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Statement of
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on
Pesticide Policy Draft and Pesticide and Fertilizer Task Force Report
to
Sustainability and Transportation Committee
Portland, Maine City Council

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Thank you for the opportunity to address the Committee. 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 Portland, ME

We Support a South Portland-Style Ordinance that Effects a Shift to Sustainable Practices

Beyond Pesticides strongly encourages the Committee and Portland City Council to adopt a pesticide ordinance in the same vein as the policy passed last year in South Portland. It is this approach to land management, pesticide restrictions, and allowable materials that will effectively stop the unnecessary use of hazardous pesticides applied for aesthetic purposes. This approach to pesticide law is 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 and around the City of Portland.

The Task Force's Proposed Ordinance Undercuts Sustainable Organic Turf Management

We urge this Committee and the Portland City Council to reject the approach taken by the proposed pesticide ordinance draft, developed by the Portland Pesticide and Fertilizer Task Force because it fails to apply principles of sustainable land management that are in sync with nature and protective of public health. The approach to Integrated Pest Management (IPM) embraced in the Task Force recommendation creates the opportunity for continued pesticide dependency through exclusions or waivers, deemed non-public health emergencies, that undercut the very principles of sustainability that communities are increasingly striving to achieve. The proposed waiver process itself creates a burdensome review apparatus with extraordinary discretionary authority to undercut sustainable organic practices. Like other communities, the Task Force should have proposed standards that would ensure the adoption of practices that eliminate the reliance on hazardous materials associated with a range of health effects. A systems approach to sustainability identifies the practices necessary to nurture soil biology that supports the natural cycling of nutrients, resulting in resilient turf systems and plants. Because the use of toxic materials undermines the organic system by harming the soil microbial life, identifying compatible products is an essential component of the system. In our experience, harmful or hazardous products are not necessary to establish and maintain beautiful and resilient turf.

A Systems Approach with Organic Compatibility

It is logical then to ask the question –what practices and products or materials are compatible with sustainable organic standards? This is what has been done for decades in organic agriculture and gardening. It is what has been codified in the Organic Foods Production Act (OFPA) and its National List of Allowed and Prohibited Substances. It is for this reason that many municipalities are utilizing the expertise and ongoing reviews of sustainable organic land management systems and materials. Yes, there are both synthetic and natural materials that are harmful and it is the work of the National Organic Standards Board under OFPA, and the organic community, to determine compatibility and ask the key question –is the addition of a material necessary or harmful?

We have learned that toxic materials are not necessary to grow beautiful turf. The Task Force Report, however, holds on to the theory of acceptable use of hazardous chemicals that, "*if used inappropriately and/or in excess* [emphasis added], pose a threat to the environment and to human health." This is the toxic chemical-reliant model in which, according to the Report, "homeowners and turf managers should use techniques that do not require pesticide inputs before they consider the use of a pesticide and conditions when the application of a pesticide might be appropriate. . ." This type of Integrated Pest Management (IPM) thinking, incorporated into the ordinance language, would most certainly result in toxic pesticide use, since all pesticides would be allowable under the waiver provision as predicted emergencies emerge without a shift to a sustainable systems approach with cultural practices and compatible materials.

IPM Does Not Stop Pesticide Reliance

In the proposed IPM approach, toxic chemicals undermine the ecological balance necessary to enhance soil biology with beneficial bacteria and fungi that contribute to soil health and support plants that are less vulnerable to disease and infestation. Under the U.S. Department of Agriculture, National Organic Program's (NOP) regulations, all material inputs used in organic production must undergo a rigorous evaluation by a board of independent experts that considers a number of factors relevant to the type of policy Portland intends to pass. The materials review includes: impacts on the environment and public health, essentiality in an organic system, as well as compatibility with organic systems. This review process adds an important protective layer on top of the U.S. Environmental Protection Agency's (EPA) pesticide registration process, the failures of which are discussed in detail in Appendix B of this testimony. By disallowing synthetic materials unless proven to meet the aforementioned criteria, and allowing natural materials unless they fail to meet that criteria, NOP is charged with protecting the environment first and foremost. This process rejects EPA's statutory requirement to weigh the risks and benefits of pesticide use primarily in terms of economic, not ecological or public health, concerns.

