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Statement of
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on
Int. No. 800, Amendment on Use of Pesticides by City Agencies
to
New York City Council Committee on Health
New York, NY
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Honorable Chair and Members of the Committee. Thank you for the opportunity to address the New York City Council Committee on Health. I am Jay Feldman, Executive Director of Beyond Pesticides, 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 New York City.

Beyond Pesticides Support Int. No. 800, and Suggests a Clarifying Amendment

Beyond Pesticides strongly supports the adoption of Int. No. 800 to modernize and update restrictions on New York City's use of pesticides on city owned and leased property. While the statute that Int. No. 800 amends provides a sound foundation for eliminating hazardous pesticides and incentivizes the adoption of organic management practices, the law requires updating to remain in sync with adequate public health and environmental protection. Unfortunately, New York City, like other local jurisdictions around the country, cannot rely on the federal government's regulatory review process because of underlying weaknesses in the federal pesticide registration law and serious implementation problems (exacerbated by the current administration). It is this understanding that motivated the adoption of Local Law 37, *Pesticide Use by City Agencies*, in 2005. The standard in Local Law 37 prohibits use of highly toxic pesticides, including those that cause acute and chronic effects in children, elderly, the general population, and pets. In addition, the understanding at the time of its adoption was that toxic chemicals are not necessary to achieve pest management goals in land and landscape care and building and community management. Int. No. 800 responds to increased knowledge that has been gained over the past decade, regarding health and environmental hazards of pesticides and the viability, efficacy, and cost competitiveness of organic management practices and products. Int. No. 899 will effectively stop the unnecessary use of hazardous pesticides that continue under existing law and no longer qualify as "best management practices."

While important progress has been made under Local Law 37, showing some herbicide use reductions (a use reduction in herbicides is cited in the city's 2015 report, after reporting an increase in the previous year), the city's 2015 report[1] shows an increase in insecticide, fungicide, and rodenticide use and a persistent reliance on toxic pesticides as a key part of its practices in public spaces where children play and pets frequent. In fact, the city has not in practice fully embraced the spirit of Local Law 37's integrated pest management (IPM) mandate:

> § 17-1204 Interagency pest management committee. b. By January 1, 2007, the interagency pest management committee shall develop a plan to further reduce pesticide use by city agencies, including initiatives to implement integrated pest management, giving preference to employing physical, mechanical, cultural, biological and educational tactics to prevent conditions that promote pest infestations, which shall be updated on an annual basis, as necessary. The plan, and any updates of such plan, shall be submitted to the mayor and the speaker of the council with in thirty days of issuance.[2]

The city does, in its 2007 plan, succinctly define its approach to IPM:

> Traditional pest control, which emphasizes the routine application of pesticides, often ignores the root causes of infestations, inadvertently allowing pest populations to persist and often flourish. In addition, many synthetic pesticides pose public health risks of their own -- some significant. IPM promotes the prevention of infestation by employing physical, mechanical, cultural, biological and educational tactics, thus reducing the need for chemical control.[3]

Int. No. 800 Updates Prohibited Materials in Local Law 37

However, the reliance on glyphosate (Roundup) and other toxic pesticides (including insecticides such as synthetic pyrethroids, organophospates, carbamates, fipronil, and indoxacarb) have continued. A close reading of Local Law 37 finds a law that establishes IPM as a decision making process with clear priorities to emphasize "physical, mechanical, cultural, biological and educational tactics," while disallowing certain hazardous materials classified as carcinogens and developmental toxicants. Int. No. 800 updates the materials prohibition, thus improving the non-toxic elements of the program. This is particularly timely, given the increasing data on pesticide hazards, including glyphosate/Roundup, and the growth of organic standards as a successful approach to management, with defined products that are compatible with organic systems.

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[1] New York City Department of Health. 2015. An Update on Integrated Pest Management in New York City. https://www1.nyc.gov/assets/doh/downloads/pdf/pesticide/pesticide-use-report2015.pdf

[2] Chapter 12 Pesticide Use by City Agencies, Title 17, Section 1 administrative code of the city of New York. 2005.

