reciprocal social behavior in childhood.
[53] Cavieres MF, Jaeger J, Porter W. Developmental toxicity of a commercial herbicide mixture in mice: I. Effects on embryo implantation and litter size. Environmental Health Perspectives. 2002;110(11):1081-1085.
[54] Cao et al. 2011. Additivity of Pyrethroid Actions on Sodium Influx in Cerebrocortical Neurons in Primary Culture. *Environmental Health Perspectives. http://ehp.niehs.nih.gov/1003394/.*
[55] Zhu et al. 2014. Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae. PLOS One. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0077547.

frog tadpoles exposed to mixtures of pesticides took longer to metamorphose to adults and were smaller at metamorphosis than those exposed to single pesticides, with consequences for frog survival. The study revealed that "estimating ecological risk and the impact of pesticides on amphibians using studies that examine only single pesticides at high concentrations may lead to gross underestimations of the role of pesticides in amphibian declines."[56]

Appendix D. Health Effects of Commonly Used Pesticides

[56] Hayes TB, Case P, Chui S, et al. Pesticide Mixtures, Endocrine Disruption, and Amphibian Declines: Are We Underestimating the Impact? *Environmental Health Perspectives*. 2006;114(Suppl 1):40-50. doi:10.1289/ehp.8051.

Health Effects of 30 Commonly Used Pesticides

Pesticides	Health Effects						
	Cancer	Endocrine Disruption	Reproductive Effects	Neurotoxicity	Kidney/Liver Damage	Sensitizer/ Irritant	Birth Defects
Herbicides							
2,4-D*	X[4]	X[10]	X[7]	X[8]	X[8]	X[1]	X[11]
Benfluralin					X[1]	X[1]	
Bensulide				X[2]	X[1]	X[2]	
Clopyralid			X[7]			X[2]	X[7]
Dicamba*			X[1]	X[2]	X[2]	X[1]	X[1]
Diquat Dibromide			X[12]		X[11]	X[1]	
Dithiopyr					X[1]	X[1]	
Fluazipop-p-butyl			X[1]		X[1]		X[1]
Glyphosate*	X[12]	X[8]	X[1]		X[8]	X[1]	
Imazapyr					X[7]	X[2]	
Isoxaben	X[3]				X[2]		
MCPA		X[6]	X[2]	X[2]	X[11]	X[1]	
Mecroporp (MCPP)*	Possible[3]	X[6]	X[2]	X[1]	X[9]	X[1]	X[1]
Pelargonic Acid*						X[1]	
Pendimethalin*	Possible[3]	X[6]	X[1]			X[2]	
Triclopyr			X[7]		X[9]	X[1]	X[7]
Trifluralin*	Possible[3]	X[6]	X[1]		X[2]	X[1]	
Insecticides							
Acephate	Possible[3]	X[6]	X[11]	X[9]		X[2]	
Bifenthrin*†	Possible[3]	Suspected[6,10]		X[8]		X[1]	X[9]
Carbaryl	X[3]	X[10]	X[8]	X[1]	X[11]	X[11]	X[7]
Fipronil	Possible[3]	X[6]	X[8]	X[8]	X[8]	X[8]	
Imidacloprid ‡			X[7]		X[2]		X[7]
Malathion*	Possible[3]	X[10]	X[11]	X[9]	X[2]	X[2]	X[2]
Permethrin*†	X[3]	Suspected[6,10]	X[1,7]	X[9,7]	X[9]	X[1]	
Trichlorfon	X[3]	X[6]	X[11]	X[2]	X[2]		X[2]
Fungicides							
Azoxystrobin					X[2]	X[2]	
Myclobutanil		Probable[6]	X[2]		X[2]		
Propiconazole	Possible[3]	X[6]	X[2]		X[1]	X[1]	
Sulfur						X[1]	
Thiophanate methyl	X[3]	X[1]	X[1]	Suspected[1]	X[1]	X[2]	X[1]
Ziram	Suggestive[3]	Suspected[6]		X[2]	X[2]	X[2]	
Totals:	16	17	21	14	25	26	12

*These pesticides are among the top 10 most heavily used pesticides in the home and garden sector from 2006-2007, according to the latest sales and usage data available from EPA (2011), available at http://www.epa.gov/opp00001/pestsales/07pestsales/market_estimates2007.pdf.

