HEALTHY ENVIRONMENT
HEALTHY CANADIANS

the food we eat

AN INTERNATIONAL COMPARISON OF PESTICIDE REGULATIONS

David Suzuki Foundation

SOLUTIONS ARE IN OUR NATURE

OCTOBER 2006

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AN INTERNATIONAL COMPARISON OF PESTICIDE REGULATIONS

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The Food We Eat: An International Comparison of Pesticide Regulations

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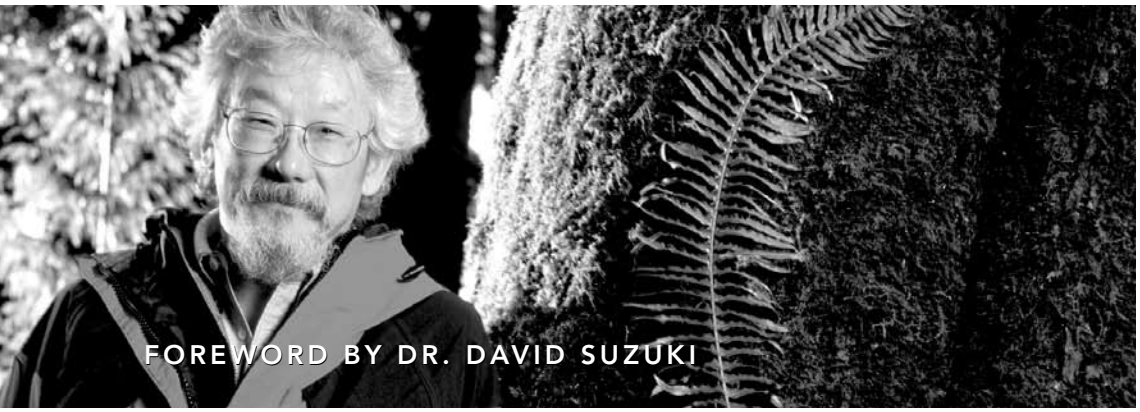
CONTENTS

"…we should no longer accept the counsel of those who tell us
that we must fill our world with poisonous chemicals;
we should look about and see what other course is open to us."

– Rachel Carson, *Silent Spring*



FOREWORD BY DR. DAVID SUZUKI

In Canada, hardly a day goes by without a news story about the debate over the future of health care. But while we fight to maintain and improve one of the world's best health-care systems, we have ignored new, important preventative actions that can save us from illness and death. We should pay attention to keeping healthy people healthy, instead of focusing on treating illness after it sets in.

Preventing pollutants and toxins from entering our air, water and food would have a profound effect on public health in Canada.

Pesticides are among the most widely used chemicals in the world, and also among the most hazardous to human health. Many food crops, including fruits and vegetables, contain pesticide residues even after being washed or peeled. In accepting the use of pesticides, we are exposing the most vulnerable among us, our children, to chronic health effects including an increased risk of cancer.

Even very low-level contamination of food, drinking water and outdoor air with a wide array of pollutants of varying toxicities presents a chemical stress to which virtually every person is vulnerable.

In the second of a series of reports on environmental health in Canada, the David Suzuki Foundation looks at Canada's pesticide regulations and compares them to those of the United States, Australia, the European Union and the *Codex Alimentarius Commission* – the single most important international reference point for developments associated with food standards.

We possess the capacity to improve our health and our children's health; it's as simple as breathing clean air, drinking clean water and eating food that's free from harmful pollutants. To guarantee a clean natural environment and healthy citizens, we require adequate systems, laws, policies and commitments by government. Individuals can also play a role by taking the steps outlined in our Nature Challenge.

Our Foundation is committed to achieving sustainability within a generation in Canada. Living within the earth's limits is not easy, but it's essential. A healthy environment – including clean air, clean water, and healthy food – is a vital cornerstone of a sustainable, prosperous future.

David Suzuki
Chair, David Suzuki Foundation

Introduction

All Canadians carry pesticides in their bodies, from newborn infants to senior citizens, from urban residents to farmers and ranchers, from organic vegetarians on the West Coast to retired cod fishermen in Newfoundland, from the homeless to the wealthy. Two recent studies tested the blood and urine of Canadians from across the country and found numerous pesticides in the bodies of all participants.[1]

A recent American study found multiple pesticides in the umbilical cord blood of newborn infants, contradicting the notion that the placenta protects the fetus from industrial chemicals.[2] Residues from pesticides banned years ago continue to be detected in the meconium (the first stool) of newborn infants, reflecting the long-term danger to human health posed by pesticides.[3]

Pesticides can have both short-term and long-term health effects. The health concerns associated with exposure to pesticides include increased risk of cancer (e.g. non-Hodgkin's lymphoma, childhood leukemia, and breast cancer), acute toxicity (creating the risk of pesticide poisoning), neurological impairment (e.g. Parkinson's disease, Alzheimer's disease), developmental effects (e.g. autism), reproductive effects (e.g. sperm abnormalities, birth defects), organ damage, and interference with the human hormone system.[4]

Based on information compiled by provincial poison control centres, thousands of Canadians, predominantly children, are acutely poisoned by pesticides each year.[5] It remains very difficult to ascribe chronic health outcomes to specific pesticides because of multiple factors, including the long period between exposure and illness, the fact that an individual is exposed to thousands of chemicals over the course of a lifetime, the different genetic susceptibility of some individuals, and the presence of other confounding factors such as occupation, geographic location, socioeconomic status, behaviour, and lifestyle. However, research is gradually unmasking some of the connections between pesticides and specific health effects, and experts agree that reducing exposure to pesticides reduces health risks.[6]

Polling data indicate that the overwhelming majority of Canadians are deeply concerned about environmental threats to their health and the health of their children.[7] Among these concerns are worries about the adverse health effects of pesticides, as two important trends demonstrate. First, concerned citizens have pushed governments in the province of Quebec, the cities of Toronto, Montreal, Vancouver, Halifax and more than 100 more Canadian municipalities to pass laws prohibiting the cosmetic use of pesticides.[8] Second, sales of organic food products are rising rapidly in Canada.[9]

This study compares three areas of government activity related to pesticide use: registering pesticides for specific uses; setting maximum residue limits (MRLs) for pesticides on food; and monitoring the food supply for pesticide residues.

- Registration data provide information on pesticides that are eligible for legal use in a given jurisdiction. If the government does not register a pesticide, it cannot be used legally. Registration data from Canada, the U.S., and Europe were analyzed to determine how many pesticides banned by other nations for health and environmental reasons are still registered and used in Canada.
- MRLs regulate the amounts of specific pesticides that are allowed to contaminate particular foods. Canadian MRLs were compared with MRLs established by the U.S., the European Union (E.U.), and Australia, as well as recommendations made by the international food organization known as *Codex*.
- Finally, Canadian data on the levels of pesticide residues found on food products, particularly fresh fruit and vegetables, were compared with the U.S. and the United Kingdom.

Pesticide Registration

Generally, registration involves an application by a corporation that wants to manufacture, import, or sell a pesticide product. In the past, registration was an opaque process where the burden of proof was on the government to prove that a pesticide posed unacceptable risks to the public. Recent changes to laws shine more light on the registration process, allow public involvement, and place more of the burden of proof upon the corporation seeking registration.[10]

In theory, the registration of a pesticide should indicate that the product in question would not have significant adverse effects on human health or the environment if used properly. A long history of mistakes proves that this theory is false. Many pesticides that were once approved and widely used, from DDT to lindane, are no longer legal in Canada because negative health or environmental effects were discovered many years later. Inadequate pre-registration testing for health effects continues to be a problem. As several medical experts noted in a recent article, "potentially toxic chemicals should not be approved for use when more benign solutions exist, when risks are not clearly quantifiable or when the potential risk outweighs the benefit."[11]

The comparative analysis of registration data in this study focuses on pesticides that have been banned, prohibited, withdrawn, or had their registration cancelled by national or, in the case of the European Union, supranational authorities, because of health and environmental concerns. Databases maintained by Canada's Pest Management Regulatory Agency (PMRA), the U.S. Environmental Protection Agency (EPA), and the Organization for Economic Cooperation and Development (OECD) provide the majority of the information.[12]

The comparative analysis reveals that as of July 2006, there are 60 active ingredients, used in 1,130 pesticide products, which continue to be registered for use in Canada despite having been banned in other western industrialized nations because of health and environmental concerns. The majority of these pesticides have been prohibited in one or more European nations.

