Pest Control Products Sales Report for 2016

Canada

Table of Contents

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 ninth Pest Control Products Sales Report provides an overview of pesticides sold in Canada for the 2016 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 7355 products registered with the PMRA for use in Canada in the 2016 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 2851 products reported as sold, the overall pesticide sales in Canada in 2016 were 120 104 921 kg a.i., which is a 18.4% increase from the 101 445 964 kg a.i. sold in 2015 (Figure 1). There is a general increasing trend in pesticide sales between 2012\ and 2016.

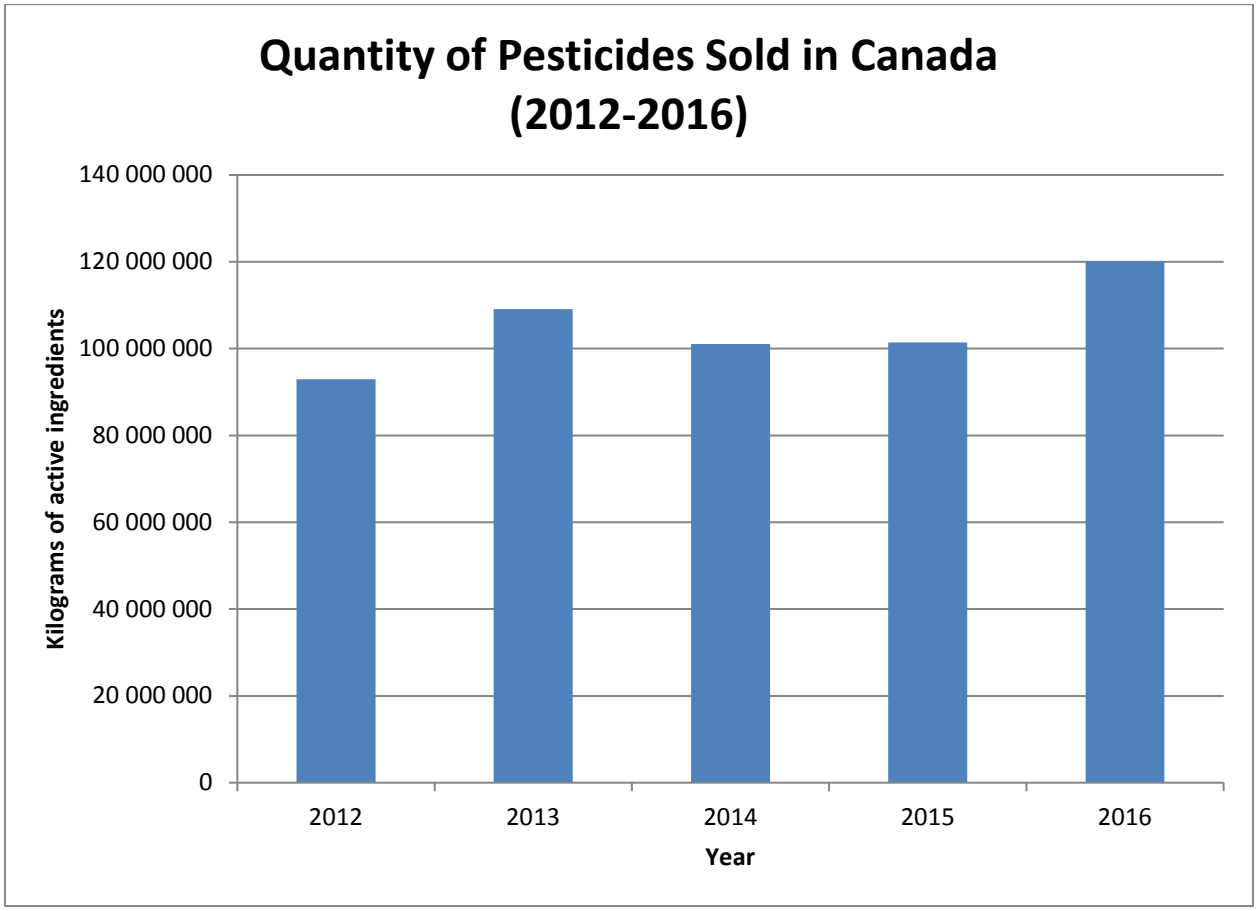

Figure 1: Quantity of pesticides sold in Canada between 2012 and 2016.

In 2016, the 50 products with the greatest sales accounted for 73.4% of the total kg a.i. sold in Canada (88 140 587 kg a.i.). This was an increase in the overall quantity and relative amount from 2015, where the top 50 products accounted for 67.1% of total sales (68 071 970 kg a.i.). The top 10 active ingredients sold, presented in decreasing order in Table 1, made up 68.7% of total sales (82 556 073 kg a.i.). A comprehensive list with the rankings for all active ingredients sold in Canada in 2016 is provided in Appendix I. Seven active ingredients have remained on the top 10 list over the past five years (since 2012): glyphosate, available chlorine, present as sodium hypochlorite, 2,4-D, MCPA, surfactant blend, glufosinate ammonium, and mineral oil.

Table 1: Top 10 Active Ingredients Sold in Canada in 2016

Active Ingredient	Product Type
Glyphosate	Herbicide
Available chlorine, present as sodium hypochlorite	Antimicrobial
Surfactant blend	Other
Creosote	Antimicrobial
2,4-D	Herbicide
Glufosinate ammonium	Herbicide
MCPA	Herbicide
Mineral oil	Insecticide/Fungicide/Other
Borates	Insecticide/Fungicide/Antimicrobial
Corn gluten meal	Herbicide

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 2016, 74.7% of pesticide sales in Canada were of Agricultural sector products (see Figure 2), whereas 20.1% were of Non-agricultural sector products and 5.2% were of Domestic sector products. The relative sales of products in the Agricultural sector increased between 2015 and 2016 (increasing from just over 73% to 75%), while the Non-agriculture sector decreased from 23% to 20%, and the Domestic sector increased from just under 4% in 2015 to just over 5% in 2016 (see Figure 3 for data from 2012 to 2016).