[3] NYC Department of Health and Mental Hygiene, Bureau of Environmental Surveillance and Policy. Integrated Pest Management Plan. January 1, 2007. https://a816-healthpsi.nyc.gov/ll37/pdf/IPM_2006.pdf.

Limiting the Use of Toxic Pesticides through an Allowed List of Organic Compatible Materials
By further limiting the use of toxic pesticides, Int. No. 800 is thus critical to the protection of community health, particularly children, 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, and learning disabilities. In this regard, we suggest that the amendment specifically allow materials that are by law allowed under organic standards and listed on the National List of Allowed and Prohibited Substances, established by the independent stakeholder National Organic Standards Board under the U.S. Department of Agriculture.[4]

The National List approach will allow the biological pesticides, defined as "a pesticide which is a naturally occurring substance that controls pests and microorganisms that control pests"[5] under Int. No. 800. It also continues to allow the use of pesticides exempt from the law under section 17-1205. While these exemption lists and definitions cover a majority of least-toxic products available on the market, under the U.S. Environmental Protection Agency's (EPA) list of biopesticides,[6] many of the active ingredients on this list are registered for specific agricultural uses, and some are genetically engineered (GE) proteins used in GE crops. Therefore, we prefer language that will establish parameters that are compatible with organic management systems:

> (1) a pesticide the active ingredients of which are recommended by the National Organic Standards Board (NOSB) pursuant to 7 U.S.C §6518, as amended, and published as the National List at 7 C.F.R §§ 205.601 and 205.602; or
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> (2) a pesticide designated as "minimum risk pesticide" under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) §25(b) and listed in 40 C.F.R. §152.25(f).

As an example of the range of products that meet the criteria listed above to manage turf and landscape systems without glyphosate, Beyond Pesticides has generated a list of allowed materials, posted at http://bit.ly/OrganicCompatible.[7]

Glyphosate Use Is Symptomatic of a Policy that Needs Strengthening
In 2015, NYC agencies sprayed the weedkiller glyphosate/Roundup over 1,200 times, with the majority of applications made by the NYC Department of Parks and Recreation.[8] In fact, over

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[4] 7 C.F.R 205.601 and 602.
[5] New York City Administrative Code 17-1202.
[6] EPA. 2016. Biopesticide active ingredients. https://www.epa.gov/ingredients-used-pesticide-products/biopesticide-active-ingredients
[7] Beyond Pesticides. 2017. Products Compatible with Organic Landscape Management. http://beyondpesticides.org/programs/lawns-and-landscapes/tools-for-change/products-compatible-with-organic-landscape-management
[8] New York City Department of Health. 2015. An Update on Integrated Pest Management in New York City. https://www1.nyc.gov/assets/doh/downloads/pdf/pesticide/pesticide-use-report2015.pdf.

50% of all herbicide applications made by city agencies in 2015 contained the chemical glyphosate. This toxic pesticide has been determined to be a carcinogen, based on laboratory test data reviewed by the International Agency for Research on Cancer (IARC). IARC has given it the highest cancer rating based on animal testing, a probable carcinogen in humans.[9] The agency only assigns a rating of known human cancer causing properties when it has human data, which is difficult to generate since we do not test chemicals on humans. Because of its carcinogenic properties, it was recently listed under California's Prop 65 of the Safe Drinking Water and Toxic Enforcement Act of 1986. Since EPA has not listed glyphosate as a carcinogen, Local Law 37 appears to not restrict its use. Further, insecticide use in 2015 was also concerning, as the city applied bee-killing neonicotinoid insecticides nearly 8,000 times. These systemic chemicals make their way into a plants flower and nectar, putting pollinators that feed on them at risk of death or slow decline.[10] Int. No. 800 will help close the gap that continues to allow hazardous pesticides, like glyphosate and neonicotinoids, to be sprayed in NYC parks and public spaces.

