

**Playing it Safe:**

**Healthy  
Choices  
about  
Lawn  
Care  
Pesticides**

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Health Promotion &  
Environmental Protection Office



## **About the Health Promotion & Environmental Protection Office**

The Health Promotion & Environmental Protection Office (HP & EPO) of Toronto Public Health works to protect the residents of Toronto from the adverse health effects that may result from pollution. The Office promotes good health and environmental protection through its research, advocacy and education activities. In addition, it encourages governments, the private sector and the public to take actions that will lead to a cleaner, healthier environment.

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## **A Message from Toronto's Medical Officer of Health**

Achieving environmental sustainability is possible if we use our natural resources wisely and ensure that human activities do not degrade the environment or endanger our health. Phasing out chemical pesticide use, wherever possible, is an important way in which we can reduce the risks to human health from toxic substances in our environment.

The use of lawn care pesticides is a public health issue of growing concern in Toronto. Scientific studies have found lawn care pesticide residues at levels that may be affecting our aquatic ecosystem. And since pesticides are mobile in the environment, people cannot avoid coming into contact with them. Of particular concern is the fact that children can be exposed to a variety of pesticides that are commonly used in and around the home.

The long-term effects on human health from continuous exposure to low levels of chemical pesticides is a subject of ongoing debate. Many scientific studies indicate significant and serious health concerns, while some others do not. Nonetheless, there is growing evidence that human health can be put at risk from pesticide use. And when risks to human health are unnecessary or uncertain, the wisest course of action is to substitute safer alternatives and methods, rather than incurring risks that may prove unacceptable in the long run.

Many Toronto residents have already demonstrated that beautiful, healthy lawns and gardens can be maintained by switching to non-chemical methods. Businesses now have significant opportunities to offer goods and services to meet the needs of this growing market. Local government can help with approaches that range from public education to municipal regulation of pesticide use, all of which should be fully reviewed and publicly debated.

The City of Toronto's consultation process provides an opportunity for everyone concerned about this issue to contribute to a strategy that will lead us to a healthy and sustainable future. I look forward to your ideas and appreciate your participation.

Dr. Sheela V. Basrur  
Medical Officer of Health

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## Introduction

### What is this document about?

Toronto City Council is considering whether it should restrict the "non-essential" use of lawn and garden pesticides on private property. Council asked Toronto Public Health to prepare this document to facilitate and encourage public discussions on the development of an appropriate strategy including considering the possible nature and scope of a by-law.

*Playing it Safe: Healthy Choices about Lawn Care Pesticides* provides up-to-date information about:

- public attitudes about, and alternative approaches to, lawn care;
- currently available research on pesticides and their effects on health and the environment;
- municipal by-laws and other regulatory tools that could be used to control or curb the use of pesticides.

### What are pesticides?

The focus of this discussion document is on lawn care **pesticides\***, manufactured chemical products that are applied to lawns and gardens to kill weeds, bugs, fungus and other unwanted living things. The federal regulator, the Pest Management Regulatory Agency (PMRA), identifies the following active ingredients as those most commonly used on Canadian lawns: the insecticides diazinon, carbaryl, and malathion and the herbicides 2,4-D, mecoprop, dicamba and MCPA. Unless we note otherwise, the reader may assume that the discussion applies primarily to these chemical compounds.

### What is a "cosmetic" or "non-essential" use of pesticides?

The use of pesticides to keep lawns free of pests is often referred to as a "cosmetic" or "non-essential" use. The question of what is a "non-essential" use is controversial, and we will not be able to resolve the controversy in this document. We can provide a few examples of what others have suggested. The PMRA suggests that a "non-essential" use may be one where pesticides are sprayed as part of a lawn care program when there are no pests or infestations apparent on the lawn.<sup>1</sup> The World Wildlife Fund suggests that any use of chemical pesticides on lawns and gardens is "non-essential".<sup>2</sup> A third suggestion is that a "non-essential" pesticide use is one where there is an alternative method or product, which makes the use of a chemical pesticide unnecessary. Finally, approximately 40 municipalities in Canada (most in Quebec, and one in Nova Scotia) have by-laws that set out permitted uses for pest control products (such as in public pools) and the conditions under which they may be used. It could be said that these by-laws identify "non-essential" uses by excluding them from the list of permitted uses.

**\*Bolded terms can be found in the Glossary.**

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## **What is Toronto doing about pesticides?**

In response to concerns expressed over the use of pesticides, Toronto Public Health released *Pesticides: A Public Health Perspective*, in October 1998.<sup>3</sup> Toronto City Council then made a commitment to phase out the use of pesticides on public green spaces. By the end of 1999, the first year of the program, Toronto had reduced its pesticide use on parks and city green spaces (excluding City golf courses, production greenhouses and road corridors) by over 97% and has maintained these reductions in subsequent years.<sup>4</sup>

Toronto's reduced pesticide use is part of a larger vision. In its Environmental Plan<sup>5</sup>, Toronto City Council envisions a city that enjoys a robust economy, a vibrant society and a healthy environment – including clean air, clean water and a thriving ecosystem. Avoiding the use of pesticides within the city is also a part of that vision. Council is now considering whether it should further control pesticide use in the City, and reduce their use on lawns and gardens.

## **How can you get involved in the pesticide issue?**

City Council has asked Toronto Public Health to consult broadly with the public on the question of further controls on the use of pesticides within the City. We need your answers to the questions: should Toronto seek further pesticide use reductions and, if so, how?

Toronto Public Health has produced *Playing it Safe* to provide Toronto residents with information about pesticides: how they are used in the City, what may be the health effects associated with their use and what may be the policy options available to achieve a reduction in pesticide use.

We encourage you to get involved in the debate over the future of pesticide use in the City.

City Council has asked Toronto Public Health to hold public meetings so that Council may make decisions about restricting pesticide use based on your informed input, concerns and advice. You can find out more about these meetings by calling: 416-338-1215.