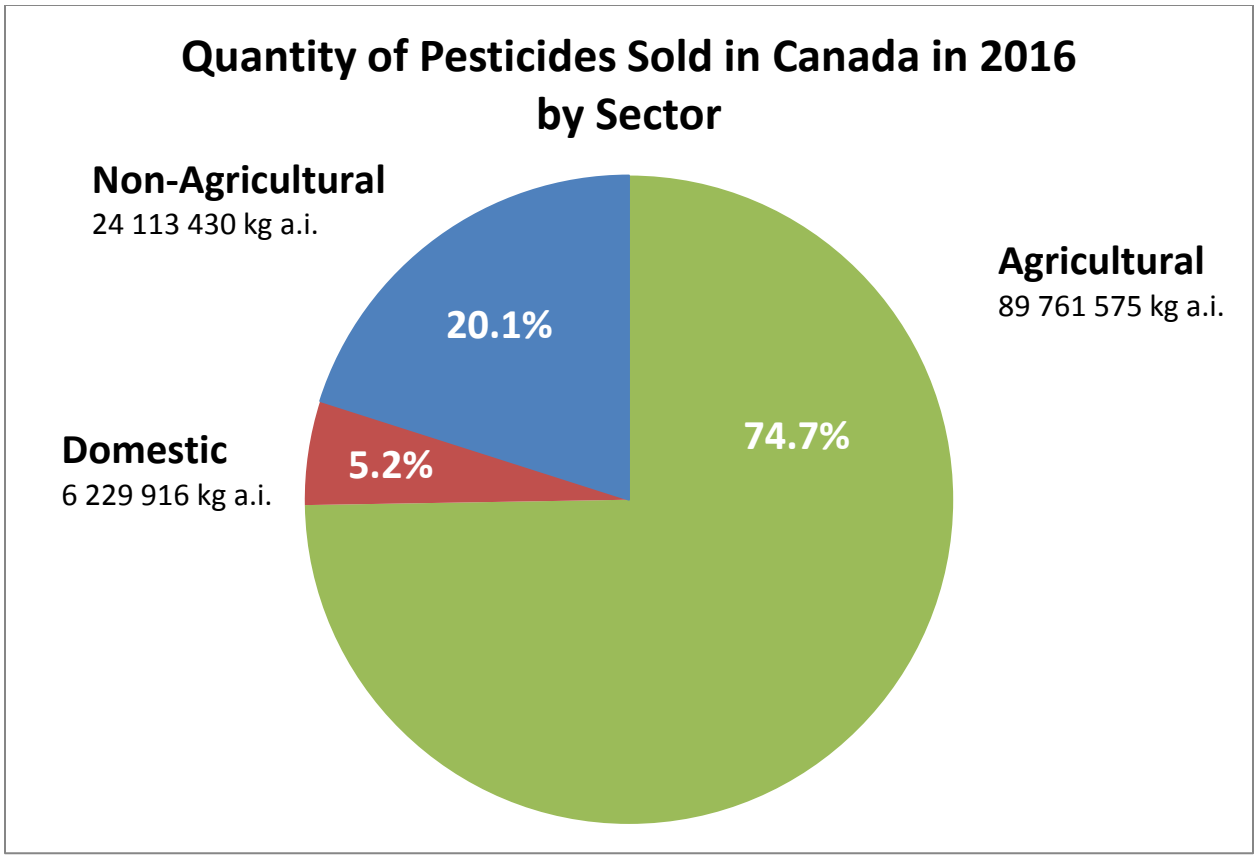

Figure 2: Quantity of pesticides sold in Canada in 2016 by sector.

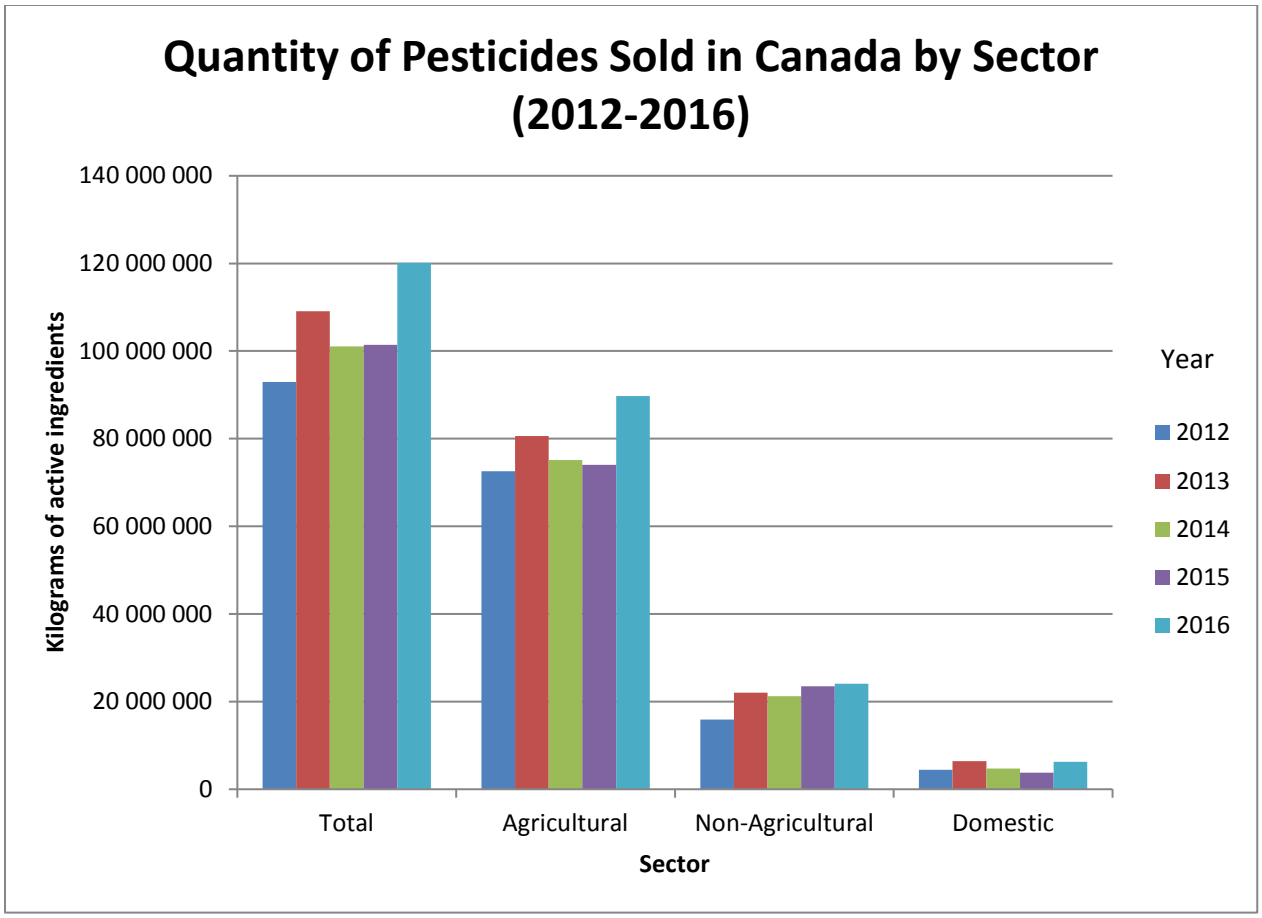

Figure 3: Quantity of pesticides sold in Canada by sector between 2012 and 2016.

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 2016, as an over-reporting would occur.

Agricultural Sector

Products with agricultural uses accounted for 74.7% of pesticide sales in Canada in 2016. There was a 21.2% increase in Agricultural sector pesticide sales from 2015 (74 059 293 kg a.i.) to 2016 (89 761 575 kg a.i.).

Herbicides accounted for 72.9% of agricultural sector pesticide sales, followed by fungicides (10.1%), insecticides (5.7%), antimicrobials (3.8%), and others (8.7%) (Figure 4). Vertebrate controls (0.04%) accounted for very small quantities of agricultural pesticides sold in 2016 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.