Adverse Effects of Chemical Pesticides

The passage of Int. No. 800 is critical, given the city's continued dependency on pesticides, raising grave concerns about the effects of chemical-intensive practices, our relationship to nature, chemical effects at the cellular level, and insect and weed resistance to chemical controls. Of the 30 most commonly used lawn pesticides, 16 are linked to cancer, 17 are endocrine disruptors, 21 are reproductive toxicants, 12 are linked to birth defects, 14 are neurotoxic, 25 cause kidney liver effects, and 26 are irritants.[11] The U.S. Geological Survey has linked pesticide use in urban areas to runoff and pesticide contamination of local waterways.[12] Of the 30 most commonly used lawn pesticides, 20 have a high potential to leach into waterways, 19 have been detected seeping into groundwater, 22 are toxic to birds, 14 are toxic to mammals, 29 are toxic to bees, and all 30 of these chemicals present toxicity concerns for fish or other aquatic organisms. [13] [See Appendix C and D for a chart and references for this information.]

Rachel Carson wrote in *Silent Spring*, "By their very nature, chemical controls are self-defeating, for they have been devised and applied without taking into account the complex biological systems against which they have been blindly hurled. The chemicals may have been

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[9] International Agency for Research on Cancer. 2015. IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides. https://www.iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf.

[10] See resources from the international Task Force on Systemic Pesticides. 2015. Worldwide Integrated Assessment. http://www.tfsp.info/resources/.

[11] Health Effects of 30 Commonly Used Pesticides. 2015. Beyond Pesticides. http://www.beyondpesticides.org/lawn/factsheets/30health.pdf (See Appendix C for a fully cited copy of the fact sheet).

[12] United States Geological Survey. 2007. Pesticides in US Streams and Groundwater. *Environmental Science and Technology..* http://water.usgs.gov/nawqa/pnsp/pubs/files/051507.ESTfeature_gilliom.pdf.

[13] Environmental Effects of 30 Commonly Used Lawn Pesticides. 2015. Beyond Pesticides. http://www.beyondpesticides.org/lawn/factsheets/30enviro.pdf.

pretested against a few individual species, but not against living communities." She warned us to protect the diverse organisms that make up a healthy ecosystem, including bees, birds, butterflies and other pollinators. In so doing, we partner with nature and support soil biology that contributes to the cycling of nutrients necessary for plant health. In the process, we grow healthier, more resilient lawns and landscapes, less vulnerable to disease and infestation, while eliminating the need for synthetic fertilizers that contaminate soil and pollute waterways.

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[14] documents over 750 studies linked 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 EPA's current approach to restricting pesticide use through risk assessment-based mitigation measures is not adequately protective and permits the unnecessary use of toxic pesticides. The warnings of those who have expressed concerns about risk assessment, such as 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 process 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. [See Appendix A for additional health effect information, and Appendix B for failures of the EPA regulatory system.]

Incentivizing a Systems Approach that Eliminates the Need for Toxic Pesticides
By limiting the use of pesticides linked to adverse health and environmental outcomes, Int. No. 800 incentivizes land managers to transition to practices that have been shown to maintain expectations for turf standards at a competitive cost. 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, which Int. No. 800 will encourage, focuses on eliminating pesticides and fertilizers that are harmful to soil biology. These modern land management techniques reveal that toxic pesticides are not needed for successful turf management. Rather, this approach incorporates natural soil building practices to improve soil fertility and turf grass health, natural or organic compatible products based on a soil analysis that determines need.

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[14] Beyond Pesticides. 2017. Pesticide Induced Diseases Database. http://www.beyondpesticides.org/resources/pesticide-induced-diseases-database/overview.

Integral to a successful land management program are specific cultural practices, including mowing height, aeration, dethatching, and over-seeding.

Research at the University of Maryland finds that proper mowing height alone can reduce weed and diseases by 50 to 80% in fescue grass, a common variety planted in New York.[15] With a 2½ to 3 inch mowing height (depending on use) in an organic systems approach, there is an increase in the root depth of grass, which contributes to a healthier plant. 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, and resist stress and pest pressure. Thus, the practices incorporated as part of an organic 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 cared for in this way, lawns and playing fields meet and exceed the same expectations of conventional turf managed with chemical-intensive methods. The bottom line is that without chemical-dependency the change is not a product replacement program, but a systems approach built on strong soil biological life.

