

**Comments on:  
Classification Harmonization for Canada,  
A Proposal for Domestic Class Pesticides, 2007**

**September 14, 2007**

Canada's Pest Management Regulatory Agency (PMRA) is proposing a framework for consistent provincial regulation of pesticides purchased by untrained citizens and used around the home (*Domestic Class*). Although it is unclear from the proposal itself, it is my understanding that this proposal does not address pesticides applied by professional applicators, even when the same chemicals are applied in the same areas as would be treated by homeowners (e.g. lawn care chemicals).

The PMRA proposal comes in the wake of considerable momentum across the country to severely curtail pesticide use for landscaping. More than 130 municipalities have enacted bylaws curtailing or banning many common pesticides. Furthermore, with its Pesticide Code the province of Quebec has banned many active ingredients that may be linked to cancer, from use in urban/residential/non-farming areas. Many medical organizations and professionals wholeheartedly support these initiatives. Neither the municipal pesticide restrictions across Canada, nor the present proposal by the PMRA, affects farming.

A majority of Canadians are eager for greater restrictions of the use of pesticides, particularly in the urban/residential environment where children's exposures are greatest. This submission discusses how this initiative should be used to markedly reduce pesticide use where vulnerable populations (e.g. children, the elderly and those with environmental sensitivities or otherwise ill health) live, work and play. This may occur by limiting access for domestic use to the least-toxic strategies and solutions, and by eliminating access to the more toxic chemicals. It also touches on problems with the proposal arising from the limited considerations in determination of risks. The PMRA proposal suggests *reducing* risks, but Canadians are increasingly impatient to *minimize* risks. We see that serious chronic conditions affecting even our children are linked to the many chemicals in their environment, and want much bolder actions to limit chemicals designed and spread in the environment specifically to be toxic. This is particularly so for chemicals that are demonstrably unnecessary, given the success of organic landscaping (e.g. the Organic Landscape Alliance ([organiclandscape.org](http://organiclandscape.org)) or Turflogic ([turflogic.ca](http://turflogic.ca))) and least-toxic indoor pest control practices (see below).

It is imperative that any federal initiative explicitly recognizes that provincial and municipal governments are free to further restrict pesticide sales and use. Any Provincial Harmonization proposal should not be in conflict with the Quebec Code by specifying unrestricted sales of pesticides banned in Quebec. This is an opportunity to bring all of Canada to an even better level of health protection. This is the right time for Canada to begin to follow the philosophy of least acceptable risk, allowing chemicals that have been demonstrated to be safe to humans when used chronically over long periods of time and which cause no environmental harm.

***“Domestic Class” designation***

The processes and considerations involved in designation of a pesticide as “domestic class” were not referenced, or clearly defined in the proposal document. It is presumed that the proposal covers pesticides available for retail sale to the public, and doesn't address those available to lawn care companies or other professional applicators using pesticides in a residential setting. That would be a good next-step.

The public might expect that weighing and comparing risks of various solutions to pest problems are at the heart of pesticide assessment. This is not the case, since any product that meets the regulatory requirements for efficacy (“value”) and toxicity/environmental testing will be registered regardless of “need.” Epidemiological as well as biochemical mechanistic evidence and hypotheses do not carry weight in pesticide assessment. These kinds of considerations must be included in a proposal to distinguish whether pesticides are of minimal risk for unrestricted access by the general public. It would be preferable that the list of pesticides that are acceptable for unrestricted access for homeowners be consistent with the products that are allowed for organic agriculture. This would ensure that horticulturally acceptable solutions are available for pest problems while minimizing risks.

Pre-mixing toxic chemicals and packaging them in a 1 L bottle does not change the fact that they are toxic chemicals, with effects at very low doses that are poorly understood and not properly included in pesticide assessment. Neurological, immune, genotoxic and endocrine effects of environmental chemicals are causing increasingly prevalent chronic disease and disabilities in Canadians (cancers, metabolic disorders, neurological impairments, reproductive and developmental problems etc.), and common pesticides used in the home and garden have been demonstrated in many well designed studies to play significant roles in these serious health issues.