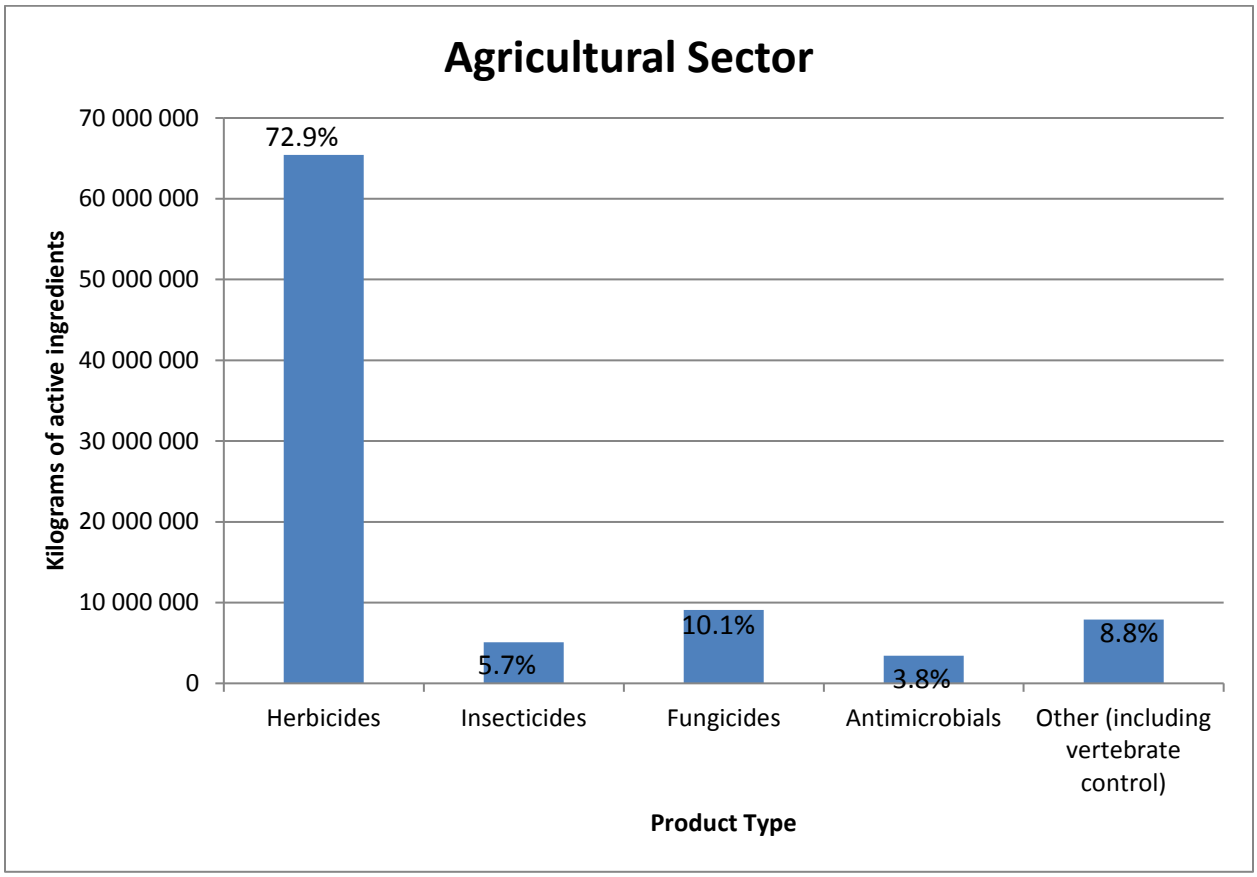

Figure 4: Kilograms of active ingredients sold in Canada in 2016 in the Agricultural sector.

The top 10 active ingredients sold with agricultural uses are shown in Table 2 in decreasing order. Six 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 2016 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
MCPA	Herbicide
Mineral oil	Insecticide/Fungicide/Other
Mancozeb	Fungicide
Hydrogen peroxide	Herbicide/Insecticide/Fungicide
Chlorothalonil	Fungicide

Non-Agricultural Sector

Commercial products with non-agricultural uses accounted for 20.1% of all pesticides sold in Canada in 2016 (compared to 23.2% in 2015). Non-agricultural sector pesticide sales increased 2.5% from 2015 to 2016 (from 23 527 062 kg a.i. to 24 113 430 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 95.4% of non-agricultural sector sales followed by herbicides (3.4%), fungicides (1.0%), insecticides (0.5%), vertebrate control (0.2%), and others (0.02%). 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%).

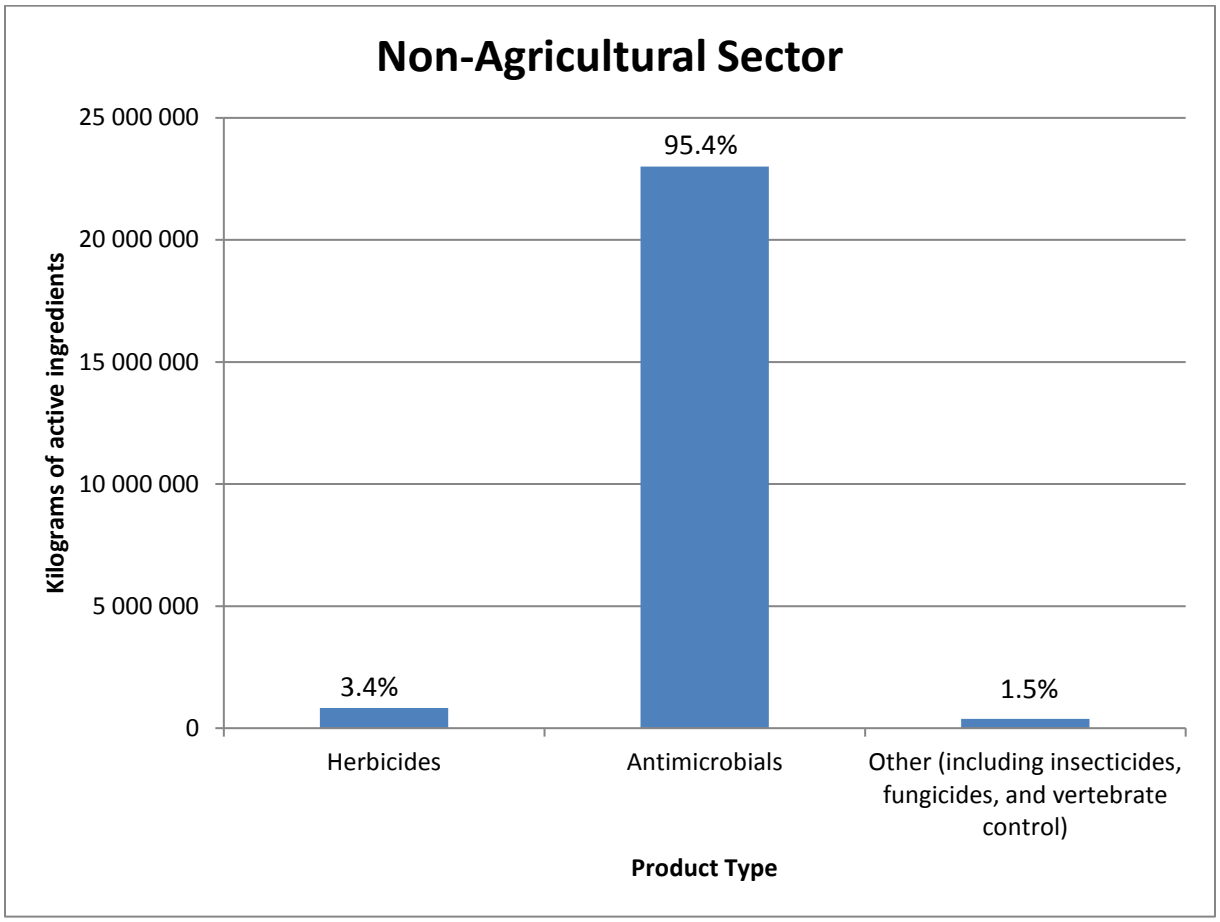

Figure 5: Kilograms of active ingredients sold in Canada in 2016 in the Non-agricultural sector.

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 84.2% 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, chromic acid, glutaraldehyde, arsenic pentoxide, and copper as elemental.

