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Pest Control Products Sales Report for 2017

Canada 



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Foreword

In November 2006, the Pest Control Products Sales Information Reporting Regulations came into force, making mandatory under the *Pest Control Products Act* the reporting of sales information by registrants to Health Canada's Pest Management Regulatory Agency (PMRA).

These regulations require registrants to submit annually to the PMRA the total volume of all their products registered with the PMRA and made available for sale to users (referred to as "sold" in the remainder of this report). These data are reported by calendar year (1 January to 31 December) and must be submitted by 1 June of the following year. The purpose of the sales information reporting program is to collect sales data that are used by the PMRA to better understand potential pesticide use in Canada.

Sales data provides additional context in risk assessments of pesticides, in policy development, and in identifying trends in pesticide use. For example, sales data are used in the re-evaluation and special review of pesticides to help understand the presence and value of the pesticide in the Canadian marketplace, as well as to predict the potential impacts if changes are made to the registration status of the pesticide. Sales data are also used to inform the Pesticide Incident Reporting Program on the market share of particular pesticides to help identify potential risks that may require attention. Sales data can also be used as an additional input in market and economic trend analyses and in the development of policies and regulatory updates.

Introduction

This tenth Pest Control Products Sales Report provides an overview of pesticides sold in Canada for the 2017 calendar year, and briefly discusses changes in pesticide sales over the last five years. Data are considered confidential business information and are combined and presented in various ways to ensure confidentiality.

Overall Canadian Pesticide Sales Data

Overview

There were 7416 products registered with the PMRA for use in Canada in the 2017 calendar year. Registrants submitted sales data in different units depending on the product (for example, kilograms, litres). To standardize across varying products, the data have been converted into kilograms of active ingredient (kg a.i.).

All technical grade active ingredient and manufacturing concentrate product information was excluded from calculation as the quantity is reported in the end-use products. Also, products where the data could not be converted to kg a.i., due to the reported units of measure, were excluded from calculation. This includes products that had unusual units, such as colony forming units. The majority of these products are biopesticides which are discussed separately in this document.



Of the remaining 2654 products reported as sold, the overall pesticide sales in Canada in 2017 were 132 135 115 kg a.i., which is a 10% increase from the 120 104 921 kg a.i. sold in 2016 (Figure 1). There is a general increasing trend in pesticide sales between 2013 and 2017.

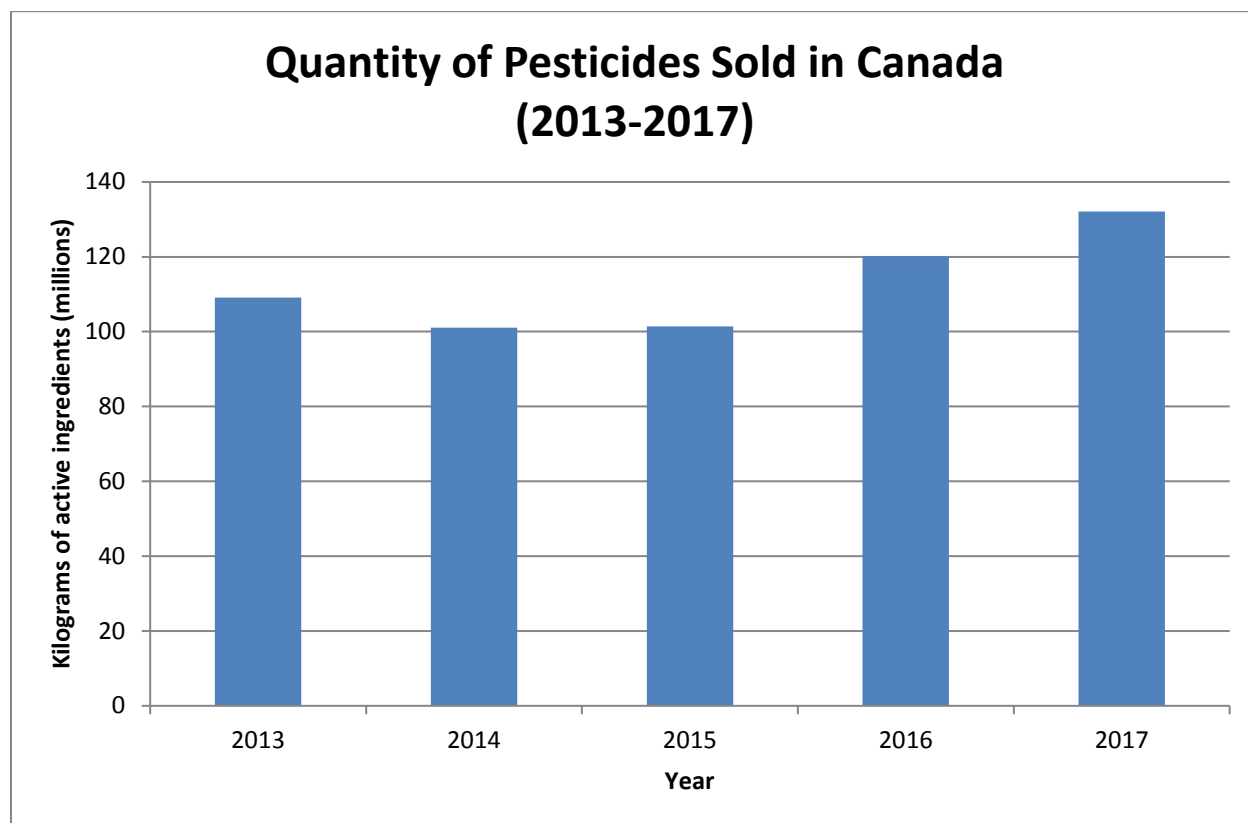


Figure 1: Quantity of pesticides sold in Canada between 2013 and 2017.

In 2017, the 50 products with the greatest sales accounted for 73.7% of the total kg a.i. sold in Canada (97 322 165 kg a.i.). This was an increase in the overall quantity and relative amount from 2016, where the top 50 products accounted for 73.4% of total sales (88 140 587 kg a.i.). The top 10 active ingredients sold, presented in decreasing order in Table 1, made up 71.0% of total sales (93 830 052 kg a.i.). A comprehensive list with the rankings for all active ingredients sold in Canada in 2017 is provided in Appendix I. Seven active ingredients have remained on the top 10 list over the past five years (since 2013): glyphosate, available chlorine, present as sodium hypochlorite, creosote, 2,4-D, surfactant blend, glufosinate ammonium, and mineral oil.



Table 1: Top 10 Active Ingredients Sold in Canada in 2017

Active Ingredient	Product Type
Glyphosate	Herbicide
Available chlorine, present as sodium hypochlorite	Antimicrobial
Creosote	Antimicrobial
Surfactant blend	Other
Glufosinate ammonium	Herbicide
Borates	Insecticide/Fungicide/Antimicrobial
2,4-D	Herbicide
Mineral oil	Insecticide/Fungicide/Other
Available chlorine, present as trichloro-s-triazinetriene	Antimicrobial
Mancozeb	Fungicide

Sales Information by Sector

All products were grouped according to their areas of use into three sectors: Agricultural, Non-Agricultural, and Domestic. (Data from each of the sectors are discussed in more detail in the following sections.)

The groups were designed so there would be no overlap between the groupings. A product was placed into the Domestic sector if its classification was Domestic on its label. For the Non-domestic products, a product with any agricultural use on the label was grouped with the Agricultural sector, even if there were non-agricultural uses listed on the label. All remaining products were grouped as Non-agricultural. In some cases, if upon analysis, it was determined a product in the Agricultural sector had its main usage in the Non-agricultural sector, the product was moved to the Non-agricultural sector group.

Agricultural sector products have constituted the largest amount of pesticides sold in Canada since data collection began, followed by Non-agricultural sector products and Domestic sector products. In 2017, 73.4% of pesticide sales in Canada were of Agricultural sector products (see Figure 2), whereas 21.4% were of Non-agricultural sector products and 5.2% were of Domestic sector products. The relative sales of products in the Agricultural sector decreased between 2016 and 2017 (decreasing from 75% to 73%), while the Non-agriculture sector increased from 20% to 21%, and the Domestic sector remained the same from 2016 to 2017 (see Figure 3 for data from 2013 to 2017).

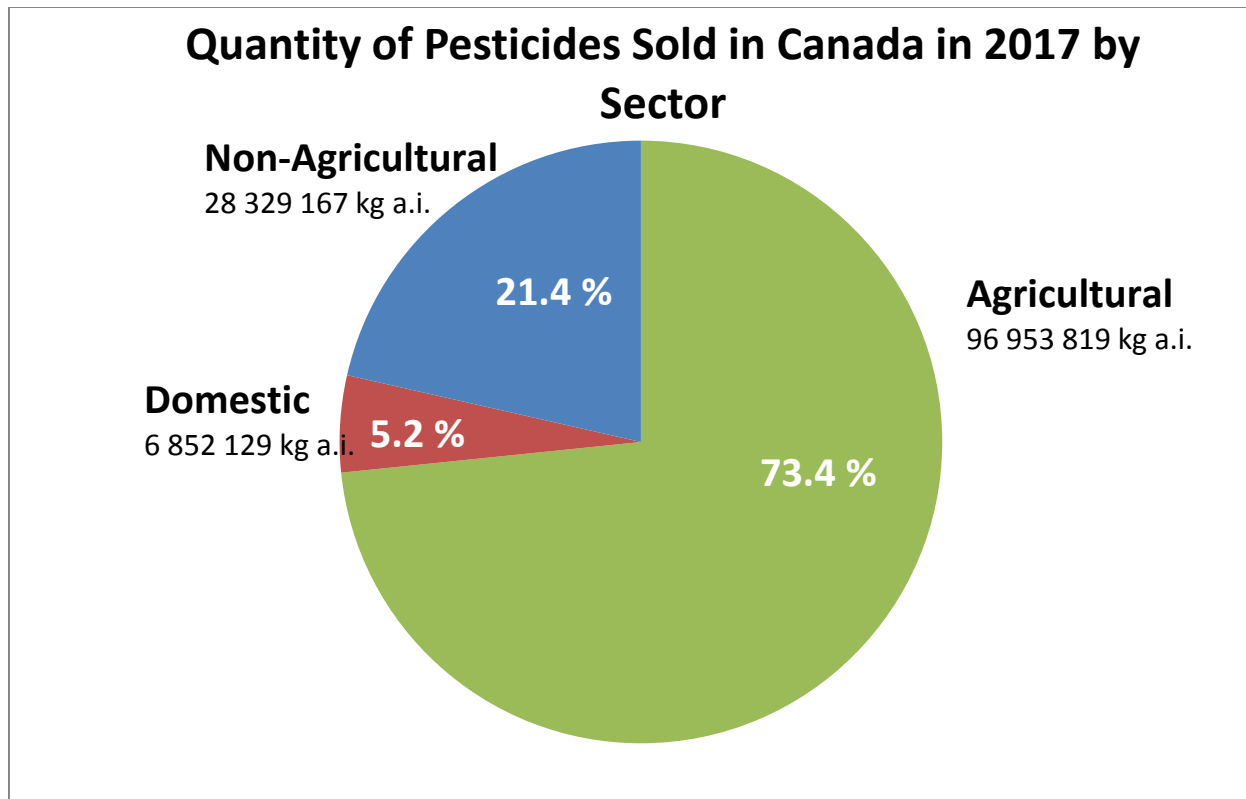


Figure 2: Quantity of pesticides sold in Canada in 2017 by sector.