These practices and the ever-expanding product line of natural alternatives has enabled a cost parity between the chemical-intensive and natural approach. A report produced by nationally renowned turf grass expert Chip Osborne, of Osborne Organics, Inc., in coordination with Grassroots Environmental Education, which looks specifically at the cost of conventional and organic turf management on school athletic fields, concludes that once established a natural turf management program can result in savings of greater than 25% compared to a conventional turf management program.[16] Research at Harvard University determined that, ultimately, total operating costs of its organic maintenance program are expected to be the same as the conventionally based program. As reported in a 2009 *New York Times* article,[17] Harvard reduced irrigation by 30%, saving two million gallons of water a year. By reducing yard waste through composting, the university saved $35,000/year for trucking yard waste off site. In addition, the university saved an additional $10,000/year due to the reduction in purchasing off-campus sources of fertilizer.[18] And, 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 be achieved from the outset.

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

[16] 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.

[17] Raver, Anne. 2009. The Grass is Greener at Harvard. http://www.nytimes.com/2009/09/24/garden/24garden.html?_r=2.

[18] 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 .

Given that the State of New York has embraced and required this approach on all school playing fields,[19] joining with the state of Connecticut[20] and many U.S. communities,[21] including Washington DC,[22] Montgomery County, MD,[23] Irvine, CA,[24] and a majority of Canadian provinces,[25] there are significant resources to assist land managers in New York City in implementing Int. No. 800. For example, the University of Connecticut has available a working document titled "*Best Management Practices for Pesticide-Free, Cool-Season Athletic Fields.*"[26] This document covers the five primary cultural practices for managing turf without the use of toxic pesticides: 1) mowing, 2) fertilization, 3) cultivation, 4) pest control and 5) irrigation.

Thank you for the opportunity to present this statement in support of Int. No. 800. We appreciate the Committee's consideration of the information and citations presented in our testimony in support of organic and sustainable turf and landscape practices, as well as structural and community pest management. We remain available to discuss the importance and finer details of this issue at any time.

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[19] New York Safe Playing Fields Act. 2010 http:/www.dec.ny.gov/chemical/41822.html.

[20] Connecticut Bill 1502 Section 448, Line 17579. 2015. http://www.cga.ct.gov/2015/TOB/s/pdf/2015SB-01502-R00-SB.pdf.

[21] Map of US Pesticide Reform Policies. 2017. https://www.google.com/maps/d/viewer?mid=1VLpVWvifO2JOrgxf1-d1DLyDruE&ll=39.03573413957711%2C-94.19459570507814&z=5.

[22] Washington DC Department of Energy and Environment. Pesticides Laws and Regulations. https://doee.dc.gov/service/pesticides-laws-and-regulations.

[23] Montgomery County, MD. 2014. Bill 52-14. https://www.montgomerycountymd.gov/lawns/Resources/Files/Healthy-Lawns-Law.pdf

[24] Irvine, CA. 2016. Discussion of City Policy for Pesticide Use on City Property. http://irvine.granicus.com/MetaViewer.php?view_id&event_id=1097&meta_id=70534.

[25] Canadian Association of Physicians for the Environment. Cosmetic Pesticides-Provincial Policies and Municipal Bylaws: Lessons Learned and Best Practices. 2016. https://cape.ca/wp-content/uploads/2016/08/Pesticides-Policy-Report-FINAL.pdf.

[26] University of Connecticut. 2013. Best Management Practices for Pesticide-Free, Cool-Season Athletic Fields. http://www.turf.uconn.edu/pdf/research/factsheets/OrganicFields_BMP_2013.pdf?llr=kaiit7cab&oeidk=a07e81i48ky01bfed07&oseq=a017dfxgjiuci.

Appendix A. Key Areas of Concern

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.[27] In fact, studies show children's developing organs create "early windows of great vulnerability" during which exposure to pesticides can cause great damage.[28] Additionally, according to researchers at the University of California-Berkeley School of Public Health, exposure to pesticides while in the womb may increase the odds that a child will have attention deficit hyperactivity disorder (ADHD).[29]

As EPA points out in its document, *Pesticides and Their Impact on Children: Keep Facts and Talking Points*:[30]

- "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."