† EPA lists all synthetic pyrethroids under the same category. While all synthetic pyrethroids have similar toxicological profiles, some may be more or less toxic in certain categories than others. See Beyond Pesticides' synthetic pyrethroid fact sheet at bit.ly/TLBuP8 for additional information.

‡ Imidacloprid is a systemic insecticide in the neonicotinoid chemical class, which is linked to bee decline.

Description

Most toxicity determinations based on interpretations and conclusions of studies by university, government, or organization databases. Empty cells may refer to either insufficient data or if the chemical is considered relatively non-toxic based on currently available data.

The list of 30 commonly used lawn chemicals is based on information provided by the General Accounting Office 1990 Report, "Lawn Care Pesticides: Risks Remain Uncertain While Prohibited Safety Claims Continue," U.S. Environmental Protection Agency (EPA) National Pesticide Survey (1990), Farm Chemicals Handbook (1989), The National Home and Garden Pesticide Use Survey by Research Triangle Institute, NC (1992), multiple state reports, current EPA Environmental Impact Statements, and Risk Assessments, EPA national sales and usage data, best-selling products at Lowe's and Home Depot, and Beyond Pesticides' information requests.

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3. U.S. EPA. 2012. Office of Pesticide Programs, *Chemicals Evaluated for Carcinogenic Potential*. http://npic.orst.edu/chemicals_evaluated.pdf.

4. California Environmental Protection Agency. *Proposition 65: Chemicals Known to the State to Cause Cancer or Reproductive Toxicity*. Office of Environmental Health Hazard Assessment. http://www.oehha.org/prop65/prop65_list/files/P65single052413.pdf.

5. The Pesticide Management Education Program at Cornell University. *Pesticide Active Ingredient Information*. http://pmep.cce.cornell.edu/profiles/index.html.

6. The Endocrine Disruption Exchange. 2011. *List of Potential Endocrine Disruptors*. http://www.endocrinedisruption.com/endocrine.TEDXList.overview.php.

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Appendix E. Environmental Effects of 30 Commonly Used Lawn Pesticides

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Environmental Effects of 30 Commonly Used Lawn Pesticides