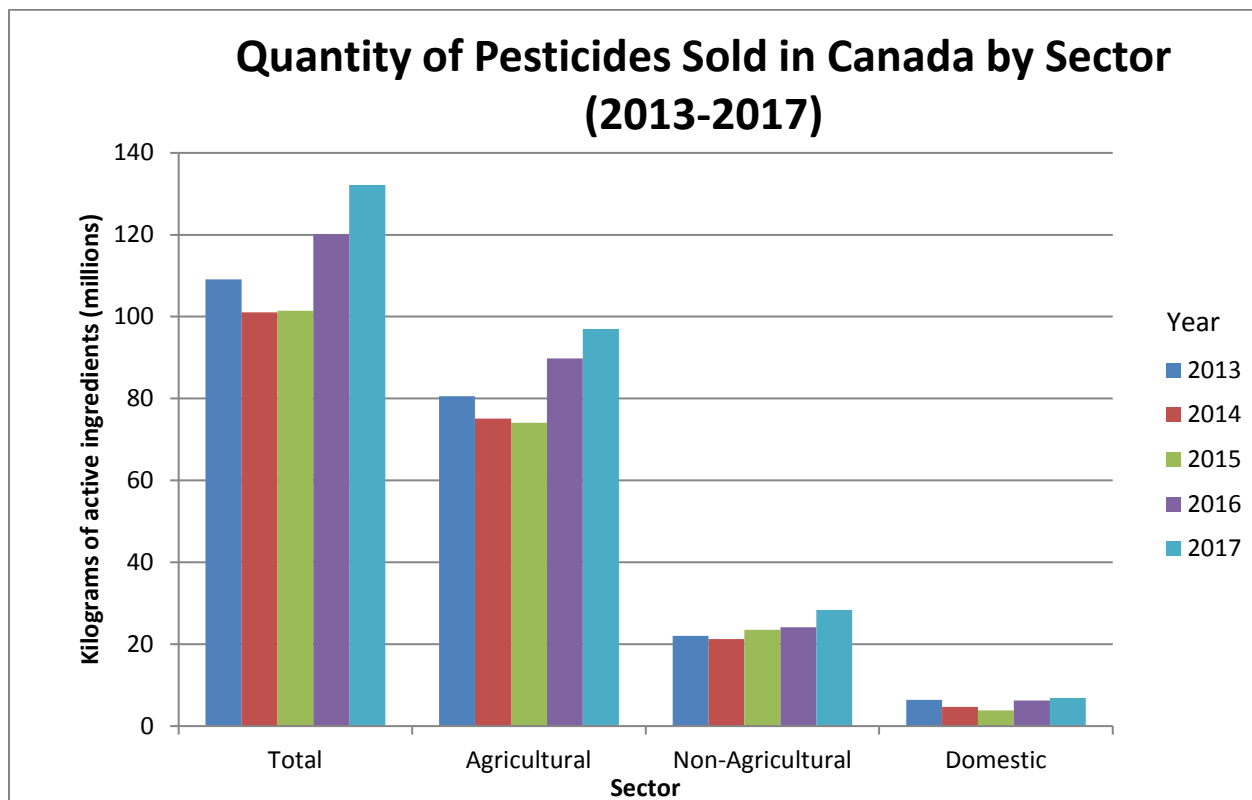


Figure 3: Quantity of pesticides sold in Canada by sector between 2013 and 2017.



Within each sector, data were further broken down into product type groupings. These include: herbicides, insecticides, fungicides, antimicrobials, vertebrate controls, and others (for the remaining products). A product may have a number of different uses on the label. As the sales reporting does not collect data on the relative amount of a product used for a specific label use, the data may not necessarily be separated into only one product type. This means that there may be overlap between the product type groupings and these numbers should not be summed to obtain total quantities sold in Canada in 2017, as an over-reporting would occur.

Agricultural Sector

Products with agricultural uses accounted for 73.4% of pesticide sales in Canada in 2017. There was an 8.0 % increase in Agricultural sector pesticide sales from 2016 (89 761 575 kg a.i.) to 2017 (96 953 819 kg a.i.).

Herbicides accounted for 77.5% of agricultural sector pesticide sales, followed by fungicides (10.0%), insecticides (4.4%), antimicrobials (3.4%), and others (6.0%) (Figure 4). Vertebrate controls (0.04%) accounted for very small quantities of agricultural pesticides sold in 2017 and have been included in the “others” category. Within the Agricultural sector, sales by product type have been consistent, with only small changes seen in the percentage of sales in each type throughout the years reported.

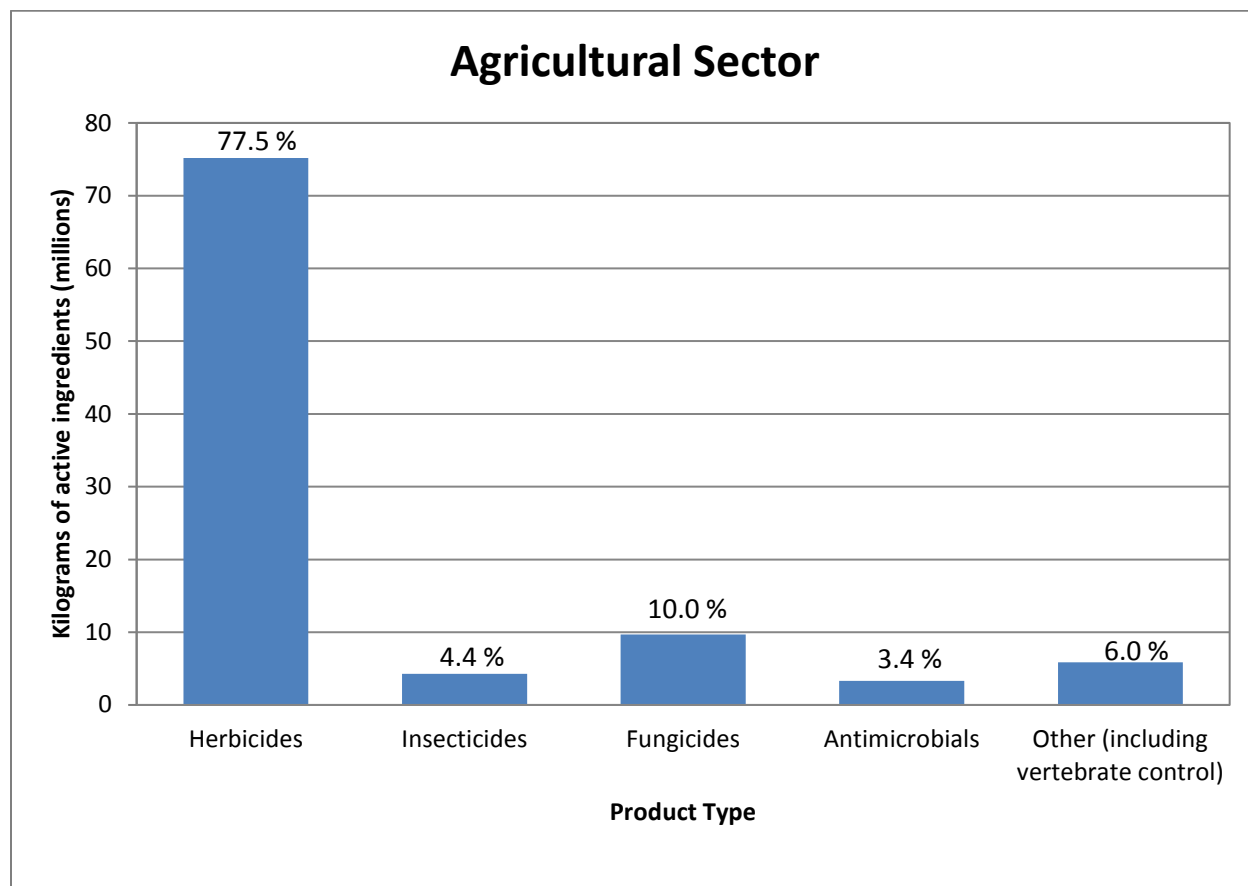


Figure 4: Kilograms of active ingredients sold in Canada in 2017 in the Agricultural sector.



The top 10 active ingredients sold with agricultural uses are shown in Table 2 in decreasing order. Seven of the top 10 agricultural active ingredients were herbicides and adjuvants that are used in conjunction with herbicides. These top 10 active ingredients accounted for 76% of the Agricultural sector pesticides sold. Seven active ingredients have remained in the top 10 over the last five years: glyphosate, 2,4-D, MCPA, glufosinate ammonium, mineral oil, surfactant blend, and mancozeb.

Table 2: Top 10 Active Ingredients Sold in Canada in 2017 in the Agricultural Sector

Active Ingredient	Product Type
Glyphosate	Herbicide
Surfactant blend	Other
Available chlorine, present as sodium hypochlorite	Antimicrobial
Glufosinate ammonium	Herbicide
2,4-D	Herbicide
Mineral oil	Insecticide/Fungicide/Other
Mancozeb	Fungicide
MCPA	Herbicide
Bromoxynil	Herbicide
S-metolachlor and R-enantiomer	Herbicide

Non-Agricultural Sector

Commercial products with non-agricultural uses accounted for 21.4% of all pesticides sold in Canada in 2017 (compared to 20.1% in 2016). Non-agricultural sector pesticide sales increased 17.5% from 2016 to 2017 (from 24 113 430 kg a.i. to 28 329 167 kg a.i.). Over the past few years, there has been some fluctuation in Non-agricultural sector sales, with a large decrease in some years (2012) and smaller increases and decreases in other years.

Antimicrobials accounted for 96.6% of non-agricultural sector sales followed by herbicides (2.2%), fungicides (0.8%), insecticides (0.3%), vertebrate control (0.05%), and others (0.4%) (Figure 5). These last four product types were combined in the figure due to the low quantities of pesticides sold. Fluctuations within the product type groupings have been evident since the start of pesticide sales reporting. However, antimicrobials consistently account for the majority of Non-agricultural sector pesticide sales (ranging from 86% to 96.8%).

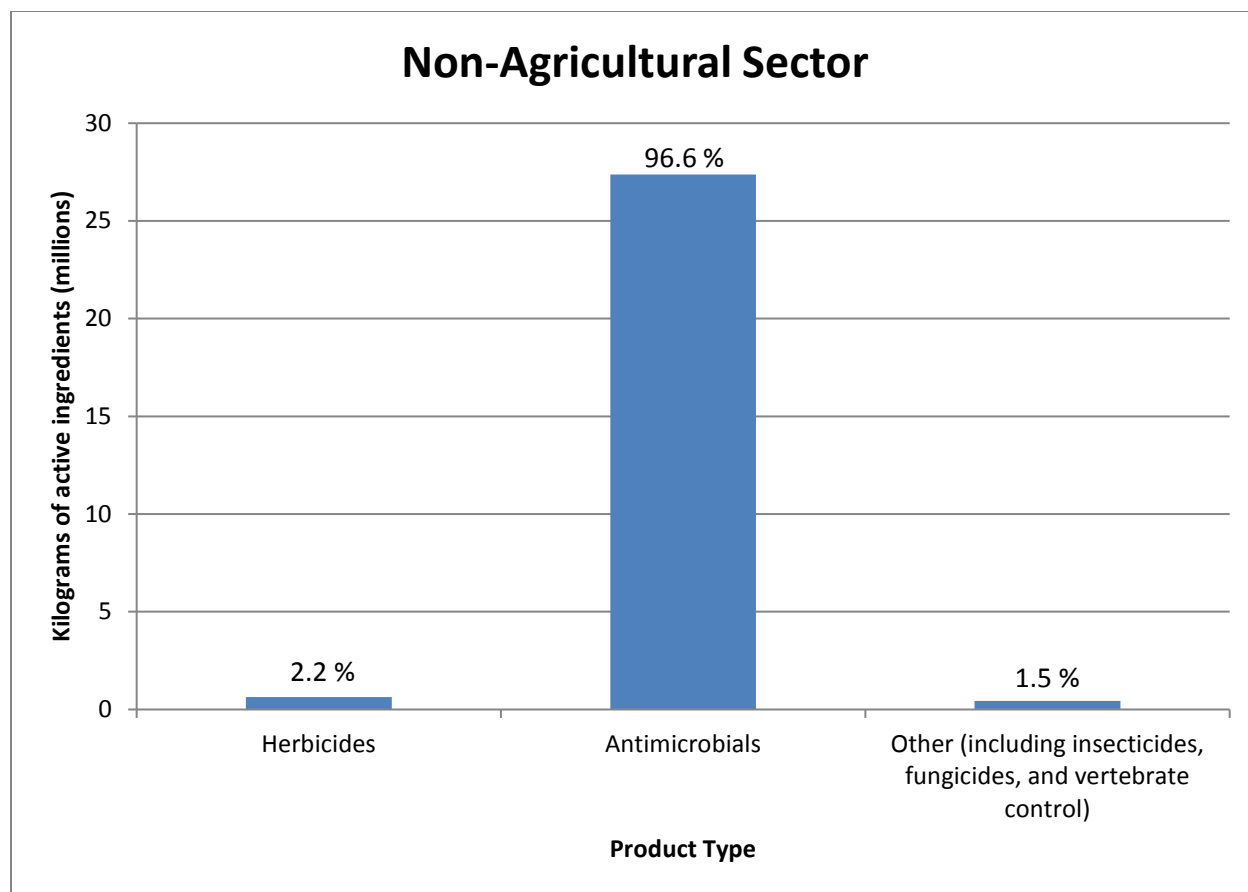


Figure 5: Kilograms of active ingredients sold in Canada in 2017 in the Non-agricultural sector.