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.[31] 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.[32,33] Pesticides in these environments may increase the risk of developing asthma, exacerbate a previous asthmatic

[27] National Research Council, National Academy of Sciences. 1993. Pesticides in the Diets of Infants and Children, National Academy Press, Washington, DC: 184-185.
[28] 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.
[29] 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.
[30] See: https://www.epa.gov/sites/production/files/2015-12/documents/pest-impact-hsstaff.pdf
[31] Roberts JR, Karr CJ; Council On Environmental Health. 2012. Pesticide exposure in children. Pediatrics. 2012 Dec; 130(6):e1765-88.
[32] Nishioka, M., et al. 1996. Measuring lawn transport of lawn-applied herbicide acids from turf. Env Science Technology, 30:3313-3320.
[33] Nishioka, M., et al. 2001. "Distribution of 2,4-D in Air and on Surfaces Inside Residences. Environmental Health Perspectives 109(11).

condition, or even trigger asthma attacks by increasing bronchial hyper-responsiveness.[34] 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.[35]

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.[36] 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.[37]

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.[38] 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.[39] Studies also find that pesticides, like 2,4-D, can also pass from mother to child through umbilical cord blood and breast milk.[40,41]

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.[42] In one study, children in areas where glyphosate is routinely applied were found to have detectable concentrations in their urine.[43] 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.[44]

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[34] Hernández, AF., Parrón, T. and Alarcón, R. 2011. Pesticides and asthma. Curr Opin Allergy Clin Immunol.11(2):90-6.
[35] 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.
[36] Lowengart, R. et al. 1987. Childhood Leukemia and Parent's Occupational and Home Exposures. Journal of the National Cancer Institute. 79:39.
[37] Turner, M.C., et al. 2010. Residential pesticides and childhood leukemia: a systematic review and meta-analysis. Environ Health Perspect 118(1):33-41.
[38] 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.
[39]Brender, JD., et al. 2010. Maternal Pesticide Exposure and Neural Tube Defects in Mexican Americans. Ann Epidemiol. 20(1):16-22.
[40] Pohl, HR., et al. 2000. Breast-feeding exposure of infants to selected pesticides. Toxicol Ind Health. 16:65-77.
[41] 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.
[42] 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.
[43] 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.
[44] 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.

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.[45]

(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.[46]

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 a 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."[47]

Appendix B. The Failure of EPA 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 process. These factors should give pause to lawmakers tasked with protecting public and environmental health, and supports action, such as Bill 52-14, to prohibit toxic pesticides and, in so doing, encourage alternatives.

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[45] 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.

[46] 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.

[47] 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.

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,*[48] 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.[49] 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."[50]

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,[51] creosols, chemicals listed as hazardous waste under Superfund regulations and considered possible human carcinogens by EPA,[52] 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

[48] 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.
[49] Environmental Protection Agency. June 2012. Imprelis and Investigation of Damage to Trees. http://www.epa.gov/pesticides/regulating/imprelis.html.
[50] 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.
[51] 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.
[52] Environmental Protectin Agency. October 2013. Cresol/Cresylic Acid. http://www.epa.gov/ttnatw01/hlthef/cresols.html.

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*,[53] found that an inert ingredient in 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,[54] learning disabilities,[55] or behavioral disorders,[56] 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.[57] A 2011 study, entitled *Additivity of pyrethroid actions on sodium influx in cerebrocotorial neurons in primary culture,*[58] finds that the combined mixture's effect is equal to the sum of the effects of individual

[53] 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.*
[54] Hernandez et al. 2011. Pesticides and Asthma. *Current opinion in allergy and clinical immunology*. http://www.ncbi.nlm.nih.gov/pubmed/21368619.
[55] 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
[56] Furlong et al. 2014. Prenatal exposure to organophosphate pesticides and reciprocal social behavior in childhood.
[57] 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.
[58] 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/.*

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*.[59] 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 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."[60]

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[59] 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.

[60] 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.

Appendix C. Health Effects of Commonly Used Pesticides

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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.

For more information on hazards associated with pesticides, please see Beyond Pesticides' *Gateway on Pesticide Hazards and Safe Pest Management* at www.beyondpesticides.org/gateway. For questions and other inquiries, please contact our office at 202-543-5450, email info@beyondpesticides.org or visit us on the web at www.beyondpesticides.org.

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Appendix D. 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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