



## **Dichlorvos**

**Environmental estimates (circa 2011): Supplemental data**

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## 1. Data for lifetime excess cancer risk estimates

### Overview

The summary data used to calculate lifetime excess cancer risk and the results for dichlorvos are provided in the tables below. For more detailed information on supporting data and sources, see below for each exposure pathway.

#### i. Environmental Concentrations

Exposure pathway	Units	Average	Maximum	Notes
Outdoor air	µg/m <sup>3</sup>	0.000423	0.0023	
Indoor air	µg/m <sup>3</sup>	Insufficient data		
Indoor dust	µg/g	Insufficient data		
Drinking water	µg/L	--	0.5	Maximum is the detection limit.
Food and beverages		See detailed data.	Not Estimated.	

#### ii. Calculated Lifetime Daily Intake

Exposure pathway	Average intake (mg/kg bodyweight per day)	Maximum intake (mg/kg bodyweight per day)
Outdoor air	0.000000098	0.000000053
Indoor air	Insufficient data	
Indoor dust	Insufficient data	
Drinking water	--	0.000013
Food and beverages	--	Not estimated.

#### iii. Cancer Potency Factors

Exposure route	Health Canada	US EPA	CA OEHHA
Inhalation	--	--	0.29
Ingestion	--	0.29	0.41

Sources for Cancer Potency Factors:

- Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment. Version 2.0.
- Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors. Version 2.0.
- United States Environmental Protection Agency Integrated Risk Information System
- California Office of Environmental Health Hazard Assessment, 2009. Air Toxics Hot Spots Risk Assessment Guidelines Part II: Technical Support Document for Cancer Potency Factors, Appendix A. (Updated 2011)

#### iv. Lifetime Excess Cancer Risk (per million people)

Exposure pathway	Average <sup>1</sup>			Maximum <sup>2</sup>
	Health Canada	US EPA	CA OEHHA <sup>3</sup>	
Outdoor air	--	--	0.0028	0.015
Indoor air	Insufficient data			
Indoor dust	Insufficient data			
Drinking water	--	--	--	5.32
Food and beverages	--	--	--	Not estimated

<sup>1</sup>Lifetime excess cancer risk based on average intake x cancer potency factor from each agency

<sup>2</sup>Lifetime excess cancer risk based on maximum intake x highest cancer potency factor

<sup>3</sup>California Office of Environmental Health Hazard Assessment

### Supporting data by exposure pathway

#### i. Outdoor air

**Outdoor air** concentrations are based on data published in peer-reviewed literature since 2000. A ranking system was used to select data most representative of Canadian conditions circa 2011:

1. Canadian data collected in 2000 or more recently, sample duration of 24 hours or longer;
2. US studies of similar currency and sample duration;
3. Studies from northern European countries of similar currency and sample duration;
4. Canadian, US or European studies with data collected prior to 2000 and similar sample duration; and
5. Studies with sample duration of less than 24 hours regardless of country or collection date, or studies from countries not comparable to Canada.

Rank:	1	Author:	Aulagnier (2008)				Location: Canada, Québec					
Samples (n)	DF	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile	
12	0	1.3x10 <sup>-5</sup>	2004 (summer)	µg/m <sup>3</sup>	7 day; Monthly			Not detected				

\*DF = Detection frequency

\*\*DL = Detection limit

Rank:	2	Author:	Peck (2005)				Location: USA, Iowa					
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile	
136	19%	9.6 x10 <sup>5</sup>	2000-2002	µg/m <sup>3</sup>	24-hr		.0023	0.00084			95 <sup>th</sup> .00143	

\*DF = Detection frequency

\*\*DL = Detection limit

Sources for outdoor air data:

- Aulagnier F, Poissant L, Brunet D, Beauvais C, Pilote M, Deblois C, Dassylva N. 2008. Pesticides measured in air and precipitation in the Yamaska Basin (Québec) : occurrence and concentrations in 2004. *Sci Total Environ* 294(2-3): 338-348.
- Peck AM, Hornbuckle KC. 2005. Gas-phase concentrations of current-use pesticides in Iowa. *Environ Sci Technol* 39: 2952-2959.

## ii. Indoor air

No recent data or studies were identified.

## iii. Dust

No recent data or studies were identified.

## iv. Drinking water

Drinking water data are from the Ontario Drinking Water Surveillance Program (DWSP) for 2006. A review of published reports was also conducted in order to compare how well the Ontario data represented other regions in Canada.

Source	Units	DL							
Ontario DWSP 2006	(µg/L)	0.5							
Sample Type	Parameter	Mean	SD	Min	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	Max	N
Treated Water		0.5	0.0	0.5	0.5	0.5	0.5	0.5	67

DL = Detection limit  
 SD = Standard Deviation

## v. Food and Beverages

Food consumption data are from the Statistics Canada Food Survey (2006) - Food available, adjusted for losses tables, and from the Nutrition Canada Survey (1970-1972).

Food concentration data are primarily from the US-FDA Total Diet Study (2003-2004), with additional data on metals and several PAHs from the Canadian Food Inspection Agency (CFIA) - National Chemical Residue Monitoring Program: 2009-2010 Annual Report and the US-FDA (TDS Statistics on Element Results - 2008).

In order to better represent actual intake, we incorporated data for cooked and/or processed foods, as in some cases, this can either add to or diminish the amount measured in raw food.

Concentration data were obtained for 22% of total meat consumed, 9% of total fruit consumed, 12% of total vegetables consumed, 4% of total dairy and eggs consumed, and 1% of total grains consumed.