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### **As you read this document, consider these questions:**

- ***Do you think it is a good idea to reduce or even eliminate the use of lawn and garden pesticides on private property?***
  - ***How can residents be encouraged to reduce their use of lawn and garden pesticides?***
  - ***Should a by-law be developed to restrict pesticide use on lawns and gardens?***
-

## **Attitudes Toward Lawn Care in Toronto**

City Council has asked whether we should reduce our use of pesticides. This section of the document provides information about how people are using lawn pesticides in Toronto.

There are no exact figures available regarding how much and what types of pesticides are used on lawns and gardens in Toronto. However, we do have data from three sources: a recent poll of consumer attitudes toward pest control products done by *Ipsos-Reid* on behalf of a number of pesticide manufacturers; a Toronto Public Health survey of Toronto residents' use of pest control products; and, input from stakeholders at a City of Toronto workshop held on January 23, 2002. We also have information, from a poll conducted for the Toronto Environmental Alliance, about the attitudes of Ontario residents on the use of lawn care pesticides.

### **Consumer attitudes to pesticides**

This *Ipsos-Reid* 2001 poll was commissioned by three companies that manufacture pesticides, and a chemical products manufacturer's association. They surveyed 600 Canadian homeowners (excluding those in condominium apartments) on their opinions about indoor and outdoor use pesticides. The analysis of the poll noted, "Canadian homeowners are of two minds about their use of pest and weed control products.... On the one hand, [homeowners] see merit in the products' purpose and see the products as effective ... on the other hand, homeowners also see disadvantages or potential risks to using these products."<sup>6</sup> The survey notes that the greatest proportion of homeowners prefer to "do it themselves," with 77% of respondents saying they would remove pests in their lawns and/or gardens either by hand (28%) or with suitable products they purchased themselves (49%). Thirteen per cent (13%) responded that they would hire a professional.

### **Survey of Toronto households**

This survey conducted in 2001 by Toronto Public Health obtained responses from 341 households with lawns in Toronto. Responses to the Toronto survey disclosed that more than half (55%) of the lawns had no application of chemical pesticides in the two years preceding January 2001. Twenty-four per cent (24%) of households responded that they applied chemical pesticides to their lawns themselves, 13% had professionals apply chemical pesticides to their lawns, and 8% of the households used both methods.

The responses to the two polls suggest that any restrictions on the use of lawn and garden pesticides would have their greatest impact on householders who currently purchase and apply pest control products themselves.

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## Stakeholder input on attitudes toward lawns

### The benefits of green space

People use pesticides because they believe they improve the look of their properties. The industry poll described earlier in this document notes “these products further the pride [people] take in their gardening efforts (and their home) by improving the appearance and health of the lawn.”<sup>7</sup>

At a City of Toronto stakeholder workshop on Toronto’s proposed strategy to achieve a phase-out of non-essential outdoor use of pesticides, those in attendance agreed that beautiful green spaces in the urban environment are beneficial in many respects. Green spaces are aesthetically pleasing, provide natural cooling in the urban **heat island**, retain topsoil, prevent run-off of sediment and pollutants into surface water and provide pleasant recreational opportunities on private and public lands.

### A range of opinion of how to keep green spaces beautiful (and What is a beautiful green space)

A wide range of stakeholder opinion emerged at the workshop around the question of how beneficial green spaces are best kept green and healthy.

Some stakeholders suggested that in order to keep a lawn in a healthy weed-free, insect-free condition, the best means was the appropriate use of chemical pest control products.

Some stakeholders suggested that healthy lawns and gardens maintained with chemical-pesticide-free horticultural methods are naturally more resistant to weed and insect infestations and any pests can be managed with non-chemical means.

Some stakeholders suggested that people should adjust their expectations about what makes a beautiful property and create green spaces less reliant on chemical products to resist damaging pests and unwelcome weeds.

Some stakeholders suggested that **Integrated Pest Management** (which includes pesticides as one tool among a broad range of horticultural techniques) is the best means to maintain a beautiful lawn with limited use of pesticides.

Some stakeholders suggested that **Integrated Plant Health Care** is a better method to maintain healthy green spaces. Integrated Plant Health Care considers the use of chemical pesticides, not so much as a "tool in the toolbox" but as an absolute last resort when all other methods have failed.

With just this short list of some of the opinions expressed at the stakeholder workshop, it is clear that there are a variety of ideas about both green spaces and the ways to keep them healthy.

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Even with the very broad range of opinion expressed at the stakeholder workshop on January 23, 2002, most of the participants did agree that people could be educated to reduce their use of pesticides.

### **What do the federal and provincial governments say about lawn care?**

Health Canada and the Pest Management Regulatory Agency (PMRA) are the federal Ministry and agency chiefly responsible for pest control product regulation in Canada. All provincial governments also have laws regulating pesticide use (see the section in this document on pesticide law and policy for more information).

The federal government supports the notion that people should reduce their pesticide use at home as much as they can. The PMRA has put some resources toward a Healthy Lawn Strategy for Urban Use Pesticides. The objective of the strategy is "to reduce reliance on pesticides used for lawn care through the application of Integrated Pest Management principles, with particular emphasis on pest prevention, use of reduced risk products and applications of pesticides only when necessary."<sup>8</sup> The Ontario Ministry of the Environment participates in this federal program.<sup>9</sup>

### **What's the word on pesticide use?**

It appears that many of Toronto households with lawns have already chosen not to use chemical pesticides. Most stakeholders at the January workshop believe that pesticide use can be reduced, but other stakeholders do not think reductions are necessary. Both the federal and provincial governments also support the idea that people can reduce their use of pesticides and still maintain beautiful properties. When asked by Toronto Public Health, about two-thirds of the poll respondents supported restricting the use of lawn and garden pesticides. The Toronto Environmental Alliance, conducting an Ontario-wide poll of public opinion (October 2001), including people who do not have lawns, found that 82% supported "a by-law restricting the use of cosmetic pesticides on private residential property."<sup>10</sup>

What do you think? Do you use pesticides on your lawn and garden? Are there ways you could reduce your pesticide use?