Table 3: Top 10 Active Ingredients Sold in Canada in 2016 in the Non-agricultural Sector

Active Ingredient	Product Type
Available chlorine, present as sodium hypochlorite	Antimicrobial
Creosote	Antimicrobial
Borates	Antimicrobial/Insecticide/Fungicide
Copper as elemental	Antimicrobial/Herbicide/Fungicide
Glutaraldehyde	Antimicrobial
Chromic acid	Antimicrobial
Arsenic pentoxide	Antimicrobial
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)	Antimicrobial
2,2-dibromo-3-nitrilopropionamide	Fungicide/Antimicrobial
Pentachlorophenol	Antimicrobial

Domestic Sector

The Domestic Class products accounted for 5.2% of overall pesticide sales in Canada for 2016. There was a 64% increase from 2015 (3 795 427 kg a.i.) to 2016 (6 229 916 kg a.i.) in Domestic sector pesticide sales. This increase was mainly due to a large increase in corn gluten meal. Changes from year to year in the Domestic sector may be dependent on changes in regional regulations (e.g. restrictions at the municipal or provincial level), as well as changes in weather (e.g. 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 53.5% of domestic pesticides sold in Canada (Figure 6) (mainly sales of swimming pool and spa products) followed by herbicides (35.8%), insecticides (8.6%), vertebrate controls (2.0%), fungicides (0.3%), and “other” products (0.01%). 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.

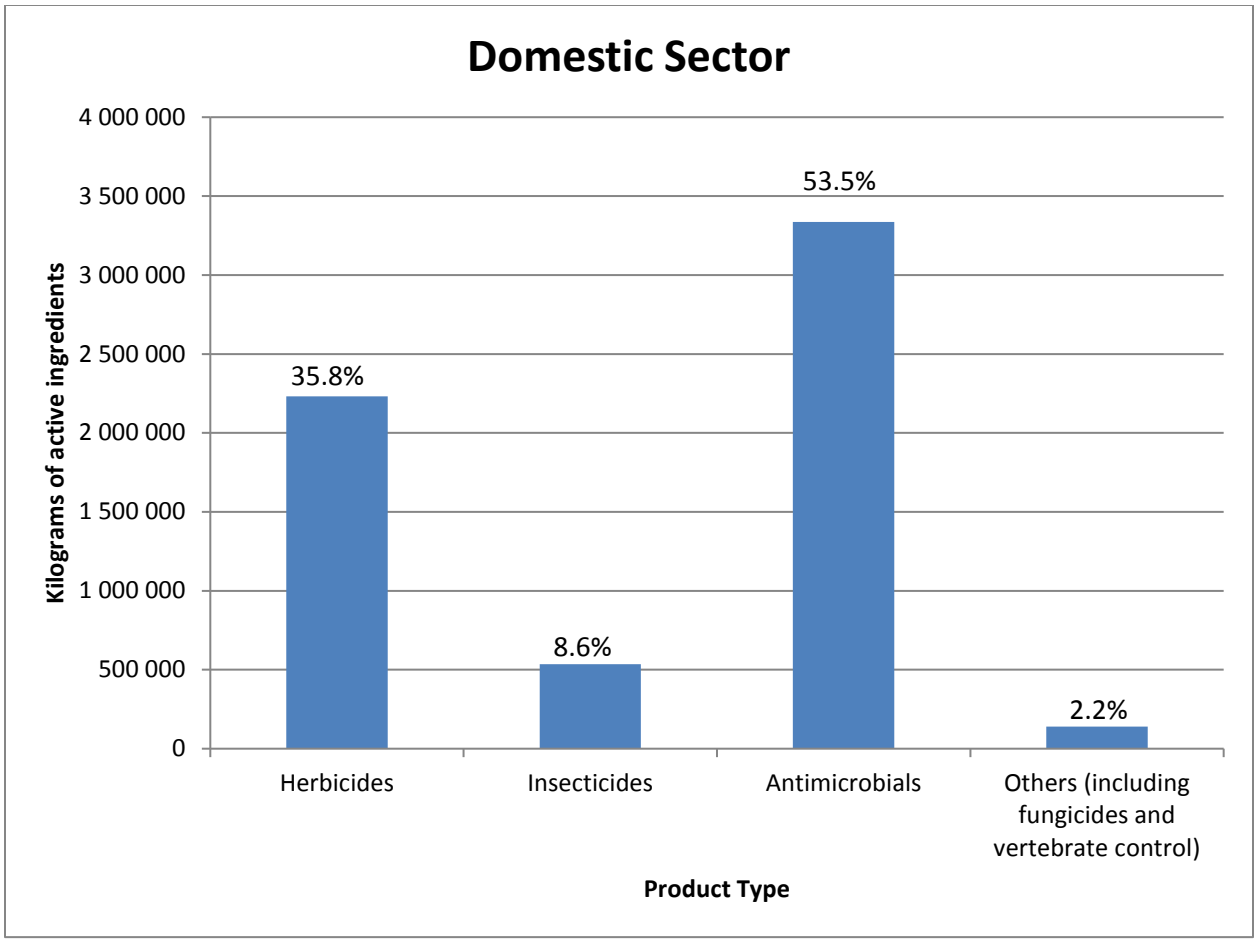

Figure 6: Kilograms of active ingredients sold in Canada in 2016 in the Domestic sector.

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 88.2% of the Domestic sector pesticides sold. Of the top 10 products, six 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-, 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 2016 in the Domestic Sector

Active Ingredient	Product Type
Corn gluten meal	Herbicide
Available chlorine, present as trichloro-s-triazinetrione	Antimicrobial
Available bromine, present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	Antimicrobial
Available chlorine, present as calcium hypochlorite	Antimicrobial
Alcohol anhydrous	Antimicrobial
Poly[oxyethylene(dimethyliminio)ethylene	Antimicrobial

Active Ingredient	Product Type
(dimethyliminio)ethylene dichloride]	
N-alkyl (40% C12, 50% C14, 10% C16) dimethyl benzyl ammonium chloride	Antimicrobial
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	Antimicrobial
DEET*	Insecticide
Glyphosate	Herbicide

*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 2016, as an over-reporting would occur.

Herbicides

Herbicides accounted for 57.0% (68 504 191 kg a.i.) of all pesticides sold in Canada in 2016. This is an increase from 2015 when herbicides accounted for 54.2% of all pesticides sold. This translates into an increase of 24.5% in the quantities of herbicides sold from 2015 (54 999 360 kg a.i.) to 2016 (68 504 191 kg a.i.).

The top 10 herbicides sold in 2016, as listed in Table 5 in decreasing order, accounted for 88.6% of all herbicide sales in Canada and 50.5% 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 2016

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

Insecticides

Insecticides accounted for 4.7% (5 744 585 kg a.i.) of all pesticides sold in Canada in 2016. 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 seventh-most sold insecticide (DEET) is used only in the Domestic sector.

The top 10 insecticides sold in 2016, as listed in Table 6 in decreasing order, accounted for 81.9% of all insecticides sales in Canada and 3.9% of pesticide sales overall. Five insecticides have remained in the top 10 during the last five years of reporting: mineral oil, hydrogen peroxide, chlorpyrifos, DEET, and sulphur.

Table 6: Top 10 Insecticide Active Ingredients Sold in Canada in 2016

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

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

Fungicides

Fungicides accounted for 7.7% (9 349 467 kg a.i.) of all pesticides sold in Canada in 2016. 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 (97.1%).

The top 10 fungicides sold in Canada in 2016, as listed in Table 7 in decreasing order, accounted for 72.6% of fungicide sales and 5.6% of pesticide sales overall. Six of the active ingredients have remained in the top 10 in the last five years of reporting: chlorothalonil, mancozeb, metam-sodium, pyraclostrobin, chloropicrin, and sulphur.

