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Statement of
Beyond Pesticides
on
Ordinance Prohibiting the Use and Application of Non-Organic Substances on City-Owned Properties
(Item No. O30.094)
to
Stamford, CT Board of Representatives

August 24, 2021

Thank you for the opportunity to address Stamford lawmakers on this important issue. 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 Stamford.

Beyond Pesticides Supports Action from the Board of Representatives on Toxic Pesticides

Beyond Pesticides strongly encourages the passage of an Ordinance Prohibiting the Use and Application of Non-Organic Substances on City-Owned Properties. Implementation of this ordinance will help the city shift to sustainable land management practices, ensuring that the products and practices used in Stamford are compatible 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, implementing this program will highlight the ability of organic land care to contribute to reversing the escalating crisis in biodiversity, including pollinator declines and the climate crisis—which is exacerbated by petroleum-based, synthetic pesticides and fertilizers, the release of carbon into the environment, and the lost opportunity to sequester carbon in organic soil systems.

Hazardous Pesticides Threaten Health

Pesticides use can result in both short and long-term harm to human health.[1]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.[2,3] 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.[4] This is especially important as infants crawling behavior and

[1] See Appendix A and B for a chart on the health and environmental effects of the 30 most commonly used pesticide active ingredients.
[2] Nishioka, M., et al. 1996. Measuring lawn transport of lawn-applied herbicide acids from turf. Env Science Technology, 30:3313-3320.
[3] Nishioka, M., et al. 2001. "Distribution of 2,4-D in Air and on Surfaces Inside Residences. Environmental Health Perspectives 109(11).
[4] Hernández, AF., Parrón, T. and Alarcón, R. 2011. Pesticides and asthma. Curr Opin Allergy Clin Immunol.11(2):90-6.

proximity to the floor account for a greater potential than adults for dermal and inhalation exposure to contaminants on carpets, floors, lawns, and soil.[5]

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.[6] In fact, studies show children's developing organs create "early windows of great vulnerability" during which exposure to pesticides can cause great damage.[7] 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).[8] 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.[9]

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.[10] Similarly, a 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.[11]

A landmark policy statement from the American Academy of Pediatrics (AAP), *Pesticide Exposure in Children*, on the impacts of pesticide exposure in children, acknowledges the risks to children from both acute and chronic effects.[12] 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, and recommends the adoption of pesticide policies that reduce and eliminate children's exposure to toxic pesticides. We applaud the Stamford Board of Representatives for considering the science and crafting a policy that addresses these concerns in a substantial and meaningful manner.

Lack of Federal Oversight Necessitates Council Action

Over the last 5 years, the US Environmental Protection Agency (EPA) underwent a severe reduction in programmatic work and adequate scientific assessment. This is an urgent problem, given that the state regulatory system relies almost exclusively on the underlying scientific determinations of EPA when it registers pesticides in the state.

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[5] 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.
[6] National Research Council, National Academy of Sciences. 1993. Pesticides in the Diets of Infants and Children, National Academy Press, Washington, DC: 184-185.
[7] 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.
[8] 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.
[9] 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
[10] Lowengart, R. et al. 1987. Childhood Leukemia and Parent's Occupational and Home Exposures. Journal of the National Cancer Institute. 79:39.
[11] Turner, M.C., et al. 2010. Residential pesticides and childhood leukemia: a systematic review and meta-analysis. Environ Health Perspect 118(1):33-41.
[12] Roberts JR, Karr CJ; Council On Environmental Health. 2012. Pesticide exposure in children. Pediatrics. 2012 Dec; 130(6):e1765-88.

Recent examples of federal action on toxic pesticides shed light on a deeper problem that calls for local action on all pesticides in the absence of federal and state protections:

• EPA's Office of Pesticide Program was recently featured in an extensive article published in the Intercept, providing detailed accounts of bullying and intimidation of rank-and-file EPA members by political appointees, members of Congress, and pesticide manufacturers to approve toxic pesticides without adequate scientific review or backing.[13] This corruption dates back decades and spans administrations regardless of political affiliation, placing the true safety of registered pesticide products currently on the market is serious doubt.