The City of Toronto has information about how to reduce your use of pesticides. Call the Lawn Improvement Helpline at 416-397-5296.

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## Health & Environmental Effects of Pesticides

We should state at the outset of this discussion that not all of the experts are convinced that the medical evidence supports the theory that pesticides pose health risks in the urban environment.<sup>11</sup> However, other members of the scientific community are persuaded by the evidence that urban use of pesticides may pose long-term health risks<sup>12</sup> and support a policy of prudent avoidance when it comes to lawn care pesticides.

*“Particular uncertainty exists regarding the long-term health effects of low-dose pesticide exposure.... Considering these data gaps, it is prudent for homeowners, farmers and workers to limit pesticide exposures ... and to use the least toxic chemical pesticides or non-chemical alternatives.”*

Council of Scientific Affairs, American Medical Association, 1997<sup>13</sup>

### How does Toronto Public Health weigh the risks?

Toronto Public Health views a risk worthy of concern – and action – if there is sufficiently strong reason to believe that human health might be harmed and if there is potential for many people to be affected. It is a public health mandate to protect the health of people before actual harm occurs.

New evidence suggests that there are more opportunities for children and foetuses to be exposed to some lawn care pesticides than was previously understood. When we consider the evidence for exposure of children and unclear but potentially serious health effects, we believe there is sufficient reason to take preventive action and minimize the opportunities for everyone – and especially children – to be exposed.

### How does science help us understand the health effects of pesticides?

Most of the information currently available about the health effects of pesticides comes from laboratory experiments conducted on animals or cell cultures (this is called **toxicology**). Additional information comes from studies of people who are exposed to high levels of pesticides, either by accident or through their work. Few studies, however, have explored the health risks posed to the general population from long-term, low-level exposures to lawn and garden pesticides, even though this is the way most people are likely exposed to pesticides – in small doses, repeatedly over a long period of time.

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## **How are people exposed to pesticides?**

Pesticides can enter a person's body by three possible routes: by the lungs, by the mouth or through the skin. Skin contact is the most likely route of exposure to lawn care pesticides. Spray applications of pesticides increase the chance that the applicator and bystanders may inhale fine spray drops. Lawn-care pesticide residues may also be tracked into the home. Children are more likely to be exposed by inadvertent ingestion of pesticide residues on objects in their environment.

## **What are the health effects of lawn care pesticides?**

There are two broad categories of health effects caused by pesticides, short-term (or acute) effects and long-term (or chronic) effects. There is little disagreement among the medical community about the short-term effect of over-doses of pesticides. As is the case with any accidental poisoning, these extreme exposures are not common. The short-term (or acute) effects vary depending on the chemical, the **dose** received and the susceptibility of the individual exposed. If people don't follow instructions on how to avoid over-exposure, they can experience burning, stinging or itching of eyes, nose, throat and skin. Other acute symptoms may include nausea, vomiting, diarrhea, wheezing, coughing and headache.<sup>14</sup>

## **What are the health effects of long-term pesticide exposure?**

Medical science is less certain about the long-term health effects that may result from routine exposures, such as might occur when someone steps out into their yard after pesticides have been applied or when children play on treated turf, especially when these exposures are repeated over time. Recent scientific studies do, however, point to some possible long-term health effects from repeated low-level exposure to pesticides.

The following review of studies must be understood in terms of the science that arrived at these findings. **Epidemiology** studies how diseases (or health effects) are distributed in large groups of people and it examines what might influence the patterns of disease distribution. It attempts to measure the statistical relationships between health effects in people and exposure to possible threats to health, such as different environmental hazards.

Epidemiological studies describe what appear to be increased risks of certain health effects when populations are exposed to certain conditions. When a study finds an "association" between a health effect and an environmental factor, such as exposure to pesticides, it means that exposure to that environmental factor appears to increase the risk of the health effect for that sample of people studied. No single epidemiological study on its own can give us "the answer" about whether a particular environmental factor actually causes a specific health effect. It often takes many decades of research and hundreds of studies to arrive at a solid conclusion about an environmental factor and a health effect.

The ongoing epidemiological research adds to our knowledge every day, but there are still many unanswered questions regarding the health effects associated with pesticide

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exposure. The reader is cautioned that while the research described below indicates cause for concern, there remains uncertainty regarding the role of these substances in giving rise to the described health effects.

In recent years, health researchers have described reproductive effects, neurological effects, and certain cancers in association with pesticide exposures. We should note, however, that not all studies show positive associations; some show no association, or an association that is not statistically significant. Moreover, there are comparatively few epidemiological studies that have shown associations between health effects and exposure to *specific* pesticides such as those commonly used on lawns and gardens. We explore each of these areas of health effects in more detail below, highlighting studies that have provided information on pesticides used on lawns and gardens.

## **Reproductive effects**

Researchers suggest that there is a moderately elevated risk of reproductive or developmental effects from direct exposures to some pesticides prior to conception, or during prenatal or postnatal periods.<sup>15</sup> Although not all studies are consistent, several studies of women who work with pesticides suggest that some pesticides are associated with fertility problems and increased risks of spontaneous abortion and miscarriage.<sup>16</sup>

Increased risk of miscarriage among Ontario farmwomen has been associated with preconception exposure to glyphosate, the carbamate insecticide carbaryl and **phenoxy acid herbicides**.<sup>17</sup> Higher rates of miscarriage and premature birth were also seen when farmers in this study handled certain pesticides (including **organophosphates**, and carbaryl) during the three months before conception.<sup>18</sup>

Some studies (mainly of workers) suggest that maternal exposure to pesticides used in gardening during early pregnancy is associated with increased risks of certain birth defects, such as cleft lip and palate,<sup>19</sup> spina bifida<sup>20</sup> and defects of limbs or digits<sup>21 22</sup>. One study in Denmark showed that boys whose mothers worked in farming or gardening had a moderately higher risk of undescended testes.<sup>23</sup> A study of people living in a farming region of Minnesota showed higher rates of birth defects when conception had occurred during the spring when use of pesticides is highest.<sup>24</sup>

Declining sperm count and increased abnormal sperm have been associated with exposure to the herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) in farm sprayers.<sup>25</sup> 2,4-D has also been measured in the semen of farmers.<sup>26</sup> There is very limited evidence of **toxicity** of 2,4-D or other pesticides to sperm but these findings suggest there is a need to conduct further studies.

