

Protecting Our Tomorrow, Today: Reducing Our Risk From Pesticides

"We allow the chemical death rain to fall as though there were no alternative, whereas in fact there are many, and our ingenuity could soon discover many more if given the opportunity."

Rachel Carson, Silent Spring 1962

"How can we continue to choose a green lawn over the health of our children?"

Dr. Jim Hollingsworth, Canadian Association of Physicians For the Environment

What are pesticides? Pesticides — they are designed to kill, injure, repel and neuter living organisms that some have determined to be pests. These pests might include insects, plants, fungi, moulds and/or rodents. The term “pesticides” refers to a wide range of products, including herbicides, insecticides and fungicides. They are available in a variety of formulations including sprays, dusts, powders, granulars, concentrates, liquids, pastes, pellets, pressurized products and tablets.

A pesticide always has at least one active ingredient of which there are many types, for example organochlorines, organophosphates, carbamates, and phenoxy acids. Agriculture and Agri-Food Canada defines active ingredients as the ingredients which are related to the intended outcome of the product. Inert ingredients, also included in pesticides, are those added to improve physical characteristics of the product, such as solubility, spread ability and stability.

There are approximately 6,000 pesticide products registered for use in Canada. Most came into the market following World War II. The World Wildlife Fund has calculated that at least 50 million kilograms of these products are used in Canada each year at a reported value of one billion dollars a year. They are used in agriculture, for lawn care, in fish farming, in homes, in day cares, on golf courses, on pets, and even on children to combat head lice. They are also used widely in industries such as food service and textile industries.

Many pesticides are used for cosmetic purposes. These include pesticides used on lawns and in agriculture to prevent blemishes and other “aesthetic” imperfections. Other non-essential purposes include those used to control pests in buildings.

Do pesticides work? Only about one per cent of a pesticide actually reaches its target. The rest is released into the environment, unnecessarily exposing adults, children and wildlife. Many pesticides are losing their effectiveness as the bugs and plants they are designed to eliminate develop resistance. (Already 504 insect and mite species, 150 plant diseases, and 188 weed species have developed resistance.) Further, even though farmers have increased their usage of pesticides they are still losing about 20 per cent of their crops to weeds and insects, the same proportion as they lost in 1930.

Do pesticides contaminate our water? Pesticides are widely found in rivers, streams, and wells. In a recent national study, the U.S. Geological Survey found that over 95 per cent of river and stream samples, as well as over 50 per cent of well samples contained at least one pesticide. Many samples contained multiple pesticides. Both urban and agricultural areas have pesticide-contaminated streams and rivers. New research shows that the relatively low concentrations of pesticides found in water can affect both animal and human health.

Are pesticides hazardous to our health? A recent study of individuals newly diagnosed with Parkinson's disease has also found that home pesticide use and exposure is associated with an increased risk of developing this disease. This study, led by Lorene Nelson, a Neuroepidemiologist at Stanford University's School of Medicine, in Palo Alto, California, is the largest of its kind to date, and the first to show a positive relationship between pesticide exposure and Parkinson's disease. Researchers questioned almost 500 individuals first diagnosed with this disease in 1994 and 1995 about past use of pesticides in their homes and gardens. Subjects were asked detailed questions about types of pesticides used, frequency of use and first exposure to household and garden pesticides. Compared to a control group of approximately the same number, researchers found individuals exposed to pesticides used in the home were 70 per cent more likely to develop the disease. Meantime, those with exposure to garden pesticides carried a 50 per cent increased risk. According to Nelson, pesticides can damage the nerve cells of the basal ganglia, with subsequent deficiencies in the neurotransmitter dopamine contributing to the balance and movement difficulties characteristic of this disease.

This latest study is yet another in a long series of reports linking human exposure to pesticides and adverse health effects. Previous studies have found a relationship between pesticide exposure and neurological disorders, negative effects to the immune system, liver and kidney damage, respiratory ailments, infertility and cancers, including brain, lung and breast cancers.