•Although EPA recently banned food uses of the insecticide chlorpyrifos, that decision was nearly two decades overdue, as the agency dragged out legal challenges, allowing EPA to avoid making a decision on the chemical. As a federal judge stated when it gave EPA its 60 day deadline to ban chlorpyrifos, "The EPA has spent more than a decade assembling a record of chlorpyrifos's ill effects," U.S. District Judge Jed S. Rakoff wrote. "Yet, rather than ban the pesticide or reduce the tolerances to levels that the EPA can find are reasonably certain to cause no harm, the EPA has sought to evade, through one delaying tactic after another, its plain statutory duties."[14]

• Despite the independent science and the World Health Organization's 2015 finding on glyphosate's (Roundup's) cancer-causing properties,[15] as well as other science on its connection to liver and kidney damage, endocrine (hormone) disruption,[16] and adverse birth outcomes,[17] EPA has failed to place meaningful restrictions on the weedkiller's use.

• In a 2019 decision, EPA significantly weakened children's protections for 23 synthetic pyrethroid insecticides. Pyrethroids are a common class of neurotoxic insecticides that have been repeatedly linked by peer-reviewed studies to neurological issues such as learning disabilities in children.[18] The agency, based on studies submitted by the chemical industry, allowed a three-fold increase in children's exposure to synthetic pyrethroids when the data indicates that children are more susceptible to the impacts of toxic pesticides.

• Despite overwhelming evidence linking systemic neonicotinoid insecticides to the decline of pollinators, as recognized by the state of CT as well as other international bodies like the European Union, EPA has consistently downplayed risks to pollinators and opted for insufficient, voluntary measures that allow pollinator declines to continue.[19]

• US regulators at the U.S. Department of Agriculture were influenced by representatives of Bayer to pressure a United Nations Task Force to drop any reference of "fungicides" or "crops" from a document intended to counter the rising number of drug-resistant fungal infections.[20]

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[13] Lerner, Sharon. 2021. The Department of Yes – How Pesticide Companies Corrupted the EPA and Poisoned America. https://theintercept.com/2021/06/30/epa-pesticides-exposure-opp/

[14] Daly, Matthew. 2021. Appeals court tells EPa to ban pesticide or decide it's safe. Associated Press. https://apnews.com/article/jed-s-rakoff-environment-courts-environment-and-nature-government-and-politics-b2f87ec484c518ca89b94dba87e427b5

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

[16] Beyond Pesticides. 2017. Glyphosate. https://www.beyondpesticides.org/assets/media/documents/pesticides/factsheets/bp-fact-glyosphate.082017.pdf

[17] Silver, Monica et al. 2021. Prenatal Exposure to Glyphosate and Its Environmental Degradate, Aminomethylphosphonic Acid (AMPA), and Preterm Birth: A Nested Case–Control Study in the PROTECT Cohort (Puerto Rico). Environmental Health Perspectives. https://ehp.niehs.nih.gov/doi/10.1289/EHP7295

[18] Dalsager, L. et al. Maternal urinary concentrations of pyrethroid and chlorpyrifos metabolites and attention deficit hyperactivity disorder (ADHD) symptoms in 2-4-year-old children from the Odense Child Cohort. Environmental Research, 10 Jun 2019, 176:108533.

[19] Beyond Pesticides. 2021. What the Science Shows. https://www.beyondpesticides.org/programs/bee-protective-pollinators-and-pesticides/what-the-science-shows

[20] Jacobs, Andrew. 2020. Emails Show How Pesticide Industry Influenced U.S. Position in Health Talks. New York Times. https://www.nytimes.com/2020/09/24/health/pesticides-drug-resistance-trumpanifungals.html.

• EPA recently (August 2021) revised restrictions on the hazardous herbicide paraquat, eliminating a provision that would have banned the aerial use of the herbicide that is banned is most other countries, including the EU, China, and Brazil. Like its decision on synthetic pyrethroids, EPA relied on data newly submitted by the pesticide industry, downplaying the risk of aerial pesticide exposure to farmworkers and their families.[21]

Given disturbing trends toward fewer, not more, protections for residents, local action in Stamford is needed to fill in gaps left by a deficient federal regulatory apparatus. Additional information regarding the general deficiencies of EPA's pesticide registration process can be found in Appendix C.