## **Neurological effects**

Several pesticides are associated with effects on the central or peripheral nervous systems of animals and humans. Studies of exposed workers have shown sensory, motor, mental and psychological effects,<sup>27</sup> although these have not been observed in all studies.<sup>28</sup> These

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effects have been observed following exposure to pesticides known to be **neurotoxic** such as organophosphates, **carbamates**, and some **fungicides**.<sup>29</sup>

There is mounting evidence suggesting a moderate, but significant, elevation in the risk of **neurodegenerative disorders**, such as Parkinson's disease (PD), among those persons occupationally exposed to pesticides, particularly farmers<sup>30</sup> and gardeners.<sup>31</sup> The increased risk for PD from pesticide exposure may involve a specific genetic susceptibility.<sup>32</sup> This is an important area of ongoing research.

While there are only limited data available and not all scientists draw the same conclusions<sup>33</sup>, several studies show that the nervous system in young animals is particularly vulnerable to some insecticides, such as those from the organophosphates and carbamates.<sup>34</sup> For example, chlorpyrifos reduces the number of brain cells in new-borns when test animals are exposed during pregnancy.<sup>35</sup> Infant rats exposed to low levels of chlorpyrifos demonstrated long-term cognitive deficits.<sup>36</sup>

One study has examined the effects of low-level, long-term exposure to many different pesticides (including DDT, which has been banned in Canada for many years) in a group of preschool children from an agricultural community in Mexico.<sup>37</sup> These children tested poorer in stamina, gross and fine motor coordination, memory and drawing ability than children from a non-agricultural community in Mexico (whose exposure was much lower but who, otherwise, shared comparable genetic, economic and social traits). Although this study has limited applicability to children in Toronto, it is the only epidemiological study that has examined nervous system function in children with different exposures to pesticides.

### **Carcinogenic and immune system effects**

Animal studies and some evidence in humans link some pesticides (for example, chlorpyrifos, malathion, some pyrethroids, and phenoxy herbicides) to changes in immune system function (**immunotoxicity**).<sup>38</sup> A compromised immune system may increase the susceptibility to infectious diseases.<sup>39</sup> It may also contribute to the development of some cancers, but this finding is disputed in the literature.<sup>40</sup> There is need for considerably more research to better understand what immune effects may come from exposure to pesticides.

Studies of pesticide-exposed populations or workers do not consistently show elevated cancer risks.<sup>41</sup> Some recent workplace studies, however, do show increased risks of testicular, prostate and cervical cancers,<sup>42</sup> **Non-Hodgkin's Lymphoma (NHL)**<sup>43</sup> and **multiple myeloma**<sup>44</sup> among those exposed to pesticides through their work.<sup>45</sup> There have also been some studies that show higher cancer rates among those living in agricultural regions.<sup>46</sup>

Multiple studies suggest an association between some pesticide exposures and some cancers in children, although a causal relationship is far from proven.<sup>47</sup> Certain childhood cancers may be related to parental exposure to pesticides.<sup>48</sup> Several researchers conclude that there is reason to suspect that pre-conception, prenatal and early childhood exposures

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to pesticides are associated with increases in childhood brain tumours<sup>49</sup>, **leukemia**,<sup>50</sup> NHL<sup>51</sup> and **neuroblastoma**.<sup>52</sup> The use of pesticides in the home appears to increase the risks of developing these cancers. The research on childhood cancer risks associated with yard and garden pesticides doesn't always arrive at the same conclusions.<sup>53</sup>

### What are the risks to children?

*“For fetuses, infants and children alike, **subclinical** developmental neurotoxicity is the major threat posed by exposure to pesticides.... Because these injuries cannot be reversed medically, prevention of exposure must be emphasized.”*

Dr. Philip Landrigan, Professor of Pediatrics and Director of the Center for Children's Health and the Environment, Mt. Sinai School of Medicine, New York, NY.<sup>54</sup>

The few studies focusing on children and pesticides show that the risks for children and for adults may be very different.<sup>55</sup> In general, the studies find that children have a lower tolerance for pesticides.<sup>56</sup> On the whole, children are typically more sensitive to the effects of pesticides because the enzymes and organs that rid their body of toxic chemicals are not fully developed. Children are also smaller and lighter than adults, so they receive a proportionately larger dose per exposure than adults.<sup>57</sup> A child's breathing zone is much lower to the ground than an adult's; as a result, children inhale a higher dose of those pesticides that settle closer to the ground.<sup>58</sup> And because children explore their environment with their hands and mouths, they are also more likely to transfer pesticide residues directly into their bodies.<sup>59</sup> One study showed that hand-to-mouth transfer of pesticide residues possibly accounted for about half of the pesticides that the children absorbed from playing on a lawn treated with chlorpyrifos.<sup>60</sup> In addition, children are more likely to be exposed to pesticide residues tracked indoors on shoes and feet.<sup>61</sup>

Two separate studies of children in Minnesota and in Washington State detected breakdown products of some organophosphate pesticides in the urine of most children.<sup>62</sup> Pesticides like chlorpyrifos normally break down and are eliminated from the body within three to six days. The amounts detected in urine are usually very small and aren't associated with adverse health effects in individual children. Yet researchers caution that we don't have all the answers concerning the potential for long-term effects of such exposures where children are concerned.<sup>63</sup> Researchers testing urine samples for pesticide levels have found that most people in the United States (greater than 80% in some samples) carry evidence of having been recently exposed to pesticides and pesticide metabolites.<sup>64</sup>