Food or Beverage	Concentration (µg/g)	DF	Food or Beverage	Concentration (µg/g)	DF
Beef	0.00002	0.00300	Peaches fresh		
Chicken			Pears canned		
Mutton and lamb	0.00001	0.00010	Pears fresh		
Offal			Pineapples canned		
Oils and fats			Pineapples fresh		
Pork			Plums total fresh		
Salad oils			Quinces fresh		
Shortening and shortening oils			Raspberries frozen	0.02522	0.00160
Stewing hen			Strawberries canned		
Turkey			Strawberries fresh	0.00036	0.00330
Veal	0.00001	0.00010	Strawberries frozen		
Fish fresh and frozen seafood			Sugar maple		
Fish freshwater			Sugar refined		
Fish processed seafood			Honey		
Apple pie filling			Artichokes fresh		
Apple sauce	0.00142	0.00040	Asparagus canned		
Apples canned			Asparagus fresh		
Apples dried			Avocados fresh		
Apples fresh			Beans baked and canned		
Apples frozen			Beans dry		
Apricots canned			Beans green and wax canned		
Apricots fresh			Beans green and wax fresh	0.00000	0.00030
Bananas fresh			Beans green and wax frozen		
Berries other fresh			Beets canned		
Blueberries canned			Beets fresh		
Blueberries fresh			Broccoli fresh		
Blueberries frozen			Broccoli frozen		
Cherries fresh			Brussels sprouts fresh		
Cherries frozen			Brussels sprouts frozen		
Citrus other fresh			Cabbage Chinese fresh		
Coconut fresh			Cabbage fresh		
Cranberries fresh			Carrots canned		
Dates fresh			Carrots fresh		
Figs fresh			Carrots frozen		
Fruit dried			Cauliflower fresh		
Grapefruit fresh			Cauliflower frozen		
Grapes fresh	0.00009	0.00010	Celery fresh		
Guava and mangoes fresh			Corn canned		
Kiwi fresh			Corn flour and meal		
Lemons fresh			Corn fresh		

Food or Beverage	Concentration (µg/g)	DF	Food or Beverage	Concentration (µg/g)	DF
Mushrooms fresh	0.00005	0.00180	Milk buttermilk		
Okra fresh			Milk chocolate drink		
Olives fresh			Milk concentrated skim		
Onions and shallots fresh			Milk concentrated whole		
Parsley fresh			Milk other whole milk products		
Parsnips fresh			Milk partly skimmed 2%		
Peas canned			Milk skim		
Peas dry			Milk standard		
Peas fresh			Milk sweetened concentrated skim		
Peas frozen			Milkshake		
Peppers fresh	0.00000	0.00060	Powder buttermilk		
Potatoes chips			Powder skim milk		
Potatoes frozen			Powder whey		
Potatoes other processed			Sherbet		
Potatoes sweet fresh			Yogurt		
Potatoes white fresh			Cereal products		
Potatoes white fresh and processed			Oatmeal and rolled oats		
Pumpkins and squash fresh			Peanuts		
Radishes fresh	0.00024	0.00080	Pot and pearl barley		
Rappini fresh			Pulses and nuts		
Rutabagas and turnip fresh			Rice		
Spinach fresh	0.00001	0.00010	Rye flour		
Spinach frozen			Tree nuts	0.00001	0.00030
Tomatoes canned			Wheat flour		
Tomatoes fresh	0.00001	0.00050	Ale, beer, stout and porter		
Tomatoes pulp, paste and puree			Beverages alcoholic		
Vegetables other edible root fresh			Coffee		
Vegetables other leguminous fresh			Distilled spirits		
Vegetables unspecified canned			Juice apple		
Vegetables unspecified fresh			Juice grape		
Vegetables unspecified frozen			Juice tomato		
Butter			Juice fruit		
Cheese cheddar			Juice grapefruit		
Cheese cottage			Juice lemon		
Cheese processed			Juice orange		
Cheese variety	0.00000	0.00010	Juice pineapple		
Cream cereal 10%			Juice vegetable		
Cream sour			Soft drinks		

## 2. Data quality for lifetime excess cancer risk estimates

Only publicly available data were used to calculate these indicators. Data that are not publicly available may produce different results.

No systematic method for measuring data quality was possible, so we provide the following assessments of how well the data used may represent the actual Canadian average levels. Quality is rated higher when there are data from a number of Canadian monitors, or from Canadian studies that show results similar to other comparable studies. Quality is rated lower when data from few monitors or studies were available, and lowest when estimates are based on non-Canadian data. Others may rate data quality differently.

Exposure Pathway	Data Quality	Notes
Outdoor air	Very Low	<ul style="list-style-type: none"> <li>One Canadian study in St. Damase, Quebec was identified, but dichlorvos was not detected in outdoor air. Data from a US study in Iowa detected dichlorvos infrequently at low levels.</li> </ul>
Indoor air	Gap	<ul style="list-style-type: none"> <li>No recent data or studies identified using appropriately accurate analytical methods.</li> </ul>
Indoor dust	Gap	<ul style="list-style-type: none"> <li>No recent data or studies identified using appropriately accurate analytical methods.</li> </ul>
Drinking water	Low	<ul style="list-style-type: none"> <li>Dichlorvos was not detected in any samples of treated drinking water (n=10), based on data from the Ontario Drinking Water Surveillance Program in 2011. The detection limit was 0.5 µg/L.</li> </ul>
Food and beverages	Gap	<ul style="list-style-type: none"> <li>No Canadian or US data on concentrations of dichlorvos in foods or beverages were available.</li> </ul>