The top 10 active ingredients sold with Non-agricultural sector uses were antimicrobials. These are presented in Table 3 in decreasing order. Three of the active ingredients also had other product types in addition to the antimicrobial type (copper, borates, and 2,2-dibromo-3-nitrilopropionamide). Non-agricultural sector products are used predominantly in the wood preservation industry and for water treatment. The top 10 active ingredients accounted for 84.7% of the Non-agricultural sector pesticides sold. Five active ingredients have remained in the top 10 for Non-agricultural sector pesticides over the last five years: available chlorine, present as sodium hypochlorite, creosote, chromic acid, glutaraldehyde, and copper as elemental.



Table 3: Top 10 Active Ingredients Sold in Canada in 2017 in the Non-agricultural Sector

Active Ingredient	Product Type
Available chlorine, present as sodium hypochlorite	Antimicrobial
Creosote	Antimicrobial
Borates	Antimicrobial/Insecticide/Fungicide
Glutaraldehyde	Antimicrobial
Copper as elemental	Antimicrobial/Herbicide/Fungicide
Sodium chlorite	Antimicrobial
2,2-dibromo-3-nitrilopropionamide	Fungicide/Antimicrobial
Chromic acid	Antimicrobial
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)	Antimicrobial
Alkyl-1,3-propylene diamine acetates	Antimicrobial

Domestic Sector

The Domestic Class products accounted for 5.2% of overall pesticide sales in Canada for 2017. There was a 10% increase from 2016 (6 229 916 kg a.i.) to 2017 (6 852 128 kg a.i.) in Domestic sector pesticide sales. Changes from year to year in the Domestic sector may be dependent on changes in regional regulations (for example, restrictions at the municipal or provincial level), as well as changes in weather (for example, hot and sunny summers may result in increased sales of swimming pool and spa products) and changes in the marketing strategies of specific products.

Antimicrobial products accounted for 60.8% of domestic pesticides sold in Canada (Figure 6) (mainly sales of swimming pool and spa products) followed by herbicides (28.9%), insecticides (8.6%), vertebrate controls (1.7%), fungicides (0.3%), and “other” products (0.04%). These last three product types were combined in Figure 6. The Domestic sector has seen fluctuation from year to year in the product-type groupings.

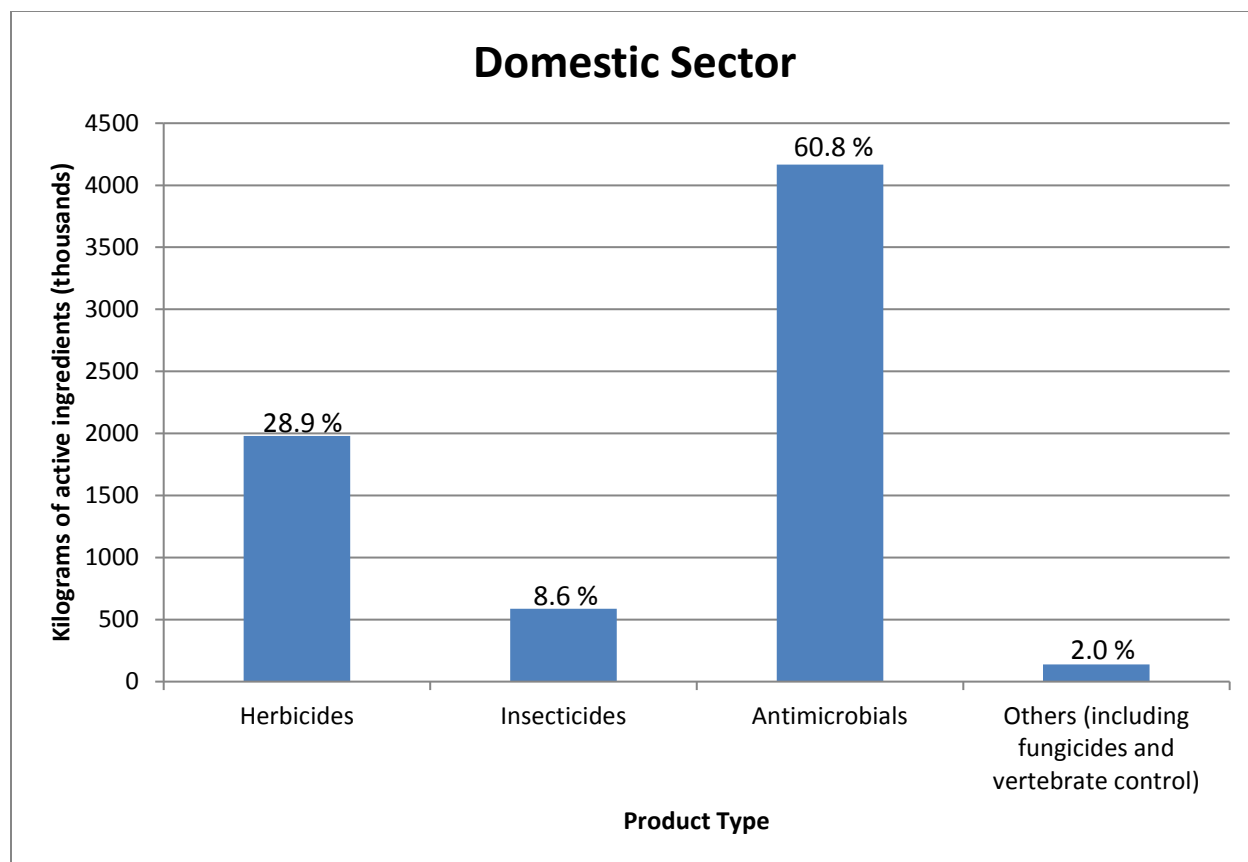


Figure 6: Kilograms of active ingredients sold in Canada in 2017 in the Domestic sector.

The top 10 active ingredients sold for use in the Domestic sector are from three product type groups: antimicrobials, herbicides, and insecticides. They are presented in Table 4 in decreasing order. These active ingredients accounted for 90.1% of the Domestic sector pesticides sold. Of the top 10 products, seven are used for swimming pools and spas. Six active ingredients have remained in the top 10 over the last five years: available chlorine, present as calcium hypochlorite, available chlorine, present as trichloro-s- triazinetrione, n-alkyl (40% C12, 50% C14, 10% C16) dimethyl benzyl ammonium chloride, poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio) ethylene dichloride], DEET, and available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins.

Table 4: Top 10 Active Ingredients Sold in Canada in 2017 in the Domestic Sector

Active Ingredient	Product Type
Available chlorine, present as trichloro-s-triazinetrione	Antimicrobial
Corn gluten meal	Herbicide
Available chlorine, present as calcium hypochlorite	Antimicrobial
Alcohol anhydrous	Antimicrobial
Available bromine, present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	Antimicrobial
Poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio)ethylene dichloride]	Antimicrobial
N-alkyl (40% C12, 50% C14, 10% C16) dimethyl benzyl	Antimicrobial



Active Ingredient	Product Type
ammonium chloride	
DEET*	Insecticide
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	Antimicrobial
Paradichlorobenzene	Insecticide

*Since DEET is an insect repellent, it has been grouped with the insecticides.

Sales Information by Product Type

In the following sections, all pesticides are discussed according to their product type (including herbicides, insecticides, fungicides, antimicrobials, vertebrate controls, and other product types). As previously discussed, a product may have a number of different uses on the label. As the sales reporting does not collect data on the relative amount of a product used for a specific label use, the data may not necessarily be separated into only one product type. This means that there may be overlap between the product type groupings and these numbers should not be summed to obtain total quantities sold in Canada in 2017, as an over-reporting would occur.

Herbicides

Herbicides accounted for 58.8% (77 765 728 kg a.i.) of all pesticides sold in Canada in 2017. This is an increase from 2016 when herbicides accounted for 57.0% of all pesticides sold. This translates into an increase of 13.5% in the quantities of herbicides sold from 2016 (68 504 191 kg a.i.) to 2017 (77 765 728 kg a.i.).

The top 10 herbicides sold in 2017, as listed in Table 5 in decreasing order, accounted for 89.4% of all herbicide sales in Canada and 52.9% of pesticide sales overall. Six active ingredients have remained in the top 10 over the last five years: glyphosate, glufosinate ammonium, 2,4-D, MCPA, bromoxynil, and S-metolachlor and R-enantiomer.

Table 5: Top 10 Herbicide Active Ingredients Sold in Canada in 2017

Active Ingredient
Glyphosate
Glufosinate ammonium
2,4-D
Corn gluten meal
MCPA
Bromoxynil
S-metolachlor and R-enantiomer
Bentazon (present as sodium salt)
Diquat
Metam-sodium



Insecticides

Insecticides accounted for 3.7% (4 932 766 kg a.i.) of all pesticides sold in Canada in 2017. Insecticide sales have remained relatively low during the years of reporting, with the highest quantities sold in 2016 (5 744 585 kg a.i.) and the lowest in 2011 (4 112 386 kg a.i.). Many of the insecticides are used in agricultural settings, though the fifth-most sold insecticide (DEET) is used only in the Domestic sector.

The top 10 insecticides sold in 2017, as listed in Table 6 in decreasing order, accounted for 78.7% of all insecticides sales in Canada and 2.9% of pesticide sales overall. Six insecticides have remained in the top 10 during the last five years of reporting: mineral oil, hydrogen peroxide, chlorpyrifos, silicon dioxide, DEET, and sulphur.

Table 6: Top 10 Insecticide Active Ingredients Sold in Canada in 2017

Active Ingredient
Mineral oil
Hydrogen peroxide
Sulphur
Chlorpyrifos
DEET*
Dimethoate
Thiamethoxam
Malathion
Clothianidin
Silicon dioxide

*Since DEET is an insect repellent, it has been grouped with the insecticides.

Fungicides

Fungicides accounted for 7.5% (9 928 052 kg a.i.) of all pesticides sold in Canada in 2017. Fungicide sales have remained relatively low throughout the reporting years, with a high in 2014 (9 939 107 kg a.i.) and a low in 2010 (5 784 829 kg a.i.). The vast majority of fungicides are used in the Agricultural sector (97.6%).

The top 10 fungicides sold in Canada in 2017, as listed in Table 7 in decreasing order, accounted for 72.2% of fungicide sales and 5.4% of pesticide sales overall. Seven of the active ingredients have remained in the top 10 in the last five years of reporting: chlorothalonil, mancozeb, metam-sodium, pyraclostrobin, prothioconazole, chloropicrin, and sulphur.