Because their brains are still growing, children are at greatest risk from the effects of neurotoxic pesticides. The developing brain and nervous system represent vulnerable

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targets.<sup>65</sup> The cells of the nervous system do not readily repair themselves after damage and the **blood-brain barrier** that protects the brain from toxic agents is not fully developed until six months of age.<sup>66</sup> Animal studies also suggest that low-dose exposure to some neurotoxic insecticides (for example, the pyrethroid **allethrin**) during the **brain growth spurt** leads to greater susceptibility to neurological effects with exposure later in life.<sup>67</sup>

These and other findings by health researchers suggest that the potential risks associated with pesticides are typically greater for foetuses and children than the general adult population. The PMRA states that in their re-evaluations of lawn-care pesticides it is applying newer scientific methods to take children's vulnerabilities into account.<sup>68</sup> This has already led to phase-outs of all home-use products for two pesticides, chlorpyrifos and diazinon (see discussion in the section on Pesticide Law and Policy below.)

### **What happens to pesticides in the environment?**

In order to kill an intended target pest, pesticides have to be released into the environment. Once applied to a lawn or garden, some of the pesticide may migrate into the air, soil, groundwater and surface waters and be carried away from the lawn or garden. Just how readily pesticides move off-site from where they are applied depends on the chemical and physical characteristics of the individual pesticide.

Pesticides do not necessarily distinguish between "pests" and other living things. Pesticides can kill beneficial soil bacteria, earthworms, snails, frogs, birds, fish, honeybees and other valuable species. Sometimes instructions on the product label include information about risks to these "**non-target species**".

In 1999, researchers from Environment Canada measured a number of lawn care pesticides (including mecoprop, 2,4-D and diazinon) in water samples collected from both the Humber and Don Rivers in Toronto.<sup>69</sup> Lawn care pesticides have also been detected in surface waters in Hamilton, Guelph and other urban areas.<sup>70</sup> Based on a preliminary comparison of four years of sample data, there appear to be consistent patterns. The waters of urban rivers, creeks and ponds do contain lawn care pesticides, and the concentrations are higher after rainfall.<sup>71</sup>

In some cases (for example, diazinon and 2,4-D), the highest levels measured in urban ponds and streams have, at times, exceeded the levels set by governments to protect aquatic life.<sup>72 73</sup> It is generally the case, however, that there is insufficient data to estimate the impacts of urban pesticide use on the surrounding environment in terms of harm to flora or fauna and the overall health of the ecosystem.

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## **Pesticide Law and Policy in Canada**

There are many outstanding issues regarding implementing a by-law to achieve a phase out of "non-essential" outdoor uses of pesticides in Toronto, including the question of whether, in fact, there should be a by-law at all.

We cannot deal with all of these issues in this short discussion document. What we will do in this section is describe the main regulatory and policy issues as they apply to pesticide use, and provide a brief description of municipal by-laws that control the use of pesticides on private property.

### **What is the federal role in pesticide regulation?**

The federal legislation that applies to pesticides is the Pest Control Products Act (PCPA).<sup>74</sup> Regulations under this Act provide that any pest control product used or manufactured in Canada must be tested and registered with the federal government, including pesticide products used on residential properties in urban environments.

### **How are pest control products evaluated by the federal government?**

It is the purpose of the federal Pest Management Regulatory Agency (PMRA) to protect human health and the environment against the risks posed by pest control products while preserving for society the benefits of these same products.

The PMRA bases its decisions upon a process known as risk assessment. The risk assessment process employs a wide range of sources of information and relies on the judgement of scientific experts.

When a pesticide manufacturer proposes a new chemical for use as a pesticide it must provide the PMRA with the information that allows the Agency to judge the safety of the product. In order for the PMRA to assess safety, manufacturers have to provide results from multiple types of animal studies that test for toxicity.

### **Does federal registration of a product mean it is safe?**

It is often said that federal regulations provide adequate assurance that a product is safe. It may be more accurate to say that the federal regulatory regime acknowledges that there are risks associated with the products, but the risks are acceptable – by a very wide margin of safety – and can be managed through labeling information. This is what people mean when they say, “pesticides are safe when used as directed”.

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## **Merit<sup>â</sup> Solupak<sup>â</sup>**

### **RESTRICTIONS**

**Do not graze treated areas or use clippings from treated areas for feed or forage.**

**Do not plant any food crop within one year of a treatment.**

### **ENVIRONMENTAL HAZARDS**

**Do not apply within 30 metres of environmentally sensitive areas such as lakes, streams, rivers, or other aquatic systems.**

**Do not contaminate water when disposing of equipment washwaters.**

**This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds.**

**Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.**

**This product is highly toxic to aquatic invertebrates.**

**Apply this product only in accordance with this label**

**This chemical demonstrates the properties and characteristics associated with chemicals detected in groundwater.**

**The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.**

### **Are the risks of older pesticides being addressed?**

Most of the pesticides commonly used on lawns were registered long before the new standards described above came into effect and have all been under re-evaluation. The PMRA has identified eight “older” pesticides as candidates for priority re-evaluation. These are four insecticides (chlorpyrifos, diazinon, malathion and carbaryl) and four herbicides (2,4-D, MCPA, dicamba and mecoprop).

New scientific data indicate that the once commonly used insecticide chlorpyrifos may pose more risks to children than had previously been estimated.<sup>75</sup> This evidence has prompted PMRA to institute a phase-out of all home uses of the pesticide.<sup>76</sup> Diazinon, another insecticide in widespread use, is also on a program of voluntary phase-out that will substantially reduce how much is available for public use by the year 2003.<sup>77</sup>

### **What is the provincial role in pesticide regulation?**

Every province and territory in Canada has passed pesticide-related legislation. In Ontario, the Pesticides Act<sup>78</sup> and its regulations cover the shipment, sale, application, storage and disposal of pesticides. The Act also provides for permitting requirements, training, certification and licensing of applicators and sellers of pesticides.