Unfortunately, there is no national data available on pesticide use in Canada, making it impossible to evaluate the magnitude of use of pesticides containing these 60 active ingredients. However some insight can be gleaned through a recent provincial survey of pesticide use in Ontario in 2003.[13] Many of the pesticides banned in other nations were reported as being used in significant volumes in Ontario. In fact, two of the five most heavily used pesticides in Ontario, atrazine and 1,3-dichloropropene, are banned in other OECD nations. Atrazine, used predominantly on corn in Ontario, was banned years ago in Sweden, Germany, Norway, and Denmark and is now prohibited throughout the European Union. Used mainly on tobacco in Ontario, 1,3-dichloropropene is has been prohibited in Austria and Germany and its registration cancelled in Australia.

A large number of additional pesticides registered for use in Canada are currently under review by the European Union. It should be noted that Quebec's *Pesticide Code*, which fully came into force in 2006, prohibits the use of more than 100 pesticide products registered for use in the rest of Canada, including pesticides containing the active ingredients 2,4-D, captan, carbaryl, chlorothalonil, dicofol, iprodione, quintozene, and thiophanate-methyl. Quebec appears to be moving toward the European approach of providing greater protection for the health and well-being of its citizens.

In addition, some pesticides registered for use in Canada have been banned by governments in developing countries because of health and environmental concerns. For example, methamidophos is registered for use in Canada but banned in Indonesia and other developing nations. Methamidophos is an acutely toxic organophosphate pesticide, causing nausea, dizziness, confusion, and at very high exposures (e.g., accidents or major spills), respiratory paralysis and death. The World Health Organization rates four pesticides registered for use in Canada – carbofuran, dichlorvos, methamidophos, and oxamyl – as "highly hazardous." The Food and Agriculture Organization recommends that these pesticides not be used in developing countries.

The following table (Table 1) provides further information on the 60 pesticide active ingredients that are still registered for use in Canada but have been banned in other OECD nations, including:

- the common name;
- the Chemical Abstracts Service registry number (CAS#);
- a list of OECD nations where the pesticide is prohibited;
- a brief summary of the adverse effects on human health; and
- the number of registered pesticide products for sale in Canada that contain the active ingredient banned elsewhere.

The summaries of health effects are synthesized from information published by the U.S. Agency for Toxic Substances and Disease Registry, the U.S. Environmental Protection Agency, and the European Union.[14] Although not described in the following summary, all of these pesticides also have adverse environmental effects, including harm to birds, fish, and other forms of wildlife.

TABLE 1

Pesticide active ingredients registered in Canada but prohibited in other OECD nations

1. 1,3-DICHLOROPROPENE [CAS# 542-75-6]

BANNED BY: Austria, Germany, Sweden, registration cancelled in Australia
HEALTH EFFECTS: According to the U.S. Environmental Protection Agency, 1,3-dichloropropene is a probable human carcinogen and is highly toxic. The International Agency for Cancer Research classifies it as a possible human carcinogen. Exposure to 1,3-dichloropropene causes irritated skin and eyes, as well as damage to the lungs, stomach, liver, and kidneys.[15]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING 1,3-DICHLOROPROPENE: 4

2. 2,4-D [CAS# 94-75-7]

BANNED BY: Denmark, Norway, Sweden
HEALTH EFFECTS: 2,4-D is a possible human carcinogen and a suspected endocrine disruptor.[16]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING 2,4-D: 193

3. AMITRAZ [CAS# 33089-61-1]

BANNED BY: Norway, European Union
HEALTH EFFECTS: The U.S. EPA has classified amitraz as a possible human carcinogen. Amitraz is toxic to the central nervous system and impairs development and reproduction.[17]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING AMITRAZ: 5

4. AMITROLE [CAS# 61-82-5]

BANNED BY: Finland, Norway, Sweden
HEALTH EFFECTS: Action was taken in these three Nordic nations because of risk of carcinogenic effect on humans. The U.S. EPA describes amitrole as a relatively potent carcinogen. Amitrole is also a suspected endocrine disruptor.[18]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING AMITROLE: 5

5. ATRAZINE [CAS# 1912-24-9]

BANNED BY: Denmark, Germany, Norway, Sweden, European Union
HEALTH EFFECTS: Atrazine is an endocrine disruptor. Adverse effects include low birth weight, impaired development, and possible organ damage. There is evidence of carcinogenicity in other animals but data on cancer risk to humans are inconclusive.[19]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING ATRAZINE: 18

6. BROMACIL [CAS# 314-40-9]

BANNED BY: Germany, Slovenia, Sweden
HEALTH EFFECTS: The U.S. EPA classifies bromacil as a possible human carcinogen. Other health effects include negative effects on development, the thymus, the thyroid, and eye irritation.[20]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING BROMACIL: 8

7. BROMOXYNIL [CAS# 1689-99-2, 1689-84-5]

BANNED BY: Norway, Sweden
HEALTH EFFECTS: The U.S. EPA considers bromoxynil to be a possible human carcinogen and a developmental toxin. Fetuses, infants, and children are particularly vulnerable.[21]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING BROMOXYNIL: 34

Glossary

CARCINOGEN: A substance or agent that causes cancer.

BIOACCUMULATIVE: The increase in the concentration of a substance, especially a contaminant, in an organism or in the food chain over time.

DEVELOPMENTAL TOXIN: A chemical compound that alters normal fetal development.

ENDOCRINE DISRUPTER: An exogeneous substance that causes adverse biological effects by interfering with the endocrine system and disrupting the physiologic function of hormones. The endocrine system, along with the nervous system, regulates many of the body's activities, including growth, metabolism, sexual development, and reproduction.

GENOTOXIN: A chemical compound capable of causing genetic mutation and of contributing to the development of tumors.

MUTAGEN: An agent that changes the genetic information (usually DNA) of an organism and thus increases the number of mutations above the natural background level.

NEUROTOXIN: A chemical compound that alters the normal activity of the nervous system.

ORGANOCHLORINE: Any hydrocarbon pesticide, such as DDT, that contains chlorine. Organochlorine pesticides were introduced in the 1940s and persist in the environment long after they are applied.

PERSISTENT: Compounds that accumulate and do not easily degrade in the environment.

PLASTICIZER: Additives that soften the material they are added to.