Healthy Lawn Practices Gaining Momentum

Beyond Pesticides has seen firsthand the adoption of strong pesticide reform ordinances in local communities throughout the United States. Beyond Pesticides' Map of Pesticide Reform Policies highlights over 180 communities that have enacted some level of lawn and landscape pesticide reduction policy.[22]

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 finds that proper mowing height alone can reduce weed and diseases by 50 to 80% in fescue grass.[23] 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, particularly 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.

A range of resources are available within the state of Connecticut to assist communities in transitioning towards safer, organic practices. The state, having already identified the dangers associated with pesticide exposure in children, requires management practices that do not utilize toxic pesticides on school grounds and playgrounds throughout the state.[24] The University of Connecticut has developed resources for organic turf management, such as its document "Best Practices for Pesticide-Free Cool-Season Athletic Fields."[25] In addition, the Northeast Organic Farming Association of Connecticut provides

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[21] Nosowitz, Dan. 2021. EPA Reverses Course, Will Allow Use of the Pesticide Paraquat. https://modernfarmer.com/2021/08/epa-reverses-course-will-allow-use-of-pesticide-paraquat/

[22] 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

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

[24] Hartford Courant. 2015. Senate Extends Pesticide Ban to Public Playgrounds. https://www.courant.com/politics/hc-school-playground-pesticide-ban-20150528-story.html

[25] UCONN. ND. Best Management Practices for Pesticide-Free, Cool-Season Athletic Fields (Second Edition). http://ipm.uconn.edu/documents/raw2/1760/UConn%20Athletic%20Field%20BMP_Second%20Edition_August%202020.pdf

the opportunity for city staff to become accredited organic land care professionals through a rigorous course.[26]

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. Beyond Pesticides' Cost Comparison: Organic vs Chemical Land Management fact sheet outlines the reasoning behind this cost saving and is provided in Appendix D.

In considering cost, local governments are encouraged to reflect not only on budget expenditures, but also 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 cities 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 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.[27]
- 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 *New York Times* article,[28] 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. [29]
- The experience in South Miami, FL may also be instructive. After a two-year pilot program that limited toxic pesticide use only to organic certified products, the city codified the practice 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."[30]

[26] Northeast Organic Farming Association. 2021. NOFA Accreditation Course in Organic Land Care. https://nofa.organiclandcare.net/nofa-accreditation-course-in-organic-land-care/

[27] 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

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

[29] 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.

[30] City of South Miami. 2019. City Commission Agenda Item Report: Inter-office Memorandum. https://beyondpesticides.org/assets/media/documents/SouthMiami_FL_Organicordinance.pdf.

- 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.[31] 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."

Take it from the state. The CT Department of Energy and Environmental Protection 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."[32] Beyond Pesticides has found that new practices and technologies have cut that time down significantly. While a decade ago the organic approaches 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.

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.[33] This trend is likely to be seen across cities along the US east coast. 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 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."[34]

Conclusion
In light of the success and urgent need to move towards safer land management practices, we urge the Stamford Board of Representatives to pass an Ordinance Prohibiting the Use and Application of Non-Organic Substances on City-Owned Properties. In addition to protecting the residents of the city and the surrounding ecosystem that Stamford shares with other communities, as lawmakers you play an instrumental role in exploring new ways to improve public health, tackle inequality and environmental racism, and the devastating declines in pollinators and biodiversity. 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.

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[31] 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/.
[32] 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.
[33] The Black Institute. 2020. Poison Parks. https://theblackinstitute.org/wp-content/uploads/2020/01/TBI_Poison_Parks_Report._010820_FINAL.pdf
[34] Ibid

Appendix A. Health Effects of Commonly Used Pesticides

A Beyond Pesticides Factsheet – A Beyond Pesticides Factsheet – A Beyond Pesticides Factsheet – A Beyond Pesticides Factsheet

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.

Citations

1. U.S. EPA. Office of Pesticide Program *Reregistration Eligibility Decisions (REDs), Interim REDS (iREDs)*, and *RED factsheets*. http://www.epa.gov/pesticides/reregistration/.

2. National Library of Medicine, TOXNET, *Hazardous Substances Database*, http://toxnet.nlm.nih.gov/.

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.

7. Northwest Coalition for Alternatives to Pesticides (NCAP), *Pesticide Factsheets*. http://www.pesticide.org/get-the-facts/pesticide-factsheets.