Access to all other pesticides should be denied or at least severely restricted. If toxic chemicals are to be sold at all, it would be highly advisable for them to be in a single-use or small container size, pre-mixed if at all possible, from approved retailers with specially trained staff able to guide consumers to less toxic alternatives. Possible merits are discussed in the PRMA document, but there is no evidence that they might be successful, nor a plan to assess success. There is a concern that all products available on a self-select basis will be perceived as being an environmentally better or healthier choice, and would subvert good aims into “greenwashing” (marketing based on dubious environmental claims).

### ***Domestic class designation - Insufficiency of LD50 to rate toxicity***

According to the PMRA Proposal, designation as a Domestic Class pesticide is based upon the acute toxicity, specifically that the dose that kills half of a population (LD50) must be above 500 mg/kg. There is no protocol described or referenced, so it is unclear, for instance, the methods or species for which this determined. For instance 2,4-D is one of the most common “domestic” herbicides. According to the Extension Toxicology Network (Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University) it wouldn’t fit this criterion. “The oral LD50 of 2,4-D ranges from 375 to 666 mg/kg in the rat, 370 mg/kg in mice, and from less than 320 to 1000 mg/kg in guinea pigs.” (<http://extoxnet.orst.edu/pips/24-D.htm>) Thus, 2,4-D should not be a “domestic” pesticide at all. This method may sound simple, but it is apparently arbitrary. It does not address important modes and manifestations of exposure and toxicity (neurological, endocrine disruption, genetic damage etc.), does not address chronic exposure, exposure to contaminants or environmental breakdown products, or combined effects of mixtures and multiple exposures, is open to abuse by focussing on results from particularly hardy animals, and in short is not scientifically defensible.

Other classification issues are discussed below.

### ***Indoor pesticides***

Pest control at the Children’s Hospital of Eastern Ontario and the Ottawa Hospital (General Campus) has evolved to the point that the most toxic chemicals (e.g. organophosphate and carbamate insecticides) are simply never used. Pest control relies upon:

- preventive maintenance and sanitation
- elimination of habitat for pest (e.g. rotting wood)
- non-toxic electronic insect monitoring and control
- traps with pheromones or baits
- judicious and very limited use of least-toxic products, that are approved for organic agriculture (e.g. borax, diatomaceous earth)

If it is feasible to meet hospitals' rigorous standards, these strategies should be sufficient for homeowners. Again, only least-toxic strategies and products should be allowed.

### ***Mixtures***

Previous consultations on this topic recommended that fertilizer-pesticide mixtures be discontinued. These are incompatible ingredients, similar in a sense to sunscreen and insect repellent. Those combination creams were discontinued because one should be applied sparingly and seldom, while the other should be applied liberally and frequently. Similarly, fertilizer must be applied to the entire lawn while pesticides should be applied selectively, and "using up" leftovers results in completely unnecessary pesticide use and attendant exposures. Tracking into homes leads to chronic exposures. The Canadian Medical Association, Canada's premier medical organization, has called for a ban of "weed and feed" type mixtures. The first pesticide listed in many of these formulations is 2,4-D, which is discussed elsewhere.

### ***Misclassification?***

It is unclear how pesticides get "upgraded" from commercial to domestic or reduced-risk status. These standards and the information supporting designations should be public. The present proposal to add another classification hoping to manage risk should be accompanied with clear scientific criteria first for the "domestic" and "reduced risk" designations that are presently used, and then for the additional classifications proposed. The one set of criteria that have gained credibility in the public's mind is that for organic agriculture, which is a natural fit for the self-select designation.

As mentioned, 2,4-D is a chemical that may be misclassified based upon the LD50. Attached to this email is our peer-reviewed article regarding pesticide assessment and 2,4-D, as well as the subsequent letter that appeared in the journal, with references to studies demonstrating genetic damage, endocrine disruption and additional epidemiological evidence of harm. I have had ongoing discussions with the PMRA about the need to assess the unmonitored dioxins in 2,4-D, because the prevalent form is "equipotent" to the most toxic dioxin in *in vitro* and *in vivo* tests of immune suppression (Holsapple, 1986). Dioxin is necessarily produced during the manufacturing, and without countervailing regulation and monitoring levels could be substantial. This contamination could plausibly be contributing to the ongoing observations of lymphoproliferative disorders and cancers associated with phenoxy herbicide exposure.