In the Task Force's report, it is noted that adopting the allowed pesticides criteria passed by South Portland would be "a burden on the general public who lack training about specific pesticides and are not well equipped to determine which ones contain allowed or forbidden substances." However, the language of the draft ordinance, under 34-4 Pest Management, requires residents to choose the "least toxic pesticide needed to effectively control pests…" in circumstances where non-pesticidal controls have been proven ineffective. There is no definition to guide the determination of the least toxic pesticides. The proposed Task Force ordinance, then, does nothing to ease the "burden on the general public," which some members of the Task Force believe "are not well equipped to determine" pesticide toxicity. In contrast, an allowed list of materials, as defined by the South Portland ordinance, creates the needed framework to identify permitted materials and ensure their ongoing and updated review.

Establishing an Allowed List of Materials Compatible with Organic Systems

Beyond Pesticides, in advocating for a list of allowed pesticides, has developed a webpage (attached to this testimony), which we encourage the City to use, that identifies those products that meet the criteria listed in the South Portland ordinance. It is available at this link: http://bit.ly/OrganicCompatible.[1] When fully implemented, South Portland's ordinance will achieve the shared goal of successfully discouraging pesticide use without eliminating organic compatible management tools. The Task Force's proposed ordinance, on the other hand, embraces the chemical-intensive paradigm, allowing "control measures that have been demonstrated to be practicable, effective and affordable," and will certainly not be moderated by the waiver provision to use pesticides in an emergency, "a serious, unexpected, and often dangerous situation requiring immediate action."

To advance the shared community goal of protecting public health from pesticides that make their way into our soil, air, and water, we urge the Committee to expand the reach of the ordinance beyond "turf, walkways, driveways and/or patios" to include playgrounds, ornamental plants and beds, trees, rights-of-way, the golf course, and other city property.

Despite these important and necessary changes, Beyond Pesticides is pleased that there is no argument over the importance of a Pesticide Oversight Committee, education campaign, and

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[1] 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.

public notification requirements for real emergencies in the South Portland ordinance. These aspects will be critical to the ordinance's implementation, because much of the success of the ordinance will be dependent upon resident awareness of the new requirements. We are also pleased that the Pesticide Oversight Committee will be charged with setting action threshold guidelines for common pests and invasive species. However, it is critical that the Committee be devoid of those who have a conflict of interest. Pests and weed problems must be managed on a case by case basis, and action thresholds will provide an independent reference point that is not solely dependent upon whether a pest or invasive exists is in a certain area, but accurately reflects current impact on the environment and public health. We look forward to assisting the City of Portland in educating its residents about non-toxic and organic pest management.

Adverse Effects of Chemical Pesticides

The passage of an ordinance like South Portland's is critical as our country's appetite for pesticides raises 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.[2] The U.S. Geological Survey has linked pesticide use in urban areas to runoff and pesticide contamination of local waterways.[3] 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. [4]

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 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.

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[5] documents over

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[2] 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).

[3] 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.

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

[5] Beyond Pesticides. 2016. Pesticide Induced Diseases Database. http://www.beyondpesticides.org/resources/pesticide-induced-diseases-database/overview.

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

A Systems Approach without Toxic Chemicals

Chemical-intensive turf and landscape management programs are generally centered on a synthetic product approach that continually treats symptoms with toxic chemicals, rather than focusing on the root causes of pest problems, which lies in the soil. Experience finds that toxic pesticides are not needed for successful turf management. Rather, a systems approach incorporates preventive steps based on building soil biomass to improve soil fertility and turf grass health, organic products based on a soil analysis that determines need, and specific cultural practices, including mowing height, aeration, dethatching, and over-seeding.

Organic turf management, which meets the standards of the *Organic Foods Production Act*, is a "feed-the-soil" approach that centers on natural, organic fertilization, microbial inoculants, compost teas, and compost topdressing as needed. This approach builds a soil environment rich in microbiology that will produce strong, healthy turf able to withstand stress. The aim of a natural approach to land care is not to simply swap one herbicide or insecticide for another, but instead build a soil environment rich in microbial diversity that will produce strong, healthy landscapes able to withstand stress from weeds, pests, fungus and other disease.