Table 7: Top 10 Fungicide Active Ingredients Sold in Canada in 2017

Active Ingredient
Mancozeb
Chlorothalonil
Metam-sodium
Chloropicrin
Prothioconazole
Sulphur
Pyraclostrobin
Boscalid
Tebuconazole
Mono- and dibasic sodium, potassium, and ammonium phosphites

Antimicrobials

Antimicrobials accounted for 26.4% (34 864 449 kg a.i.) of all pesticides sold in Canada in 2017. While most of the antimicrobial active ingredients are used in the Non-agricultural sector, there are a number where the majority of the active ingredient is sold in the Domestic sector. This is true of some of the active ingredients containing available chlorine and available bromine. The high volumes are due to large quantities used in swimming pools and spas, which are mostly for Domestic use.

The top 10 antimicrobial active ingredients sold in 2017, as listed in Table 8 in decreasing order, accounted for 83.2% of all antimicrobial sales in Canada and 22.0% of pesticide sales overall. Six of the active ingredients have remained in the top 10 in the last five years of reporting: available chlorine, present as sodium hypochlorite, as calcium hypochlorite, and as trichloro-s-triazinetriene, creosote, glutaraldehyde, and copper as elemental.

Table 8: Top 10 Antimicrobial Active Ingredients Sold in Canada in 2017

Active Ingredient
Available chlorine, present as sodium hypochlorite
Creosote
Borates
Available chlorine, present as trichloro-s-triazinetriene
Glutaraldehyde
Copper as elemental
Available chlorine, present as calcium hypochlorite
Sodium chlorite
2,2-dibromo-3-nitrilopropionamide
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)



Vertebrate Control

Vertebrate controls accounted for 0.12% (163 405 kg a.i.) of all pesticides sold in Canada in 2017. Since sales data collection began in Canada, products for vertebrate control have always accounted for a very small and consistent amount of overall pesticide sales.

The top 10 vertebrate controls, as listed in Table 9 in decreasing order, accounted for 97.7% of all vertebrate control sales in 2017 and 0.12% of pesticide sales overall. Eight of the active ingredients have remained in the top 10 in the last five years: carbon dioxide gas, cellulose (from powdered corn cobs), aluminum phosphide, sulphur, dried blood, fish meal mixture, thiram, and zinc phosphide.

Table 9: Top 10 Vertebrate Control Active Ingredients Sold in Canada in 2017

Active Ingredient
Cellulose (from powdered corn cobs)
Aluminum phosphide
Carbon dioxide gas
Dried blood
Sulphur
Zinc phosphide
Fish meal mixture
Thiram
<i>Brassica hirta</i> white mustard seed powder
Oil of black pepper

Others

Products fall into the “Others” type when they include uses that are not classified in any of the groups above and include adjuvants, nematicides, and molluscicides. These “other” products accounted for 4.5% (5 958 314 kg a.i.) of pesticide sales in Canada in 2017. Sales in this category have fluctuated slightly over the years of reporting, but have remained fairly low, with a high in 2016 (7 852 564 kg a.i.) and a low in 2008 (2 033 691 kg a.i.). The majority of the label uses of these other active ingredients are in the Agricultural sector (98.4%).

The top 10 active ingredients sold in Canada in 2017 that fall into this type are listed in Table 10 in decreasing order and accounted for 99.8% of “other” type sales and 4.5% of pesticide sales overall. Eight of the active ingredients have remained in the top 10 in the last five years of reporting: surfactant blend, mineral oil, nonylphenoxypolyethoxyethanol, paraffin based petroleum oil, octylphenoxypolyethoxyethanol, triglyceride ethoxylate, polyoxyalkylated alkyl phosphate ester and ethoxylated alcohol, C9-11.



Table 10: Top 10 Other Active Ingredients Sold in Canada in 2017

Active Ingredient
Surfactant blend
Triglyceride ethoxylate
Mineral oil
Paraffin based petroleum oil
Nonylphenoxypolyethoxyethanol
Methylated seed oil of soybean
5,5-dimethylhydantoin
Alcohols, C9-11, ethoxylated
Octylphenoxypolyethoxyethanol
Octadec-9-enoic acid

Biopesticides

Biopesticides include microbial pesticides (which contain a bacterium, fungus, virus, protozoan, or alga as the active ingredient), pheromones and other semiochemical pesticides, and other non-conventional (formerly biochemical) pesticides.

In 2017, there were 175 active ingredients identified as biopesticides, which accounted for 1002 registered products.

The 402 end-use biopesticide products reported as sold have been broken into two groups: 1) those products which could be converted into kg a.i. and 2) microbial products that could not be converted into kg a.i. It is important to note that biopesticide sales are represented in this subsection in addition to being included in each individual product type section above (for example, herbicides, insecticides).

The 316 products that could be converted to kg a.i. accounted for 5.7% of total pesticide sales (7 533 464 kg a.i.) in 2017. There was an 8.0% decrease in biopesticide sales from 2016 (8 190 690 kg a.i.) to 2017. The sales of biopesticides have fluctuated in the years in which data have been collected. Insecticides accounted for 38.8% of the biopesticide sales in 2017 (Figure 7), followed by herbicides (34.6%), fungicides (17.8%), antimicrobials (8.2%), “others” (4.4%), and vertebrate controls (1.6%).

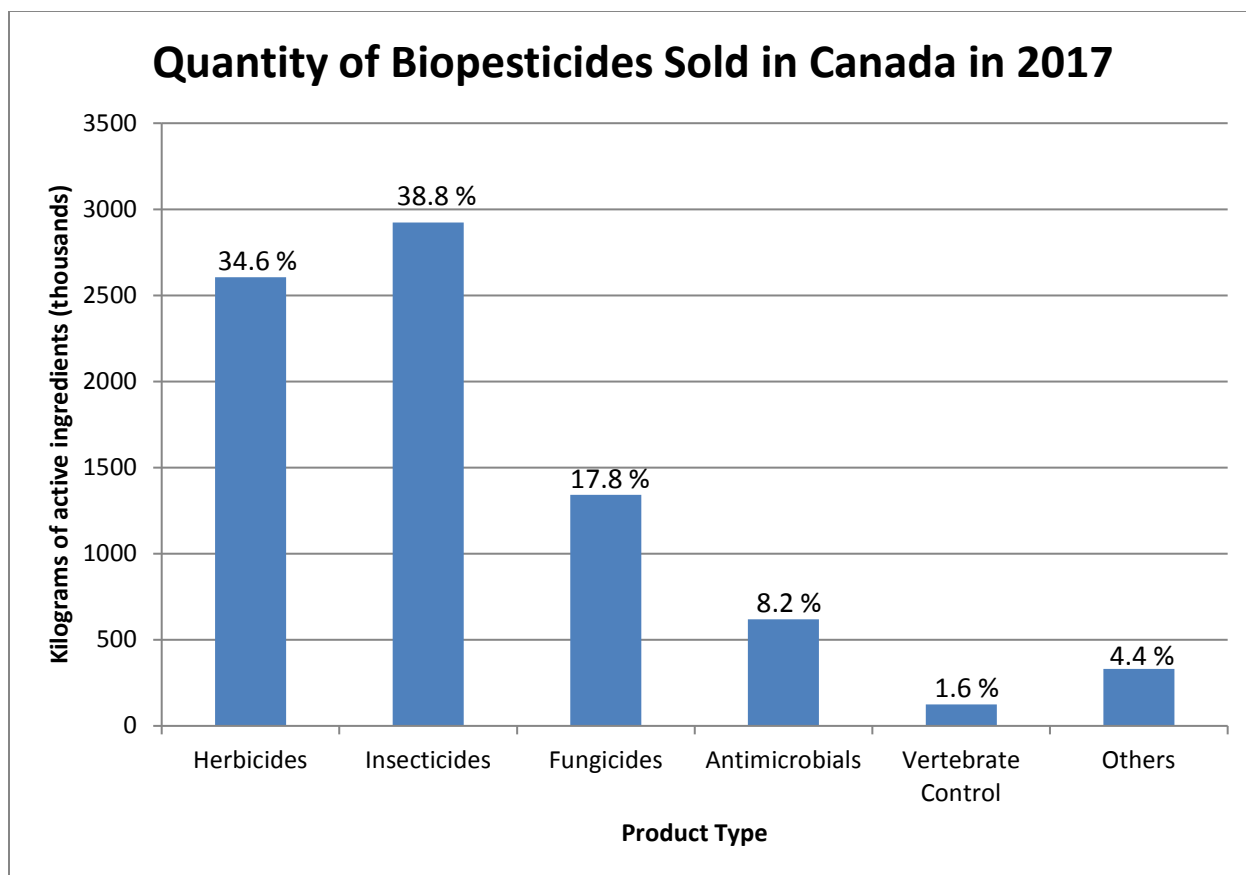


Figure 7: Kilograms of active ingredients of biopesticides sold in Canada in 2017.

The top 10 biopesticide active ingredients sold in Canada are listed in Table 11 in decreasing order. The top 10 active ingredients accounted for 89.5% of sales of biopesticides that could be converted to kg a.i. and 5.1% of pesticide sales overall. Seven of the active ingredients have remained in the top 10 over the last five years: corn gluten meal, mineral oil, sulphur, N-decanol, hydrogen peroxide, mono- and dipotassium phosphite, and mono- and dibasic sodium, potassium, and ammonium phosphites.

Table 11: Top 10 Biopesticide Active Ingredient Sold in Canada in 2017

Active Ingredient	Product Type
Mineral oil	Fungicide/Insecticide/Other
Corn gluten meal	Herbicide
Hydrogen peroxide	Herbicide/Insecticide/Fungicide/Antimicrobial
Sulphur	Fungicide/Insecticide/Vertebrate Control
N-decanol	Herbicide
Alcohol anhydrous	Antimicrobial
Mono- and dibasic sodium, potassium, and ammonium phosphites	Fungicide
Mono- and dipotassium phosphite	Fungicide
Ammonia (present as ammonium sulfate)	Antimicrobial
Cellulose (from powdered corn cobs)	Vertebrate control



The remaining 58 products are microbial agents that could not be converted into kg a.i. due to unconventional units of measure. The amount of products sold in 2017 of these is listed in Table 12.

Table 12: Quantity of Microbials Sold in Canada in 2017

Units of Product Sold	Total
Litres (microbials)	919 204
Kilograms (microbials)	391 152

Sales Information by Chemical Group

Active ingredients have been grouped into chemical groups to present an alternate way of viewing Canadian pesticide sales information (Table 13). The chemical groups were realigned with the Quebec Ministry of Sustainable Development, Environment and Climate Change listings (Quebec, 2016) and are outlined in Appendix II.

In 2017, the chemical group with the largest proportion of sales was the “Phosphonic and phosphinic acids” group at 45%, followed by the “Inorganics” group at 16%. The third group was the “Hydrocarbons” at just over 5%. The remaining chemical groups were all under 5% and 39 out of 54 chemical groups were less than 1% of total sales. Nine chemical families remained in the top 10 from 2016 to 2017.

Table 13: Summary of Pesticide Sales by Chemical Group (All Sectors) in 2017

Chemical Grouping	Kilograms of Active Ingredients	Rank
Phosphonic acids, phosphinic acids	59212012	1
Inorganic	21701889	2
Hydrocarbons	7250137	3
Fatty acids, surfactants	5884969	4
Phenoxy acids	5068497	5
Acylureas	3958650	6
Oils, minerals, vegetable	2414987	7
Others	2161366	8
Benzonitriles	2155639	9
Biscarbamates	2071908	10
Anilides	1824070	11
Alcohols	1677345	12
Dinitrobenzenes	1672886	13
Ammoniums, quaternary	1596722	14
Triazoles	1373331	15
Dithiocarbamates	1304242	16
Aldehydes	1244662	17
Organochlorines	XXX	18
Chlorotriazines	XXX	19
Azoles, oxazoles, thiazoles	670736	20
Amides	647497	21



Chemical Grouping	Kilograms of Active Ingredients	Rank
Methoxyacrylates	631903	22
Triazines, tetrazines	570392	23
Thiocarbamates	XXX	24
Dithiophosphates	XXX	25
Guanidines	401502	26
Imidazolinones	397641	27
Phenols/chlorophenols	361206	28
Benzamides	356658	29
Cyclohexanedione oximes	343404	30
Thiophosphates	316690	31
Urea derivatives	313836	32
Benzoic acid and derivatives	311354	33
Aryloxyphenoxyl acids	302983	34
Phthalic acids	288617	35
Carbamates	238701	36
Organic acids	188172	37
Pyrethroids, pyrethrins	133993	38
Nitrobenzenes	123857	39
Halogenated organic acids	85377	40
Sulfonylureas	84537	41
Morpholines & oxathiines	XXX	42
Phosphates	XXX	43
Pyridines	34487	44
Diazines	28637	45
Organohalogens	20506	46
Phosphoramidothioates	XXX	47
Oximes-carbamates	XXX	48
Pheromones	1952	49
Anilines	1696	50
Organometallics	XXX	51
Chromenones	40	52
Indanediones	XXX	53
Microbials	0	54

XXX Indicates confidential business information. The chemical group did not contain a minimum of four registrants in the calculation of the total.