Glyphosate is another example of a "reduced risk" pesticide that may be misclassified, because it is associated with significant human health and environmental risks associated. Glyphosate is formulated as Roundup, Vision etc. Attached is a brief discussion of some concerns with this chemical.

Imidacloprid is a third chemical that may be misclassified. It is used extensively and in some jurisdictions almost exclusively on lawns. It is the prime suspect is colony collapse of bees, which potentially could devastate agriculture. A discussion of this chemical is also attached.

The origin and rationale behind the appendices is unclear, particularly the mosquito-control products that are listed for controlled purchase. These were previously not available to the homeowner. Specifically, when methoprene isomerizes in the sunlight, the new form binds with retinoid receptors, which is a first step in carcinogenesis. As well, mosquito “control” may also be linked to counter-productive declines in predator populations and population shifts that ultimately result in higher vector populations (e.g. Howard JJ, Oliver J. Impact of naled (Dibrom 14) on the mosquito vectors of eastern equine encephalitis virus. J Am Mosq Control Assoc. 1997 Dec;13(4):315-25) It is not desirable to put yet more potent biological agents in the hands of homeowners.

### **Recommendations**

- Least-toxic strategies and products should be the only ones registered for domestic use. Preference should be given to mechanical treatments (e.g. pulling of weeds, or trapping of rodents or insects), and to substances that are approved for organic agriculture and/or that are “generally recognized as safe” (GRAS – e.g. corn gluten meal, plain soap or vegetable oil etc).
- All pesticides, including least-toxic and biopesticides should be accompanied by education and be used with caution because non-target and population-shifting effects may render them harmful or cause the procedure to backfire. Education to read and follow the label is important.
- If homeowners are to continue to have access to toxic chemicals, the rationale for this designation should be public and clear. They should all be of restricted accessibility with independently-produced educational programs.

In conclusion, flourishing organic lawn care companies and franchises demonstrate that no more toxic chemicals are actually needed for exterior uses, and the Ottawa experience demonstrates that organic standards are sufficient for the most demanding indoor uses as well. Canada’s medical community is clearly stating that no more should be tolerated by this and coming generations. It is our hope that rather than re-packaging toxic chemicals for easy access for homeowners, the PMRA will take this opportunity to delineate pest control strategies and products with minimal risk, such as have been identified for organic agriculture. Canadians are increasingly aware that the “acceptable risk” paradigm has failed, and they want to move on.

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**This submission is endorsed by:**  
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## Letter re. 2,4-D in Paediatrics and Child Health

Paediatr Child Health 2006;11(6):332, 342.

In response to our article ‘Pesticide assessment: Protecting public health on the home turf’, the Industry Task Force II on 2,4-D Research Data asserts that Canada’s risk assessment led to “incredible (sic) confidence ... that 2,4-D does not pose a risk to human health.”

To put this opinion in perspective, the Task Force consortium owns the registrations for the herbicide 2,4-dichlorophenoxy- acetic acid (2,4-D), and funds and circulates research studies to government agencies, including to Canada’s Pest Management Regulatory Agency (PMRA).

The Task Force contends that 2,4-D does not pose a cancer risk, but Canada’s and other cited government agencies found that the evidence was inconclusive. This is not the same as risk-free.

Recent writings of Gandhi and Alavanja (1,2), authors cited by the Task Force, also diverge from the risk-free message.

Gandhi published a fact sheet indicating that 2,4-D may be linked to breast cancer via mechanisms other than mutagenesis, such as hormonal effects. Indeed, 2,4-D exhibits estrogenic and androgenic effects in vitro. Endocrine effects were not considered in the 2,4-D reassessment.