Cost of Organic Is on Par with Chemical-Intensive in the Long-Term

The cost of implementing an organic systems approach is not typically more than current costs, and there is likely to be savings in the long-term.

In considering cost, local governments should reflect on the externalities associated with pesticide use, including its effect to reduce the risk of exposure to carcinogens and neurotoxicants, prevent the contamination of groundwater, 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. A sustainable 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 towns 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.[6]
- There is also the research from Harvard University which determined that, ultimately, total operating costs of its organic maintenance program are expected to be the same as the conventionally based program. In a 2009 *New York Times* article,[7] 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. [8]
- The Department of Energy and Environmental Protection in the state of Connecticut, which itself has a successful ban on pesticide use in school playing fields up to 8th grade, 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."[9]
- The experience in Reno, NV may also be instructive. As part of their pesticide-free pilot program there, the Parks Department stated, "There will be no cost implications as staff will implement changes within its adopted budget." [10]

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[6] 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.

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

[8] 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.

[9] 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.

[10] City of Reno, Nevada Staff Report. 2015. Update, discussion and potential approval of a Pesticide-Free Parks program for twelve City Parks.

- 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.[11] 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."

Local Success Stories

Beyond Pesticides has seen firsthand the success of this approach in communities throughout the country. Beyond Pesticides' *Map of Pesticide Reform Policies* highlights over 120 communities that have enacted some level of lawn and landscape pesticide reduction policy.[12]

These examples prove in practice that organic methods of managing landscapes are feasible and cost-effective for local governments of all sizes. As land managers are trained and familiarize themselves with organic methods and new practices and products continue to emerge, more and more communities are moving toward common-sense, sustainable approaches to land care. These practices do not put humans, pets, and the environment, particularly pollinators and other wildlife, at risk of non-target pesticide impacts, in unnecessary danger.[13] Furthermore, the current and past pesticide testing and labeling protocols used by EPA have failed to address the full range of hazards and allow for too many data gaps to adequately protect against harm. The hazards and uncertainties that put people and the environment in harm's way are, in our view, unreasonable, given that they are unnecessary to achieve beautiful lawns and gardens.

The Canadian Experience

A 2014 study published in the journal *Challenges* analyzes changes in the detection of herbicides 2,4-D, dicamba, and mecoprop in urban streams after the implementation of a non-essential pesticide ban in Ontario, Canada. Results show that concentrations decreased from 16% to 92%, depending on the stream and herbicide. Although the study was not able to determine whether the source reduction came from residential or commercial pesticide use, prior surveys indicate that the three pesticides tested accounted for 51% of the total amount of pesticides used by professional lawn services in the province. The study concludes that decreases in urban stream concentration of these herbicides was a likely result of a combination of restrictions on sale and use, as well as increased public awareness of pesticide issues.[14]

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[11] 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/.

[12] 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.

[13] (See Appendix A for additional information about these issues).

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

A 2011 study published in Environmental Health assessed changes in resident practices associated with the implementation of the cosmetic/non-essential pesticide bylaw by a municipal health department in Toronto, Ontario, Canada. Implementation indicators documented multiple municipal health department activities and public involvement in complaints from commencement of the educational phase. During the enforcement phases only 40 warning letters and seven convictions were needed. The number of lawn care companies increased. Among survey respondents, awareness of the bylaw and the Natural Lawn campaign reached 69% and 76% respectively by 2008. Substantial decreases in the proportion of households applying pesticides (25 to 11%) or hiring lawn care companies for application (15 to 5%) occurred. Parallel absolute increases in use of natural lawn care methods occurred among households themselves (21%) and companies they contracted (7%). The researchers concluded that bylaws or ordinances implemented through education and enforcement are a viable policy option for reducing urban cosmetic pesticide use.[15]

Thank you for the opportunity to present this statement to the Committee. We appreciate the Council's consideration of the information and citations presented here in support of organic and sustainable turf and landscape practices as outlined in South Portland's ordinance. We remain available to discuss the importance and finer details of this issue at any time.