Table 7: Top 10 Fungicide Active Ingredients Sold in Canada in 2016

Active Ingredient
Mancozeb
Chlorothalonil
Metam-sodium
Chloropicrin
Mono- and dipotassium phosphite
Captan
Pyraclostrobin
Sulphur
Prothioconazole
Boscalid

Antimicrobials

Antimicrobials accounted for 24.8% (29 773 271 kg a.i.) of all pesticides sold in Canada in 2016. 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 2016, as listed in Table 8 in decreasing order, accounted for 82.8% of all antimicrobial sales in Canada and 20.5% 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-triazinetrione, chromic acid, glutaraldehyde, and copper as elemental.

Table 8: Top 10 Antimicrobial Active Ingredients Sold in Canada in 2016

Active Ingredient
Available chlorine, present as sodium hypochlorite
Creosote
Borates
Copper as elemental
Available chlorine, present as trichloro-s-triazinetrione
Glutaraldehyde
Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins
Chromic acid
Available chlorine, present as calcium hypochlorite
Arsenic pentoxide

Vertebrate Control

Vertebrate controls accounted for 0.2% (207 020 kg a.i.) of all pesticides sold in Canada in 2016. 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 98.6% of all vertebrate control sales in 2016 and 0.2% 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 2016

Active Ingredient
Cellulose (from powdered corn cobs)
Carbon dioxide gas
Aluminum phosphide
Sulphur
Dried blood
Zinc phosphide
Thiram
Fish meal mixture
Brassica hirta 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 6.5% (7 852 564 kg a.i.) of pesticide sales in Canada in 2016. 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 (99.9%).

The top 10 active ingredients sold in Canada in 2016 that fall into this type are listed in Table 10 in decreasing order and accounted for 99.9% of “other” type sales and 6.5% 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, ethoxylated alcohol, C9-11, and polyoxyalkylated alkyl phosphate ester.

Table 10: Top 10 Other Active Ingredients Sold in Canada in 2016

Active Ingredient
Surfactant blend
Paraffin based petroleum oil
Polyoxyalkylated alkyl phosphate ester
Mineral oil
Triglyceride ethoxylate
Nonylphenoxypolyethoxyethanol
Methylated seed oil of soybean
Octylphenoxypolyethoxyethanol
Alcohols, C9-11, ethoxylated
5,5-dimethylhydantoin

Biopesticides

Biopesticides include 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.

In 2016, there were 172 active ingredients identified as biopesticides, which accounted for 969 registered products.

The 360 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, etc.).

The 304 products that could be converted to kg a.i. accounted for 6.8% of total pesticide sales (8 190 690 kg a.i.) in 2016. There was a 48.8% increase in biopesticide sales from 2015 (5 504 154 kg a.i.) to 2016. The sales of biopesticides have fluctuated in the years in which data have been collected and the increase in 2016 can be mainly attributed to a large increase in the sale of corn gluten meal. Insecticides accounted for 42% of the biopesticide sales in 2016 (Figure 7), followed by herbicides (31.6%), fungicides (17.9%), antimicrobials (6%), “others” (5.6%), and vertebrate controls (2.0%).

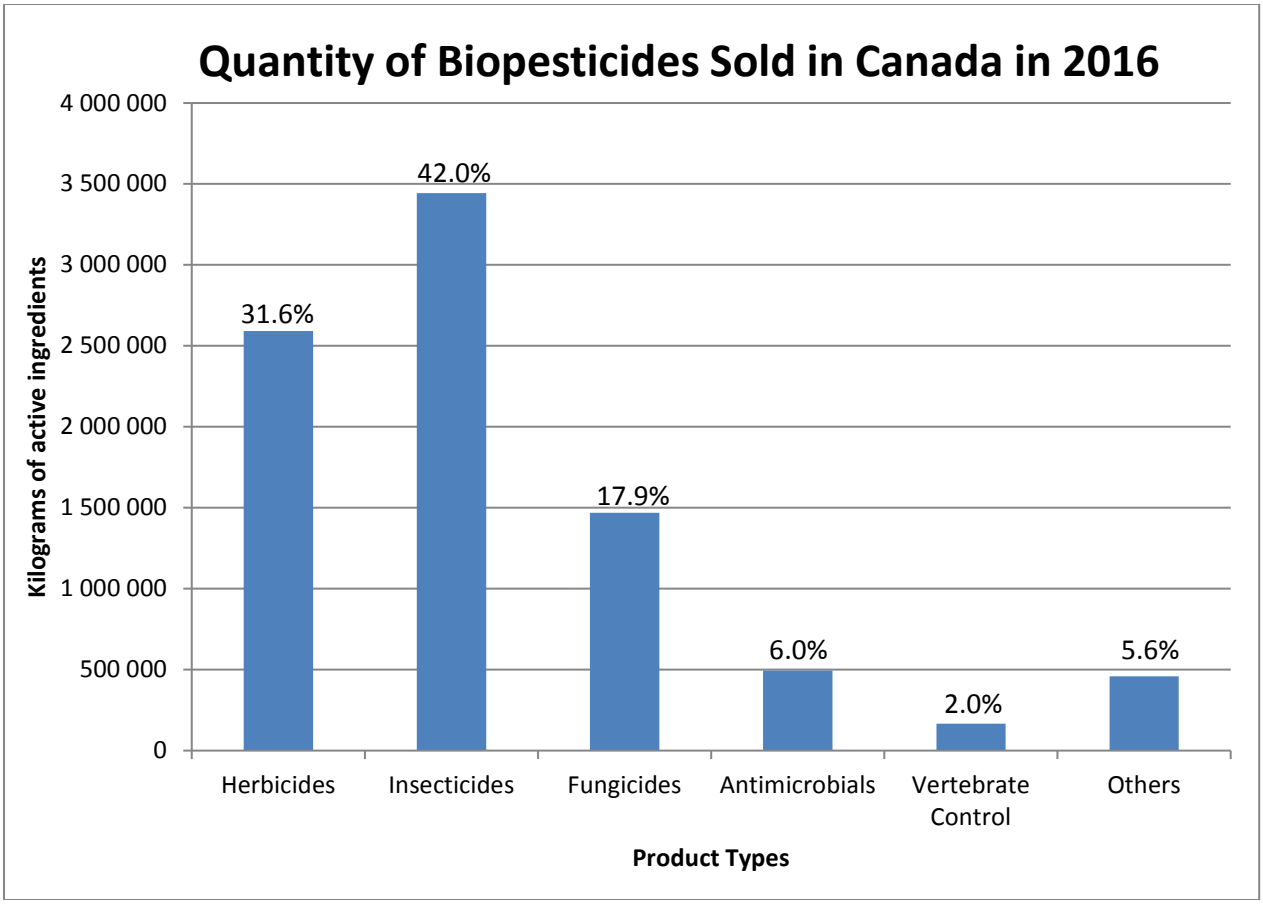

Figure 7: Kilograms of active ingredients of biopesticides sold in Canada in 2016.

The top 10 biopesticide active ingredients sold in Canada are listed in Table 11 in decreasing order. The top 10 active ingredients accounted for 89.8% of sales of biopesticides that could be converted to kg a.i. and 6.1% 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 2016

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

The remaining 56 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 2016 of these is listed in Table 12.

Table 12: Quantity of Microbials Sold in Canada in 2016

Units of Product Sold	Total
Litres (microbials)	865 224
Kilograms (microbials)	500 340

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 re-aligned with the Quebec Ministry of Sustainable Development, Environment and Climate Change most current listings (Quebec, 2016) and are outlined in Appendix II.