Milder reactions to pesticide exposure include: nausea, vomiting, headaches, body aches, rashes and swollen eyes.

Do pesticides pose a special risk to children? Children from conception to sexual maturity are most vulnerable to pesticides. The Canadian Institute of Child Health gave the following reasons for their vulnerability.

- Pound for pound children breathe more air, drink more water and eat more food than adults — all of which are potentially contaminated with pesticides.
- Behaviour patterns, such as playing close to the ground and hand-to-mouth contacts increase their exposure to pesticides.
- Their systems are still developing, therefore, they may be less able than adults to metabolize, detoxify and excrete pesticide toxins.
- Toxic injury to developing organs can carry lifelong consequences. In short, children are not little adults. All of us, including community leaders and policy makers, need to understand this as a basis for action.

The Environmental Health Committee of the Ontario College of Family Physicians report a higher incidence of leukemia, brain cancer and soft tissue sarcomas in children exposed to

herbicides and insecticides.

Recent research has also linked a wide variety of health problems in children to their parent's exposure to pesticides. Examples include:

- A study of children with brain cancer in Los Angeles County, California, found that these children were twice as likely as children without the disease to have been exposed prenatally to flea and tick insecticides when their mothers treated their pets.
- In California counties with high agricultural pesticide use, the incidence of limb reduction birth defects is also high.
- In Minnesota, farmers licensed to apply pesticides on their farms are more likely to have children with birth defects. This association was strongest in counties with high use of fungicides and herbicides related to 2,4-D. (2,4-D was a component of agent orange, a notoriously toxic defoliant used during the Vietnam war.)
- A study of Canadian farmers found that use of the insecticide carbaryl was associated with an increased incidence of miscarriage and the use of the herbicide atrazine and 2,4-DB was associated with an increased risk of premature birth. Emerging science also warns of more subtle and irreversible effects yet. They demonstrate that disease is not the only consequence of exposures to chemicals like pesticides. Many we encounter have the potential of "diminishing individuals without making them sick." For instance, serious questions are being raised about their ability to rob children of their intellectual and social capacities.

Do we not have laws to protect us from pesticides? Canadian parliament passed the current Pest Control Products Act (PCPA) in 1969. Since then it has never been systematically revised. The structure of the Act remains fundamentally unchanged from what it was 30 years ago — a framework legislation that relegates to the regulations the important task of defining in greater detail the federal pesticide management regime in Canada.

The Pest Control Products Act has allowed the manufacture, sale and application of hundreds of chemicals, many of which have proven disastrous effects on human health and the environment. These include organochlorines, such as DDT and Lindane that are still approved for pest control in Canada despite being linked to estrogenic-related cancers and breast cancer, and organophosphates, such as Malthion and chlorpyrifos, recently banned in the United States and linked to neurological disorders and nervous system cancers. Pyrethroids, implicated in breast cancer, neurological disorders and other mutations at the cellular level are also included in this list as are the phenoxy class of chemicals, that includes 2,4-D, the most commonly used herbicide in this country, and pesticide that has been associated with soft tissue sarcomas like non-Hodgkin's lymphoma.

Additionally this legislation has never taken into account what affects the so-called Maximum Levels of Residue (allowable levels based on health impact on the average adult male), would have on young children and the developing fetus. And since this Act lacks the mechanism to require assessment of a complete pesticide formulation, it fails to account for the effect of inert ingredients on human health and also doesn't allow overall toxicity of a formulation after inert ingredients have been combined with active ones. The Act also neglects to consider the synergistic effects of pesticides and how the most vulnerable might be affected by combined

exposure to these chemicals over the short, medium and long term. Further, it does not protect Canadians from the potential impact of pesticide residue accumulation over years and years of exposure and provides no authority for the release of hazard information.