8. Beyond Pesticides *ChemWatch Factsheets*, http://www.beyondpesticides.org/pesticides/factsheets/index.htm.

9. U.S. EPA. *Chronic (Non-Cancer) Toxicity Data for Chemicals Listed Under EPCRA Section 313.* Toxic Release Inventory Program. http://www.epa.gov/tri/trichemicals/hazardinfo/hazard_chronic_non-cancer95.pdf.

10. European Union Commission on the Environment. *List of 146 substances with endocrine disruption classifications, Annex 13.* http://ec.europa.eu/environment/endocrine/strategy/substances_en.htm#report2.

11. Extension Toxicology Network (EXTOXNET) *Pesticide Information Profiles.* http://extoxnet.orst.edu/ghindex.html.

12. International Agency for Research on Cancer, World Health Organization (IARC) category 2A, the agent (mixture) is probably carcinogenic to humans based on sufficient evidence of carcinogenicity in laboratory animal studies. http://monographs.iarc.fr/ENG/Classification/index.php.

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Appendix B. Environmental Effects of 30 Commonly Used Lawn Pesticides

A Beyond Pesticides Factsheet – A Beyond Pesticides Factsheet – A Beyond Pesticides Factsheet – A Beyond Pesticides Factsheet

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.

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 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 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 report from the Government Accountability Office, entitled *EPA Should Take Steps to improve Its Oversight of Conditional Registrations,*[35] 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, and food uses eliminated in 2021. 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. One product manufactured by DuPont, Imprelis, with the active ingredient aminocyclopyrachlor, was removed from the market only two years after EPA approval under conditional registration.[36] 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."[37]

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

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[35] 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.

[36] Environmental Protection Agency. June 2012. Imprelis and Investigation of Damage to Trees. http://www.epa.gov/pesticides/regulating/imprelis.html.

[37] 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.

international agencies to be hazardous to human health. For example, until October 23, 2014,[38] creosols, chemicals listed as hazardous waste under Superfund regulations and considered possible human carcinogens by EPA,[39] 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. According to EPA's current database, inert ingredients could indeed be as harmless as cocoa power and canola oil, or toxic as formaldehyde, quaternary ammonium, and hydrochloric acid.[40]

One concerning example addresses the inert ingredients in glyphosate-based herbicides. A study, titled *Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells*,[41] found that an inert ingredient in formulations of the weed killer, 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 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,[42] learning disabilities,[43] or behavioral disorders,[44] 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.[45] A study titled *Additivity of pyrethroid actions on sodium influx in cerebrocotorial*

[38] 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.
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neurons in primary culture,[46] finds that the combined mixture's effect is equal to the sum of the effects of individual synthetic pyrethoids insecticides. 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*.[47] 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."[48]

These examples are only the 'tip of the iceberg' as it pertains to the deficiencies in EPA's process for registering toxic pesticides. A broad range of additional examples are available upon request.

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Appendix D Cost Comparison – Organic vs Conventional Land Care

COST COMPARISON

Organic vs Chemical Land Management

SYMPTOM

Dandelions

CAUSE

Compacted Soil
Low pH
Nutrient Imbalance

An organic approach corrects nutrient and pH per a soil test and focuses on soil aeration.

A chemical approach focuses on killing the weed. However, this is only a short-term solution.

Unless the reason why dandelions are in the turf is addressed, chemical land managers will more likely than not be back next season to spray again.

The organic approach saves money on material inputs like pesticides, by providing long-term solutions.

DIFFERENTIATING TWO APPROACHES

While chemical land management focuses on treating symptoms, the organic approach is a preventive approach that addresses root causes. In this context, unwanted organisms (pests, including insects and weeds) are the symptoms of a problem caused by poor soil health.

Organic land management emphasizes managing weeds and insects through the building of soil conditions and employing cultural practices, such as aeration, overseeding, dethatching, and proper mowing and watering. Nutrients are cycled naturally and, if determined to be necessary by a soil test, soil amendments are used to feed biological life in the soil, which in turn feeds the plant.

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With the **chemical approach**, focus is placed on using synthetic, petrochemical pesticides and fertilizers that adversely affect life in the soil. These chemicals are typically applied based on a calendar date, or by a "see and spray" approach to weed and insect management. Soil tests and cultural practices are not prioritized.