Appendix A. Key Areas of Concern

<u>Children's Vulnerability</u>

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.[16] In fact, studies show children's developing organs create "early windows of great vulnerability" during which exposure to pesticides can cause great damage.[17] 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).[18]

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

[16] National Research Council, National Academy of Sciences. 1993. Pesticides in the Diets of Infants and Children, National Academy Press, Washington, DC: 184-185.

[17] 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.

[18] 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.

As EPA points out in its document, *Pesticides and Their Impact on Children: Keep Facts and Talking Points*:[19]

- "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.[20] 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.[21,22] 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.[23] 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.[24]

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.[25] Similarly, a 2010 meta-analysis on residential pesticide use and childhood leukemia finds an

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[19] See: https://www.epa.gov/sites/production/files/2015-12/documents/pest-impact-hsstaff.pdf.
[20] Roberts JR, Karr CJ; Council on Environmental Health. 2012. Pesticide exposure in children. Pediatrics. 2012 Dec; 130(6):e1765-88.
[21] Nishioka, M., et al. 1996. Measuring lawn transport of lawn-applied herbicide acids from turf. Env Science Technology, 30:3313-3320.
[22] Nishioka, M., et al. 2001. "Distribution of 2,4-D in Air and on Surfaces Inside Residences. Environmental Health Perspectives 109(11).
[23] Hernández, AF., Parrón, T. and Alarcón, R. 2011. Pesticides and asthma. Curr Opin Allergy Clin Immunol.11(2):90-6.
[24] 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.
[25] Lowengart, R. et al. 1987. Childhood Leukemia and Parent's Occupational and Home Exposures. Journal of the National Cancer Institute. 79:39.

association with exposure during pregnancy, as well as to insecticides and herbicides. An association is also found for exposure to insecticides during childhood.[26]

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.[27] 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.[28] Studies also find that pesticides, like 2,4-D, can also pass from mother to child through umbilical cord blood and breast milk.[29,30]

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.[31] In one study, children in areas where glyphosate is routinely applied were found to have detectable concentrations in their urine.[32] 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.[33]

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).

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[26] Turner, M.C., et al. 2010. Residential pesticides and childhood leukemia: a systematic review and meta-analysis. Environ Health Perspect 118(1):33-41.

[27] 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.

[28]Brender, JD., et al. 2010. Maternal Pesticide Exposure and Neural Tube Defects in Mexican Americans. Ann Epidemiol. 20(1):16-22.

[29] Pohl, HR., et al. 2000. Breast-feeding exposure of infants to selected pesticides. Toxicol Ind Health. 16:65-77.

[30] 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.

[31] 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.

[32] 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.

[33] 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.

(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.[34]
(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.[35]

<u>Adverse Effects to Wildlife</u>
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."[36]

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.

<u>Conditional Registration.</u> EPA will often approve the use of a pesticide without all of the

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[34] 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.
[35] 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.
[36] 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.

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,*[37] 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.[38] 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."[39]

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,[40] creosols, chemicals listed as hazardous waste under

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[37] 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.
[38] Environmental Protection Agency. June 2012. Imprelis and Investigation of Damage to Trees. http://www.epa.gov/pesticides/regulating/imprelis.html.
[39] 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.
[40] Environmental Protection Agency. October 2014. EPA Proposes to Remove 72 Chemicals from Approved Pesticide Inert Ingredient List. http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/3397554fa65588d6

Superfund regulations and considered possible human carcinogens by EPA,[41] were allowed in pesticide formulations without any disclosure requirement. EPA recently took action to remove cresols and 71 other inert ingredients from inclusion in pesticide formulations as a result of petitions from health and consumer groups. However, numerous hazardous inerts remain. For example, a 2009 study, entitled *Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells*,[42] 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,[43] learning disabilities,[44] or behavioral disorders,[45] 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

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[41] Environmental Protectin Agency. October 2013. Cresol/Cresylic Acid. http://www.epa.gov/ttnatw01/hlthef/cresols.html.

[42] Benachour and Seralini. 2009. Glyphosate 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.*

[43] Hernandez et al. 2011. Pesticides and Asthma. *Current opinion in allergy and clinical immunology*. http://www.ncbi.nlm.nih.gov/pubmed/21368619.