Future Years

The PMRA is collecting the sales data for the 2018 calendar year. The PMRA will publish the 2018 data once the data analysis is complete.

References

Quebec. Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques. *Bilan des ventes de pesticides au Québec 2016*. Retrieved from ministry website: <http://www.mddelcc.gouv.qc.ca/pesticides/bilan/> on April 2018.

**Appendix I Ranking of all active ingredients sold in Canada in 2017**

Active name	Kilograms of active ingredients
Glyphosate	>50 000 000
Available chlorine, present as sodium hypochlorite	>10 000 000
Creosote	>5 000 000
Surfactant blend	>1 000 000
Glufosinate-ammonium	
Borates	
2,4-D	
Mineral oil	
Available chlorine, present as trichloro-s-triazinetriene	
Mancozeb	
Corn gluten meal	
MCPA	
Glutaraldehyde	
Copper (as elemental)	
Bromoxynil	
Chlorothalonil	
S-metolachlor and R-enantiomer	>500 000
Bentazon (present as sodium salt)	
Metam-sodium	
Diquat	
Available chlorine, present as calcium hypochlorite	
Ethalfuralin	
Chloropicrin	
Trifluralin	
Atrazine (plus related active triazines)	
Sodium chlorite	
Hydrogen peroxide	
2,2-dibromo-3-nitrilopropionamide	
Fluroxypyr (present as 1-methylheptyl ester)	
Prothioconazole	
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)	
Chromic acid	
Available bromine present as 1-bromo-3-chloro-5,5dimethylhydantoin and related hydantoins	>100 000
Sulphur	
Triallate	
N-decanol	
Alkyl-1,3-propylene diamine acetates	
Alcohol anhydrous	
Pyraclostrobin	
Tebuconazole	



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Active name	Kilograms of active ingredients
Arsenic pentoxide	
Boscalid	
Triglyceride ethoxylate	
N-alkyl (40% C12, 50% C14, 10% C16)dimethyl benzyl ammonium chloride	
Mono- and dibasic sodium, potassium, and ammonium phosphites	
Pentachlorophenol	
Poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio)ethylene dichloride]	
Mono- and dipotassium phosphite	
Dicamba	
Chlorpyrifos	
Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine	
Paraffin base petroleum oil	
Nonylphenoxypolyethoxyethanol	
Captan	
Mecoprop	
Propiconazole	
DEET	
Sodium bromide	
Metribuzin	
Available chlorine present as 1-bromo-3-chloro-5,5dimethylhydantoin and related hydantoins	
Imazamox	
Ammonia (present as ammonium sulfate)	
Dimethoate	
Clethodim	
Ammonium bromide	
Imazethapyr	
Acrolein	
Thiamethoxam	
Saflufenacil	
Malathion	
Bronopol	
Fluxapyroxad	
Ziram	
Dimethenamid-p	
Clothianidin	
Metconazole	
Methylated seed oil of soybean	
Pinoxaden	
5,5-dimethylhydantoin	
Silicon dioxide	



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Active name	Kilograms of active ingredients
Paradichlorobenzene	
Linuron	
Soap	
Clodinafop-propargyl	
Potassium dimethyldithiocarbamate	
Pendimethalin	
Iprodione	
Metiram	
Picoxystrobin	
Cellulose (from powdered corn cobs)	
Sodium chloride	>50 000
Mineral spirits	
Quizalofop-p-ethyl	
2,4-DB	
Alcohols, C9-11, ethoxylated	
Chlorpropham	
Available chlorine present as 1,3-dichloro-5,5-dimethylhydantoin and 1,3-dichloro-5-ethyl-5-methylhydantoin	
Fenoxaprop-P-ethyl	
Sethoxydim	
Azoxystrobin	
Iron	
Carbathiin	
Mesotrione	
Permethrin	
Chlormequat chloride	
Clomazone	
Dazomet	
Tralkoxydim	
Cyantraniliprole	
Naled	
Acetic acid	
Didecyldimethylammonium present as carbonate and bicarbonate salts	
Octylphenoxypolyethoxyethanol	
Sodium chlorate	
Lime sulphur	
Didecyldimethylammonium chloride	
Available chlorine, present as sodium dichloro-s-triazinetriene	
Metalaxyl	
Fosetyl-AL	
Difenoconazole	



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Active name	Kilograms of active ingredients
Propamocarb hydrochloride	
Pyrasulfotole	
Octhilinone	<50 000
Clopyralid	
1,2-benzisothiazolin-3-one	
1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride	
N-alkyl(5% C12, 60% C14, 30% C16, 5% C18)dimethylbenzylammonium chloride	
Thiram	
Fomesafen	
Iodocarb	
Pyrimethanil	
Carbaryl	
N-alkyl(68% C12, 32% C14)dimethylethylbenzylammonium chloride	
EPTC	
Sulfuryl fluoride	
Aluminum phosphide	
Phorate	
Available chlorine present as 1-bromo-3-chloro-5,5dimethylhydantoin, 1,3-dichloro-5,5-dimethylhydantoin, 1,3dichloro-5-ethyl-5-methylhydantoin and related hydantoins	
Sulfentrazone	
Pyroxasulfone	
Flumioxazin	
Hexazinone	
Fluazinam	
Carfentrazone-ethyl	
Kaolin	
Simazine plus related active triazines	
Imidacloprid	
5-chloro-2-methyl-4-isothiazolin-3-one	
Lambda-cyhalothrin	
Chlorantraniliprole	
Isoxaflutole	
Sedaxane	
Picloram	
Triclopyr-butotyl	
Flucarbazone (present as flucarbazone-sodium)	
Potassium bicarbonate	
Ethephon	
Tribenuron-methyl	



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Active name	Kilograms of active ingredients
Octadec-9-enoic acid	
Maleic hydrazide	
Streptomycin present as sulphate	
Trifloxystrobin	
Ferrous sulfate monohydrate	
Formic acid	
Phosmet	
Thiophanate-methyl	
Metam-potassium	
Florasulam	
Oxydiethylene bis(alkyl dimethyl ammonium chloride)	
Fludioxonil	
Imazamethabenz-methyl	
Sodium dimethyldithiocarbamate	
Nabam	
Fluopyram	
Dichlobenil	
N-alkyl(67% C12, 25% C14, 7% C16, 1% C18)dimethylbenzylammonium chloride	
Thiabendazole	
Formaldehyde	
Dichlorprop	
Paraquat	
Piperonyl butoxide	
Diflufenzopyr	
Sodium omadine	
Thifensulfuron-methyl	
Fluazifop-p-butyl	
Mandipropamid	
4,5-dichloro-2-n-octyl-3(2H)isothiazolone	
Folpet	
4-chloro-3-methylphenol (sodium salt)	
Pyroxsulam	
2-methyl-4-isothiazolin-3-one	
Diazinon	
Carbendazim	
1,3-bis(hydroxymethyl)-5,5-dimethylhydantoin	
2-(hydroxymethyl)-2-nitro-1,3-propanediol	
Imazapyr	
Icaridin	
Thiencarbazone-methyl	
Prometryne plus related active triazines	
Diodofon	



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Active name	Kilograms of active ingredients
Bifenthrin	
Triticonazole	
Sulfoxaflor	
1,2-dibromo-2,4-dicyanobutane	
Deltamethrin	
Ferbam	
2-(thiocyanomethylthio)benzothiazole	
Acephate	
Garlic juice	
Diuron	
2-phenylphenol	
Zinc	
Oxirane derivatives (50% minimum)	
Flonicamid	
Fenamidone	
Aminopyralid	
Carbon dioxide gas	
Dried blood	
Siloxylated polyether	
Fluoxastrobin	
Dichlorvos	
Methylene bis(thiocyanate)	
Tebufenozide	
Penflufen	
Spinetoram	
Silica gel (amorphous)	
Benzovindiflupyr	
Daminozide	
Fenhexamid	
Dimethomorph	
Rimsulfuron	
MCPB	
Penthiopyrad	
Pyraflufen-ethyl	
Spirotetramat	
Terbacil	
2,2'-(1-methyltrimethylenedioxy)bis-(4-methyl-1,3,2dioxaborinane)	
Pyrethrins	
Barium metaborate monohydrate	
Potassium peroxymonosulfate (present as potassium peroxymonosulfate sulfate)	



Active name	Kilograms of active ingredients
Flumetsulam	
Aminocyclopyrachlor	
Methomyl	
3-decen-2-one	
Spinosad	
Chlorimuron-ethyl	
Ametoctradin	
Cymoxanil	
Peracetic acid	
Cypermethrin	
Topramezone	
Napropamide	
Metsulfuron-methyl	
Chlorthal-dimethyl	
Octylbicyclo heptene dicarboximide	
Hydroxymethyl-5,5-dimethylhydantoin	
Dodecylguanidine hydrochloride	
Zinc phosphide	
Acifluorfen-sodium	
Tetramethrin	
Propyzamide	
Cyazofamid	
Trinexapac-ethyl	
Canola oil	
Fish meal mixture	
Cyprodinil	
Myclobutanil	
Halauxifen-methyl	
Oxyfluorfen	
Tembotrione	
Garlic powder	
Acetamiprid	
D-phenothrin	
Thiacloprid	
2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane)	
Methoxyfenozone	
D-cis, trans-allethrin	
(S)-methoprene	
Metrafenone	
Ethofumesate	
Halosulfuron (present as methyl ester)	
Ethaboxam	
P-menthane-3,8-diol	



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Active name	Kilograms of active ingredients
Indaziflam	
Novaluron	
Fluopicolide	
Famoxadone	
Spiromesifen	
Bifenazate	
From nanogen: chlorocresol (or: parachlorocresol)	
Tetrachlorvinphos	
Oriental mustard seed meal	
Bromacil (present in free form, as dimethylamine salt, or as lithium salt)	
Cyflumetofen	
Flupyradifurone	
Quinoxifen	
Amitraz	
<i>Brassica hirta</i> white mustard seed powder	
Pyridaben	
Tefluthrin	
Diphenylamine	
Oxadiazon	
Chlorsulfuron	
Acequinocyl	
Ipconazole	
Quinclorac	
Oil of lemon eucalyptus, hydrated, cyclized	
N-alkyl(40% C12, 50% C14, 10% C16)dimethylbenzylammonium saccharinate	
Oil of black pepper	
Prohexadione calcium	
Azamethiphos	
Isofetamid	
Phenmedipham	
Desmedipham	
Oxalic acid	
Bicyclopyrone	
Azadirachtin	
Strychnine	
Naphthalene	
Tea tree oil	
Dried eggs	
Nicosulfuron	
4-chloroindole-3-acetic acid	
Sodium alpha-olefin sulfonate	