The need to update the Act has been recognized and advocated for years. In 1987, the Law Reform Commission of Canada issued a study paper on federal law and policy that contained 23 detailed recommendations for change. In 1989, a multidisciplinary task force, convened by the Minister of Agriculture, was charged with making recommendations to improve the system. In 1990, the Pesticide Registration Review Committee released a report advocating a complete overhaul of the system and a transfer of legislative authority to the Ministry of Health.

As part of the Liberal Party of Canada's 1993 campaign promises, Jean Chretien, then Leader of the Official Opposition, pledged to act on these recommendations. In 1994, the newly elected Liberal government outlined how it would implement these changes and in 1995, created the Pest Management Regulatory Agency and transferred administrative responsibilities for the Act to the Ministry of Health.

In May 2000, the Report of the Standing Committee on Environment and Sustainable Development tabled its report entitled Pesticides – Making the Right Choice for the Protection of Health and the Environment. In its report, the Committee recommended the 30-year-old Pest Control Products Act be amended to incorporate a new pest management vision that focuses on protecting the health of Canadians and the environment. In particular, the Committee proposed new legislation that made the protection of human health and the environment central in its pest management decisions, integrated the precautionary principle in decision making and promoted increased reliance on pollution prevention strategies.

Among those changes of particular interest to workers is a proposal to bring pesticides within the framework of the Workplace Hazardous Materials Information System (WHMIS), requiring all pesticides to meet WHMIS requirements, including those for labeling, and Material Safety Data Sheets (MSDS). These amendments are to be introduced in the last half of 2001.

Meanwhile, Marlene Jennings, a Liberal MP for the Quebec riding of Notre-Dame-de-Grâce — Lachine, has recently introduced a Private Members' Bill (C-388) that prohibits use of pesticides for non-essential purposes. In effect, this bill shifts the burden of proof by placing a moratorium on the cosmetic use of chemical pesticides in the home and garden and on all recreational facilities, until such time that scientific evidence showing use to be safe is presented to parliament and concurred by a parliamentary committee. If passed the bill would come into effect April 22, 2001.

Regardless of what measures are taken over the next few months, it is clear the public is demanding legislative reform that ensures protection of both human health and the environment.

What about local efforts to reduce pesticides? For many municipalities in Canada, there has been sufficient evidence for several years now to warrant implementation of pesticide reduction programs in an effort to protect both municipal workers and local residents. In fact, in most jurisdictions, concerns regarding the harmful effects of cosmetic pesticide use were first brought

to the fore by those required to apply these products to city properties. Questions from municipal workers regarding the safety of pesticides, and increased awareness on the part of city residents necessitated a shift in pest management practices.

The City of Waterloo was one of the first municipalities to adopt a Plant Health Care Program that focused on working with local plant populations to reduce its reliance on chemical pest control. Twenty years ago more than 70 per cent of Waterloo's green space was sprayed with pesticides. Concerns about the health impacts of these chemicals on municipal workers and the public prompted an investigation and experimentation with ecological alternatives. These proved so successful that regular spraying of the city's green space was eliminated in 1983. By 1991, only 0.05 per cent of Waterloo's parks and fields were sprayed. The cultivation and maintenance of healthy plants, less susceptible to disease and less reliant on pesticides forms the basis of Waterloo's unique program. With implementation of responsible horticultural practices, including mowing high, regular aeration, irrigation, over seeding and natural fertilization, the city now boasts more than 1,200 hectares of green space with healthy grass growth.

Shortly thereafter, the municipality of Ottawa-Carlton and City of Gloucester implemented a similar program in an effort to reduce unnecessary pesticide use and adverse health effects. Both have used an Integrated Pest Management approach to reduce pesticide usage to below 10 per cent in managed areas such as soccer fields.

Similarly, other municipalities across the country have embraced pesticide reduction programs in their entirety, or at the least, incorporated key components. In 1995, the City of Edmonton introduced a program modeled after that developed in Waterloo and has seen measurable results in the past several years. Pesticide use has been cut in half and municipal parks and fields now support healthier and hardier grass plants. About the same time, the Community Services Department of Moncton also adopted some of Waterloo's techniques. Today, more than 75 per cent of parks and fields maintained by the city are pesticide-free.