[44] 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

[45] Furlong et al. 2014. Prenatal exposure to organophosphate pesticides and reciprocal social behavior in childhood.

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.[46] A 2011 study, entitled *Additivity of pyrethroid actions on sodium influx in cerebrocotorial neurons in primary culture,*[47] finds that the combined mixture's effect is equal to the sum of the effects of individual pyrethoids. This equates to a cumulative toxic loading for exposed individuals. Similarly, researchers looked at the cumulative impact the numerous pesticides that may be found in honey bee hives in the 2014 paper *Four Common Pesticides, Their Mixtures and a Formulation Solvent in the Hive Environment Have High Oral Toxicity to Honey Bee Larvae*.[48] 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."[49]

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[46] 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.

[47] 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/.*

[48] 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.

[49] 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

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.

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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.

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Appendix D. 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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Products Compatible with Organic Landscape Management

THE MARKET FOR GREENER PEST MANAGEMENT MATERIALS GROWS

Organically managed playing field in Marblehead, Massachusetts.

© Jay Feldman

With communities across the country adopting organic landscape management practices and policies for lawns, playing fields, and parks, identifying products that are compatible with the sustainable approach is a central concern for managers and residents. Organic systems nurture soil biology to support the natural cycling of nutrients, resulting in resilient turf systems and plants. Because the use of toxic materials undermines the organic system by harming the soil microbial life, identifying compatible products is an essential component of the system. To assist communities in identifying products and complying with local laws, where they exist, that restrict products to organic compatible materials, Beyond Pesticides has developed the *List of Products Compatible with Organic Landscape Management*.

The List is based on two established lists of materials and products: (i) the National List of Allowed and Prohibited Substances of the Organic Foods Production Act (OFPA), passed by the U.S. Congress in 1990 and overseen by a stakeholder board created by the statute, the National Organic Standards Board (7 C.F.R 205.601 and 602), and (ii) the U.S. Environmental Protection Agency's list of exempt pesticides, Section 25(b) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (40 C.F.R. 152.25).

BACKGROUND ON UNDERLYING LIST

In creating the National List, the authors of OFPA recognized the (i) inherent safety of most natural materials that results from a long history of exposure and adaptation, and (ii) need to assess synthetic chemicals that may cause harm to health and ecology. Thus, the National List allows natural materials to be used in organic crop production unless found to be harmful, but prohibits synthetic materials unless recommended by the NOSB and codified. Three criteria are applied in deciding whether a material should be allowed on the National List: no adverse effects to humans or the environment, need for the material (essentiality) in an organic system, and compatibility with organic practices. OFPA outlines a number of impacts that must be considered in this evaluation.

Because continuous improvement is a principle in the organic law, the National List is under a five-year sunset and review cycle to evaluate new information about environmental and health impacts, which may require a change in a listing. A petition process allows the NOSB to evaluate proposed additions or adjustments to the National List.

Tying the *List of Products Compatible with Organic Landscape Management* to the National List allows communities to take advantage of the evaluation, and regular re-evaluation, performed by the NOSB's public process. The list of organic landscape management products also incorporates EPA's list of active ingredients that do not need to be registered as pesticides. This is a short list of materials, most of which are nonsynthetic and are allowed in organic production.

Beyond Pesticides encourages residents to advocate in their community for pesticide policies with the above criteria. The list can be used as a guide for inputs in all organic lawn care practices community-wide. Organic turf management is not a product-based approach, and since all products have some degree of risk, Beyond Pesticides urges that all products are used as a last resort. For assistance in adopting an organic landscape management policy and practices in your community, visit *bit.ly/ToolsForChange* and contact Beyond Pesticides at *info@beyondpesticides.org* or 202-543-5450.

Contributors to this article include Drew Toher, Terry Shistar, PhD, and Jay Feldman. See chart at bit.ly/OrganicCompatible.

List of Products Compatible with Organic Landscape Management

Note that there may be other formulations of a product under a similar brand name (e.g., many brands sell both ready to use and concentrate versions of their products). The allowed list describes: (i) active ingredient in product; (ii) product name; (iii) pesticide category [i.e., insecticide, herbicide, fungicide, etc.), and (iv) regulatory status [organic or exempt from EPA registration, 25b).