In 2016, the chemical group with the largest proportion of sales was the “Phosphonic and phosphinic acids” group at 41%, followed by the “Inorganics” group at 18%. The third and fourth groups were the “Fatty acids and surfactants” and “Phenoxy acids” at just over 5% each. The remaining chemical groups were all under 5% and 40 out of 54 chemical groups were less than 1% of total sales. Seven chemical families remained in the top 10 from 2015 to 2016.

Table 13: Summary of Pesticide Sales by Chemical Group (All Sectors) in 2016

Chemical Grouping	Kilograms of Active Ingredients	Rank
Phosphonic acids, phosphinic acids	49 040 613	1
Inorganic	21 339 402	2
Fatty acids, surfactants	7 146 304	3
Phenoxy acids	6 087 098	4
Hydrocarbons	4 912 348	5
Acylureas	3 174 691	6
Oils, minerals, vegetable	2 923 803	7
Others	2 356 713	8
Benzonitriles	2 306 470	9
Dinitrobenzenes	1 820 841	10
Anilides	1 796 441	11
Biscarbamates	1 710 832	12
Alcohols	1 296 243	13
Ammoniums, quaternary	1 279 578	14
Triazoles	1 090 592	15
Dithiocarbamates	966 690	16
Aldehydes	886 346	17
Thiophosphates	819 300	18
Organochlorines	XXX	19
Thiocarbamates	XXX	20

Chemical Grouping	Kilograms of Active Ingredients	Rank
Chlorotrianzines	XXX	21
Triazines, tetrazines	613 418	22
Cyclohexanedione oximes	589 944	23
Azoles, oxazoles, thiazoles	575 578	24
Methoxyacrylates	542 227	25
Phtalic acids	536 048	26
Amides	495 391	27
Dithiophosphates	XXX	28
Phenols/chlorophenols	422 168	29
Carbamates	354 249	30
Aryloxyphenoxyl acids	324 306	31
Benzamides	282 551	32
Guanidines	282 286	33
Benzoic acid and derivatives	262 281	34
Imidazolinones	197 939	35
Organic acids	174 058	36
Urea derivatives	168 692	37
Sulfonylureas	141 796	38
Pyrethroids, pyrethrins	129 933	39
Nitrobenzenes	111 664	40
Halogenated organic acids	80 318	41
Morpholines & oxathiines	XXX	42
Phosphates	XXX	43
Diazines	33 240	44
Pyridines	27 145	45
Organohalogens	18 863	46
Phosphoramidothioates	XXX	47
Organometallics	2877	48
Oximes-carbamates	XXX	49
Pheromones	1843	50
Anilines	1304	51
Chromenones	134	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 2017 calendar year. The PMRA will publish the 2017 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 2016

Active name	Kilograms of active ingredients
Glyphosate	> 25 000 000
Available chlorine, present as sodium hypochlorite	> 10 000 000
Surfactant blend	> 5 000 000
Creosote	> 1 000 000
2,4-D	
Glufosinate-ammonium	
MCPA	
Mineral oil	
Borates	
Corn gluten meal	
Mancozeb	
Copper as elemental	
Chlorothalonil	
Hydrogen peroxide	
S-metolachlor and R-enantiomer	
Bromoxynil	
Ethalfluralin	> 500 000
Available chlorine, present as trichloro-s-triazinetrione	
Glutaraldehyde	
Metam-sodium	
Trifluralin	
Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	
Chromic acid	
Available chlorine, present as calcium hypochlorite	
Bentazon (present as sodium salt)	
Diquat	
Triallate	
Chloropicrin	
Paraffin based petroleum oil	
Atrazine (plus related active triazines)	
Mono- and dipotassium phosphite	
Arsenic pentoxide	
Polyoxyalkylated alkyl phosphate ester	
Fluroxypyr (present as 1-methylheptyl ester)	
Captan	
Diazinon	
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)	

Active name	Kilograms of active ingredients
2,2-dibromo-3-nitrilopropionamide	>100 000
Pentachlorophenol	
Triglyceride ethoxylate	
Pyraclostrobin	
Sulphur	
Prothioconazole	
Boscalid	
Alcohol anhydrous	
Mono- and dibasic sodium, potassium, and ammonium phosphites	
Clethodim	
Chlorpyrifos	
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	
Poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio)ethylene dichloride]	
N-alkyl (40% C12, 50% C14, 10% C16) dimethyl benzyl ammonium chloride	
Tebuconazole	
Sodium bromide	
Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine	
N-decanol	
Dicamba	
Metribuzin	
Alkyl-1,3-propylene diamine acetates	
Mecoprop	
Malathion	
Saflufenacil	
DEET	
Sethoxydim	
Propiconazole	
Ammonium bromide	
Ammonia (present as ammonium sulfate)	
Acrolein	
Nonylphenoxypolyethoxyethanol	
Dimethenamid-P	
Thiamethoxam	
Methylated seed oil of soybean	
Dimethoate	
Metiram	
Sodium chlorite	
Pendimethalin	

Active name	Kilograms of active ingredients
Clodinafop-propargyl	
Silicon dioxide	
3-iodo-2-propynyl n-butylcarbamate	
Cellulose (from powdered corn cobs)	
Sodium chloride	
Metconazole	
Linuron	
Bronopol	
Fluxapyroxad	
Soap	
Difenoconazole	> 50 000
Pinoxaden	
Quizalofop-P-ethyl	
Chlorpropham	
Fenoxaprop-P-ethyl	
Iprodione	
Available chlorine present as 1,3-dichloro-5,5-dimethylhydantoin and 1,3- dichloro-5-ethyl-5-methylhydantoin	
Azoxystrobin	
Octylphenoxypolyethoxyethanol	
Available chlorine, present as sodium dichloro-s-triazinetrione	
Lime sulphur	
Paradichlorobenzene	
Imazamox	
2,4-DB	
Tralkoxydim	
Alcohols, C9-11, ethoxylated	
EPTC	
Halosulfuron (present as methyl ester)	
Iron	
Permethrin	
Propamocarb hydrochloride	
Picoxystrobin	
Thiram	
Carbathiin	
Carbaryl	
Imazethapyr	
Clomazone	
Potassium dimethyldithiocarbamate	
Hexazinone	

Active name	Kilograms of active ingredients
Mesotrione	
Acetic acid	
Fosetyl-Al	
Phorate	
Pyroxasulfone	
Pyrasulfotole	
Didecyl dimethyl ammonium chloride	
Naled	
Ferrous sulfate monohydrate	
Fomesafen	
1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride	
Sulfentrazone	
Amitrole	
Didecyldimethylammonium present as carbonate and bicarbonate salts	
1,2-benzisothiazolin-3-one	
Clopyralid	
Pyrimethanil	
Carbon dioxide gas	
Metalaxyl	
Aluminum phosphide	
Mineral spirits	
Cyantraniliprole	
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	< 50 000
Triclopyr-butotyl	
Octhilinone	
N-alkyl (5% C12, 60% C14, 30% C16, 5% C18) dimethyl benzyl ammonium chloride	
Sodium chlorate	
Metam-potassium	
Maleic hydrazide	
Imazamethabenz-methyl	
Clothianidin	
Tribenuron-methyl	
Fluazinam	
Imidacloprid	
Lambda-cyhalothrin	
Dazomet	
N-alkyl (68% C12, 32% C14) dimethyl ethylbenzyl ammonium chloride	