Reviewing pesticides and cancer, Alavanja calls for consideration of epidemiology, toxicology and molecular bioassays, with hypothesis testing. This is the comprehensive basis upon which we concluded that 2,4D was linked persuasively to cancers, neurological impairment and reproductive difficulties.

Recent research has strengthened the association between 2,4-D and cancer.

In a cohort of 139,000 farm workers, incidence of non- Hodgkin lymphoma (NHL) was increased on farms where 2,4-D was used (OR = 3.80,95% CI=1 .85-7.8 I) (3).

Non-Hodgkin lymphoma (NHL) with t (14; 18) (q32;q2 I) chromosomal translocation is correlated with herbicide exposure, while the subset without this genetic trait is not (4). The age standardized incidence rates of NHL in Canada and the United States are among the highest in the world, and the number of cases and age adjusted incidence rates for NHL rose steadily in Canada from 1992-2002 (5). Although most cases of NHL are large cell diffuse, the increases have been greater for the nodular follicular form — the subtype associated with exposure to pesticides.

Beyond cancer, we note that reproductive and neurological impairment are also linked to 2,4-D. The PMRA’s reassessment proceeded without developmental neurotoxicity data, despite evidence of demyelination in animals, human epidemiological evidence of neurological harms, and recognition of the issue in the form of notice requirements for professional applicators.

Canada is not alone in short-changing developmental neurotoxicity. A letter to the Administrator of the United States Environmental Protection Agency (EPA) from the National Treasury Employees’ Union representing EPA scientists, protests that the EPA is violating the public trust and is putting children and the unborn at risk by not acting appropriately regarding developmental neurotoxicity of pesticides (6).

Therefore, we maintain our previous conclusions and recommendations. Recent research and events strengthen our contention that 2,4-D (and doubtless other pesticides that are also subject to inadequate scrutiny) are harming Canadians and our environment. Particularly since the PMRAs reassessment focused on use of 2,4-D on turf grass, this nonessential use cannot be as justified. We urge Canada to maintain sovereignty over the use of toxic chemicals.

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## **Attachment - Glyphosate Concerns**

Human studies show us that Roundup or Vision damage DNA, result in difficulty conceiving and bearing healthy children, and increased cancers . Cancers may be linked to DNA damage, as well as to immune function impairment as seen in other species, and interference with hormones and detoxification enzymes.

Glyphosate doesn't stay where it is put (DNA damage is recorded in Ecuador, from herbicides sprayed in Colombia, and Roundup was banned then severely restricted in Denmark due to groundwater contamination). The "soap" that glyphosate is mixed with is exquisitely toxic to frogs, and also increases transport of the chemical through the skin.

Recent research shows that a breakdown product, sarcosine, affects the immune and hormonal systems - the scientific "puzzle-pieces" are coming together pointing out why the epidemiological observations come to pass.

The bottom line is that we have to move from "acceptable risk" (the chemical has slipped under a poorly-understood and limited regulatory bar of risk) to "least-toxic" strategies for dealing with problems, including raspberries etc. in forests.

Many groups (e.g. Canadian Cancer Society) and health professionals (e.g. Canadian Medical Association, Ontario College of Family Physicians) are calling for least-toxic strategies, and a reduction / elimination in the use of pesticides.

## **Attachment: Imidacloprid**

**compiled by Meg Sears PhD, spring 2007**

Imidacloprid (Merit™) is a relatively new insecticide in Canada, registered in 2001.<sup>1</sup> It is a persistent neo-nicotinoid insecticide used to kill invertebrates in turf.

### **Health Effects**

Imidacloprid (Figure 1) binds with a nicotinic acetylcholine receptor that is prevalent in insects, and very weakly with mammalian receptors, resulting in a favourable insect/mammal toxicity profile. However, minor structural changes that occur during degradation confer greater binding strengths with mammalian receptors.<sup>2</sup> Greater toxicity of break-down products may have contributed to the delayed human deaths following ingestion that have been reported.<sup>3,4</sup> In animals, diverse effects of imidacloprid may include apathy, difficulty breathing, staggering, trembling, spasms and paralysis.<sup>5</sup> Organs affected include the liver, kidney, thyroid, heart, lung, spleen, adrenal gland, brain and gonads.