TABLE 1: **Fungicides**

Active Ingredient	Product Name	Regulatory Status
Fungicide		
Bacillus subtilis GB03	Companion Liquid Biological Fungicide	Organic
Bacillus subtilis QST 713 strain	Rhapsody	Organic
Bacillus subtilis QST 713 strain	Serenade Garden Disease Control RTU	Organic
Bacillus subtilis QST 713 strain	Natria Disease Control RTU	Organic
Essential Oil (Cinnamon/Clove)	Blizzard Organic Fungicide	25b
Essential Oil (Clove/Cinnamon)	Bravado Organic Fungicide	Organic
Gliocladium catenulatum Strain J1446	Prestop Biofungicide Powder	Organic
Oil (Cottonseed, Corn, Garlic)	Mildew Cure	Organic
Potassium Bicarbonate	Greencure Fungicide	25b
Potassium Bicarbonate	Kaligreen	Organic
Potassium Bicarbonate	Bi-Carb Old Fashioned Fungicide	Organic
Potassium Bicarbonate	Carb-O-Nator	Organic
Pythium oligandrum DV 74	Polyversum	Organic
Streptomyces lydicus	Actinovate Lawn and Garden Fungicide	Organic
Trichoderma harzianum Rifai strain T-022	Rootshield Seed Treatment	Organic
Trichoderma harzianum Rifai strain T-22 and Tricho-derma virens strain G-41	TurfShield PLUS WP Biological Fungicide	Organic
Trichoderma spp.	Tenet WP	Organic

TABLE 2: **Herbicides, PGRs**

Active Ingredient	Product Name	Regulatory Status
Herbicide		
Acetic Acid	SummerSet AllDown	Organic
Acetic Acid	Vinagreen Natural Non Selective Herbicide	Organic
Acetic Acid, Citric Acid	Black Jack 21	25b
Ammoniated Soap of Fatty Acids	Final-.San-O	Organic
Ammonium Nonanoate	Mirimichi Green Pro Con-centrate	Organic
Ammonium Nonanoate	Emerion 7020 Concentrate	Organic
Ammonium Nonanoate	Emerion 7020 Concentrate	Organic

TABLE 2: **Herbicides, PGRs** (CONTINUED)

Active Ingredient—Herbicide	Product Name	Regulatory Status
Herbicide		
Ammonium Nonanoate	Mirimichi Green Effective Earth Solutions Grass & Weed Control Ready To-Spray	Organic
Ammonium Nonanoate	BioSafe Weed Control	Organic
Ammonium Nonanoate	AXXE	Organic
Caprylic Acid, Capric Acid	Suppress Herbicide EC	Organic
Citric acid, Essential Oil (Clove), Malic Acid	Phydura	25b
Corn Gluten	Concern Weed Prevention Plus	25b*
D-limonene	Avenger Weed Killer	Organic
Essential Oil (Clove/Cinnamon)	JH Biotech Weed Zap	Organic
Essential Oil (Clove/Cinnamon)	Safer Grow Weed Zap	Organic
Eugenol, Essential Oil (Clove)	Halo	25b
Oil (Soybean)	EcoBlend Weed and Grass Burndown	Organic
Oil (Soybean)	Preem	25b
Potassium Salt of Fatty Acids	Safer Brand Weed and Grass Killer	Organic
Potassium Salt of Fatty Acids	Safer Brand Fast-Acting Weed and Grass Killer Concentrate	Organic
Sodium Chloride	A.D.I.O.S	Organic
Sodium Lauryl Sulfate, 2-Phenethyl Propionate	EcoSmart Weed and Grass Killer	25b
Mossicide/Algaecide		
Ammoniated Soap of Fatty Acids	Quik-Fire	Organic
D-limonene	Monterey Moss Stopper	Organic
D-limonene	Moss Melt Concentrate	Organic
Oil (Cottonseed, Garlic), Essential Oil (Clove)	No Moss	Organic
Potassium Salt of Fatty Acids	Safer Brand Moss and Algae Killer and Surface Cleaner	Organic
Plant Growth Regulator (PGR)		
Gibberelic Acid	GibGro 4LS	Organic
Gibberelic Acid	N-Large Plant Growth Regulator Solution	Organic

* Only corn gluten that is not derived from genetically engineered corn may be used in organic production.