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Provincial laws are designed to manage the risks posed by pesticides by controlling who may apply them. The Ontario Pesticides Act and regulations create six different pesticide classifications. The classifications rank products on the basis of how toxic and persistent they are. For example, a Schedule 1 pesticide is in the “Restricted Category”. Every pesticide in this category is very toxic, very persistent and highly mobile in the environment. Only licensed applicators or certified agriculturists may use this category of pesticide and must apply for a permit first. The provincial regulations require that applicators of pesticides in the restricted categories (Schedules 1, 2 and 5) be trained in pesticide safety and certified at least once every five years.

Three of the pesticide categories (Schedules 3, 4, and 6) – ranging from moderate toxicity and **persistence** to low toxicity and no persistence – are available to homeowners without any licensing or permitting requirements. Licensed applicators may use these pesticides without a permit. Provincial law requires homeowners and licensed applicators to follow the instructions on the product label.

### **What is the municipal role in pesticide regulation?**

High population densities in urban areas increase the possibility that one person’s use of their property might conflict with another person’s enjoyment of theirs.

It often falls to municipalities to impose by-laws and land use restrictions to reduce the potential for these kinds of conflict. Municipalities sometimes also pass by-laws to reflect local values. In its consideration of a Quebec community's pesticide by-law, the Supreme Court of Canada observed that “Law-making [is] often best achieved at a level of government that is ... closest to the citizens affected and thus most responsive to their needs, to local distinctiveness and to population diversity.”<sup>79</sup>

In Canada, provincial governments establish the powers and capacities of municipalities through legislation. This is what people mean when they say, “municipalities are creatures of the province”. Through various pieces of provincial legislation, municipalities have the power to pass by-laws. Ontario’s Municipal Act<sup>80</sup> also provides for a general power to make by-laws regulating health, safety, morality and welfare of the inhabitants of the municipality.<sup>81</sup>

This power under the Ontario Municipal Act (both the ‘old’ and the ‘new’ Acts) is important because, in June 2001, the Supreme Court of Canada found a legitimate municipal power to control the use of pesticides in a similar clause in Quebec law.

### **How did the Supreme Court define a municipality’s power to regulate pesticides?**

In 1991 the Town of Hudson, located west of Montreal, adopted By-law 270, which restricted the use of pesticides within its boundaries to specified locations and applications. In November 1992, two landscaping companies, Chemlawn and Spraytech, were charged for being in violation of the by-law. The companies pleaded not guilty and,

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when they lost at trial level, they appealed the decision. The companies also lost on appeal. They then took their case to the Supreme Court of Canada.

Chemlawn and Spraytech argued that it was outside the jurisdiction of the municipality to regulate pesticides. They also argued that the municipal law conflicted with provincial and federal law and was invalid. The Court found that there was no conflict between the by-law and other levels of regulation.

In its decision, the Supreme Court acknowledged that the primary value of local government is that it can move more sensitively and more flexibly in response to local needs. The Court observed that there is a ‘general enabling clause’ in the Quebec City and Towns Act which gives each municipality the ability to make by-laws to “secure peace, order, good government, health and general welfare in the territory of the municipality”.<sup>82</sup> The Court found that the by-law controlling the non-essential use of pesticides fell within the “health” component of the general enabling clause.

## **What are Toronto's options to phase out non-essential uses of pesticides?**

### **Examples of municipal pesticide by-laws**

There are many different ways that a municipality may control the use of pesticides. Existing Canadian municipal by-laws that regulate pesticides do not, for example, impose complete bans. Rather, they generally tend to define which uses of pesticides are permitted. Some, such as in Halifax, also provide lists of pest control products that are exempt from the by-law restrictions.

Described below are some of the main components of by-laws in Hudson, Quebec and the Halifax Regional Municipality in Nova Scotia.

#### **The Town of Hudson, Quebec**

The Hudson by-law starts with a general prohibition, and then lists exceptions to the prohibition. In this way, the by-law restricts pesticide use only to the ones it permits.

The by-law permits, for example, the use of pesticides in public and private swimming pools, to purify water intended for human and animal consumption, inside a building, and to control or destroy animals that constitute a danger to human beings. The Hudson by-law also permits the spraying of pesticides on farm crops and, until 2005, the spraying of pesticides on golf courses.

#### **The Halifax Regional Municipality**

Halifax Regional Municipal Council passed its pesticides by-law on August 15, 2000. The by-law has three implementation stages. Different provisions of the by-law come into effect at different times. In 2000, Council passed the by-law, giving immediate effect to a ban on the use of pesticides on all municipal property and initiated a public education

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and awareness program. On April 1, 2001, a general restriction came into effect on the use of pesticides on residential properties located within a 50-metre radius of: a property registered as being occupied by a person at risk who provides medical documentation; or any school, licensed daycare centre, park, playground, licensed senior citizens' residence, university, church or hospital. On April 1, 2003, there will be a general ban on the use of pesticides on all properties in Halifax Regional Municipality affected by the by-law.

As with the Hudson by-law, there are exceptions to the ban to be enacted in 2003. The by-law will not restrict pesticide use on property used for agriculture or forestry, or on commercial or institutional properties. The by-law will not apply to the indoor use of pesticides or to outdoor use for other than plant and turf maintenance. In special cases where people are in danger or pests have infested a property, the by-law permits people to make special application to use otherwise banned pesticides.