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Active name	Kilograms of active ingredients
1,4-dimethylnaphthalene	
Kresoxim-methyl	
Beta-cyfluthrin	
Foramsulfuron	
Metaldehyde	
Mandestrobin	
Fenbutatin oxide	
10,10'-oxybis(phenoxarsine)	
Magnesium phosphide	
Citronella oil	
Liquid corn gluten	
Fenbuconazole	
Cloransulam-methyl	
Capsaicin	
Zoxamide	
Spirodiclofen	
Etridiazole	
Methyl nonyl ketone	
Phosphine	
Propoxur	
3-(trimethoxysilyl)-propyldimethyloctadecyl ammonium chloride	
Meat meal mixture	
Cyfluthrin	
6-benzylaminopurine (or: 6-benzyladenine)	
Abamectin	
Codlure	
Citronella terpene	
Wintergreen oil	
Natamycin	
Chlorfenapyr	
Ethametsulfuron-methyl	
Bis(trichloromethyl)sulfone	
Gibberellic acid	
Buprofezin	
Related capsaicinoids	
Lactic acid	
Kasugamycin hydrochloride hydrate	
Oxathiapiprolin	
Prohydrojasmon	
Methyl bromide	
D-trans-allethrin	
Garlic oil	
Polybutene	



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Active name	Kilograms of active ingredients
Verbenone	
Fish oil mixture	
Sodium 2-phenylphenate	
Castor oil	
(Z)-9-dodecenyl acetate + (Z)-11-tetradecenyl acetate	
Citric acid	
Tau-fluvalinate	
Pyriproxyfen	
Pyriofenone	
Z-8-dodecen-1-yl acetate	
Octenol	
Clove oil	
D-limonene	
Coumaphos	
Naphthylacetic acid	
S-kinoprene	
Paclobutrazol	
1-MCP	
1-dodecanol	
Fenpyroximate	
Bispyribac-sodium	
Artificial grape extract	
Piperine	
Triflurosulfuron-methyl	
Di-n-propyl isocinchomeronate	
Diisobutylphenoxyethoxyethyl dimethylbenzylammonium chloride	
3-methyl-2-cyclohexen-1-one	
Bromadiolone	
N-dialkyl(5% C12, 60% C14, 30% C16, 5% C18)methylbenzylammonium chloride	
Muscalure	
Denatonium benzoate	
(Z,Z)-3,13-octadecadien-1-yl acetate	
Warfarin	
Diflubenzuron	
Pine needle oil	
Lemon oil	
Eucalyptus oil	
Oil of geranium	
Diphacinone (present in free form or as sodium salt)	
Chlorophacinone	
Garlic	
1-tetradecanol	



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Active name	Kilograms of active ingredients
1-alkyl(C6-C18)-1,3-propanediamine	
(E,Z)-3,13-octadecadien-1-yl acetate	
4-aminopyridine	
E-8-Dodecen-1-yl acetate	
Sodium monofluoroacetate	
Metofluthrin	
Camphor oil	
Bromethalin	
Brodifacoum	
Difethialone	
(Z)-11-tetradecenyl acetate	
Butoxypolypropylene glycol	
Saponins of <i>Chenopodium quinoa</i>	
Z-8-Dodecen-1-ol	
(9Z,12E)-9,12-tetradecadien-1-yl acetate	
Prosulfuron	
Uniconazole-P	
Aviglycine hydrochloride	
Pymetrozine	
(Z)-9-tetradecen-1-yl acetate	
Ancymidol	
Nicarbazin	
(Z)-11-tetradecen-1-ol	
4-CPA	
(Z)-11-tetradecenal	
Rotenone	
N-alkyl(3% C12, 95% C14, 2% C16)dimethylbenzylammonium chloride (or: myristyl dimethylbenzylammonium chloride dihydrate)	
Propoxycarbazone-sodium	
<i>Streptomyces griseoviridis</i> strain K61	
<i>Streptomyces lydicus</i> strain WYEC108	
Nucleopolyhedrovirus for gypsy moth larvae	
<i>Lactobacillus casei</i> strain LPT-111	
Triforine	
Sodium cyanide	
3-ketopetromyzonol-24-sulfate, ammonium salt	
Polyoxyalkylated alkyl phosphate ester	
<i>Pantoea agglomerans</i>	
Spiroxamine	
Prallethrin	
Nucleopolyhedrovirus for Douglas-fir tussock moth	
Sulfuric acid	



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Active name	Kilograms of active ingredients
N-alkyl(25% C12, 60% C14, 15% C16)dimethylbenzylammonium chloride	
Propetamphos	
Soybean oil	
(E,Z)-11-tetradecenal	
<i>Metarhizium anisopliae</i> (strain F52)	
<i>Trichoderma asperellum</i> , strain T34	
<i>Pasteuria nishizawae</i> PN1	
Momfluorothrin	
Dioctyldimethylammonium chloride	
<i>Trichoderma virens</i> strain G-41	
Thidiazuron	
Primisulfuron-methyl	
Oxycarboxin	
Oxamyl	
Sodium fluoride	
Naphthaleneacetamide	
<i>Streptomyces acidiscabies</i> strain RL-110T cells and spent fermentation media	
Sulfometuron methyl	
Triethylene glycol	
Thymol	
<i>Lactococcus lactis</i>	
4-nitro-3-(trifluoromethyl)phenol sodium salt	
<i>Phoma macrostoma</i>	
(Z)-8-dodecenyl acetate + (E)-8-dodecenyl acetate + (Z)-8dodecen-1-ol	
<i>Nosema locustae</i> canning, (spore of)	
(Z,Z)-3,13-octadecadien-1-ol	
Tetraconazole	
<i>Paecilomyces fumosoroseus</i> strain FE 9901	
Noviflumuron	
N-alkyl(5% C5-18, 61% C12, 23% C14, 11% C16)dimethylbenzylammonium chloride	
Propylene glycol	
<i>Neodiprion abietis</i> nucleopolyhedrovirus	
Paraformaldehyde	
Thyme oil	
<i>Verticillium albo-atrum</i> , isolate WCS850	
<i>Trichoderma harzianum</i>	
Octyldecyldimethylammonium chloride	
Tolpyralate	
Sodium lauryl sulfate	



Active name	Kilograms of active ingredients
<i>Clavibacter michiganensis</i> (spp michiganensis) bacteriophage	
Picolinafen	
Tepraloxydim	
Mesosulfuron-methyl	
Tributyl tetradecyl phosphonium chloride	
Available chlorine, present as lithium hypochlorite	
Quintozone	
R-(-)-1-octen-3-ol	
Methyl salicylate	
Nuclear polyhedrosis virus of red-headed pine sawfly	
(E,E)-8,10-dodecadien-1-ol + 1-dodecanol + 1-tetradecanol	
Extract of <i>Reynoutria sachalinensis</i>	
Pyrazon	
(E)-11-tetradecenyl acetate	
Triclopyr triethylamine salt	
Polyoxin D zinc salt, Polyoxorim-zinc	
(E)-4-tridecenyl acetate + (Z)-4-tridecenyl acetate	
<i>Phlebiopsis gigantea</i>	
Petroleum hydrocarbon blend	
<i>Lactobacillus rhamnosus</i> (strain LPT-21)	
Etoxazole	
Cloquintocet-mexyl	
Imiprothrin	
1-octanol	
(E,Z)-9-dodecenyl acetate	
<i>Bacillus sphaericus</i>	
Amitrole	
<i>Bacillus subtilis</i>	
<i>Bacillus thuringiensis</i>	
Ethylene oxide	
<i>Pseudomonas fluorescens</i>	
Hydramethylnon	
(E,Z)-2,13-octadecadien-1-ol	
Fenpropimorph	
BLAD polypeptide	
1-(alkyl-amino)-3-carboxymethylaminopropane (component of AMPHO 443-31)	
(E,Z)-2,13-octadecadien-1-yl acetate	
Etofenprox	
Ammonia (present as ammonium carbamate)	
N-coco-alkyltrimethylene diamines present as monobenzoate salt	
Dithiopyr	
Fungus: <i>Gliocladium catenulatum</i>	



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Active name	Kilograms of active ingredients
Dodine	
<i>Bacillus firmus</i> strain I-1582	
Bensulide	
Flutriafol	
<i>Sclerotinia minor</i> IMI 3144141	
Flumethrin	
Clofentezine	
Cyprosulfamide	
Endothal or Endothall	
German cockroach extract	
Flufenacet	
<i>Bacillus amyloliquefaciens</i> , strain D747	
<i>Bacillus mycoides</i> isolate J	
Acibenzolar-s-methyl	
(ACMNPV) cabbage looper	
Cyphenothrin	
Benzyl benzoate	
Niclosamide	
Fluensulfone	
Putrescent whole egg solids	
<i>Pseudomonas syringae</i> - strain ESC-10	
Isoxaben	
<i>Coniothyrium minitans</i> strain CON/M/91-08	
1-(alkyl-amino)-3-aminopropane hydrochloride (component of AMPHO 443-31)	
Isopropyl alcohol	
Alkyl(C12-16)dimethylamine oxide	
Iodosulfuron-methyl-sodium	
3-chloro-P-toluidine hydrochloride	
<i>Agrobacterium radiobacter</i>	
1,4-bis(bromoacetoxy)-2-butene	
Disodium cyanodithioimidocarbonate	
2-bromo-4'-hydroxyacetophenone	
<i>Beauveria bassiana</i>	
<i>Cydia pomonella</i> granulosus virus	
Cyclaniliprole	
<i>Chondrostereum purpureum</i> (strain: North American; pathovar: PFC2139)	
Formetanate hydrochloride	
Cornmint oil	
Cyromazine	
<i>Aureobasidium pullulans</i>	

**Appendix II Chemical Groups and Active Ingredients–2017**

Chemical Group	Active Ingredient Name
Acylureas	Bromacil (present in free form as dimethylamine salt or as lithium salt) Bentazon (present as sodium salt) Bentazone Cymoxanil Diflubenzuron Iprodione Noviflumuron Novaluron Terbacil Hexazinone
Alcohols	Alcohols, C9-11, ethoxylated Aviglycine hydrochloride Bronopol Butoxypolypropylene glycol Alcohol anhydrous Ethylene oxide N-decanol 1-octanol Tetrakis (hydroxymethyl) phosphonium sulphate (THPS) Isopropyl alcohol Oil of lemon eucalyptus, hydrated, cyclized P-menthane-3,8-diol Propylene glycol Siloxylated polyether Triethylene glycol 2-(hydroxymethyl)-2-nitro-1,3-propanediol
Aldehydes	Formaldehyde Glutaraldehyde Metaldehyde Paraformaldehyde
Amides	2,2-dibromo-3-nitrilopropionamide Capsaicin Piperine Daminozide Isofetamid Mandipropamid Naphthaleneacetamide Napropamide Related capsaicinoids Saflufenacil



Chemical Group	Active Ingredient Name
Ammoniums, Quaternary	<p>Chlormequat chloride</p> <p>1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride</p> <p>Alkyl(C12-16)dimethylamine oxide</p> <p>Denatonium benzoate</p> <p>Diquat</p> <p>Paraquat</p> <p>N-alkyl (25% C12, 60% C14, 15% C16) dimethylbenzylammonium chloride</p> <p>N-alkyl (40% C12, 50% C14, 10% C16) dimethyl benzyl ammonium chloride</p> <p>N-alkyl (68% C12, 32% C14) dimethylethylbenzylammonium chloride</p> <p>Didecyldimethylammonium chloride</p> <p>N-alkyl (5% C12, 60% C14, 30% C16, 5% C18) dimethylbenzylammonium chloride</p> <p>N-alkyl (67% C12, 25% C14, 7% C16, 1% C18) dimethylbenzylammonium chloride</p> <p>Diisobutylphenoxyethoxyethyl dimethylbenzylammonium chloride</p> <p>N-alkyl (5% C5-18, 61% C12, 23% C14, 11% C16) dimethylbenzylammonium chloride</p> <p>N-alkyl (40% C12, 50% C14, 10% C16) dimethylbenzylammonium saccharinate</p> <p>Didecyldimethylammonium present as carbonate and bicarbonate salts</p> <p>Decyl isononyl dimethyl ammonium chloride</p> <p>Dioctyldimethylammonium chloride</p> <p>Octyldecyldimethylammonium chloride</p> <p>N-dialkyl (5% C12, 60% C14, 30% C16, 5% C18) methylbenzylammonium chloride</p> <p>Oxydiethylene bis(alkyl dimethyl ammonium chloride)</p> <p>N-alkyl (3% C12, 95% C14, 2% C16) dimethylbenzylammonium chloride (or: myristyl dimethylbenzylammonium chloride dihydrate)</p> <p>3-(trimethoxysilyl)-propyldimethyloctadecyl ammonium chloride</p>
Anilides/Anilines	<p>S-Metolachlor and R-Enantiomer</p> <p>Amitraz</p> <p>Niclosamide</p> <p>Benzovindiflupyr</p> <p>Boscalid</p> <p>3-chloro-P-toluidine hydrochloride</p> <p>Dimethenamid-P</p> <p>Diphenylamine</p> <p>Fenhexamid</p> <p>Flufenacet</p> <p>Flumioxazin</p> <p>Fluxapyroxad</p> <p>Artificial grape extract</p> <p>Metalaxyl-m and s-isomer</p> <p>Metalaxyl</p> <p>Picolinafen</p> <p>Penflufen</p> <p>Penthiopyrad</p> <p>Sedaxane</p>