### **Environmental Fate**

As seen in Figure 1, imidacloprid undergoes complex breakdown in the environment. The breakdown pathways converge to 6-chloronicotinic acid, with subsequent degradation to unidentified product(s) and carbon dioxide. This suggests that the very toxic and persistent 2-chloropyridine would be an environmental contaminant arising from imidacloprid.

2-chloropyridine is very toxic to the liver and has properties of a carcinogen.<sup>6</sup> It is also extraordinarily persistent. There was no evidence of any environmental degradation in various soils and oxygen tensions.<sup>7</sup> It is expected to be mobile in the environment, as it may volatilize, and is somewhat soluble in water.

### **Environmental Effects**

Imidacloprid is a leading suspected cause of collapse of bee colonies; it was banned as a seed treatment on sunflower seeds in France when bee colonies collapsed there.<sup>8</sup> It also adversely affects biodiversity and health of organisms in turf because it kills or harms predatory insects and earthworms, and deters birds that would otherwise eat grubs.

### **Imidacloprid Use – Pattern and Quantities**

Pesticide use data is not readily available. However in 2003, according to a report from the Canadian Ministers of the Environment, 527 kg of imidacloprid active ingredient was used in agriculture in Ontario,<sup>9</sup> [I suspect that this should be 5270 kg, largely for potatoes – it may be a typographical error] while according to a report from the City of Ottawa 776 kg of imidacloprid + Sevin was used on turf by lawn care companies (this does not include golf courses, large properties etc.).<sup>10</sup> According to the statements of the lawn care representatives at the time, imidacloprid was largely used because it is less toxic to people.

Regardless of uncertainties in the data, it is abundantly clear that the predominant use of imidacloprid is for turf, where it is applied as a prophylaxis over the entire surface.

### **Significance regarding pollinator populations**

In the US this spring many bee hives were found basically dead and/or empty except for the queen (which cannot fly). It is not known what precisely is causing this, and the cause may not be identical in each case, with several factors possibly contributing. However, the chemical imidacloprid has been implicated as a prime suspect in this phenomenon. It was banned on some crops in France because it was observed as this chemical came into use that “wherever [imidacloprid] went, the bees died.”

Imidacloprid has been used longer and more widely in the US than in Canada. “Merit” is only available to professional applicators in Canada. If applied annually, as it is in turf care, imidacloprid and breakdown products will build up in the environment, and it will take many years if not decades for the many daughter chemicals to break down. It is doubtful that 2-chloropyridine would break down substantially in a person’s lifetime. This would probably go the way of other persistent organic pollutants, building up in wildlife and people, but perhaps eventually diminishing as it accumulates in the Arctic, or in sediments that are then buried.

Colony collapse has not been seen widely in Ottawa yet, but there were at least a few experiences this past spring. However, we dare not wait until it does occur widely. If imidacloprid is indeed a major contributing cause, at that point it would probably take years for the toxic chemicals in the environment to dissipate to the extent that pollinators would once again be healthy.

It is a simple fact of nature that all crops pollinated by insects will fail in the absence of pollinating insects. This includes our fruits such as berries and apples, as well as beans (including soybeans), peas, tomatoes and many more.

There are many reasons not to use imidacloprid on turf. Apart from the toxic and non-target effects, this chemical is not necessary and is arguably counter-productive. Optimum soil composition and maintenance minimizes damage to turf, and there is a very effective, inexpensive preventative biological treatment (parasitic nematodes) for which resistance does not develop.

Given the facts that

- bees are essential for food production;
- Ottawa beekeepers are experiencing difficulties;
- imidacloprid and breakdown products are extremely toxic and persistent and a major suspect in contributing to these die-offs; and
- excellent alternatives are available for controlling grubs in turf, so there should be no impact on citizens.

## **Conclusion**

Canada’s medical community and a vast majority of the citizens support strong bylaws restricting chemicals used on lawns to least-toxic products and strategies. This is yet another reason why pesticides for all non-agricultural gardening as well as turf care should be restricted to products approved for organic agriculture. Only least-toxic pest control products and strategies (e.g. parasitic nematodes and planting of resistant species) should be used for turf.