TABLE 1 CONTINUED

8. CAPTAN [CAS# 133-06-2]

BANNED BY: Denmark, Finland, Norway
HEALTH EFFECTS: Captan is a severe eye irritant and is classified by the U.S. EPA as a probable human carcinogen.[22]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING CAPTAN: 30

9. CARBARYL [CAS# 63-25-2]

BANNED BY: Austria, Germany, Sweden
HEALTH EFFECTS: The U.S. EPA classifies carbaryl as a likely human carcinogen. It affects the nervous system, causing nausea, dizziness, confusion, and at high exposures, respiratory paralysis, and death. Carbaryl is also a suspected endocrine disruptor.[23]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING CARBARYL: 66

10. CARBOFURAN [CAS# 1563-66-2]

BANNED BY: Sweden
HEALTH EFFECTS: Exposure to carbofuran can over-stimulate the nervous system, causing nausea, dizziness, confusion, and at very high exposures (e.g., accidents or major spills), respiratory paralysis and death. Carbofuran is a suspected endocrine disruptor.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING CARBOFURAN: 3

11. CHLOROPICRIN [CAS# 76-06-2]

BANNED BY: Austria, Germany, Sweden
HEALTH EFFECTS: Chloropicrin is highly toxic and can cause abdominal pain, cough, diarrhea, dizziness, headache, nausea, and sore throat.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING CHLOROPICRIN: 6

12. CHLOROTHALONIL [CAS# 1897-45-6]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA classifies chlorothalonil as a likely human carcinogen, while the International Agency for Research on Cancer rates it as a possible human carcinogen. Chlorothalonil is also a severe eye irritant.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING CHLOROTHALONIL: 16

13. CHLORPYRIFOS [CAS# 2921-88-2]

BANNED BY: Finland, Sweden
HEALTH EFFECTS: Chlorpyrifos can cause nausea, headaches, vomiting, blurred vision, difficulty breathing, memory impairment, and damage to the central nervous system. High exposures can result in respiratory paralysis and death. Chlorpyrifos is suspected of being genotoxic. Children, the elderly, and people with respiratory problems are particularly vulnerable.[24]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING CHLORPYRIFOS: 33

14. DAZOMET [CAS# 533-74-4]

BANNED BY: Denmark
HEALTH EFFECTS: Denmark banned dazomet because of concerns about developmental and reproductive problems.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DAZOMET: 23

TABLE 1 CONTINUED

15. DELTAMETHRIN [CAS# 52918-63-5]

BANNED BY: Denmark
HEALTH EFFECTS: Deltamethrin is a suspected endocrine disruptor.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DELTAMETHRIN: 6

16. DIAZINON [CAS# 333-41-5]

BANNED BY: Denmark
HEALTH EFFECTS: Symptoms include nausea and vomiting, abdominal cramps, diarrhea, difficulty in breathing, and damage to the pancreas. Central nervous system toxicity includes respiratory depression, anxiety, insomnia, headache, apathy, drowsiness, dizziness, loss of concentration, confusion, tremors, convulsions, and coma. At very high exposures (e.g. accidents or major spills), it may cause respiratory paralysis and death. Diazinon is a suspected endocrine disruptor with adverse developmental and reproductive effects.[25]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DIAZINON: 19

17. DICHLOBENIL [CAS# 1194-5-6]

BANNED BY: Denmark, Norway, Sweden
HEALTH EFFECTS: Dichlobenil is generally of low acute toxicity, but causes systemic, developmental and reproductive toxicity effects in animal studies and has been classified as a possible human carcinogen.[26]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DICHLOBENIL: 13

18. DICHLORPROP [CAS# 120-36-5, 7547-66-2]

BANNED BY: Denmark
HEALTH EFFECTS: Dichlorprop is a possible human carcinogen and has adverse effects on the mental and physical developmental processes of young children.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DICHLORPROP: 19

19. DICHLORVUS/DDVP [CAS# 62-73-7]

BANNED BY: Denmark, Sweden, United Kingdom
HEALTH EFFECTS: The U.S. EPA concluded that dichlorvos is a *probable* human carcinogen while the International Agency for Research on Cancer ranks dichlorvos as a *possible* human carcinogen. Dichlorvos affects the central nervous system and can cause symptoms ranging from nausea and loss of bladder control to respiratory failure and coma.[27]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DICHLORVOS: 14

20. DICOFOL [CAS# 115-32-2]

BANNED BY: Finland, Netherlands, Norway, Sweden
HEALTH EFFECTS: The U.S. EPA classifies dicofol as a possible human carcinogen. An organochlorine pesticide, dicofol is persistent, bioaccumulative, and a suspected endocrine disruptor.[28]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DICOFOL: 3

21. DINITROPHENOL [CAS# 51-28-5]

BANNED BY: Sweden
HEALTH EFFECTS: Dinitrophenol is acutely toxic and causes skin irritation, nausea, headaches, numbness, cataracts, and decreased white blood cell counts. People with certain genetic characteristics are much more susceptible than the majority of the population.[29]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DINITROPHENOL: 1

TABLE 1 CONTINUED

22. DINOCAP [CAS# 39300-45-3]

BANNED BY: Sweden. In the U.S., the manufacturer of dinocap voluntarily withdrew all product registrations for the U.S. market; hence there are no registered dinocap products used in the U.S.
HEALTH EFFECTS: Dinocap is a developmental toxin.[30]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DINOCAP: 2

23. DIQUAT [CAS# 85-00-7]

BANNED BY: Denmark
HEALTH EFFECTS: Diquat is a neurotoxin and causes abdominal pain, diarrhea, disorientation, nausea, and vomiting.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DIQUAT: 3

24. DIURON [CAS# 330-54-1]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA classifies diuron as a known/likely human carcinogen. Diuron is also a suspected endocrine disruptor.[31]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING DIURON: 7

25. ENDOSULFAN [CAS# 115-29-7]

BANNED BY: Netherlands, Norway, Sweden, European Union
HEALTH EFFECTS: High acute oral and inhalation toxicity. Adverse effects on the central nervous system and harmful effects on the stomach, blood, liver, and kidney. Endosulfan is highly persistent, causes neurotoxic effects, and acts as an endocrine disruptor.[32]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING ENDOSULFAN: 10

26. ETHYLENE OXIDE [CAS# 75-21-8]

BANNED BY: Austria, Czech Republic, Finland, Germany, Sweden, United Kingdom, European Union
HEALTH EFFECTS: The International Agency for Research on Cancer classifies ethylene oxide as carcinogenic to humans. Ethylene oxide also causes irritation of the eyes, skin, and mucous membranes and problems in the functioning of the brain, central nervous system, and reproductive system.[33]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING ETHYLENE OXIDE: 1

27. FENTHION [CAS# 55-38-9]

BANNED BY: European Union
HEALTH EFFECTS: Exposure to fenthion can cause dizziness, vomiting, headaches, incontinence, respiratory problems, muscle spasms, and seizures.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING FENTHION: 4

28. FERBAM [CAS# 14484-64-1]

BANNED BY: European Union
HEALTH EFFECTS: Ferbam is toxic to the liver, kidneys, and lungs.[34]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING FERBAM: 6

29. HEXAZINONE [CAS# 51035-04-2]

BANNED BY: Denmark, Norway, Slovenia, Sweden
HEALTH EFFECTS: Hexazinone is a severe eye irritant and has adverse effects on developmental and reproductive systems.[35]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING HEXAZINONE: 8

TABLE 1 CONTINUED

30. IPRODIONE [CAS# 36734-19-7]

BANNED BY: Denmark
HEALTH EFFECTS: The U.S. EPA classifies iprodione as a likely human carcinogen. Iprodione is also a suspected endocrine disruptor.[36]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING IPRODIONE: 10

31. LINURON [CAS# 330-55-2]

BANNED BY: Norway, Sweden
HEALTH EFFECTS: The U.S. EPA classifies linuron as a possible human carcinogen. Linuron is also a suspected endocrine disruptor with adverse developmental and reproductive effects.[37]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING LINURON: 9

32. MALEIC HYDRAZIDE [CAS# 123-33-1, 10071-13-3]

BANNED BY: Austria, Denmark, Finland, Germany, United Kingdom
HEALTH EFFECTS: According to the U.S. EPA, maleic hydrazide appears to be genotoxic at high doses in some mutagenicity tests.[38]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING MALEIC HYDRAZIDE: 5

33. MANCOZEB [8018-01-07]

BANNED BY: Norway
HEALTH EFFECTS: The U.S. EPA indicates that mancozeb harms the thyroid, impairs neurological development, and is a probable human carcinogen. Ethylene thiourea (ETU) is a metabolite of mancozeb, maneb, and metiram. ETU causes developmental defects, with effects seen in the central nervous system, urogenital and skeletal systems. The U.S. EPA classifies ETU as a probable human carcinogen and a possible endocrine disruptor.[39]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING MANCOZEB: 30