Active name	Kilograms of active ingredients
Phosmet	
Folpet	
Pyroxsulam	
Sedaxane	
Picloram	
Formic acid	
Isoxaflutole	
Sulfuryl fluoride	
Chlorantraniliprole	
Flumioxazin	
5-chloro-2-methyl-4-isothiazolin-3-one	
Paraquat	
N-alkyl (67% C12, 25% C14, 7% C16, 1% C18) dimethyl benzyl ammonium chloride	
Formaldehyde	
Dichlorprop	
Ethephon	
Carfentrazone-ethyl	
Fluopyram	
Diuron	
Fludioxonil	
Diflufenzopyr	
Simazine plus related active triazines	
Streptomycin present as sulphate	
Thiophanate-methyl	
Kaolin	
Dichlorvos	
Thifensulfuron-methyl	
Piperonyl butoxide	
Oxydiethylene bis(alkyl dimethyl ammonium chloride)	
Florasulam	
Thiabendazole	
Sodium omadine	
Triticonazole	
Potassium bicarbonate	
Dichlobenil	
Sodium dimethyldithiocarbamate	
Nabam	
Imazapyr	
4-chloro-3-methylphenol (sodium salt)	
Fluazifop-p-butyl	
Garlic juice	

Active name	Kilograms of active ingredients
Mandipropamid	
MCPB	
Carbendazim	
Napropamide	
Oxirane derivatives (50% minimum)	
2-phenylphenol	
Aminopyralid	
Terbacil	
Prometryne plus related active triazines	
Diodofon	
Penthiopyrad	
2-(thiocyanomethylthio)	
Flumetsulam	
Icaridin	
Deltamethrin	
2-methyl-4-isothiazolin-3-one	
Fenamidone	
Thiencarbazone-methyl	
Oxalic acid	
1,2-dibromo-2,4-dicyanobutane	
Acephate	
4,5-dichloro-2-n-octyl-3(2H)isothiazolone	
Ferbam	
Bifenthrin	
Sulfoxaflor	
1,3-bis(hydroxymethyl)-5,5-dimethylhydantoin	
Zinc	
Flucarbazone (present as flucarbazone-sodium)	
5,5-dimethylhydantoin	
2,2'-(1-methyltrimethylenedioxy)bis-(4-methyl-1,3,2-dioxaborinane)	
Methylene bis(thiocyanate)	
Dimethomorph	
Trifloxystrobin	
Bromacil (present in free form, as dimethylamine salt, or as lithium salt)	
Spirotetramat	
Ametoctradin	
Silica gel (amorphous)	
Barium metaborate monohydrate	
D-phenothrin	
Chlorthal-dimethyl	

Active name	Kilograms of active ingredients
Fluoxastrobin	
Propyzamide	
Flonicamid	
Chlorimuron-ethyl	
Penflufen	
Cymoxanil	
Oil of lemon eucalyptus, hydrated, cyclized	
3-decen-2-one	
Fenhexamid	
Pyrethrins	
N-coco-alkyltrimethylene diamines present as monobenzoate salt	
Metsulfuron-methyl	
Spinetoram	
Acetamiprid	
Octylbicyclo heptene dicarboximide	
Spinosad	
Myclobutanil	
Acifluorfen-sodium	
Tetrachlorvinphos	
Dried blood	
Zinc phosphide	
Potassium peroxymonosulfate (present as potassium peroxymonosulfate sulfate)	
Peracetic acid	
Cypermethrin	
Methomyl	
Daminozide	
Ethofumesate	
10,10'-oxybis(phenoxarsine)	
Tetramethrin	
Rimsulfuron	
Chlormequat chloride	
2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane)	
Ethaboxam	
Halauxifen-methyl	
Oxyfluorfen	
Tembotrione	
D-cis,trans-allethrin	
Zoxamide	
Metrafenone	
Tebufenozide	

Active name	Kilograms of active ingredients
Topramezone	
Cyazofamid	
Thiacloprid	
Dodecylguanidine hydrochloride	
Fish meal mixture	
Benzovindiflupyr	
Indaziflam	
Novaluron	
Isofetamid	
(s)-methoprene	
Pyraflufen-ethyl	
Hydroxymethyl-5,5-dimethylhydantoin	
Trinexapac-ethyl	
Quinoxyfen	
Cyprodinil	
Garlic powder	
Naphthalene	
Nicosulfuron	
Ipconazole	
Acequinocyl	
Blad polypeptide	
P-menthane-3,8-diol	
Phenmedipham	
Desmedipham	
Formetanate hydrochloride	
Cyflumetofen	
Bifenazate	
Azamethiphos	
Prohexadione-calcium	
Spiromesifen	
Methoxyfenozide	
Kresoxim-methyl	
Tefluthrin	
Famoxadone	
Bis(trichloromethyl)sulfone	
Brassica hirta white mustard seed powder	
Amitraz	
Azadirachtin	
Fluopicolide	
Fenbutatin oxide	
Oil of black pepper	

Active name	Kilograms of active ingredients
Diphenylamine	
Pyridaben	
Tea tree oil	
Metaldehyde	
Magnesium phosphide	
From nanogen: chlorocresol (or: parachlorocresol)	
N-alkyl (40% C12, 50% C14, 10% C16) dimethyl benzyl ammonium saccharinate	
Sodium 2-phenylphenate	
Spirodiclofen	
Aminocyclopyrachlor	
Dried eggs	
Citronella oil	
Liquid corn gluten	
D-trans-allethrin	
Sodium alpha-olefin sulfonate	
Cloransulam-methyl	
Quinclorac	
1,4-dimethylnaphthalene	
Capsaicin	
Oxadiazon	
Cyfluthrin	
Lactic acid	
Etridiazole	
Kasugamycin hydrochloride hydrate	
Ethametsulfuron-methyl	
Methyl nonyl ketone	
Chlorsulfuron	
6-benzylaminopurine (or: 6-benzyladenine)	
Related capsaicinoids	
Foramsulfuron	
Citronella terpene	
Prohydrojasmon	
Codlelure	
Meat meal mixture	
Clove oil	
Wintergreen oil	
Polybutene	
Natamycin	
Citric acid	
Abamectin	
Chlorfenapyr	

Active name	Kilograms of active ingredients
Gibberellic acid	
Oxathiapiprolin	
Hydramethylnon	
Propoxur	
Methyl bromide	
Verbenone	
Tetraconazole	
Rotenone	
Fish oil mixture	
Pyriproxyfen	
Garlic oil	
Castor oil	
(Z)-9-dodecenyl acetate + (Z)-11-tetradecenyl acetate	
Phosphine	
(Z)-8-dodecen-1-yl acetate	
Naphthylacetic acid	
S-kinoprene	
(E,Z)-11-tetradecenal	
Coumaphos	
Octenol	
Paclobutrazol	
Pine needle oil	
Lemon oil	
Eucalyptus oil	
Oil of geranium	
Di-n-propyl isocinchomeronate	
1-dodecanol	
Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride	
Dioctyl dimethyl ammonium chloride	
Buprofezin	
Piperine	
Bispyribac-sodium	
Triflusulfuron-methyl	
N-dialkyl (5% C12, 60% C14, 30% C16, 5% C18) methyl benzyl ammonium chloride	
Muscalure	
Bromadiolone	
Denatonium benzoate	
Warfarin	
Diflubenzuron	
(Z,Z)-3,13-octadecadien-1-yl acetate	

