



## Pesticides and Health

### Issue

Pesticides, also known as pest control products, control, destroy or inhibit the activities of pests, and minimize their injurious, noxious or troublesome effects. If not properly managed, pests can affect our quality of life in many different ways. Pests can represent a threat to public health and the environment as well as create significant negative impacts to the economy if they are not efficiently controlled. The availability and use of pesticides have the potential to pose risks, both directly and indirectly, to the health, safety and well-being of people in Canada, and to the environment. As such, pesticides are highly regulated products.

### Background

Pesticides have a wide range of intended uses in agriculture (e.g. insecticides to prevent crop damage; fungicides to prevent plant disease), forestry, industry (e.g. material preservatives in paints or metal working fluids), and society (e.g. personal insect repellents). Pesticides include conventional chemical substances as well as pheromones, organisms and devices that can be used to control a pest or to lessen the detrimental effects of a pest.

All pesticides used, sold or imported into Canada are stringently regulated by Health Canada's Pest Management Regulatory Agency (PMRA). The federal legislative authority for the regulation of

pesticides in Canada is the *Pest Control Products Act* (PCPA). Before a product or use is registered, the PCPA requires the federal government to use a science-based approach to determine that the pesticide does not pose an unacceptable risk to human health and the environment. In addition, it must be demonstrated that the product has value. The use of pesticides is also subject to regulation under provincial/territorial legislation, and also by municipalities.

Infants and children have been a special consideration in pesticide risk assessments for many years. The PMRA has established policies that require additional protection for children and pregnant women, and to also take into account pesticide exposure from all sources, including food and water. These policies were formally implemented in law in June 2006 when the new PCPA came into force.

The new Act also supports pesticide risk reduction. For example, it specifies that only pesticides that make a useful contribution to pest management are to be registered, and it supports expedited registration of lower-risk products.

Internationally, the PMRA continues to work with its counterparts in other countries to harmonize the processes used to regulate pesticides and ensure the protection of health and the environment. Partners include the USEPA<sup>1</sup> and Mexico through the NAFTA<sup>2</sup> technical working group on pesticides, the European Union, the OECD<sup>3</sup>, and the United Nations through Codex<sup>4</sup> and WHO<sup>5</sup>.

### Sources of Pesticide Exposure

Pesticide intake may occur through dietary sources (food and water) as pesticides are primarily used in agriculture to protect crops and livestock. In some instances, residues of these pesticides can remain in or on the foods that have been treated. In addition, pesticide use patterns are such that contamination of drinking water sources may occur via drift, runoff or leaching through the soil.

Residential exposure to pesticides may occur from uses on lawns, gardens and ornamental plants, the use of personal insect repellents, flea and tick products on pets, or uses to control pests such as ants, wasps and cockroaches in homes.

Bystander exposure to pesticides may occur from uses in institutions such as schools and hospitals, public areas such as parks and other recreational areas, and from public health uses.

In occupational settings such as agriculture and forestry, exposure may occur while handling or applying pesticides. As well, workers re-entering treated areas may be exposed to pesticide residues.

### Health Risks

Before a product is approved for use in Canada, it must undergo a thorough science-based risk assessment and meet strict health and environmental standards. If the use of a product poses unacceptable risks to human health or the environment, it is not registered for use in Canada. Furthermore, all pesticides registered prior to 1995 are being re-evaluated using the most modern scientific risk

1. United States Environmental Protection Agency
2. North American Free Trade Agreement
3. Organisation for Economic Co-operation and Development
4. Codex Alimentarius of the WHO and FAO
5. World Health Organization of the United Nations

assessment approaches to ensure they meet current safety standards. Moving forward, pesticides will be re-evaluated on a 15 year cycle.

During the evaluation or re-evaluation of a pesticide, the PMRA considers a comprehensive toxicology database in order to assess potential health effects. These include, but are not limited to, studies to characterize acute and chronic toxicity, carcinogenic potential, reproductive and developmental toxicity, immunotoxicity, neurotoxicity, genotoxicity and endocrine disruption potential. The PMRA assessments are also informed by epidemiological evidence, general scientific knowledge and published scientific information.

The risk posed by a pesticide depends on the toxicity of the pesticide and the amount of pesticide to which a person is exposed. A pesticide with low toxicity and high exposure may cause similar risks as a pesticide with high toxicity and low exposure. Therefore, as part of its assessments, the PMRA estimates the extent to which a user and bystander(s) could be exposed through use of the pesticide.

In the exposure assessment, sensitive populations and life stages are specifically addressed, including infants, children, and women of child-bearing age. Consideration is given to the different activities, dietary habits, food intake and body weight of children versus adults. A pesticide will only be registered if this estimated exposure raises no concerns. Once this is determined, the PMRA will ensure the label directions indicate the appropriate use instructions to best minimize exposure. Therefore, it is highly important that the person using the product carefully follow the label directions.

