Relative toxicity of the main active ingredients contained in pesticides for domestic use used for green spaces

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LAWNS AND PAVED SURFACES

Relative toxicity of the main active ingredients contained in pesticides for domestic use[1]

Active ingredient	Short-term health risk	Carcinogenic potential	Endocrine system disturbers	Toxicity for not targeted species			Persistence in the soil	Main pests controlled
								
Insecticides / Acaricides								
Borax	✓✓				✓	⚠	✗✗	ants
Spinosad	✓✓			⚠	✓	✗✗	✓	sod webworms
Herbicides								
Acetic acid								undesirable vegetation growing in paved surfaces
Corn gluten meal								dandelion and crabgrass seeds
Ferrous sulphate								moss
Glufosinate-ammonium					✓	⚠	✓	undesirable vegetation growing in paved surfaces

Active ingredient	Short-term health risk	Carcinogenic potential	Endocrine system disturbers	Toxicity for not targeted species			Persistence in the soil	Main pests controlled
								
Glyphosate	✓✓			✓	✓	⚠	✗	undesirable vegetation growing in paved surfaces
Herbicide soap				✓	✓		✓	moss and lichens
Mixture of capric and pelargonic acids				✓	✓	⚠	✓	undesirable vegetation growing in paved surfaces

[1]Active ingredients mentioned in this table are contained in pesticides for domestic use class (federal government) and classes 4 and 5 (provincial government).

TREES, SHRUBS AND GARDENS

Relative toxicity of the main active ingredients contained in pesticides for domestic use[1]

Active ingredient	Short-term health risk	Carcinogenic potential	Endocrine system disturbers	Toxicity for not targeted species			Persistence in the soil	Main pests controlled
								
INSECTICIDES / ACARICIDES								
Acetamiprid				✗	✓		✓	whiteflies, scale bugs, aphids and leaf miners
Allethrin	✓			✓	✗	✗	✓	mites, caterpillars, aphids and thrips
Bacillus thuringiensis kurstaki	✓✓			✓	✓	⚠	✗	caterpillars
Calcium sulphide or calcium polysulphide								mites
Carbaryl	⚠	☒	☑	⚠	✓	✗✗	⚠	a number of insects
Dicofol	✓	☒	☑	⚠	✓	✗	✗	a number of insects
Endosulfan	⚠		☑	✗✗	✗	✗	⚠	weevils and borers
Insecticide soap				✓	✓		✓	a number of insects

Active ingredient	Short-term health risk	Carcinogenic potential	Endocrine system disturbers	Toxicity for not targeted species			Persistence in the soil	Main pests controlled
								
Malathion	✓	☒	☑	✗	✗	✗✗	✓	cankerworms, leaf hoppers, caterpillars, leaf miners and aphids
Mineral oil								mites, caterpillars, scale insects and mites
Natural gum resins								cankerworms, caterpillars and ants
Permethrin	⚠	☒	☑	✓	✗	✗✗	⚠	ants and earwigs
Phosalone	⚠			✓	✗		✓	codling moths, apple maggots, aphids and tarnished plant bugs
Pyrethrins	⚠			✓	✗	✗✗	✓	a number of insects
Rotenon	⚠			✓	✗		✓	a number of insects
Silicon dioxide present as diatomaceous earth								ants and earwigs
Spinosad	✓✓			⚠	✓	✗✗	✓	caterpillars, gypsy moths and thrips
FUNGICIDES								
Calcium sulphide or calcium polysulphide								black spot of rose trees and apple scab
Captan	✓✓	☒		✗	⚠	⚠	✓	powdery mildew, seedling blight, bulb rot and black spot

Active ingredient	Short-term health risk	Carcinogenic potential	Endocrine system disturbers	Toxicity for not targeted species			Persistence in the soil	Main pests controlled
								
Copper present as copper oxychloride	✓				✓			anthracnose, bacterial blight, bacterial wilt, mildew and leaf spot
Copper present as tribasic copper sulphate	⚠			⚠	⚠			anthracnose, mildew, leaf spot and black spot of rose trees
Ferbam	✓✓			⚠	⚠		⚠	rust and apple scab
Folpet	✓✓	☒		✓	✗	✓		anthracnose, powdery mildew and black spot
Oxine benzoate				✓	✓	✓		seedling blight
Sulphur	✓			✓	✓	✓		powdery mildew, mildew, leaf spot, black spot of rose trees and rust
Triforine	✓✓	☒		✓	✓	✓	⚠	mildew and black spot
Zineb	✓✓		☑	⚠	✓	⚠	✓	powdery mildew, early and late potato blight, leaf spot and rust
HERBICIDES								
Dichlobenil	✓✓	☒		⚠	✓	✗	✗	undesirable vegetation
Mixture of capric and pelargonic acids				✓	✓	⚠	✓	undesirable vegetation

Active ingredient	Short-term health risk	Carcinogenic potential	Endocrine system disturbers	Toxicity for not targeted species			Persistence in the soil	Main pests controlled
								
Trifluralin								undesirable vegetation
MOLLUSCICIDES								
Silicon dioxide present as diatomaceous earth								slugs
Metaldehyde								slugs and snails
Ferric phosphate								slugs and snails

[1]Active ingredients mentioned in this table are contained in pesticides for domestic use class (federal government) and classes 4 and 5 (provincial government).