In 1999, the Toronto City Council adopted an Environmental Task Force recommendation to end the application of pesticides on public green spaces, except in emergency situations. Under the Pesticide Reduction Program, administered by the Parks and Recreation Department, chemical means for controlling pests may only be used as a last resort and only if other strategies have failed. When chemical herbicides, insecticides and fungicides are used, the least toxic and most effective pesticide must be chosen and use is restricted to localized treatments. In addition to these measures, new techniques and alternative maintenance practices to reduce the city's reliance on pesticides were introduced. As a result, pesticide use in city owned parks, sports fields and roadsides has declined by 95 per cent from 1998 to 1999. Pesticide use in green houses, garden parks and bowling greens has been reduced by between 31 and 81 per cent.

Most recently, with encouragement from a grassroots environmental group, including local Canadian Auto Workers activists, Stratford Ontario has moved to reduce their pesticide use by 60 per cent. They too have adopted many of Waterloo's methods. But they also benefit from the considerable knowledge of the chief gardener, for the Stratford Festival. The Festival's grounds are the envy of many. Better yet, they are also pesticide free.

While pesticide use has declined or been eliminated on municipal properties nation wide, this practice has not, as of yet, spread to private lawns and gardens. A 1988 Toronto community health survey found 59 per cent of respondents used lawn pesticides with 22 per cent hiring an independent contractor to address pests. An Environment Canada study conducted in 1991 of pesticide applications to lawns and gardens in two urban subdivisions in Hamilton and Guelph found 66 per cent of lawns received a single application of pesticides every season. Homeowners that used lawn care companies tended to use more chemicals and at a greater frequency than those that did not. At least 22 different pesticides were used. Another report published in 1993 by the Ontario Ministry of Agriculture, Food and Rural Areas found that 63 per cent of the total active ingredients used by all licensed pesticide applicators on parks, playgrounds and golf courses were also found on residential lawns.

According to a public opinion poll conducted by the Toronto Environmental Alliance in 1997 though, most residents are deeply concerned about the adverse health effects associated with pesticide use. Seventy-two per cent of respondents to this survey were supportive of a ban on pesticide spraying in public parks and 64 per cent were responsive to a ban on pesticide use on residential yards. An even more recent survey conducted by MacLean's Magazine clearly shows Canadians are concerned about the health impact of lawn pesticides. Seventy per cent of those polled believed pesticides used on residential lawns posed a threat to their health.

With concerns about the health implications of pesticide exposure on the rise, Halifax recently took the lead among municipalities in Canada and banned pesticide use not just on municipal land but also on residential properties. By-law 2331 will be phased in over the next four years with a total ban in place by April 1, 2003. Eighty-three per cent of residents applaud the move, supporting a reduction in pesticide use as a means to protect human and environmental health. Unlike other jurisdictions who lack the legal power to pass pesticide bans on private property, Halifax is in a unique position of having provincial legislation allowing it to regulate pesticide use within its' borders.

What can you do to reduce pesticide use? Effective alternatives to pesticides are there for the choosing. But making the transition from chemical treatments to natural control many take added effort at the out set.

Pesticides used on lawns can kill beneficial organisms, which serve important functions such as controlling pests, providing nutrients to plants, and aerating the soil. You will need to develop healthy soil, a strong root system and then re-establish the natural balance between beneficial organisms and pests in your lawn. The following compromises a natural approach also known as integrated pest management.

- **Choose grasses** or other ground covers that are well adapted to your general climate and that are suitable for the specific site. Many pest problems begin with the selection of an inappropriate plant variety.
- **Proper mowing** helps keep grass healthy and just as important is a major tool for fending off weeds. Regularly mow the lawn with sharp blades set as high as possible. Dull mowers cause unnecessary damage, which stresses grass. Long grass blades are stronger. They also shade the

roots, prevent drying of soil and encourage longer, healthier roots. Do not mow wet grass. For best results also mow in evenings or on cloudy days.