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## A Made-In-Toronto Solution

On January 23, 2002, the City of Toronto engaged in a conversation with a community of stakeholders on the question of reducing the use of pesticides on lawns and gardens. Stakeholders came from pesticide manufacturing companies, lawn care companies (both “traditional” and “organic”), health care organizations, community garden groups, school boards, golf course associations, the provincial Ministry of the Environment, a rate payers association, the Toronto Transit Commission, the Toronto Region Conservation Authority, the Canadian Environmental Law Association and many others. About sixty-five people shared their knowledge and insight to help start the conversation about the best ways to reduce pesticide use on lawns and gardens in Toronto.

The City of Toronto consulted with stakeholders in January 2002 about how it could best achieve reductions in pesticide use on lawns and gardens. Most of the stakeholders agreed that reductions in pesticide use on lawns and gardens were beneficial and possible.

The stakeholders proposed a variety of ways that reductions in pesticide use could be achieved. Many mentioned public education as an effective means to increase public knowledge about alternative ways to maintain beautiful properties that required fewer, or no applications of pesticides. Pesticide manufacturers and retailers suggested there might be ways for them to sell their products and inform their customers that could lead to reductions in the amount of pesticides applied to lawns and gardens. Representatives from the horticultural trades, including lawn care companies, indicated they could promote within their own industry integrated pest management, integrated plant health care, and pesticide-free lawn care services. Other stakeholders observed that a by-law could set out restrictions on the use of lawn and garden pesticides. Others observed that reductions could be satisfactorily achieved without resorting to a by-law.

Different stakeholders supported three different categories of ways to achieve the commonly accepted goal of reducing pesticide use.

- Education
- Voluntary initiatives by pesticide retailers, manufacturers and the horticultural trades
- A municipal by-law

The three categories can co-exist. Many stakeholders noted, for example, that public education would be a necessary component of any by-law, and that some industry initiatives could be upheld within a by-law. More information about these and other options will be available at the public consultation meetings.

The City of Toronto needs to hear now from its residents. What do you think would be the best way to achieve reductions in the use of pesticides on lawns and gardens?

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## Reducing Pesticide Use in Toronto

The use of lawn care pesticides is currently a matter of public debate, both in Toronto and elsewhere in Canada. *Playing it Safe* supports a cautious approach. The public health experts at Toronto Public Health are persuaded that the findings in the medical literature warrant finding ways to reduce exposing children and other vulnerable members of society to chemical pesticides.

The question remains, how does Toronto reduce pesticide use on private lawns?

### Join in the community conversation!

Let us know your views by writing or e-mailing Toronto Public Health at:

Toronto Public Health  
Health Promotion and Environmental Protection Office  
277 Victoria Street, 7th Floor  
Toronto, ON  
M5B 1W2

e-mail: [pesticide@city.toronto.on.ca](mailto:pesticide@city.toronto.on.ca)

Your comments will be forwarded to your City Councillor, and you will be informed of the public meetings that are planned to continue the community conversation on making *Healthy Choices about Lawn Care Pesticides*.

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***Have your say about reducing pesticides.  
Call 416-338-1215 for details of upcoming meetings.***

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## Glossary

**Acetylcholinesterase:** An enzyme in the body that is critical for proper functioning of the nervous system.

**Acute:** The term used to describe a single or short period of exposure and the health effects that occur immediately after exposure.

**Blood-brain barrier:** A defensive barrier formed by the blood vessels and supportive tissues of the brain that prevents some toxic substances found in the blood from entering the brain.

**Brain growth spurt:** The period of development of the human brain (from the third trimester of pregnancy through the first two years of life) that coincides with rapid structural and biochemical changes that accompany the brain's maturation. It is also associated with various motor, sensory and cognitive milestones.

**Carbamates:** A class of pesticides that are commonly used against various insect pests. They inhibit the enzyme acetylcholinesterase and therefore cause malfunctioning of nerve transmission that is reversible (unlike organophosphates, see below).

**Chronic:** A term referring to health effects that are delayed or occur weeks, months or years after exposures that occur repeatedly (or intermittently), over a longer period of time.

**Dose:** The actual amount of a substance that ends up being delivered to critical body tissues or organs. It is often expressed as an amount per unit of body weight of the organism.

**Epidemiology:** the study of epidemic disease, with a view to finding means of control and future prevention. This applies to the study of epidemics such as smallpox and cholera, and all forms of disease that relate to the environment and ways of life. Epidemiology includes the study of associations between smoking and cancer and diet and coronary disease.

**Exposure:** Actual contact with a chemical that can occur by several routes including breathing it in (inhalation), absorption through the skin or taking it in by the mouth (ingestion).

**Fungicides:** Pesticides that are used to treat fungi that cause disease in plants and fruit.

**Hazard:** Any thing or substance that can cause harm to health or to the environment

**Heat Island:** The US EPA provides the following explanation of the heat island effect: On hot summer days, urban air temperatures can be 2-10°F hotter than the surrounding countryside. Scientists call this phenomenon the "urban heat island effect." Heat islands form as vegetation is replaced by pavement, buildings and other structures necessary to accommodate growing populations. These surfaces absorb, rather than reflect, the sun's heat, causing surface temperatures and overall ambient temperatures to rise.

**Herbicide:** A type of pesticide that works against weeds by killing or inhibiting growth of these unwanted plants.

**Immunotoxic:** The ability of a substance to have harmful effects on any aspect of the immune system.

**Insecticide:** A type of pesticide that kills or harms pest insects.

**Integrated Pest Management (IPM):** Health Canada defines IPM as a decision- making process that uses all necessary techniques to suppress pests effectively, economically and in an environmentally sound manner to sustain healthy landscapes. The City of Toronto defines IPM as a decision- making process that is based upon, and assumes that proper horticultural and plant health care has been utilized in the first place. It provides a framework for making rational pest

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control decisions based upon an understanding of and close observation (monitoring) of living systems. IPM considers the wide range of available measures to suppress pests effectively, economically and in an environmentally sound manner to sustain healthy landscapes.