34. MANEB [CAS# 12427-38-2]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA indicates that maneb harms the thyroid and impairs neurological development. Ethylene thiourea (ETU) is a metabolite of mancozeb, maneb, and metiram. ETU causes developmental defects, with effects seen in the central nervous system, urogenital and skeletal systems. The U.S. EPA classifies ETU as a probable human carcinogen and a possible endocrine disruptor.[40]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING MANEB: 7

35. METALAXYL [CAS# 57837-19-1]

BANNED BY: European Union
HEALTH EFFECTS: Metalaxyl can cause nausea, vomiting, respiratory difficulties, severe eye irritation and liver damage.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING METALAXYL: 7

36. METIRAM [CAS# 9006-42-2]

BANNED BY: Denmark, Finland, United Kingdom
HEALTH EFFECTS: The U.S. EPA indicates that metiram harms the thyroid and impairs neurological development. Ethylene thiourea (ETU) is a metabolite of mancozeb, maneb, and metiram. ETU causes developmental defects, with effects seen in the central nervous system, urogenital and skeletal systems. The U.S. EPA classifies ETU as a probable human carcinogen and a possible endocrine disruptor.[41]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING METIRAM: 4

TABLE 1 CONTINUED

37. MONOLINURON [CAS# 1746-81-2]

BANNED BY: European Union
HEALTH EFFECTS: Exposure to monolinuron can harm the blood system and may cause anemia. Monolinuron also contains 4-chloroaniline, a highly toxic substance that is suspected of being carcinogenic and genotoxic.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING MONOLINURON: 1

38. PCNB (AKA QUINTOZENE) [CAS# 82-86-8]

BANNED BY: Austria, Finland, Germany, European Union
HEALTH EFFECTS: The U.S. EPA classifies PCNB as a possible human carcinogen. PCNB is a suspected endocrine disruptor.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PCNB: 8

39. PACLOBUTRAZOL [CAS# 76738-62-0]

BANNED BY: Sweden
HEALTH EFFECTS: Paclobutrazol can cause eye irritation, headaches, respiratory problems, liver damage, and harm to reproduction and development. Inadequate data exists to determine whether exposure to paclobutrazol causes an increased risk of cancer.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PACLOBUTRAZOL: 4

40. PENTACHLOROPHENOL (PCP) [CAS# 87-86-5]

BANNED BY: Germany, Netherlands, New Zealand, Sweden, Switzerland
HEALTH EFFECTS: PCP can cause harmful effects on the liver, kidneys, blood, lungs, nervous system, immune system, and gastrointestinal tract. Low-level long-term exposure can also result in damage to the immune system and the endocrine system. The International Agency for Research on Cancer has determined that pentachlorophenol is possibly carcinogenic to humans, and the U.S. EPA has classified pentachlorophenol as a probable human carcinogen.[42]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PENTACHLOROPHENOL: 3

41. PARA-DICHLOROBENZENE (AKA 1,4-DICHLOROBENZENE) [CAS# 106-46-7]

BANNED BY: Sweden
HEALTH EFFECTS: Both the U.S. EPA and the International Agency for Research on Cancer classify para-dichlorobenzene as a possible human carcinogen. It is toxic to the liver, and irritates both the eyes and the respiratory system.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PARA-DICHLOROBENZENE: 9

42. PARAQUAT [CAS# 1910-42-5, 4685-14-7]

BANNED BY: Austria, Denmark, Finland, Slovenia, Sweden
HEALTH EFFECTS: Paraquat exhibits high acute toxicity and can cause lung damage, nausea, abdominal pain, vomiting, and impair normal development.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PARAQUAT: 3

43. PERMETHRIN [CAS# 52645-53-1, 54774-45-7, 51877-74-8]

BANNED BY: European Union
HEALTH EFFECTS: The U.S. EPA classifies permethrin as a possible human carcinogen. Permethrin is a suspected endocrine disruptor. Permethrin is also linked to Parkinson's disease.[43]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PERMETHRIN: 256

TABLE 1 CONTINUED

44. PICLORAM [CAS# 1918-02-1]

BANNED BY: Sweden
HEALTH EFFECTS: Picloram contains hexachlorobenzene, an impurity that is a probable human carcinogen. As well, picloram is extremely persistent and is structurally similar to DEHP, a plasticizer that causes cancer in rodents. Picloram is also a suspected endocrine disruptor.[44]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PICLORAM: 6

45. PROPANIL [CAS# 709-98-8]

BANNED BY: Sweden
HEALTH EFFECTS: Propanil causes methemoglobinemia (similar in effect to carbon monoxide poisoning). It is a suspected endocrine disruptor, and harms the body's immune system. The U.S. EPA classifies propanil as a likely human carcinogen.[45]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PROPANIL: 1

46. PROPOXUR [CAS# 114-26-1]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA classifies propoxur as a probable human carcinogen. It is highly toxic and has adverse effects on the brain and central nervous system.[46]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING PROPOXUR: 88

47. QUIZALOFOP-ETHYL [CAS# 76578-14-8]

BANNED BY: Norway
HEALTH EFFECTS: Quizalofop-ethyl may be a human carcinogen and can cause reproductive and developmental harm, e.g., birth defects, infertility, sterility and impairment of normal growth and development.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING QUIZALOFOP-ETHYL: 2

48. SIMAZINE [CAS# 122-34-9]

BANNED BY: Norway, European Union
HEALTH EFFECTS: Simazine is described by the U.S. Environmental Protection Agency as a possible human carcinogen. Simazine is also a suspected endocrine disruptor.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING SIMAZINE: 12

49. SODIUM CHLORATE [CAS# 7775-09-9]

BANNED BY: Norway, Sweden
HEALTH EFFECTS: Exposure to sodium chlorate can cause confusion, cough, dizziness, headaches, nausea, sore throat, convulsions, and unconsciousness.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING SODIUM CHLORATE: 5

50. TERBACIL [CAS# 5902-51-2]

BANNED BY: Sweden
HEALTH EFFECTS: Terbacil is harmful to the mental and physical developmental processes of young children.[47]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING TERBACIL: 2

51. THIABENDAZOLE [CAS# 148-79-8]

BANNED BY: Denmark, Slovenia
HEALTH EFFECTS: The U.S. EPA classifies thiabendazole as a likely human carcinogen. Thiabendazole also causes damage to the liver, thyroid, and developmental processes.[48]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING THIABENDAZOLE: 8

TABLE 1 CONTINUED

52. THIOPHANATE-METHYL [CAS# 23564-05-8]

BANNED BY: Denmark
HEALTH EFFECTS: The U.S. EPA classifies thiophanate-methyl (TM) as a likely human carcinogen. TM harms the liver, thyroid and testes and also causes adverse developmental and reproductive effects.[49]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING THIOPHANATE-METHYL: 13

53. THIRAM [CAS# 137-26-8]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA describes thiram as a neurotoxin and a developmental toxin. Thiram harms the liver, blood, and urinary systems. Thiram is also a suspected endocrine disruptor.[50]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING THIRAM: 27

54. TRIADIMENOL [CAS# 55219-65-3]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA classifies triadimenol as a possible human carcinogen. Triadimenol is also a suspected endocrine disruptor with adverse developmental and reproductive effects.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING TRIADIMENOL: 2

55. TRIALLATE [CAS# 2303-17-5]

BANNED BY: Sweden
HEALTH EFFECTS: The U.S. EPA classifies triallate as a possible human carcinogen and a neurotoxin. Triallate also harms the mental and physical developmental processes of young children.[51]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING TRIALLATE: 8

56. TRIBUTYLTIN OXIDE [CAS# 56-35-9]

BANNED BY: Denmark, Japan, United Kingdom
HEALTH EFFECTS: Highly toxic, with impacts on the immune system and developmental processes. Tributyltin oxide is also a suspected endocrine disruptor.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING TRIBUTYLTIN OXIDE: 8