- **Leave grass clippings** on the lawn. The mulch returns nutrients to the soil and reduces the need for organic fertilizer by 30 per cent. However, if you are detoxifying a previously chemically treated lawn, don't mulch for a year or two: thatch may build up.
- **Water slowly and deeply** about once a week. Irrigate until one inch of water has accumulated in cups placed at different distances from the sprinkler. Frequent light sprinklings waste water and encourage shallow roots. Avoid watering during strong sun or heat. During these times evaporation rates are high, and the sun's reflection off the water can burn the grass. Also avoid watering at night. The best time to water is in the morning before 9 a.m.
- **Aeration alleviates** compacted soil problems. It fosters healthy grass growth and crowds out weeds by allowing air and water to penetrate through the thatch layer to the root zone. The best natural aerator is the earthworm. Pesticides can kill or repel earthworms from inhabiting your lawn. Aerating machines that remove small plugs of earth can be rented, or for small areas you can simply go over the lawn with a garden fork. Aeration is best done in May/June and autumn. Avoid times when seeder weeds may germinate and plug holes.
- **Organic fertilizer** and/or top dressing help's maintain proper fertility and pH levels necessary to a healthy lawn. Use slow release, granular, organic fertilizer such as compost, manure, rock mineral fertilizer, bone and blood meal or kelp in autumn. To modify pH levels add lime or sulphur. Top dressing with compost is best done with aeration or anytime between mid-June and late August. Spread compost evenly no more than one-quarter inch thick.
- **Over seeding** is another important strategy. You can attain excellent results by casting a mix of drought-tolerant grasses (i.e. perennial rye) with white clover compost after aeration. To treat stressed areas or bare patches loosen the soil, spread compost, sprinkle seeds, tap lightly and water. You will need to keep the area from drying until seed sprouts are well established.
- **Ongoing monitoring** and prompt treatment is also necessary. Remove occasional "weeds" by hand.
- **Insect infestations** that threaten the health of your lawn can be treated without harmful pesticides. But remember 90 per cent of all insects in your lawn are beneficial. The following are a few tips for the most common infestations.
 - **Ants:** Apply bone meal or diatomaceous earth at the borrow opening. Encircle the point of entry with a line of red chili powder, paprika or dried peppermint leaves.
 - **Aphids:** In a blender, mix garlic, green onions and half a teaspoon of Tabasco sauce. Strain and mix with soapy water. Spray the garden, wait a half an hour and rinse off affected plants.
 - **Slugs/snails/earwigs:** Place a dish of stale beer in the garden. Insects will enter and drown.
 - **Grubs:** Seed your lawn with perennial rye grass rather than Kentucky bluegrass, which is the favorite food of grubs. Spray lawn with soapy water and turn over areas of sod infested with grubs allowing birds to eat them. Alternatively, apply nematodes, a natural predator of grubs, to the affected areas. In buildings, solutions are similarly straightforward. As most have found, the best way to rid buildings of pests is to eliminate the conditions under which they thrive. For instance, following the lead of custodians represented by the Canadian Union of Public Employees, the Metropolitan Toronto Separate School Board first introduced an integrated pest management system in 1995. This included system included:
 - Sanitation and housekeeping;
 - Barriers such as caulking and screens around doors; and

- Controlled pesticide use, including cockroach glue traps. With food disposed of properly, desks and lockers cleaned nightly, unwanted books and papers recycled and dead plants removed, pest populations fell sharply and immediately — within six months. Last reported, pest sightings were virtually a thing of the past.

Who can help on this issue? There are a number of health, safety and environmental organizations out there that can provide you with additional information. The CAW National health, safety and environmental department can also provide you with much needed information. There are even organizations you can hire to advise or administer organically your pest control system.