Chemical Group	Active Ingredient Name
Aryloxyphenoxyl Acids	Clodinafop-propargyl Fenoxaprop-P-ethyl Fluazifop-P-butyl Quizalofop-P-ethyl
Azoles, Oxazoles, Thiazoles	Chlorfenapyr 1,2-benzisothiazolin-3-one 4-chloroindole-3-acetic acid Carbendazim Clomazone Fluensulfone Ethaboxam Etoxazole Fenpyroximate Fludioxonil 2-methyl-4-isothiazolin-3-one 5-chloro-2-methyl-4-isothiazolin-3-one 4,5-dichloro-2-n-octyl-3(2H)isothiazolone Isoxaflutole Topramezone Othilinone Oxathiapiprolin Pyraflufen-ethyl Pinoxaden Pyrasulfotole Pyroxasulfone Spirotetramat Strychnine 2-(thiocyanomethylthio)benzothiazole Tolpyralate Etridiazole Thiabendazole
Benzamides	Cyantraniliprole Cyprosulfamide DEET Fluopicolide Fluopyram Isoxaben Chlorantraniliprole Propyzamide Methoxyfenozide Tebufenozide Zoxamide
Benzoic Acid And Derivatives	Acibenzolar-s-methyl Benzyl benzoate Bispyribac-sodium Dicamba (present as acid, amine salt, ester or sodium salt) Methyl salicylate Quinclorac



Chemical Group	Active Ingredient Name
Benzonitriles	Bromoxynil Dichlobenil Chlorothalonil
Biscarbamates	Desmedipham Ferbam Mancozeb Metiram Nabam Phenmedipham Thiram Thiophanate-methyl
Carbamates	Ammonia (present as ammonium carbamate) Propoxur Bifenazate Carbaryl Chlorpropham EPTC Famoxadone Formetanate hydrochloride Iodocarb Methomyl Oxadiazon Oxamyl Propamocarb hydrochloride Icaridin Polyoxin D zinc salt, Polyoxorim-zinc Triallate
Chromenones	Brodifacoum Bromadiolone Difethialone Rotenone Warfarin
Cyclohexanedione Oximes	Clethodim Sethoxydim Tepraloxydim Tralkoxydim
Diazines	Aminocyclopyrachlor Ancymidol 6-benzylaminopurine (or: 6-benzyladenine) Buprofezin Maleic hydrazide Pyridaben Pyrazon Triforine
Dinitrobenzenes	Bromethalin Ethalfluralin Fluazinam Pendimethalin Trifluralin



Chemical Group	Active Ingredient Name
Dithiocarbamates	Dazomet Disodium cyanodithioimidocarbonate Potassium dimethyldithiocarbamate Metam-potassium Metam-sodium Sodium dimethyldithiocarbamate Ziram
Dithiophosphates	Bensulide Dimethoate Malathion Phorate Phosmet
Fatty Acids, Surfactants	N-coco-alkyltrimethylene diamines present as monobenzoate salt Alkyl-1,3-propylene diamine acetates 1-alkyl(C6-C18)-1,3-propanediamine Alkanolamine salts of fatty acids Ammonium salt of fatty acid Fatty acids Nonylphenoxypolyethoxyethanol Octadec-9-enoic acid, methyl ester Octadec-9-enoic acid, ethyl ester Octylphenoxypolyethoxyethanol Paraffin based petroleum oil Polyoxyalkylated alkyl phosphate ester Poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio)ethylene dichloride] Sodium lauryl sulfate Soap (non-specific) Potassium salts of fatty acids Soap (herbicidal) Triethanolamine salts of fatty acids Tributyl tetradecyl phosphonium chloride Triglyceride ethoxylate 10 POE Surfactant blend Surfactant mixture
Guanidines	Hydramethylnon Clothianidin Cyprodinil Dodine Dodecylguanidine hydrochloride Imidacloprid Kasugamycin hydrochloride hydrate Pirimethanil Streptomycin present as sulphate Thiamethoxam



Chemical Group	Active Ingredient Name
Halogenated Organic Acids	Aminopyralid 1,4-bis(bromoacetoxy)-2-butene Cyflumetofen Clopyralid Fluroxypyr (present as 1-methylheptyl ester) Halauxifen-methyl Picloram (present as potassium salts) Picloram (present as acid) Picloram (present as amine salts) Spirodiclofen Triclopyr triethylamine salt
Hydrocarbons	Citronella terpene Creosote 1,4-dimethylnaphthalene Mineral spirits Naphthalene Petroleum hydrocarbon blend Polybutene
Imidazolinones	Imazapyr Imazamethabenz-methyl Fenamidone Imazethapyr Imazamox
Indanediones	Chlorophacinone Diphacinone (present in free form or as sodium salt)
Inorganic Zincs	Zinc as elemental (present as zinc naphthenate) Zinc (present as zinc oxide) Zinc phosphide
Inorganic, Others	Aluminum phosphide Ammonium bromide Arsenic pentoxide Ammonia (present as ammonium sulfate) Barium metaborate monohydrate Borax pentahydrate Borax Boracic acid (boric acid) Disodium octaborate tetrahydrate Borax or sodium borate Available chlorine, present as calcium hypochlorite Chromic acid Copper, present as basic copper sulphate Copper (present as cuprous thiocyanate) Copper (present as copper octanoate) Copper (present as cupric oxide) Metallic copper Copper (present as copper naphthenate) Cupric oxide Copper (present as cuprous oxide) Copper, present as copper 8-quinolinolate



Chemical Group	Active Ingredient Name
	<p>Copper (present as mixed copper ethanolamine complexes or as bis(2-aminoethanolate))</p> <p>Copper (present as copper sulfate pentahydrate)</p> <p>Copper (present as basic copper carbonate)</p> <p>Copper (present as picro cupric ammonium formate and tannate complex)</p> <p>Copper (present as copper oxychloride)</p> <p>Copper (present as copper hydroxide)</p> <p>Borax or disodium tetraborate decahydrate</p> <p>Fosetyl-Al</p> <p>Ferrous sulfate monohydrate</p> <p>Ferric phosphate</p> <p>Hydrogen peroxide</p> <p>Iron (present as ferric phosphate)</p> <p>Iron (present as FeHEDTA)</p> <p>Kaolin</p> <p>Potassium peroxymonosulfate present as potassium peroxymonosulfate sulfate</p> <p>Available chlorine, present as lithium hypochlorite</p> <p>Mono- and dipotassium phosphite</p> <p>Magnesium phosphide</p> <p>Sodium chloride</p> <p>Phosphine</p> <p>Potassium bicarbonate</p> <p>Sodium bromide</p> <p>Sodium chlorite</p> <p>Sodium chlorate</p> <p>Sodium cyanide</p> <p>Sodium fluoride</p> <p>Sulfuryl fluoride</p> <p>Available chlorine, present as sodium hypochlorite</p> <p>Silicon dioxide (present as 100% diatomaceous earth) - fresh water fossils</p> <p>Silica gel (amorphous)</p> <p>Silicon dioxide (present as 100% diatomaceous earth) - salt water fossils</p> <p>Sulphur</p> <p>Lime sulphur</p> <p>Sulfuric acid</p> <p>Zinc borate</p> <p>Zinc as elemental (present as zinc naphthenate)</p> <p>Zinc (present as zinc oxide)</p> <p>Zinc phosphide</p>
Methoxyacrylates	<p>Azoxystrobin</p> <p>Fluoxastrobin</p> <p>Kresoxim-methyl</p> <p>Mandestrobin</p> <p>Pyraclostrobin</p> <p>Picoxystrobin</p> <p>Trifloxystrobin</p>



Microbials	<p> <i>Agrobacterium radiobacter</i> <i>Aureobasidium pullulans</i> DSM 14940 <i>Aureobasidium pullulans</i> DSM 14941 <i>Aureobasidium pullulans</i> DSM 14940 and DSM 14941 (ACMNPV) cabbage looper <i>Beauveria bassiana</i> strain ANT 03 <i>Bacillus firmus</i> I-1582 <i>Beauveria bassiana</i> strain GH4 <i>Beauveria bassiana</i> strain HF23 <i>Bacillus amyloliquefaciens</i>, strain D747 <i>Bacillus mycoides</i> isolate J <i>Pseudomonas fluorescens</i> A506 <i>Pseudomonas syringae</i> - strain ESC-10 <i>Pseudomonas fluorescens</i> CL145A <i>Bacillus subtilis</i> QST 713 <i>Bacillus subtilis</i> (strain GB03) <i>Bacillus subtilis</i> MB1600 <i>Bacillus subtilis</i> var. <i>amyloliquefaciens</i> strain FZB24 <i>Bacillus thuringiensis</i> Berliner spp. <i>kurstaki</i> <i>Bacillus thuringiensis</i> serotype H-14 <i>Bacillus sphaericus</i> <i>Bacillus thuringiensis</i> sp. <i>tenebrionis</i> <i>Bacillus thuringiensis</i> ssp. <i>aizawai</i> <i>Coniothyrium minitans</i> strain CON/M/91-08 <i>Cydia pomonella</i> granulovirus (strain M) <i>Cydia pomonella</i> granulosis virus (strain CMGV4) <i>Chondrostereum purpureum</i> (strain: North American; pathovar: PFC2139) Fungus: <i>Gliocladium catenulatum</i> <i>Sclerotinia minor</i> IMI 3144141 <i>Trichoderma harzianum</i> strain KRL-AG2 <i>Lactobacillus casei</i> strain LPT-111 <i>Lactobacillus rhamnosus</i> (strain LPT-21) <i>Lactococcus lactis</i> ssp. <i>lactis</i> strain LL64/CSL <i>Lactococcus lactis</i> ssp. <i>cremoris</i> strain M11/CSL <i>Lactococcus lactis</i> ssp. <i>lactis</i> strain LL102/CSL <i>Metarhizium anisopliae</i> (strain F52) <i>Phoma macrostoma</i> <i>Neodiprion abietis</i> nucleopolyhedrovirus <i>Nosema locustae</i> canning (spore of) Nucleopolyhedrovirus for gypsy moth larvae Nuclear polyhedrosis virus of red-headed pine sawfly Nucleopolyhedrovirus for Douglas-fir tussock moth <i>Pantoea agglomerans</i> C9-1 <i>Pantoea agglomerans</i> strain E325 (NRRL B-21856) <i>Phlebiopsis gigantea</i> <i>Paecilomyces fumosoroseus</i> strain FE 9901 <i>Pasteuria nishizawae</i> Pn1 <i>Streptomyces acidiscabies</i> strain RL-110T cells and spent fermentation media <i>Streptomyces griseoviridis</i> strain K61 <i>Streptomyces lydicus</i> strain WYEC 108 </p>
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Chemical Group	Active Ingredient Name
	<i>Trichoderma asperellum</i> , strain T34 <i>Trichoderma virens</i> strain G-41 <i>Trichoderma harzianum</i> Rifai strain T-22 <i>Clavibacter michiganensis</i> (spp <i>michiganensis</i>) bacteriophage <i>Verticillium albo-atrum</i> isolate WCS850
Morpholines, Oxathiines	Dimethomorph Fenpropimorph Oxycarboxin Carbathiin Spiroxamine
Nitrobenzenes	Acifluorfen-sodium Fomesafen Tembotrione Mesotrione Oxyfluorfen Quintozene
Oils, Minerals, Vegetable	Oil of black pepper Citronella oil Clove oil Canola oil Castor oil Oil of geranium Garlic oil D-limonene Lemon oil Mineral oil - paraffin base (adjuvants) Mineral oil Methylated seed oil of soybean Verbenone Pine needle oil Thymol Soybean oil Thyme oil Tea tree oil Wintergreen oil
Organic Acids	Abamectin Acetic acid Acequinocyl Azadirachtin Citric acid Formic acid Gibberellic acid Gibberellins A4A7 Lactic acid Naphthylacetic acid Oxalic acid Peracetic acid Prohexadione calcium Prohydrojasmon