57. TRIFLURALIN [CAS# 1582-09-8]

BANNED BY: Denmark, Norway, Sweden
HEALTH EFFECTS: The U.S. EPA classifies trifluralin as a possible human carcinogen. Nordic nations banned trifluralin because of its persistence in the environment and toxicity to aquatic species. Trifluralin is also a suspected endocrine disruptor.[52]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING TRIFLURALIN: 23

58. VINCLOZOLIN [CAS# 50471-44-8]

BANNED BY: Denmark, Finland, Norway, Sweden
HEALTH EFFECTS: Vinclozolin disrupts hormonal systems resulting in developmental and reproductive problems, including sex organ malformations. The U.S. EPA classifies vinclozolin as a possible human carcinogen.[53]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING VINCLOZOLIN: 2

TABLE 1 CONTINUED

59. ZINEB [CAS# 12122-67-7]

BANNED BY: European Union. Zineb is not registered for use in the U.S.
HEALTH EFFECTS: Zineb is a suspected endocrine disruptor.
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING ZINEB: 4

60. ZIRAM [CAS# 137-30-4]

BANNED BY: Denmark, Sweden
HEALTH EFFECTS: Ziram is a severe eye irritant and harms the nervous system, liver, and thyroid. The U.S. EPA classifies ziram as "suggestive of carcinogenicity." Ziram is also a suspected endocrine disruptor.[54]
NUMBER OF REGISTERED PESTICIDE PRODUCTS IN CANADA CONTAINING ZIRAM: 3

Maximum Residue Limits for Pesticides on Food

An essential element of ensuring food safety in a world dependent on industrial agriculture is monitoring food products to ensure that they are not unduly contaminated by pesticides and other toxic substances used in the growing, handling, preservation, transportation, and distribution processes. Health and/or environmental agencies in all industrialized nations have legislated responsibilities for establishing Maximum Residue Limits (MRLs) and ensuring that both domestic and imported food products comply with these rules. Although there is an international program established by the World Health Organization and the Food and Agriculture Organization that sets recommended MRLs, called the *Codex* program, nations retain the sovereign right to determine their own MRLs, resulting in widely divergent levels of health protection.[55]

This study examines legally binding, enforceable MRLs in Canada, the U.S., the E.U., and Australia. The non-binding recommendations provided by *Codex* are also incorporated into the analysis. Different MRLs are established not only for hundreds of different pesticides, but for hundreds of different food products potentially contaminated by a specific pesticide, so there are literally thousands of MRLs in each nation. For example, for a specific pesticide such as azinphos methyl, there are different MRLs for grapes, apples, broccoli, cucumber, kiwi fruit, and peppers. This study compares MRLs for a small subset of the overall number of pesticide-food combinations. Many of the MRLs selected for this study involve pesticides that are still registered in Canada but have been prohibited in at least one OECD nation because of health and environmental concerns.

Maximum residue limits are set using toxicology data and human exposure assessments. Limits are recorded in parts per million and establish levels that theoretically prevent harm to human health. Unfortunately, this theory no longer holds water. In fact, for some substances, such as carcinogens (i.e. cancer causing chemicals), there is no safe threshold. For other substances, such as chemicals that disrupt the endocrine or hormonal system, seemingly tiny concentrations can produce adverse health effects. The pesticide atrazine, widely found in Canadian drinking water supplies, causes sexual deformities and reproductive

problems in frogs at concentrations measured in just a few parts per billion – concentrations that have been found in drinking water in Canada.[56] In other words, even exposure to an extremely small amount of some chemicals may have negative health effects. A recent report noted "hundreds of studies in the peer-reviewed literature show that adverse health effects from low dose exposures are occurring in the population, caused by unavoidable contamination with PCBs, DDT, dioxin, mercury, lead, toxic air pollutants and other chemicals."[57] The old saying that "the dose makes the poison" must now be modified by recognition that other factors, including the timing of the exposure, combinations with other chemical exposures, and the genetic vulnerability of some individuals, also determine toxicity.

TABLE 2
International Comparison of Maximum Residue Limits for Pesticides on Food Products[58]

PESTICIDE	*CODEX*	E.U.	AUSTRALIA	U.S.	CANADA
Aldicarb					
Potatoes	0.5	0.5	-	1	0.5
Azinphos-methyl					
Grapes	1	-	2	4	5
Bromoxynil					
Eggs, milk	-	-	0.02	0.05	0.1
Meat	-	-	0.02	0.5	0.1
Captan					
Fruit	3-25	2-3	10-15	25-50	5
Carbaryl					
Fruit/vegetables	1-15	1-3	5-10	5-12	10
Carbofuran					
Strawberries	-	0.1	-	0.5	0.4
Chlorothalonil					
Celery	10	5	10	15	15
Chlorpyrifos					
Citrus fruit	1	0.2-0.3	0.5	1	1
Diazinon					
Apples	-	0.3	0.5	0.5	0.75
Apricots, strawberries	0.1	0.02	0.5	0.5	0.75
Dichlorvos					
Tomatoes	-	0.1	0.5	0.05	0.25
Dicofol					
Cucumber	0.5	0.02	5	-	3
Strawberries	1	0.02	1	-	3
Diquat					
Lentils	0.2	0.05	1	0.02	0.2
Diuron					
Asparagus	-	-	2	7	7
Endosulfan					
Fruit/vegetables	0.1-2	0.05-0.3	0.2-2	0.2-2	1-2

PESTICIDE	*CODEX*	E.U.	AUSTRALIA	U.S.	CANADA
Glyphosate					
Soybeans	20	20	10	20	20
Heptachlor					
Dairy products	0.006	0.004	0.15	0.05	0.1
Iprodione					
Lettuce	10	10	5	25	15
Lindane					
Pineapple	-	0.01	0.5	1	3
Malathion					
Apricots	-	0.5	2	8	8
Blueberries	10	0.5	0.5	8	8
Pineapple	-	0.5	2	8	8
Maleic hydrazide					
Onion	15	10	15	15	15
Methamidophos					
Broccoli	-	0.5	1	1	1
Methoxychlor					
Fruit/vegetables	-	0.01	-	-	14
Metolachlor					
Dry beans	-	-	0.05	0.2	0.3
Metribuzin					
Potatoes	-	-	0.05	0.6	0.5
Paraquat					
Fruit	0.05	0.05	0.05	0.05	1
Vegetables	0.05	0.05	0.05	0.05	0.7
Permethrin					
Leaf lettuce, spinach	2	0.05	5	20	20
Propiconazole					
Apricots, peaches, plums	1	0.05-0.2	2	1	1
Thiabendazole					
Apples, citrus, pears	10	5	10	10	10
Thiram					
Apples, peaches, tomatoes	2	3	3	7	7
Trifluralin					
Carrots	-	-	0.5	1	0.5
Vinclozolin					
Apricots	-	2	-	25	5
Cherries	5	0.5	-	25	3
Tomatoes	3	0.05	-	-	3
Ziram					
Fruit and vegetables	0.1-20	-	3	7	7

NOTE: All MRLs are measured in parts per million. A dash (-) indicates that no specific MRL has been established for that particular pesticide-food combination.

Comparative Analysis of Maximum Residue Limits

This international assessment compares MRLs for 40 pesticide/food combinations (see Table 2). The European Union clearly has the strongest standards (i.e. the lowest MRL) for the majority of the pesticide/food combinations examined.[59] For 29 of the pesticide/food combinations in this study, the European Union had the lowest (i.e. strictest) MRL, in many cases by a substantial margin. Australia has the second strongest record, with the lowest MRL for 11 of the pesticide/food combinations. At the other end of the spectrum, Canada has the weakest standards of any of the jurisdictions examined in this study, with the highest (i.e. least protective of health) MRL for 24 of the pesticide/food combinations in the study. Similarly, the U.S. has the weakest MRL for 21 of the pesticide/food combinations examined.