CHEMICAL-INTENSIVE	ORGANIC
• Treats **symptoms**; "see and spray," ignore underlying conditions that contribute to pest issue.	• Addresses **root causes**; focus on **soil health** through testing and analysis.
• Pesticides and fertilizers are fossil fuel-based **synthetics** that are harmful to to soil biology and biodiversity.	• Uses **naturally derived** fertilizers and pesticides with a systems-based approach, nurturing soil biology and biodiversity.
• Does **not** often focus on cultural practices.	• Prioritizes **cultural practices** for turf management, such as aeration, overseeding, dethatching, and proper watering.

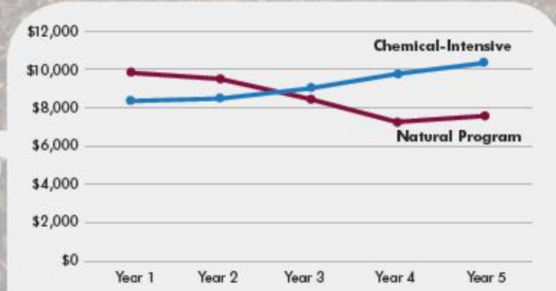
ORGANIC VS CHEMICAL LAND MANAGEMENT

ORGANIC SAVES OVER TIME

Healthy soil reduces the need for expensive outside inputs

COST COMPARISONS

A report from the non-profit Grassroots Environmental Education and organic turf expert Chip Osborne, with Osborne Organics, concludes that, once established, ***an organic turf management approach results in savings greater than 25% over chemical management***.[1] While initial expenditures over the first two years may be slightly higher, ***costs decrease as soil biology improves***. Healthy soil reduces the need for expensive outside inputs.



The cost to manage a football field using natural programs is less expensive than chemical-intensive programs over time.

Harvard University's experience with the organic approach on its campus found similar results. There were initial costs required to train staff, purchase equipment, and improve soil health, but at ***maturity costs are now expected to stay the same as its previous chemical-based program***.[2]

Connecticut's Department of Energy and Environmental Protection (encourages residents to maintain landscapes with organic practices. They note, "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 less money. Once established, an organic lawn uses less water and fertilizers, and requires less labor for mowing and maintenance.***"[3]

Healthy soil has a rich diversity of microbial life. Feed the soil, not the plant for long-lasting, resilient ecosystems!

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ORGANIC TRENDS ARE EMERGING NATIONWIDE

In 2019, the City of South Miami completed a two-year pilot program that required city staff and contractors to follow practices intended to eliminate toxic pesticide use, and limited inputs only to organic-certified products. A city memorandum codifying these practices into law 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."[4]

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CONSIDERING EXTERNALITIES

There are costs from the chemical approach not captured by the shelf price of a pesticide bottle or bag of synthetic fertilizer. While chemical manufacturers profit, the public pays a steep price through increased health care expenditures and the need to clean up environmental contamination.

A 2016 literature review determined **the health costs from pesticide use in the U.S. to be $15 billion annually**. The most significant cost is death due to chronic pesticide exposure, such as fatal outcomes after contracting cancer.[5] The authors indicate that **environmental costs of pesticide use total roughly $8 billion**, but that is likely an underestimate due to the difficulty in pricing ecosystem services (economic value of nature, such as pollination and nutrient cycling) and obtaining accurate data on wildlife mortality.[6]

A study from Seattle Public Utilities determined that, by moving toward natural and organic practices, some of these external costs can be recouped. Households switching from synthetic to natural practices generate roughly $75 in ongoing public health, ecological, water conservation, and hazardous waste management benefits each year.[7] Cost savings came primarily from reducing the use of chemical pesticides and fertilizers and the need for irrigation.[8]

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CONCLUSION: ORGANIC IS WORTH IT

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Cost concerns of switching from chemical to organic land management should be considered negligible over the long-term. There may be some initial upfront costs for staff training, or the purchase of new material or equipment, but these costs decline significantly as focus shifts to root causes and soil health improves. The transition to organic also captures additional external health and environmental costs that are currently borne by the public at-large.

Organic land management represents an economically viable approach for individual homeowners, landscapers, local parks departments, and school districts willing to commit to the change in practices organic land management entails.

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