The PMRA also sets the maximum residue limits (MRLs) on food commodities, which are enforced by the Canadian Food Inspection Agency. For pesticide residues MRLs are set only after the PMRA has confirmed that any pesticide residues that could be consumed are acceptable.

As required, exposure reduction measures are developed. These can include limitations on the conditions of use for a product, such as restricting use to only professional applicators where specialized equipment and training are needed.

### **Childrens' Health Priorities**

The PMRA's human health risk assessments consider the Canadian population in general and subpopulations such as women of child-bearing age, pregnant and nursing women, infants and children. Infants and children have been a special consideration in health risk assessments for many years. Recent advances in scientific understanding reaffirm that children are not "little adults" and must be considered as a discrete subgroup. Two elements distinguish infants and children from the adult population:

- 1) Biological considerations. The developing fetus, infants, and children are in a state of rapid growth with cells dividing and organ systems developing. Children have a higher ratio of skin surface area to body weight than adults and on a weight for weight basis, children eat more food, drink more water, and breathe more air, than adults. As a result of these biological differences, children may absorb, metabolize, and excrete chemicals differently than adults do, potentially resulting in differing levels of susceptibility to chemical hazards.
- 2) Unique exposures. In addition to exposure through minute residues that may remain on some food, such as fruits and vegetables, children may be exposed to pesticide residues in breast milk and formula, through skin contact with treated surfaces while crawling and playing, and through incidental ingestion from behaviours such as hand to mouth transfer.

### **Aggregate and Cumulative Risk**

Exposure to a pesticide may occur through different routes (oral, dermal and inhalation) and pathways (dietary, drinking water, residential uses in and around homes and schools). In order to fully assess potential risks, the PMRA conducts aggregate assessments which consider these different pathways and routes. Where it has been demonstrated that a group of pesticides share a common mechanism of toxicity, they are subject to a cumulative risk assessment in which the combined aggregate risks are assessed.

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## **Re-evaluation of Organophosphate, Carbamate and Lawn Care Pesticides**

### **Organophosphates Pesticides**

Organophosphates (OPs) are a group of closely related pesticides used extensively in agricultural and non-agricultural sites that have potential to affect functioning of the nervous system. As a result of the common mechanism, a cumulative risk assessment of these pesticides is being conducted. Several of these pesticides have been voluntarily discontinued or have had their residential uses severely restricted. Completion of the re-evaluation of these pesticides and their uses is a priority of the PMRA.

### **Carbamate Pesticides**

The N-methyl carbamates are a group of closely related pesticides used in homes, gardens and agriculture that have potential to affect the functioning of the nervous system. As with the OPs, a cumulative risk assessment of these compounds is being conducted and re-evaluation of these pesticides and their uses is underway. Voluntary risk reduction measures have been implemented for carbaryl, including the discontinuation of pet care products, as well as limitations on broadcast turf uses and dust formulations.

## Lawn Care Pesticides

There is an increased interest on the part of the public regarding the urban use of pesticides, particularly for lawn care. PMRA initiated a special review of four herbicides and four insecticides commonly used in lawn care. The re-evaluations are completed for four of the lawn pesticides. As a result of these re-evaluations, the insecticides chlorpyrifos, diazinon and malathion (broadcast turf use), and the herbicide mecoprop are being phased out. The re-evaluation review for lawn and turf uses of 2,4-D was released February, 2005, with an update provided in August, 2006, and the proposed decision following the review of the agricultural uses is targeted for 2007. The proposed decision for the herbicide MCPA was published April 2006, and the herbicide dicamba is slated for publication in 2007. The assessment of the insecticide carbaryl is underway, and is expected to be completed in 2008.

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## Minimizing Your Risk

### Responsible Use of Pesticides

It is good practice to reduce or eliminate any unnecessary exposure to pesticides. Canadians can and should seek opportunities to minimize their exposure to and reduce their reliance on pesticides. As such, the PMRA supports integrated pest management practices, an approach combining biological, cultural, physical and chemical tools to manage pests. In doing so, pest control benefits are maximized, while health and environmental risks are minimized.

### Pesticide Use In and Around the Home

A homeowner must decide how much damage from pests can be tolerated before control is necessary. Before purchasing any pesticide product or hiring a pest control operator, check on possible alternatives that may be available to control the pest. Some pests may be controlled by using traps and physical barriers or by sealing cracks and crevices that may allow pests to enter the home.

If you choose to use pesticides, use products only for their registered and intended uses while carefully following the directions on the label. These directions specify how you must use the product so that it poses no health or environmental concerns. To prevent accidents, pesticides should always be stored safely, in their original containers and out of children's reach. Minimize exposure to yourself and others by only using pesticides when necessary.

### Food

It is always a good idea to wash fresh produce under running water and wipe dry. This will help remove any remaining surface pesticide residues, and more importantly, it will help to remove any dirt or bacteria that may be on the surface of the food. From the time when it is picked to the time it arrives in your kitchen, produce can come in contact with different environments and be handled by many people.