In a head-to-head comparison with the E.U., Canada has a weaker MRL in 30 cases, a stronger MRL in zero cases, and the same MRL in two cases. In some cases the difference appears to be relatively modest, with the Canadian MRL being two to three times higher than the European MRL. However, even modest differences may be cause for concern when the pesticides involved are known or suspected carcinogens and/or endocrine disruptors. In other cases, the difference between the Canadian and European MRLs is enormous. For diazinon on apricots and strawberries, the Canadian limit is 38 times higher than the European limit. For lindane on pineapples, the Canadian limit is 300 times higher than the European limit. For permethrin on leaf lettuce and spinach, the Canadian limit is 400 times higher than the European limit. For methoxychlor on fruit and vegetables, the Canadian limit is 1,400 times higher than the European limit.

Canada also has significantly weaker protection for pesticide residues in food products than Australia. In a head-to-head comparison, Canada has a weaker MRL in 21 cases, a stronger MRL in only five cases, and the same MRL in four cases. The Canadian MRLs range from two to 20 times higher than the Australian MRLs. For example, the Canadian limit for paraquat on fruit is 20 times higher than the Australian limit.

Canada's MRLs for pesticide residues are closest to the MRLs of the United States, although there are still many significant differences between the standards set by the two countries. In a head-to-head comparison, Canada has the same MRL in 14 cases, a weaker MRL in nine cases, and a stronger MRL in nine cases.

Even compared to the recommendations of the international *Codex*, Canada fares poorly. The Canadian MRLs are weaker than the *Codex* recommendation in 11 cases, stronger than the *Codex* recommendation in only two cases, and the same as the *Codex* recommendation in eight cases.

Another significant concern is that Canada does not have specific MRLs for a number of pesticides despite the existence of MRLs for these pesticides in other nations. Instead, Canada uses a general MRL of 0.1 parts per million (ppm) for pesticides not specifically listed. The list of pesticide/food combinations that lack specific MRLs in Canada includes many pesticides that are used in Canadian agriculture.

PESTICIDES WITH MRLS SET BY OTHER INDUSTRIALIZED NATIONS BUT NOT CANADA

atrazine
bendiocarb
deltamethrin
dichlobenil
dichlorprop
ethylene dichloride
ethylene oxide
ferbam
hexachlorobenzene
hexazinone
linuron
mecoprop
metiram
monolinuron
oxamyl
paclobutrazol
propanil
propoxur
quintozene
simazine
terbacil
terbufos
triadimenol
triallate

Many pesticides on this list continue to be registered for use in Canada but have been banned in other industrialized nations.

A recent document published by Canada's Pest Management Regulatory Agency (PMRA) identifies more than 300 food/pesticide combinations where the Canadian MRL, by default, is 0.1 ppm and the U.S. MRL is less than 0.1 ppm.

The modestly encouraging news is that the PMRA is proposing to replace the general Canadian MRL of 0.1 ppm with specific MRLs for all pesticide/food combinations.[60] To expedite the process, the PMRA is proposing to use American MRLs where those MRLs are equal to or less than 0.1 ppm. If the PMRA sets specific MRLs for all pesticide/food combinations, then any detectable pesticide residue will be treated as a violation unless it is within the established MRL. This change would bring the Canadian system into line with the American system. However the PMRA proposal makes no mention of the much stronger MRLs that are already in place in the E.U. and Australia.

Canadian MRLs appear to be among the weakest in the industrialized world in protecting the health of citizens from the negative effects of pesticides in food products. In theory, both Canada and the European Union endorse the precautionary principle, which means "where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."[61] Most current Canadian environmental legislation incorporates the precautionary principle, and the Supreme Court of Canada has endorsed it.[62] In practice however, when it comes to protecting human health from the adverse effects of pesticides, the EU is applying the precautionary principle while Canada is not.

Monitoring for Pesticide Residues

Government agencies in all industrialized nations sample food products – both domestic and imported – for pesticide residues, heavy metals, and other pollutants. The purpose of these sampling programs is to ensure compliance with MRLs and to prevent severely contaminated food products from reaching consumers. Based on government reports from Canada, the U.S., and the United Kingdom, this study compares the level of pesticide residues detected by monitoring programs (See Table 3).

In 2004-2005, the Canadian Food Inspection Agency (CFIA) sampled 36,045 plant products, predominantly fresh fruits and vegetables. Pesticide residues were detected on 10 per cent of the samples, and 0.48 per cent of samples had pesticide concentrations in excess of the relevant MRL.[63] The CFIA reports that there is a trend of declining pesticide residues on fruits and vegetables, with a decrease in detectable residues of organophosphate pesticides on produce from 12 per cent to 3 per cent between 1995 and 2002.[64]

The Canadian data is strikingly inconsistent with similar sampling programs conducted in the U.S. and the U.K. In 2004, the U.S. Department of Agriculture tested 12,446 samples of fruit, vegetables, soybeans, wheat flour, and milk for pesticide residues. Overall, 76 per cent of fresh fruit and vegetables and 40 per cent of processed fruit and vegetables showed detectable residues. Residues were detected in 42 per cent of soybean samples, 57 per cent of wheat flour samples, and 100 per cent of milk samples. Testing found residues exceeding the American MRL in 0.2 per cent of the samples. Thirty per cent of the samples contained no detectable residues, 30 per cent contained one pesticide, and 40 per cent contained multiple pesticides.[65] In the U.S., the percentage of fruits and vegetables with detectable residues of organophosphate pesticides ranged from 19 per cent to 29 per cent between 1994 and 2001. All of these American figures are far higher than the comparable Canadian statistics.

In the U.K., a study published in 2006 by the Government Pesticide Residues Committee found 37 per cent of food products sampled were contaminated by pesticides (40 per cent of fresh fruit and vegetables), and two per cent of the food products sampled had pesticide residues exceeding the legal limit.[66] Again, these British figures are far higher than the comparable Canadian statistics. The higher level of British food samples exceeding the legal limit may be related to the fact that British MRLs are much stricter than either Canadian or American MRLs.

It is difficult to believe that fruits and vegetables in Canada are so much cleaner than produce in the U.S. or the U.K., especially when a substantial proportion of Canadian produce is imported from the U.S. Although beyond the scope of this report, these glaring inconsistencies merit further investigation.

TABLE 3
International Comparison of Detectable Pesticide Residues

	CANADA	U.S.	U.K.
Percentage of fresh fruits and vegetables (domestic and imported) with detectable pesticide residues	10	76	40
Percentage of fresh fruits and vegetables (domestic and imported) with pesticide residues in excess of MRLs	0.48	0.2	2.0

Canadian Legislation Governing Pesticides

Canada passed a new and improved *Pest Control Products Act* (*PCPA*) in 2002.[67] However, the new law did not come into force until June 2006. It is widely acknowledged that the previous Canadian legislation governing pesticides was badly out of date and incapable of adequately protecting human health and the environment.[68] Recent criticisms have focused on inadequate implementation of provisions intended to protect public health from the adverse effects of pesticides.[69] The new legislation, *if satisfactorily implemented and enforced*, has the potential to address many of the concerns raised about the old law. The new *PCPA* provides, at least on paper, significant improvements in a number of areas, including recognition of the precautionary principle, mandatory re-evaluation of registered pesticides on a regular basis, improved access to information, and increased opportunities for public participation.

The new *PCPA* offers an important opportunity to enter a new era in Canadian pesticide regulation, enabling the federal government to regain the trust and confidence of Canadians. The primary purpose of the new Act is clear – to provide a stronger level of protection for the health of Canadians and the environment from the harmful effects of pesticides. As section 4 of the new *PCPA* states:

> In the administration of this Act, the Minister's primary objective is to prevent unacceptable risks to people and the environment from the use of pest control products.

In addition, section 4.1 of the new *PCPA* provides that:

> For greater certainty, protection and consideration afforded to children in this Act shall also extend to future generations.