TABLE 3: **Insecticides, IGRs, Repellents**

Active Ingredient	Product Name	Regulatory Status
Animal Repellent		
Coyote/Fox Urine	Shake-Away Coyote/ Fox Urine Granules	Organic
Dried Red Pepper and Dried Blood	Uncle Ians Dog and Cat Repellent	Organic
Dried Red Pepper and Dried Blood	Uncle Ians Mole and Gopher Deer Rabbit and Squirrel Repellent	Organic
Piperine/Oil of Black Pepper/Capsaicin	Havahart Critter Ridder	Organic
Porcine/Bovine Dried Blood	Plantskydd Granular Repellent for Rabbits and Small Critters	Organic
Porcine/Bovine Dried Blood	Plantskydd Granular Repellent for Deer, Rabbits, and Elk	Organic
Putrescent Whole Egg Solids/Capsacin/ Garlic	Deer Off Deer and Rabbit Repellent	Organic
Insect Growth Regulator (IGR)		
Azadirachtin	Neemix 4.5	Organic
Azadirachtin	Azatin O	Organic
Insecticide		
Bacillus thuringiensis	Safer Brand Garden Dust and Caterpillar Killer	Organic
Bacillus thuringiensis	DiPel® PRO DF Biological Insecticide Dry Flowable	Organic
Bacillus thuringiensis	Thuricide BT Caterpillar Control	Organic
Bacillus thuringiensis	Summit Biological Caterpillar and Webworm Control	Organic
Chromobacterium subtsugae	Grandevo	Organic
Citric Acid	Flying Skull Nuke 'Em Insecticide	Organic
Diatomaceous Earth	Perma-guard	Organic
Diatomaceous Earth	Safer Brand Ant and Crawling Insect Killer	Organic
Diatomaceous Earth	Desect Diatomaceous Earth Insecticide	Organic
D-limonene	Orange Guard Fire Ant Control	Organic
D-limonene	Orange Guard Ornamental Plants Inseticide	Organic
Essential Oil (Blend)	Dr. Earth Yard and Garden Insect Killer	Organic
Essential Oil (Blend)	Mantis Botanical Insecticide/Miticide	Organic
Essential Oil (Cedar)	CedarGuard	Organic
Essential Oil (Cedar)	CedarCure	25b

Active Ingredient	Product Name	Regulatory Status
Insecticide		
Essential Oil (Cedar), Oil (Soybean)	EcoShield Botanical Insecticide	Organic
Essential Oil (Clove/ Cinnamon)	Aramite Organic Acaricide–Insecticide	Organic
Essential Oil (Rosemary/ Peppermint)	Ecotec	Organic
Essential Oil (Thyme)	HumaGrow Proud3	Organic
Iron Phosphate	Garden Safe Slug and Snail Bait	Organic
Iron Phosphate	Miracle-Gro® Nature's Care Slug & Snail Control	Organic
Iron Phosphate	Whitney Farms Slug and Snail Killer	Organic
Iron Phosphate/ Spinosad	Brandt Antixx Plus Ant and Crawling Insect Killer	Organic
Iron Phosphate/ Spinosad	Sluggo Insect, Slug, and Nail Pellets	Organic
Milky Spore	St Gabriel Organic Milky Spore Granular	Organic
Neem Oil	Safer Brand Garden Defense	Organic
Nematodes: Steinernema carpocapsae	Ecomask Topdressing	25b
Nematodes: Steiner-nema carpocapsae and Heterorhabditis bacteriophora	Grub Guard	Organic
Nematodes: Steinernema feltiae	Scanmask Topdressing	25b
Nematodes: Steinernema glaseri	Environmental Factor Inc	25b
Oil (Cottonseed)	Safer Gro PestOut	Organic
Oil (Cottonseed)	AntOut	Organic
Potassium Salt of Fatty Acids	Safer Insect Killing Soap	Organic
Potassium Salt of Fatty Acids	Safer Brand Grub Killer	Organic
Potassium Salt of Fatty Acids/Neem Oil/Natural Pyrethrin (without PBO)	Safer Brand End ALL Insect Killer	Organic
Spinosad	Green Light Garden Spray	Organic
Spinosad	Seduce Insect Bait	Organic
Spinosad	Conserve Naturalyte Insect Control	Organic
Spinosad	Monterey Garden Insect Spray	Organic