Legend

Short-term health risk

LD_{50} (lethal dose 50) is an indicator used to evaluate the immediate degree of toxicity (acute) of a chemical product carried through the digestive and cutaneous routes (LD_{50}, oral and cutaneous). This value represents the dose that is fatal for 50 percent of an experimental group of laboratory animals, in this case rats. LD_{50} is mostly used to compare products on the basis of their acute toxicity. In other words, the lower the LD_{50} value, the more toxic is the product. A classification system is used to determine the degree of risk peculiar to each pesticide.

		LD_{50} for the rat (mg/kg body weight)			
		Oral		Dermal	
		Solid	Liquid	Solid	Liquid
	Extremely hasardous	< 5	< 20	< 10	< 40
	Highly hasardous	5-50	20-200	10-100	40-400
	Moderately hasardous	50 - 500	200 - 2000	100 - 1000	400 – 4000
	Slightly hasardous	> 500	> 2000	> 1000	> 4000
	Unlikely to present acute hazard in normal use				

Source: World Health Organization, 2005, *The WHO recommended classification of pesticides by hazard and guidelines to classification 2004*. ISBN: 92 4 154663 8, 56 p. [www.who.int/ipcs/publications/pesticides_hazard_rev_3.pdf]

Carcinogenic potential

☒ Pesticide that is potentially carcinogenic for humans

Sources: United States Environmental Protection Agency, International Cancer Research Centre, European Union

Endocrine system disturbers

☑ Pesticide suspected of disturbing the endocrine system

Endocrine system disturbers are chemical substances that produce effects that are generally irreversible in humans and mammals by disturbing their hormonal functions. Regular exposure to these products, even in small doses, may cause serious damage to various organs and cause reproductive and developmental problems.

Sources: German Federal Environment Agency, UK Environment Agency, European Union

Toxicity for not targeted species

- **Birds**

LD_{50} (lethal dose 50) is an indicator used to evaluate the immediate degree of toxicity (acute) of a chemical product carried through the digestive route (LD_{50}, oral). This value represents the dose that is fatal for 50 percent of an experimental group of animals, in this case birds.

		Oral LD_{50} (mg/kg body weight)
	Extremely hasardous	< 50
	Highly hasardous	50-500
	Moderately hasardous	500-2000
	Slightly hasardous	> 2000

- **Fishes and daphnia**

LC_{50} (lethal concentration 50) is an indicator used to evaluate the immediate degree of toxicity (acute) of a chemical product carried through the respiratory route. This value represents the dose that is fatal for 50 percent of a group of organisms exposed for a determined period of time, in this case fishes or daphnia.

		LC_{50} (µg/L)
	Extremely hasardous	< 0,1
	Highly hasardous	0,1-10
	Moderately hasardous	10-100
	Slightly hasardous	> 100

- **Bees**

LD_{50} (lethal dose 50) is an indicator used to evaluate the immediate degree of toxicity (acute) of a chemical product carried through the digestive and cutaneous routes (LD_{50}, oral and cutaneous). This value represents the dose that is fatal for 50 percent of an experimental group of laboratory animals, in this case bees.

		Oral or dermal LD_{50} (µg/bee)
	Extremely hasardous	< 2
	Highly hasardous	2-11
	Moderately hasardous	11-100
	Slightly hasardous	> 100

Sources: EXtension TOXicology NETwork (EXTOXNET), University of California-Davis, Oregon State University, Michigan State University, Cornell University et University of Idaho [extoxnet.orst.edu]
Gorse, I., F. Grégoire, C. Laverdière et T. Roussel, 2002. *Répertoire des principaux pesticides utilisés au Québec*, Les Publications du Québec, 476 p.
Tomlin, C.D.S., 2003. *The e-Pesticides Manual, 13th Edition*, The British Crop Protection Council, CDROM version 3.0 2003-04.

Persistence in the soil

DT_{50} (dissipation time 50) is an indicator used to evaluate a pesticide's persistence in the soil. DT_{50} designates the time needed for the initial quantity of pesticide to be reduced by half. The higher the value, the longer the product will persist in the soil.

		DT_{50} (days)
	Extremely persistent pesticide	> 180
	Very persistent pesticide	60-180
	Moderately persistent pesticide	20-60
	Low persistent pesticide	< 20

Sources: EXtension TOXicology NETwork (EXTOXNET), University of California-Davis, Oregon State University, Michigan State University, Cornell University et University of Idaho [extoxnet.orst.edu]
Gorse, I., F. Grégoire, C. Laverdière et T. Roussel, 2002. *Répertoire des principaux pesticides utilisés au Québec*, Les Publications du Québec, 476 p.
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