### Using Personal Insect Repellents Safely

Parents and caregivers have always tried to protect their children from mosquito bites. Now that mosquitoes can carry the West Nile virus, there is even more concern about their bites. For most Canadians, the risk of illness from West Nile virus is low, and the risk of serious health effects is even lower.

To help prevent mosquito bites, the use of a personal insect repellent should be considered. Never use personal insect repellents on children under six months of age, and for children under two years of age it is advisable to use mosquito netting around their carriages rather than personal insect repellents, unless a high risk of complications from insect bites exist.

Read the label carefully before using. Pay special attention to the maximum number of applications allowed per day, the age restrictions for use, and the protection times.

## Poisoning

If pesticide poisoning is suspected, consult a physician immediately. Bring the pesticide container or the label to the hospital. This may help in quickly diagnosing and treating the patient.

If a pesticide poisoning or other incident occurs, including adverse effects to health and the environment, it should be reported directly to the PMRA or, starting in the spring of 2007, to the pesticide registrant. Under the new PCPA, registrants will be required by law to report pesticide incidents to the PMRA within a set time frame.

### Storage

Store pesticides out of the reach of children and pets, and away from feed, food or water.

### Disposal

The best solution to the problem of pesticide disposal is good planning. It is essential to purchase only the required quantity for a specific problem. Contact your municipal officials to inquire about a collection site for household hazardous waste.

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## Role of Governments

### Federal Responsibilities

Pesticides must be registered under the PCPA before they can be imported, manufactured, sold or used in Canada. Registration under the PCPA requires a thorough scientific evaluation by the PMRA to determine if new pesticides are acceptable for a specific use and if registered pesticides remain acceptable for use once on the market. If Canadians choose to use pesticides, they can only use a pesticide registered by the federal government for the pests and treatment areas listed on the label, and use them according to the label directions.

## Provincial Responsibilities

The provinces and territories are able to enact regulations to restrict or prohibit the use of products that are registered under the PCPA in their jurisdictions. These regulations can be more restrictive than the PCPA or other federal regulations, but not less restrictive. For example, provinces and territories may be involved in the following:

- require pesticide use permits and impose additional use restrictions;
- regulate the transportation, sale, use, storage and disposal of pesticides;
- regulate the training, certification and licensing of pesticide applicators and vendors;
- respond to spills or accidents.

## Municipal Responsibilities

Provincial and territorial governments may also allow cities, towns and municipalities to enact bylaws to set further regulations, including use restrictions, on pesticide use based on local considerations.

## Need More Info?

The following links on the Health Canada PMRA website provide further information on the topics discussed in this document:

### Pesticide Risk Assessment Process

Fact Sheet on the Regulation of Pesticides in Canada

[www.pmra-arla.gc.ca/english/pdf/fact/fs\\_pestreg-e.pdf](http://www.pmra-arla.gc.ca/english/pdf/fact/fs_pestreg-e.pdf)

Roles of the Three Levels of Governments Regarding Pesticides in Canada

[www.pmra-arla.gc.ca/english/pdf/infonotes/InfoNote-GovtRoles-e.pdf](http://www.pmra-arla.gc.ca/english/pdf/infonotes/InfoNote-GovtRoles-e.pdf)

or for more details on the PMRA and pesticide regulation in html format

[www.pmra-arla.gc.ca/english/aboutpmra/about-e.html](http://www.pmra-arla.gc.ca/english/aboutpmra/about-e.html)

Science Policy Notice SPN2000-01—A Decision Framework for Risk Assessment and Risk Management in the Pest Management Regulatory Agency

[www.pmra-arla.gc.ca/english/pdf/spn/spn2000-01-e.pdf](http://www.pmra-arla.gc.ca/english/pdf/spn/spn2000-01-e.pdf)

Science Policy Notice SPN2003-03—Assessing Exposure from Pesticides in Food A User's Guide

[www.pmra-arla.gc.ca/english/pdf/spn/spn2003-03-e.pdf](http://www.pmra-arla.gc.ca/english/pdf/spn/spn2003-03-e.pdf)

Science Policy Notice SPN2002-01—Children's Health Priorities within the Pest Management Regulatory Agency

[www.pmra-arla.gc.ca/english/pdf/spn/spn2002-01-e.pdf](http://www.pmra-arla.gc.ca/english/pdf/spn/spn2002-01-e.pdf)

### Responsible Pest Management

Healthy Lawns Strategy

[www.healthylawns.net](http://www.healthylawns.net)

Pest Notes

[www.pmra-arla.gc.ca/english/consum/pnotes-e.html](http://www.pmra-arla.gc.ca/english/consum/pnotes-e.html)

Action Plan on Urban Use Pesticides

[www.pmra-arla.gc.ca/english/pdf/hlawns/hl-ActionPlan-e.pdf](http://www.pmra-arla.gc.ca/english/pdf/hlawns/hl-ActionPlan-e.pdf)