Special Reviews

Section 17 of the new *PCPA* imposes a statutory obligation upon the Minister of Health to initiate a special review of registered pesticides containing active ingredients banned

by a member nation of the Organization for Economic Cooperation and Development (OECD) because of health or environmental concerns.[70] The purpose of this section of the new *PCPA*, consistent with the overall purpose of the new law, is to ensure that Canadians are provided with strong protection against the harmful effects of pesticides rather than being subject to lower standards than citizens of other OECD nations.

Once a special review is initiated, section 19 places the burden of proof where it belongs, requiring corporations to provide evidence that their products will not cause unacceptable health and environmental effects. The Minister of Health then decides whether the pesticide's registration should be allowed to continue, or whether it should be cancelled. The special review provisions of the new *PCPA* require the Minister of Health to apply the precautionary principle, meaning that where there is some evidence of harm to human health or the environment, the lack of scientific certainty should not be used to postpone actions to avoid environmental contamination. The application of the precautionary principle is of substantial importance in special reviews in light of extensive but not conclusive evidence linking pesticides with cancer, developmental problems, reproductive disorders, and other negative health effects.

The day that the new *Pest Control Products Act* came into effect, the David Suzuki Foundation reminded the federal Minister of Health of his obligation to conduct special reviews for the 60 active ingredients, used in 1,130 pesticide products in Canada that are banned in other OECD nations. The outcome of this special review process will provide an early indication of whether the new *PCPA* will live up to expectations, bringing in a new era in pesticide regulation in Canada, or whether the unhealthy, unsustainable status quo will continue.

Harmonization

One of the driving forces behind recent changes to Canadian pesticide laws, regulations, and policies has been the objective of harmonizing the Canadian and American systems and standards to fulfill trade objectives. The U.S. is the major market for Canadian food exports. Canada lagged behind the U.S. in regulating pesticides for many years and the gap grew unacceptably wider with the American enactment of the *Food Quality Protection Act* in 1996, a law that mandated increased protection for children and other populations vulnerable to harm from pesticides. There are ongoing efforts pursuant to the *North American Free Trade Agreement* to standardize pesticide regulation in Canada, the U.S., and Mexico.

One of the main problems with North American harmonization, demonstrated by this report, is that both Canada and the U.S. fare poorly in protecting public health from pesticide risks in comparison to the European Union and Australia. The European Union approach has been to raise disparate nations up to the highest environmental standards. Canada's new *Pest Control Products Act* states that the protection of public health is the primary objective. To ensure that the law's intentions are fulfilled, Canada clearly needs to emulate the world's leaders, rather than taking a narrow North American approach.

Conclusion and Recommendations

"The approach that we have in Canada to the regulation of pesticides is known and respected around the world."

– Steven Fletcher, Parliamentary Secretary to the Minister of Health, May 16, 2006[71]

The federal government's claim that it is internationally respected in the field of pesticide regulation is untenable. This study provides conclusive evidence that Canadian regulations governing the use of pesticides and the potential impact of pesticides on food and health are among the weakest in the industrialized world. At least 60 active ingredients, used in 1,130 pesticide products available in Canada, have been banned in other OECD nations. Among these pesticide products are some of the most heavily used agricultural and home and garden pesticides in Canada (e.g. atrazine and 2,4-D). Maximum residue limits for pesticides on food are generally weaker in Canada than the standards established by the U.S., the E.U., Australia, and the recommendations made by the international body known as *Codex*. In addition, pesticides such as imidacloprid, which are not banned but are subject to severe restrictions in other nations, (e.g. France) continue to be widely used in Canada.[72]

There is a large body of scientific evidence linking pesticide exposures to negative health effects including an increased risk of cancer (e.g. non-Hodgkin's lymphoma, childhood leukemia, and breast cancer), acute toxicity (creating the risk of pesticide poisoning), developmental effects, reproductive effects, organ damage, and interference with the human hormone system.[73] In July 2006, a study published in the *Annals of Neurology* looked at the relationship between pesticide exposure and Parkinson's disease in over 140,000 people.[74] Exposure to pesticides – even at low levels – increased the likelihood that an individual would suffer from Parkinson's disease by 70 per cent compared to individuals not exposed to pesticides. Reducing the use of the most hazardous pesticides will reduce the risks to both human health and the environment, and reduce health care expenses and other societal costs.

The David Suzuki Foundation's guiding principle in policy matters related to environmental health is that Canadians should enjoy a level of protection from environmental threats that is equal to or better than the highest standard enjoyed by the citizens of other industrialized nations. The continued registration of pesticides – those prohibited in other OECD nations because of health and environmental concerns – clearly violates this principle. Similarly, allowing pesticide residues on food at higher levels than permitted in other nations also violates this principle.

A strong majority of Canadians support stronger regulations to address environmental problems.[75] In light of the foregoing factors, it is imperative that the substandard legal protection against the threats posed by pesticides currently provided by the Government of Canada be substantially strengthened.

In order to close the wide gap between Canadian pesticide regulations and the standards in the U.S., the E.U., and Australia, the David Suzuki Foundation offers the following key recommendations:

Recommendation 1

CANADA SHOULD TERMINATE THE REGISTRATION OF PESTICIDE PRODUCTS WHERE THE ACTIVE INGREDIENT HAS BEEN BANNED IN ANOTHER OECD NATION BECAUSE OF HEALTH OR ENVIRONMENTAL CONCERNS.

As mentioned earlier, the David Suzuki Foundation has reminded the federal Minister of Health of his statutory obligation to conduct a special review of the 60 active ingredients used in 1,130 pesticide products registered in Canada but prohibited in other OECD nations. The special review required pursuant to the new *Pest Control Products Act (PCPA)* places the burden of proof on the corporation seeking continued registration of a product to provide evidence that there are no health or environmental concerns. Upon conclusion of the special review, the Minister of Health must make a decision based on the precautionary principle. Given the evidence of negative health and environmental effects that resulted in bans in other OECD nations, the David Suzuki Foundation anticipates that these pesticide products also will be banned in Canada. In the interim, a moratorium should be placed on sales of these pesticide products until the special review is completed. The working assumption should be that pesticides banned by other OECD nations are guilty until proven innocent, consistent with the new approach embodied in the revised *PCPA*.

Recommendation 2

CANADA SHOULD REVIEW ALL MAXIMUM RESIDUE LIMITS FOR PESTICIDES ON FOOD TO ENSURE THAT CANADIAN STANDARDS ARE EQUAL TO OR HIGHER THAN THE STRONGEST PROTECTION ENJOYED BY CITIZENS OF ANOTHER OECD NATION.

This study demonstrates the weakness of Canadian MRLs relative to MRLs established by the E.U., Australia, the U.S., and *Codex*. For 38 out of the 40 pesticide/food combinations examined in this study, there was a jurisdiction with a lower (i.e. more stringent) MRL

than Canada. Because the E.U. is at the forefront of protecting public health from the risks posed by pesticides, it is imperative that Canada considers E.U. standards rather than solely looking at the U.S. as the basis for comparison.

The following table sets out the current Canadian MRL and a recommendation that would align each Canadian MRL with the strongest standard available in other industrialized nations.