TABLE 3: **Insecticides, IGRs, Repellents** (CONTINUED)

Active Ingredient	Product Name	Regulatory Status
Nematicide		
Paecilomyces lilacinus	Bio-Nematon	Organic
Quillaja saponaria saponins	Brandt Nema-Q	Organic
Quillaja saponaria saponins	Montery Nematode Control	Organic

Active Ingredient	Product Name	Regulatory Status
Insect Repellent		
Garlic Extract	Biolink Insect and Bird Repellent	Organic
Garlic Extract	Garlic Barrier AG Insect Repellent	Organic

TABLE 4: **Multi-Category**

Active Ingredient	Product Name	Category	Regulatory Status
Azadirachtin	AzaSol	Insecticide/Miticide/Fungicide	Organic
Azadirachtin	SoluNeem	Insecticide/Miticide/Fungicide	Organic
Azadirachtin	Azatrol	Insecticide/Miticide/Insect Growth Regulator	Organic
Azadirachtin	Molt-X	Insecticide/Nematicide	Organic
Azadirachtin	Safer Brand BioNeed	Insecticide/Repellant/Insect Growth Regulator	Organic
Azadirachtin	Amazin 1.2 ME	Insecticide/Repellant/Insect Growth Regulator/Nematicide	Organic
Bacillus amyloliquefaciens strain D747	Monterey Complete Disease Control Brand RTU	Fungicide/Batericide	Organic
Bacillus amyloliquefaciens strain D747	DoubleNickel LC Biofungicide	Fungicide/Batericide	Organic
Essential Oil (Clove), Oil (Cottonseed, Garlic)	Pest Out	Insecticide/Miticide	Organic
Essential Oil (Thyme)	HumaGrow Promax	Nematicide/Fungicide	Organic
Essential Oils (Various)	EcoSmart Brands	Insecticide/Herbicide/Fungicide	25b
Fats and Oil, Azadirachtin	Debug Tres Emulsifiable Concentrate Antifeedant, Insect Repellent, Insecticide, Miticide, Fungicide & Nematicide	Insecticide/Miticide/Nematicide/ Fungicide	Organic
Horticultural Oil (may be listed as mineral oil on label)	Civitas Turf Defense Pre-Mixed	Fungicide/Insecticide/Disease Suppression	Organic
Horticultural Oil (may be listed as mineral oil on label)	Civitas Turf Defense Ready-2-Mix	Fungicide/Insecticide/Disease Suppression	Organic
Neem Oil	70% Neem Oil	Insecticide/Fungicide	Organic
Neem Oil	Bayer Natria Neem Oil	Insecticide/Fungicide	Organic
Neem Oil	Triact 70	Insecticide/Miticide/Fungicide	Organic
Neem Oil	Trilogy	Insecticide/Miticide/Fungicide	Organic
Neem Oil	Monterey Neem Oil RTU	Insecticide/Miticide/Fungicide	Organic
Neem Oil	Triple Action Neem Oil	Insecticide/Miticide/Fungicide	Organic
Neem Oil	TerraNeem EC	Insecticide/Miticide/Nematicide/ Fungicide	Organic
Neem Oil/and Natural Pyrethrin (without PBO)	Monterey Rose & Flower Spray Plus Broad Spectrum Insecticide, Fungicide, and Miticide	Insecticide/Miticide/Fungicide	Organic
Oil (Sesame)	Organicide 3 in One	Insecticide/Fungicide/Miticide	Organic
Potassium Salt of Fatty Acids	MPEDE	Insecticide/Fungicide	Organic
Potassium Silicate	Sil-Matrix	Insecticide/Fungicide	Organic
Sulfur	Sulfur DF	Fungicide/Miticide	Organic
Sulfur	Kumulus DF	Fungicide/Miticide	Organic