Pesticides	Health Effects					
	Detected in Groundwater	Potential Leacher	Toxic to Birds	Toxic to Fish/ Aquatic Organisms	Toxic to Bees	Toxic to Mammals
Herbicides						
2,4-D*	X[1,2,3,4,7]	X[3,4]	X[1,2,3,11]	X[1,2,3,11]	X[1,11]	X[3,4,12]
Benfluralin	X[7]		X[3,11]	X[3,11]	X[5,11]	
Clopyralid	X[2,7]	X[2,11]	X[11]	X[11]	X[11]	
Dicamba	X[2,7]	X[1,2,3]	X[10,11]	X[1,2,3,11]	X[5,10,11]	
Diquat Dibromide		X[5]	X[1,3,11]	X[1,3,11]	X[5,11]	X[1]
Dithiopyr				X[5,6,11]	X[5,11]	
Fluazipop-p-butyl				X[1,4,6,11]	X[1,4]	
Glyphosate*	X[8]	X[5]	X[1,3,11]	X[1,2,11]	X[11]	X[4]
Imazapyr	X[2]	X[2,3]		X[2,5,11]	X[5,11]	
Isoxaben		X[11]	X[11]	X[3,11]	X[11]	
MCPA	X[4,7]	X[1,4,11]	X[1,3,11]	X[1,3,11]	X[5]	X[3]
Mecoprop (MCPP)*	X[4]	X[1,2,3,11]	X[3,11]	X[2]	X[11]	X[3]
Pelargonic Acid*			X[3 §]	X[3 §]	X[5]	
Pendimethalin*	X[3,7]		X[1,3,11]	X[1,3,11]	X[5,11]	X[3]
Triclopyr	X[2,7]	X[1,2,3,11]	X[2,3,11]	X[2,3,11]	X[5,11]	
Trifluralin*	X[4,7]			X[3,11]	X[5,11,12]	
Insecticides						
Acephate		X[1]	X[1,3,10,11]	X[3,11]	X[1,3,10,11]	X[3]
Bifenthrin*†			X[1,10,11]	X[1,10,11]	X[1,10,11]	X[1,4]
Carbaryl	X[1,3,7]	X[11]	X[2,11]	X[1,2,3,11]	X[1,2,3,11]	X[3,11]
Fipronil	X[7]	X[5,11]	X[2,4,10,11]	X[2,4,10,11]	X[2,4,10,11]	X[4]
Imidacloprid ‡	X[7]	X[1,2,10,11]	X[1,2,11]	X[1,2,11]	X[1,2,10,11]	
Malathion*	X[1,2,3,7]	X[1,3,5]	X[1,2,3,10,11]	X[1,2,3,10,11]	X[1,3,10,11]	X[3]
Permethrin*†	X[2,7]			X[1,2,3,11]	X[1,2,3,11]	
Trichlorfon		X[1,3,11]	X[1,3,11]	X[1,3,11]	X[1,11]	X[4 ‖]
Fungicides						
Azoxystrobin	X[9]	X[3,4,11]	X[11]	X[3,11]	X[11]	
Myclobutanil	X[7]			X[5]		
Propiconazole	X[7]	X[3]		X[3,11]	X[5,11]	X[11]
Sulfur		X[1]	X[11]	X[11]	X[11]	
Thiophanate methyl		X[3]		X[3,11]	X[11]	
Ziram		X[3,4]	X[1,3,11]	X[1,3,11]	X[11]	X[3]
Totals:	19	20	22	30	29	14

*These pesticides are among the top 10 most heavily used pesticides in the home and garden sector from 2006-2007, according to the latest sales and usage data available from EPA (2011), available at http://www.epa.gov/opp00001/pestsales/07pestsales/market_estimates2007.pdf.

† EPA lists all synthetic pyrethroids under the same category. While all synthetic pyrethroids have similar toxicological profiles, some may be more or less toxic in certain categories than others. See Beyond Pesticides' synthetic pyrethroid fact sheet at bit.ly/TLBuP8 for additional information.

‡ Imidacloprid is a systemic insecticide in the neonicotinoid chemical class, which is linked to bee decline.

§ Based on soap salts.

‖ Based on in-vitro mammalian cell study.

Description

Most toxicity determinations based on interpretations and conclusions of studies by university, government, or organization databases. Empty cells may refer to either insufficient data or if the chemical is considered relatively non-toxic based on currently available data. The column labeled "Potential to Leach" refers to a chemical's potential to move into deeper soil layers and eventually into groundwater. The column labeled "Toxic to Mammals" refers to conclusions based on evidence from studies done on non-human mammals.

The list of 30 commonly used lawn chemicals is based on information provided by the General Accounting Office 1990 Report, "Lawn Care Pesticides: Risks Remain Uncertain While Prohibited Safety Claims Continue," U.S. Environmental Protection Agency (EPA) National Pesticide Survey (1990), Farm Chemicals Handbook (1989), The National Home and Garden Pesticide Use Survey by Research Triangle Institute, NC (1992), multiple state reports, current EPA Environmental Impact Statements, and Risk Assessments, EPA national sales and usage data, best-selling products at Lowe's and Home Depot, and Beyond Pesticides' information requests.

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