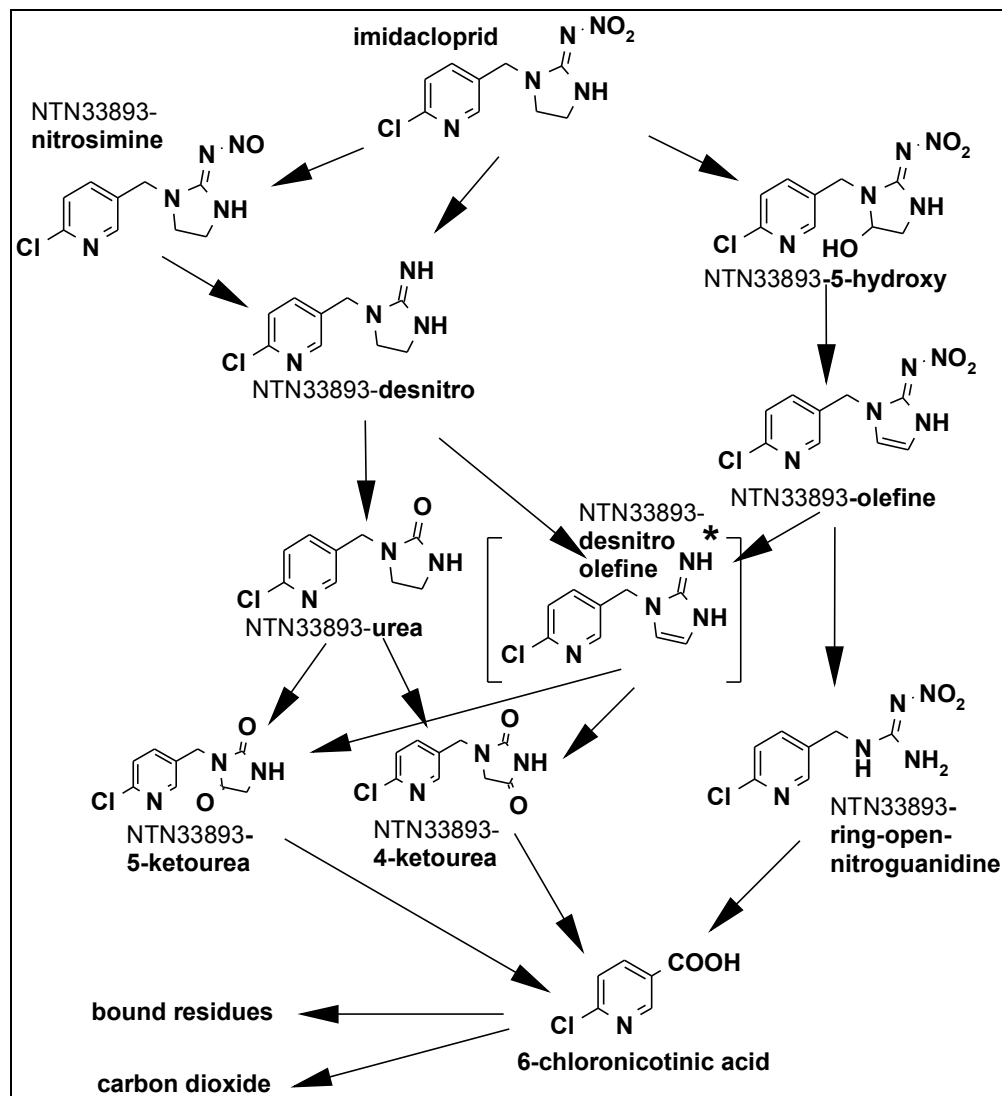
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# Figure 1: Imidacloprid breakdown and postulated end product

Environmental Fate presented to Ottawa City Council by Bayer, manufacturer of “Merit”  
August, 2004



## “Unidentified” fate of Imidacloprid



6-chloronicotinic acid → 2-chloropyridine + carbon dioxide

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