



Agriculture
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**Acute toxicity of potato pest control
products to fish, birds, and bees**
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Acute Toxicity Hazard of Pesticides to Freshwater Fish, Birds, and Bees

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Pest control products are widely used in modern agriculture to aid in the production of high quality food. However, some products have the potential to cause health and/or environmental degradation. To prevent this, **producers must read the pest control product labels** of the products they use and **follow the directions described** in the label. Producers are encouraged to select pest control products with identified reduced risks. Producers are also encouraged to practice mode of action rotation, reducing the onset of pest control product resistance and maintaining the efficacy of pest control products for future farmer generations.

Practicing mode of action rotation may result in using products with a higher toxicity hazard; however, the directions in the label are designed to mitigate the risks. This is accomplished by imposing restrictions on how products can be used, including, but not limited to, weather conditions, buffer zones, personal protective equipment, applications per year, reentry intervals, pre-harvest intervals, and other requirements detailed in the labels.

The risk that a pesticide poses to the environment depends on *i)* the toxicity to organisms such as birds, bees, fish and others, and *ii)* the chance of these organisms coming in contact with the product. The short term toxicity of a chemical, either natural or man-made, is measured using the LC50 (lethal concentration) value. An LC50 is a measure of how much product is required to kill 50% of the test population over a period of time. For example, the 96 hour LC50 of chlorothalonil, active ingredient in Bravo 500, for fish is 47 ppb, which means 0.000047 grams of Bravo 500, added to 1 litre of water, would kill half the fish present in 96 hours.

This document outlines only the acute toxicity hazard posed by these products. It does not summarize the overall environmental or human health risk posed by the use of these products. The directions in the labels mitigate the risks posed by using pest control products and that is why it is imperative to read and follow the label.



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The following tables were developed to assist producers in decision making by providing information on the short term toxicity hazard of pesticides to freshwater fish, birds, and bees. The information was developed using data from SAge Pesticides (<http://www.sagepesticides.qc.ca>). Insecticides, fungicides, and herbicides commonly used in potato production on PEI were placed into one of five hazard categories represented by a colour scale. The scale runs from green (low toxicity), through yellow and orange, to red (high to extremely high toxicity).

The ranking does not take into account the application rate, environmental conditions at the time of application, or probability of exposure. If a product is not used according to the label, the chances of exposure may be different from those assessed when registering or re-evaluating a pesticide. This means that **if a pest control product is used in a different way from that which is detailed in the label, the risks to human and environmental health are unknown, which could result in environmental degradation and negative health effects. Note that the tables in this document do not outline the acute toxicity to mammals, including humans. SOME PRODUCTS WITH LOW TOXICITY FOR BIRDS, FISH, AND BEES, MAY STILL BE HIGHLY TOXIC TO MAMMALS.**

Attempts to minimize the risk to humans, fish, birds, and bees from pesticides should not simply be limited to the selection of a lower risk pesticide. Consideration should be given to practices that reduce runoff and erosion during all phases of the production cycle (from crop rotation, to field setup, to fall and winter management of the field). Practices that prevent erosion and runoff are important in preventing pesticides from reaching surface water and eliminating negative environmental impacts.

Table 1: Acute Toxicity Hazard of Insecticide Active Ingredients to Fresh Water Fish, Birds, and Bees

The table below is not a comprehensive list and is provided only as reference. It is important to always read the product label. In case of disagreement between this table and a product's label, the label shall be considered correct. For more information and to locate product labels, please visit the Pest Management Regulatory Agency's website <https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management.html>

Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
Kaolin clay	Surround	Nil	Low	Low
Pymetrozine	Fulfill 50 WG	Slight	Low	Low
Flonicamid	Beleaf 50 SG	Slight	Slight	Low
Spirotetramat	Movento 240, Movento 150 OD,	Moderate	Low	Low
Acetamiprid	Assail 70 WP	Low	Moderate	Moderate
Clothianidin	Clutch 50 WDG, Titan, Nipsit Inside 600	Low	Low	High
Thiamethoxam	Actara 240 SC, Actara 25WG	Low	Slight	High
Sulfoxaflor	Closer	Low	Slight	High
Spinosad	Success 480, Entrust 80 W, Spinosad Insecticide	Slight	Slight	High
Imidacloprid	Admire 240 F, Alias 240 SC, Genesis 240, Grapple	Slight	Moderate	High
Flupyradifurone	Sivanto Prime	Slight	Moderate	High
Acephate	Orthene 75% SP	Moderate	Moderate	High
Clothianidin + Penflufen (Fungicide)	Emesto Quantum	High	Low	High
Spinetoram	Delegate	High	Low	High
Spinetoram + sulfoxaflor	TwinGuard	High	Slight	High
Dimethoate	Cygon 480EC, Lagon 480E	Moderate	High	High
Chlorantraniliprole	Coragen	Extremely High	Low	Low
Novaluron	Rimon 10 EC	Extremely High	Low	Low

Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
Bifenthrin	Capture	Extremely High	Low	High
Chlorantraniliprole + Lambda-cyhalothrin	Voliam express	Extremely High	Low	High
Cyantraniliprole	Verimark, Benevia, Exirel, Fortenza & Fortenza Red, HGW86 200SC	Extremely High	Low	High
Carbaryl	Sevin XLR	Extremely High	Low	High
Cypermethrin	Ripcord 400, Up Cyde 2.5 EC, Mako, Ship 250 EC	Extremely High	Low	High
Lambda-cyhalothrin	Matador 120EC, Warrior, Silencer 120 EC, Silencer 120 EC low voc	Extremely High	Low	High
Deltamethrin	Decis 5EC, Decis Flowable, Poleci 2.5 EC	Extremely High	Low	High
Permethrin	Perm Up, Pounce, Ambush 500 EC, Bio-environmental permethrin	Extremely High	Low	High
Thiamethoxam + Cyantraniliprole	Minecto Duo 40WG	Extremely High	Slight	High
Thiamethoxam + Fludioxinil (Fungicide) + Difenconazole (Fungicide)	Cruiser Maxx Potato extreme	Extremely High	Slight	High
Phosmet	Imidan 50WP	Extremely High	Slight	High
Malathion	Malathion 50EC, Malathion 500E, Malathion 85E	Extremely High	Slight	High
Abamectin	Agri-Mek	Extremely High	Moderate	High
Imidacloprid + Mancozeb (Fungicide)	Gensis MZ	Extremely High	Moderate	High
Imidacloprid + Mancozeb (Fungicide) + Thiophanate-methyl (Fungicide)	Genesis XT	Extremely High	Moderate	High
Naled	Dibrom	Extremely High	Moderate	High
Deltamethrin + imidacloprid	Concept	Extremely High	Moderate	High
Chlorpyrifos	Lorsban 4E, Lorsban NT, Lorsban 50W, Pyrifos 15 G, Pyrinex 480 EC, Sharphos, Nufos 4E, Warhwak 480EC	Extremely High	High	High



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Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
Oxamyl	Vydate L	High	Extremely High	High
Methomyl	Lannate	Extremely High	High	High
Phorate	Thimet 20G	Extremely High	Extremely High	High

Table 2: Acute Toxicity Hazard of Fungicide Active Ingredients to Fresh Water Fish

The table below is not a comprehensive list and is provided only as reference. It is important to always read the product label. In case of disagreement between this table and a product's label, the label shall be considered correct. For more information and to locate product labels, please visit the Pest Management Regulatory Agency's website <https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management.html>

Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
<i>Bacillus subtilis</i> QST 713	Serenade Soil, Serenade MAX, Serenade ASO, Serenade OPTI,	Nil	Nil	Nil
<i>Pseudomonas syringae</i> Strain ESC-10	Bio-save 10LP	Nil	Nil	NA
<i>Bacillus amyloliquefaciens</i> D747	Double Nickel LC/55	Nil	Low	Low
Cyazofamid	Cyazofamid 400 SC, Ranman 400SC, Torrant 400 SC	Low	Low	Low
Phosphorous acid	Phostrol, Cofine, Confine Extra, Winfield Phosphite Extra, Cofine Post, Rampart	Low	Slight	Low
Cymoxanil	Curzate 60 DF	Slight	Low	Low
Metalaxyl	Ridomil Gold 480 EC	Slight	Slight	Low
Saponins of <i>Chenopodium quinoa</i>	Heads Up	Moderate	Nil	NA
Thiophanate-methyl	Senator PSPT	Moderate	Low	Low
Fluopyram	Velum Prime	Moderate	Low	Low
Boscalid	Cantus WDG	Moderate	Low	Low
Mandipropamid	Revus, Orodnis Ultra A	Moderate	Slight	Low
Metconazole	Quash	Moderate	Slight	Low
Hydrogen peroxide	StorOX	Moderate	Slight	NA
Dimethomorph	Acrobat 50 WP, Forum	Moderate	Low	Moderate
Pyrimethanil	Scala 400 SC	Moderate	Moderate	Low

Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
Fluopyram + Pyrimethanil	Luna Tranquility	Moderate	Moderate	Low
Fluoxastrobin	Evito	High	Low	Low
Penflufen + Prothioconazole	Emesto Silver	High	Low	Low
Fluxapyroxad	Sercadis	High	Low	Low
Oxathiapiprolin	Ordonis Ultra B	High	Low	Low
Fludioxinil	Maxim PSP	High	Low	Low
Azoxystrobin	Quadris F, Azoshy 250 SC, Elatus A	High	Low	Low
Fludioxinil + Difenoconazole	Maxim D	High	Low	Low
Azoxystrobin + Difenoconazole	Quadris Top	High	Low	Low
Fludioxinil + Difenoconazole + Azoxystrobin	Stadium	High	Low	Low
Fenamidone	Reason 500 SC	High	Low	Low
Fluopicolide	Presidio, Fluopicolide SC	High	Low	Low
Metiram	Polyram DF	High	Low	Low
Penthiopyrad	Vertisan, Fontelis	High	Low	Low
Copper (sulphate)	Copper 53W	High	Slight	Low
Metalaxyl + Oxathiapiprolin	A21723E	High	Slight	Low
Mandipropamid + Oxathiapiprolin	Orodnis Ultra	High	Slight	Low
Copper (oxychloride)	Guardsman Copper Oxychloride 50, Copper Spray Fungicide	High	Slight	Low
Thiabendazole	Merect	High	Low	Moderate
Benzovindiflupyr	Aprovia, Elatus B	Extremely High	Slight	Low
Benzovindiflupyr + Difenoconazole	Aprovia Top	Extremely High	Slight	Low

Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
Benzovindiflupyr + Azoxystrobin	Elatus	Extremely High	Slight	Low
Famoxadone + Cymoxanil	Tanos	Extremely High	Low	Low
Chlorothalonil	Bravo 500, Bravo ZN, Echo 90DF, Echo 720	Extremely High	Low	Low
Chlorothalonil + Penthiopyrad	Treoris	Extremely High	Low	Low
Chlorothalonil + Propamocarb	Tattoo C	Extremely High	Low	Low
Cymoxanil + Famoxadone	Tanos 50 DF	Extremely High	Low	Low
Fluazinam	Allegro 500 F	Extremely High	Low	Low
Pyraclostrobin + Metiram	Cabrio Plus	Extremely High	Low	Low
Pyraclostrobin	Headline 250 EC	Extremely High	Low	Low
Mancozeb + Metalaxyl	Ridomil Gold MZ	Extremely High	Slight	Low
Mancozeb + Chlorothalonil	Elixir	Extremely High	Slight	Low
Mancozeb+ Zoxamide	Gavel 75 DF	Extremely High	Slight	Low
Mancozeb + Fludioxinil	Maxim MZ PSP	Extremely High	Slight	Low
Mancozeb	Dithane DG, Dithane Rainshield, Manzate Pro-Stick, Penncozeb 80 WP, Penncozeb 75 DF Raincoat, MancoPlus, Solan MZ, TuberSeal, TuberSeal MZ Potato ST, Potato ST16	Extremely High	Slight	Low
Metalaxyl + Chlorothalonil	Ridomil Gold/Bravo Duo	Extremely High	Slight	Low
Copper (hydroxide)	Parasol WP, Parasol Flowable, Kocide	Extremely High	Moderate	Low
Ametoctradin + Dimethomorph	Zampro	Extremely High	Slight	Moderate
Copper (octanoate)	Cueva	Risky	Risky	Nil

Table 3: Acute Toxicity Hazard of Herbicide Active Ingredients to Fresh Water Fish, Birds, and Bees

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Active Ingredient	Product Names	Relative Ranking		
		Fish	Birds	Bees
Glufosinate ammonium	Ignite	Low	Low	Low
Riumsulfuron	Prism, Riumsulfuron 25	Low	Low	Low
Fomesafen	Reflex	Low	Low	Low
Glyphosate	Roundup WeatherMax/Ultra 2	Slight	Low	Low
s-metolachlor	Dual II Magnum, UPI S-Met	Slight	Low	Low
Sulfentrazone	Authority, STZ	Slight	Low	Low
Clethodim	Arrow 240 EC, Select EC, Clethodim 250	Low	Slight	Low
Carfentrazone-ethyl	Aim EC	Moderate	Low	Low
Fluazifop-p-butyl	Venture	Moderate	Low	Low
EPTC	Eptam 8E	Moderate	Slight	Low
Endothall	Des-I-Cate	Slight	Moderate	Nil
Dimethenamid-P	Outlook, Fontier Max	Moderate	Slight	Low
Sethoxydim	Plus Ultra	Slight	Low	Moderate
Metribuzin	Sencor 75DF, Sencor 480 F, Metrix, TriCor 75 DF	Moderate	Moderate	Low
Metribuzin + s-metolachlor	Boundary LQD	Moderate	Moderate	Low
Diquat	Reglone dessicant	Moderate	Moderate	Low
Paraquat	Gramoxone	Moderate	Moderate	Low
Fenoxaprop-p-ethyl	Excel Super	High	Low	Low



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Active Ingredient	Product Names	Relative Ranking Fish	Relative Ranking Birds	Relative Ranking Bees
Linuron	Lorox L, Lorox DF, Linuron 400 FL	High	Moderate	Low