**Integrated Plant Health Care (IPHC):** The City of Toronto defines IPHC as an ecologically based approach to establishing and maintaining developed landscapes. It integrates an understanding of living systems, urban stresses, human needs and horticultural principles in developing maintenance solutions that are environmentally sound, healthy and sustainable.

**Leukemia:** Several types of cancer where the body produces large numbers of abnormal blood cells, usually white blood cells.

**Multiple myeloma:** A type of cancer where specific white blood cells called plasma cells are produced in large numbers. These abnormal cells are called myeloma cells and they tend to collect and form tumours in different bones in the body.

**Neuroblastoma:** A rare type of childhood cancer that manifests as a tumour of the adrenal gland in the brain or in nerve tissues that are related to the adrenal gland. It can occur in children from newborn up to age ten.

**Neurodegenerative disorders:** Diseases that are characterized by progressive deterioration of neurological function that can cause a wide range of disabilities and symptoms depending on the types of nerve cells that are affected.

**Neurotoxicity:** The capacity of a substance to destroy or negatively affect nerve cells or affect behaviour.

**Non-Hodgkin's Lymphoma:** A specific type of cancer of lymphatic tissue (part of the immune system) that involves formation of solid malignant tumors. The non-Hodgkin's group of lymphomas is distinguished from one specific rare type of lymphoma known as Hodgkin's Lymphoma.

**Non-target species:** Any plant, animal or insect species other than that targeted to be affected by a pesticide.

**Organophosphates (OPs):** A broad group of pesticides that represent the most commonly used insecticides in agriculture and home uses. They work by inactivating the enzyme acetylcholinesterase (AChE) and therefore cause malfunctioning of nerve transmission that is irreversible (unlike carbamates, see above).

**Persistence:** The characteristic of a substance that defines the time required for it to degrade in the environment.

**Pesticides:** The provincial *Pesticides Act* says that pesticide means any organism, substance or thing that is manufactured, represented, sold or used as a means of directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest or of altering the growth, development or characteristics of any plant life that is not a pest and includes any organism, substance or thing registered under the *Pest Control Products Act* (Canada). The *Federal Pest Control Products Act* defines a pesticide as: "any product, device, organism, substance or thing that is manufactured, represented, sold or used as a means for directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest. Control products include active ingredients used in the manufacture of end-use products and the end-use products themselves. This meaning includes herbicides, insecticides, fungicides, anti-microbial agents, pool chemicals, microbials, material and wood preservatives, animal and insect repellents and insect and rodent controlling devices. As noted in the text, this discussion in this document focuses on lawn care pesticides.

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**Phenoxy acids:** Also known as chlorphenoxy, this class of pesticides are herbicides most commonly used in the removal of broad-leaved weeds such as dandelions and can be found in “weed and feed” formulations. They act by disrupting normal growth in selective plants.

**Prudent avoidance:** A prudent avoidance policy encourages the adoption of individual or societal actions to avoid unnecessary exposures to potential health threats that entail little or no cost.

**Pyrethroids:** A specific class of pesticides that are used to remove garden insects. They are the synthetic versions of a compound derived from chrysanthemums (pyrethrins) that has “natural” pesticide properties.

**Residue:** The amount of a pesticide or its breakdown products that remains on surfaces in the environment.

**Risk Assessment:** A process that evaluates (and estimates) either the environmental or health risk from exposure to a pollutant by considering both exposure information and toxicity data for that pollutant.

**Subclinical:** The appearance of illness or harm where symptoms and signs are not recognized or detected by traditional clinical examination or laboratory tests.

**Toxicity:** The ability of a substance to be poisonous or to have some adverse effect on biological functioning of an organism.

**Toxicology:** The branch of medicine that studies the nature, properties and effects of chemical agents on living organisms.

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## End Notes

- <sup>1</sup> The PMRA provides, as a message to home owners about lawn care services, the statement: "Avoid Lawn Care Programs That Regularly Apply Pesticides Whether Or Not Pests Are Present." See: [www.healthylawns.net/english/html/keyprint%2De.html](http://www.healthylawns.net/english/html/keyprint%2De.html)
- <sup>2</sup> See: [www.wwf.ca/satellite/prip/factsheets/whyditch.html](http://www.wwf.ca/satellite/prip/factsheets/whyditch.html)
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- <sup>5</sup> City of Toronto, (2000) *Environmental Plan: Clean, Green and Healthy- A Plan for an Environmentally Sustainable Toronto*, February, 2000.
- <sup>6</sup> Ipsos-Reid Corporation, (2001) "Attitudes to Pest Control Study": 1. The survey was commissioned by Scotts Canada, SC Johnson, Nu-Gro and the Canadian Consumer Specialty Products Association.
- <sup>7</sup> *Ibid.*
- <sup>8</sup> See: [www.healthylawns.net/english/index-e.html](http://www.healthylawns.net/english/index-e.html)
- <sup>9</sup> Letter to Sheela Basur, Medical Officer of Health from Elizabeth Witmer, Ontario Minister of the Environment, September 19, 2001.
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- <sup>13</sup> American Medical Association. Council of Scientific Affairs. (1997). See note 12 above.
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- <sup>15</sup> Sever, L.W. et al. (1997) "Reproductive and developmental effects of occupational pesticide exposure: The epidemiologic evidence." *Occup Med: State of the Art Reviews* (12): 305-25; Arbuckle, T.E. & L.E. Sever. (1998) "Pesticide exposures and fetal death: A review of the epidemiologic literature." *Crit RevTox.* (28): 229-270; and Nurminen, T. (1995) "Maternal pesticide exposure and pregnancy outcome." *J Occ Env Med.* (37): 935-940; Garcia, A.M. (1998) "Occupational exposure to pesticides and congenital malformations: A review of mechanisms, methods, and results." *Am J Ind Med* (33): 232-40.
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- <sup>21</sup> Garry, V.F. et al. (1996) "Pesticide applicators, biocides, and birth defects in rural Minnesota." *Environ Health Perspect.* (104): 394-399.
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