Chemical Group	Active Ingredient Name
	Natamycin Spinosad Spiromesifen Spinetoram Sodium monofluoroacetate Trinexapac-ethyl Ferric sodium EDTA
Organochlorines	Chloropicrin Paradichlorobenzene
Organohalogens	1,2-dibromo-2,4-dicyanobutane Diodofon Methyl bromide Metrafenone Pyriofenone
Organometallics	Fenbutatin oxide 10,10'-oxybis(phenoxarsine)
Others	Acrolein 1-(alkyl-amino)-3-aminopropane hydrochloride (component of AMPHO 443-31) 1-(alkyl-amino)-3-carboxymethylaminopropane (component of AMPHO 443-31) 2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane) Dried blood <i>Brassica hirta</i> white mustard seed powder BLAD polypeptide Bis(trichloromethyl)sulfone Cellulose (from powdered corn cobs) Corn gluten meal Carbon dioxide gas Camphor oil 3-decen-2-one Cornmint oil 3-methyl-2-cyclohexen-1-one Putrescent whole egg solids Dried eggs Endothall or endothal Ethofumesate Eucalyptus oil Fish meal mixture Fish oil mixture Garlic powder Garlic juice Garlic Oxirane derivatives (50% minimum) Liquid corn gluten Methylene bis(thiocyanate) 1-MCP 2,2'-(1-methyltrimethylenedioxy)bis-(4-methyl-1,3,2-dioxaborinane) Methyl nonyl ketone



Chemical Group	Active Ingredient Name
	<p>Oriental mustard seed meal</p> <p>Meat meal mixture</p> <p>Piperonyl butoxide</p> <p>Extract of <i>Reynoutria sachalinensis</i></p> <p>Sodium alpha-olefin sulfonate</p> <p>Saponins of <i>Chenopodium quinoa</i></p>
Phenols/Chlorophenols	<p>2-bromo-4'-hydroxyacetophenone</p> <p>2-phenylphenol</p> <p>2-phenylphenol (present as sodium salt)</p> <p>Pentachlorophenol plus related active chlorophenols</p> <p>From nanogen: chlorocresol (or: parachlorocresol)</p> <p>4-chloro-3-methylphenol (sodium salt)</p> <p>Sodium 2-phenylphenate</p> <p>4-nitro-3-(trifluoromethyl)phenol sodium salt</p>
Phenoxy Acids	<p>4-CPA</p> <p>Cloquintocet-mexyl</p> <p>2,4-DB</p> <p>Dichlorprop (present as butoxyethyl ester, as isooctyl ester, or as ethylhexyl ester)</p> <p>Dichlorprop-P (present as dimethylamine salt)</p> <p>Dichlorprop-P</p> <p>Dichlorprop P-isomer (present as 2-ethylhexyl ester)</p> <p>2,4-D (present as acid)</p> <p>2,4-D (present as amine salts : dimethylamine salt, diethanolamine salt, or other amine salts)</p> <p>2,4-D (present as low volatile esters)</p> <p>2,4-D present as choline salt</p> <p>MCPA (present as acid)</p> <p>MCPA (present as amine salts: diethanolamine, dimethylamine or mixed amines)</p> <p>MCPA (present as esters)</p> <p>MCPA (present as potassium salt or sodium salt)</p> <p>MCPB (present as sodium salt)</p> <p>MCPB (present as isomer specific)</p> <p>Mecoprop P-isomer (present as acid)</p> <p>Mecoprop-P (present as dimethylamine salt)</p> <p>Mecoprop-P (present as potassium salt)</p> <p>Mecoprop-P (present as amine salt)</p> <p>Triclopyr-butotyl</p>



Chemical Group	Active Ingredient Name
Pheromones	E-8-Dodecen-1-yl acetate (E,Z)-2,13-octadecadien-1-yl acetate (E,z)-9-dodecenyl acetate (E,Z)-2,13-octadecadien-1-ol German cockroach extract S-kinoprene 3-ketopetromyzonol-24-sulfate, ammonium salt (S)-methoprene Octenol (Z)-8-dodecenyl acetate + (E)-8-dodecenyl acetate + (Z)-8-dodecen-1-ol (E,E)-8,10-dodecadien-1-ol + 1-dodecanol + 1-tetradecanol (Z)-9-dodecenyl acetate + (Z)-11-tetradecenyl acetate (E,Z)-3,13-octadecadien-1-yl acetate (Z,Z)-3,13-octadecadien-1-yl acetate (9Z,12E)-9,12-tetradecadien-1-yl acetate R-(-)-1-octen-3-ol (E)-11-tetradecenyl acetate Muscalure (Z)-11-tetradecenal (Z)-11-tetradecen-1-ol (Z)-9-tetradecen-1-yl acetate 1-tetradecanol 1-dodecanol Codlelure Z-8-dodecen-1-ol Z-8-dodecenyl acetate (Z)-11-tetradecenyl acetate (Z,Z)-3,13-octadecadien-1-ol (E,Z)-11-tetradecenal (E)-4-tridecenyl acetate + (Z)-4-tridecenyl acetate
Phosphates	Dichlorvos plus related compounds Tetrachlorvinphos Naled
Phosphonic Acids, Phosphinic Acids	Ethephon Glufosinate ammonium Glyphosate present as isopropylamine or ethanolamine salt Glyphosate present as mono-ammonium or diammonium salt Glyphosate present as isopropylamine and potassium salt Glyphosate present as potassium salt Glyphosate Glyphosate present as dimethylamine salt Mono- and dibasic sodium, potassium, and ammonium phosphites
Phosphoramidothioates	Acephate Propetamphos
Phthalic Acids	Captan Chlorthal-dimethyl Folpet Octylbicyclo heptene dicarboximide



Chemical Group	Active Ingredient Name
Pyrethroids, Pyrethrins	D-cis, trans allethrin D-trans-allethrin Bifenthrin Beta-cyfluthrin Cyfluthrin Lambda-cyhalothrin Cypermethrin Cyphenothrin Deltamethrin Imiprothrin Etofenprox Flumethrin Tau-fluvalinate Tetramethrin Metofluthrin Prallethrin Permethrin D-phenothrin Pyrethrins Momfluorothrin Tefluthrin
Pyridines	4-aminopyridine Bicyclopyrone Dithiopyr Flupyradifurone Di-n-propyl isocinchomeronate Acetamiprid Sodium omadine Pyriproxyfen Quinoxifen Sulfoxaflor Thiacloprid Flonicamid
Sulfonylureas	Chlorimuron-ethyl Chlorsulfuron Rimsulfuron Ethametsulfuron-methyl Flucarbazone (present as flucarbazone-sodium) Foramsulfuron Halosulfuron (present as methyl ester) Iodosulfuron-methyl-sodium Mesosulfuron-methyl Metsulfuron-methyl Tribenuron-methyl Thifensulfuron-methyl Nicosulfuron Propoxycarbazine-sodium Primisulfuron-methyl Prosulfuron



Chemical Group	Active Ingredient Name
	Sulfometuron methyl Triflurosulfuron-methyl
Thiophosphates	Azamethiphos Coumaphos Diazinon Chlorpyrifos
Triazines, Tetrazines	Atrazine (plus related active triazines) Metribuzin Clofentezine Cyromazine Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine Indaziflam Prometryne plus related active triazines Pymetrozine Thiencarbazone-methyl Available chlorine, present as sodium dichloro-s-triazinetriene Simazine plus related active triazines Available chlorine, present as trichloro-s-triazinetriene
Triazoles	Amitrole Ametoctradin Carfentrazone-ethyl Cloransulam-methyl Difenoconazole Fenbuconazole Flutriafol Flumetsulam Florasulam Metconazole Ipconazole Pyroxsulam Myclobutanil Paclobutrazol Propiconazole Prothioconazole Sulfentrazone Tebuconazole Triticonazole Tetraconazole Uniconazole-P



Chemical Group	Active Ingredient Name
Urea Derivatives	Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins Cyazofamid Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin, 1,3-dichloro-5,5-dimethylhydantoin, 1,3-dichloro-5-ethyl-5-methylhydantoin and related hydantoins Available chlorine present as 1,3-dichloro-5,5-dimethylhydantoin and 1,3-dichloro-5-ethyl-5-methylhydantoin Diflufenzopyr Diflufenzopyr (present as sodium salt) 5,5-dimethylhydantoin 1,3-bis(hydroxymethyl)-5,5-dimethylhydantoin Diuron Linuron Hydroxymethyl-5,5-dimethylhydantoin Nicarbazin Thidiazuron



Appendix III Glossary

Active ingredient	That ingredient of a pesticide that actually controls the targeted pest.
Adjuvant	Any substance that is added to a spray tank (separate from the pesticide formulation) that will improve the performance of the pesticide.
Agricultural sector	Commercial pesticides applied to farms involved in the production of raw agricultural commodities, such as food, fibre, and tobacco; excluding non-crop and post-harvest applications.
Antimicrobial	A pest control product that intends to control microorganisms and fouling organisms on/in inanimate objects, industrial processes and systems, surfaces, water and air.
Biopesticide	Microbial pesticides (contain a bacterium, fungus, virus, protozoan, or alga as the active ingredient), pheromones and other semiochemical pesticides, and other non-conventional (formerly biochemical) pesticides.
Colony forming unit	A measure of viable bacterial or fungal numbers.
Commercial product	A product that is used in commercial activities, such as farming and other industrial processes.
Device	An instrument or apparatus that generates or applies a pest control product.
Domestic product	A product that is used in or around the house by the public.
End-use product	A product containing active ingredient(s) and usually formulant(s) that is labelled with instructions for direct pest control use or application.
Fungicide	Pesticides used to kill or inhibit fungi or fungal spores.
Herbicide	Pesticides used to kill or inhibit weeds.
Insecticide	Pesticides used to kill or inhibit insects.
Insect repellent	Pesticides used to repel insects.
Manufacturing concentrate	A product containing a registered technical grade of active ingredient(s) and formulant(s) intended for further reformulating and/or repackaging into end-use products.
Non-agricultural sector	Commercial pesticides that are not applied to farms involved in the production of raw agricultural commodities.
Pest control product or Pesticide	Any product, device, organism, substance or thing that is manufactured, represented, sold or used as a means for directly or indirectly controlling, preventing, destroying, mitigating, attracting or repelling any pest.
Product type	Pesticide products can be grouped by their main target pest, into herbicide, insecticide, fungicide, antimicrobial, vertebrate control and “other”.
Registrant	A company that holds the registration of a pesticide with the PMRA.
Technical grade active ingredient	Contains the active ingredient and normally contains impurities that are by-products of the manufacturing process.
Vertebrate control	A product used to control vertebrates.
Water treatment	Products to control microorganisms in swimming pools and industrial process waters (for example, paper mill whitewater, wastewater systems, cooling water).
Wood preservative	Antimicrobials applied to wood to control wood-destroying organisms and increase the service life of the wood.