TABLE 4
Current and recommended MRLs on selected pesticides-food combinations in Canada

PESTICIDE	USED ON	CURRENT CDN. MRL	RECOMMENDED MRL
Azinphos-methyl	Grapes	5	1
Bromoxynil	Eggs, milk, meat	0.1	0.02
Captan	Fruit	5	2-3
Carbaryl	Fruit/vegetables	10	1-3
Carbofuran	Strawberries	0.4	0.1
Chlorothalonil	Celery	15	5
Chlorpyrifos	Citrus fruit	1	0.2-0.3
Diazinon	Apples Apricots, strawberries	0.75 0.75	0.3 0.02
Dichlorvos	Tomatoes	0.25	0.05
Dicofol	Cucumber, Strawberries	3	0.02
Diquat	Lentils	0.2	0.05
Diuron	Asparagus	7	2
Endosulfan	Fruit/vegetables	1-2	0.05-0.3
Glyphosate	Soybeans	20	10
Heptachlor	Dairy products	0.1	0.004
Iprodione	Lettuce	15	5
Lindane	Pineapple	3	0.01
Malathion	Apricots, blueberries, pineapple	8	0.5
Maleic hydrazide	Onion	15	10
Methamidophos	Broccoli	1	0.5
Methoxychlor	Fruit/vegetables	14	0.01
Metolachlor	Dry beans	0.3	0.05
Metribuzin	Potatoes	0.5	0.05
Paraquat	Fruit Vegetables	1 0.7	0.05 0.05
Permethrin	Leaf lettuce, spinach	20	0.05
Propiconazole	Apricots, peaches, plums	1	0.05-0.2
Thiabendazole	Apples, citrus, pears	10	5
Thiram	Apples, peaches, tomatoes	7	2
Vinclozolin	Apricots Cherries Tomatoes	5 3 3	2 0.5 0.05
Ziram	Fruit and vegetables	7	3

All MRLs are measured in parts per million (ppm)

As well, the David Suzuki Foundation agrees with the PMRA that the general Canadian MRL of 0.1 ppm should be replaced by specific MRLs that are equal to or lower than 0.1 ppm. This change should reduce the exposure of Canadians to pesticides through the food system. Moreover, the more stringent European and Australian standards should be relied upon when setting the new MRLs, rather than referring only to U.S. MRLs (as the PMRA is proposing). Canadians deserve the highest level of protection from pesticides enjoyed by citizens of other industrialized nations.

Recommendation 3

CANADA SHOULD REMOVE THE GST EXEMPTION FOR AGRICULTURAL PESTICIDES AND IMPOSE A SPECIAL CHARGE ON PESTICIDES TO FINANCE PROGRAMS THAT ASSIST FARMERS IN REDUCING PESTICIDE USE.

The GST exemption for agricultural pesticides is a perverse subsidy – a subsidy that carries an economic cost to Canadians and also imposes environmental and health costs by encouraging increased use of pesticides. Other nations such as Sweden and Denmark have successfully used special taxes on pesticides to cause major reductions in pesticide use. Sweden has reduced pesticide use more than 80 per cent since 1980 by charging a special tax on pesticides, offering economic support for organic agriculture, funding research on alternatives to pesticide use, and providing mandatory education programs for pesticide users.[76]

Recommendation 4

CANADA SHOULD BAN THE USE OF PESTICIDES FOR COSMETIC PURPOSES.

More than 100 Canadian municipalities (119 municipalities as of July 2006), as well as the province of Quebec, have passed laws prohibiting the use of pesticides for cosmetic, non-essential purposes.[77] These laws protect over 11 million Canadians, or approximately 37 per cent of the country's population. All Canadians deserve the same level of protection, particularly children, who are the most vulnerable to unintentional pesticide poisoning. The Supreme Court of Canada has endorsed the ability of municipalities to ban pesticide use, while stating that all levels of government share the obligation to protect the health and wellbeing of Canadians from pesticides.[78] Prohibiting the use of pesticides for cosmetic purposes is also recommended by the Canadian Cancer Society, as part of their efforts to prevent cancer.[79] The Learning Disabilities Association of Canada also supports the elimination of non-essential uses of pesticides – on lawns, gardens, and playgrounds, for example – because of concerns about the adverse effects of pesticides on the neurological development of children.[80] Similarly, the Canadian Medical Association has called on the federal government to rescind the registration of combined fertilizer/pesticide lawn care products.[81]

Recommendation 5

THE AUDITOR GENERAL OF CANADA SHOULD CONDUCT AN INVESTIGATION INTO CANADIAN REPORTING OF DETECTABLE PESTICIDE RESIDUES.

The Canadian Food Inspection Agency claims that it detects pesticide residues on 10 per cent of fresh fruit and vegetables. Government agencies in the U.S. and the U.K. find pesticide residues on 76 per cent and 40 per cent, respectively, of fresh fruits and vegetables. There is clearly a serious inconsistency in these figures, as it appears Canadian consumers are being given false assurances about the level of pesticide contamination of their food.

Recommendation 6

ESTABLISH A NATIONAL ENVIRONMENTAL HEALTH TRACKING SYSTEM THAT INCLUDES PESTICIDE POISONINGS.

The federal government, in partnership with the provinces, should establish a national environmental health tracking system.[82] The system would monitor environmental hazards, environmental exposures, and health impacts (e.g. waterborne illnesses, pesticide poisonings, hospital admissions caused by cardiovascular and respiratory illness related to air quality, learning and behavioural disabilities, childhood cancers, reproductive health outcomes, etc.). This information should be publicly available to help inform and shape public health policies and actions. The United States recently began building a national environmental health tracking system, which could serve as a template.[83] As part of this initiative, Canada should establish an accessible national database of poisonings and their causes, including pesticides, cosmetics, and household cleaning products. The national registry could gather data from provincial poison control centres and emergency medical facilities.[84]

Recommendation 7

KNOWLEDGE GAPS NEED TO BE ADDRESSED BY RESEARCH PROGRAMS AND BIO-MONITORING OF THE CANADIAN POPULATION

Canada should begin to conduct national bio-monitoring studies to regularly identify and track the exposure of Canadians to chemicals and other toxic substances by testing blood, urine, etc.[85] The U.S. Centres for Disease Control and Prevention conduct national bio-monitoring studies and publish the results bi-annually.[86]

Environmental health indicators would ensure accountability by enabling the public to monitor progress, and would also play a role in public education. As a result, Canada should develop a robust set of indicators, building on work that has been done in the U.S., Europe, and Australia.[87]

In addition, Canada should increase funding for research on health and environment issues through the Canadian Institutes of Health Research, the Social Sciences and

Humanities Research Council, and the Natural Science and Engineering Research Council. Research should be focused on informing regulatory actions by: identifying pathways from hazards to exposures; understanding the effects of these exposures on health; identifying vulnerable sub-populations; and exploring the health effects of new substances, substances in combination, and gene-environment interactions.

Finally, Canada should significantly increase support for the National Collaborating Centre for Environmental Health (established in B.C. by the federal government in 2004).

Recommendation 8

RECOGNIZE THAT CANADIANS HAVE THE RIGHT TO LIVE IN A HEALTHY ENVIRONMENT.

Canada should recognize that all Canadians enjoy a basic human right to breathe clean air, drink clean water, and live in a healthy environment. The Supreme Court of Canada has endorsed recognition of the right to live in a healthy environment.[88] In recent years more than 70 nations, including more than 20 in Europe, have explicitly acknowledged, in their constitutions, that all citizens have the right to a healthy environment.

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Initiation of special review by Minister
17. (1) The Minister shall initiate a special review of the registration of a pest control product if the Minister has reasonable grounds to believe that the health or environmental risks of the product are, or its value is, unacceptable.
Special review where OECD ban
(2) Without limiting the generality of subsection (1), when a member country of the Organisation for Economic Co-operation and Development prohibits all uses of an active ingredient for health or environmental reasons, the Minister shall initiate a special review of registered pest control products containing that active ingredient.
Special review where information from department or province
(3) Without limiting the generality of subsection (1), the Minister shall initiate a special review of the registration of a pest control product if a federal or provincial government department or agency has provided information to the Minister that relates to the health or environmental risks or the value of the product and if, after considering the information provided, the Minister has reasonable grounds to believe that the health or environmental risks of the product are, or its value is, unacceptable.
Request for special review
(4) Any person may request a special review of the registration of a pest control product by making a request to the Minister in the form and manner directed by the Minister.
Decision
(5) Within a reasonable time after receiving a request, the Minister shall decide whether to initiate a special review and shall respond to the request with written reasons for the decision.

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All Canadians carry pesticides in their bodies. And based on information compiled by provincial poison control centres, thousands of Canadians, predominantly children, are acutely poisoned by pesticides each year.

The Food We Eat: An International Comparison of Pesticide Regulations is the second in a series of reports on how our environment affects human health in Canada.

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