Active name	Kilograms of active ingredients
Camphor oil	
3-methyl-2-cyclohexen-1-one	
Chlorophacinone	
Fenpyroximate	
Garlic	
1-tetradecanol	
Metofluthrin	
E-8-dodecenyl acetate	
4-aminopyridine	
Diphacinone (present in free form or as sodium salt)	
1-MCP	
Brodifacoum	
Difethialone	
Disodium cyanodithioimidocarbonate	
Bromethalin	
(E,Z)-3,13-octadecadien-1-yl acetate	
(Z)-11-tetradecenyl acetate	
Uniconazole-P	
Pymetrozine	
Z-8-dodecenol	
Butoxypolypropylene glycol	
Strychnine	
Ancymidol	
Prosulfuron	
Aviglycine hydrochloride	
Cyromazine	
(Z)-9-tetradecen-1-yl acetate	
Tau-fluvalinate	
(E,Z)-2,13-octadecadien-1-yl acetate	
4-CPA	
(Z)-11-tetradecen-1-ol	
(Z)-11-tetradecenal	
(Z,Z)-3,13-octadecadien-1-ol	
Sodium monofluoroacetate	
(E,Z)-2,13-octadecadien-1-ol	
(Z)-8-dodecenyl acetate + (E)-8-dodecenyl acetate + (Z)-8-dodecen-1-ol	
(E,E)-8,10-dodecadien-1-ol + 1-dodecanol + 1-tetradecanol	
Primisulfuron-methyl	
Prallethrin	
Triclopyr triethylamine salt	
Quintozene	

Active name	Kilograms of active ingredients
Triforine	
Oxycarboxin	
Phoma macrostoma	
Mesosulfuron-methyl	
Sulfometuron methyl	
Lactobacillus rhamnosus (strain LPT-21)	
Picolinafen	
Spiroxamine	
Lactococcus lactis	
Streptomyces acidiscabies strain RL-110T cells and spent fermentation media	
Sodium cyanide	
Streptomyces griseoviridis strain K61	
3-ketopetromyzonol-24-sulfate, ammonium salt	
Streptomyces lydicus strain WYEC108	
Pasteuria nishizawae PN1	
Pyriofenone	
2-(hydroxymethyl)-2-nitro-1,3-propanediol	
Extract of *Reynoutria sachalinensis*	
R-(-)-1-octen-3-ol	
Verticillium albo-atrum, isolate WCS850	
Oriental mustard seed meal	
Naphthaleneacetamide	
Nucleopolyhedrovirus for gypsy moth larvae	
Artificial grape extract	
Sulfuric acid	
Siloxylated polyether	
Nuclear polyhedrosis virus of red-headed pine sawfly	
Ziram	
3-(trimethoxysilyl)-propyldimethyloctadecyl ammonium chloride	
Methyl salicylate	
Trichoderma asperellum, strain T34	
Petroleum hydrocarbon blend	
(E)-11-tetradecenyl acetate	
Trichoderma virens strain G-41	
Triethylene glycol	
Thidiazuron	
N-alkyl (5% C5-18, 61% C12, 23% C14, 11% C16) dimethyl benzyl ammonium chloride	
Propoxycarbazone-sodium	
Nucleopolyhedrovirus for Douglas-fir tussock moth	

Active name	Kilograms of active ingredients
Noviflumuron	
Paraformaldehyde	
Mandestrobin	
D-limonene	
Thymol	
Oxamyl	
4-nitro-3-(trifluoromethyl)phenol sodium salt	
Paecilomyces fumosoroseus strain FE 9901	
Phlebiopsis gigantea	
Sodium fluoride	
Soybean oil	
Available chlorine, present as lithium hypochlorite	
Metarhizium anisopliae (strain F52)	
Propetamphos	
Octadec-9-enoic acid	
Neodiprion abietis nucleopolyhedrovirus	
Thyme oil	
Pantoea agglomerans	
Trichoderma harzianum	
Sodium lauryl sulfate	
Clavibacter michiganensis (spp *michiganensis*) bacteriophage	
Octyl decyl dimethyl ammonium chloride	
Tepraloxydim	
N-alkyl (25% C12, 60% C14, 15% C16) dimethyl benzyl ammonium chloride	
Tributyl tetradecyl phosphonium chloride	
Propylene glycol	
N-alkyl (3% C12, 95% C14, 2% C16) dimethyl benzyl ammonium chloride (or: myristyl dimethyl benzyl ammonium chloride dihydrate)	
Pyrazon	
(9Z,12E)-9,12-tetradecadien-1-yl acetate	
Saponins of *Chenopodium quinoa*	
(E)-4-tridecenyl acetate + (Z)-4-tridecenyl acetate	
Nosema locustae canning, (spore of)	
Lactobacillus casei strain LPT-111	
Momfluorothrin	
Isopropyl alcohol	
Bacillus thuringiensis	
Chondrostereum purpureum (strain: North American; pathovar: PFC2139)	

Active name	Kilograms of active ingredients
Diallyl disulfide and related sulfides	
Bicyclopyrone	
4-chloroindole-3-acetic acid	
Fenbuconazole	
Beauveria bassiana	
Fenpropimorph	
Bacillus subtilis	
Bacillus amyloliquefaciens, strain D747	
Cornmint oil	
Cyphenothrin	
Fungus: *Gliocladium catenulatum*	
Niclosamide	
Dodine	
Clofentezine	
Cloquintocet-mexyl	
Flutriafol	
Putrescent whole egg solids	
Bacillus mycoides isolate J	
Iodosulfuron-methyl-sodium	
Flumethrin	
Canola oil	
1,4-bis(bromoacetoxy)-2-butene	
Flufenacet	
2-bromo-4'-hydroxyacetophenone	
Bacillus firmus I-1582	
German cockroach extract	
Bensulide	
1-(alkyl-amino)-3-aminopropane hydrochloride (component of AMPHO 443-31)	
(ACMNPV) cabbage looper	
Etoxazole	
(E,Z)-9-dodecenyl acetate	
Cyprosulfamide	
1-(alkyl-amino)-3-carboxymethylaminopropane (component of AMPHO 443-31)	
Coniothyrium minitans strain CON/M/91-08	
Agrobacterium radiobacter	
3-chloro-P-toluidine hydrochloride	
Bacillus sphaericus	
Benzyl benzoate	
1-alkyl(C6-C18)-1,3-propanediamine	
Pseudomonas fluorescens	

Active name	Kilograms of active ingredients
Flupyradifurone	
Imiprothrin	
Beta-cyfluthrin	
Endothal or endothall	
Aureobasidium pullulans	
Ethylene oxide	
Pseudomonas syringae - strain ESC-10	
Dithiopyr	
Acibenzolar-s-methyl	
Cydia pomonella granulovirus	
Etofenprox	
Isoxaben	
Sclerotinia minor IMI 3144141	
N-octanol	

Appendix II Chemical Groups and Active Ingredients–2016

Chemical Group	Active Ingredient Name
Acylureas	Bromacil (present in free form as dimethylamine salt or as lithium salt) Bentazon (present as sodium salt) Cymoxanil Diflubenzuron Iprodione Novaluron Terbacil Hexazinone
Alcohols	Alcohols, C9-11, ethoxylated Aviglycine hydrochloride Bronopol Butoxypolypropylene glycol Alcohol anhydrous Ethylene oxide N-decanol N-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 capsaiciniods Saflufenacil

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

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 Carbendazim Clomazone 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 Octhilinone Oxathiapiprolin Pyraflufen-ethyl Pinoxaden Pyrasulfotole Pyroxasulfone Spirotetramat Strychnine 2-(thiocyanomethylthio)benzothiazole 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
Benzonitriles	Bromoxynil Dichlobenil Chlorothalonil

Chemical Group	Active Ingredient Name
Biscarbamates	Desmedipham Ferbam Mancozeb Metiram Nabam Phenmedipham Thiram Thiophanate-methyl
Carbamates	Propoxur Bifenazate Carbaryl Chlorpropham EPTC Famoxadone Formetanate hydrochloride Iodocarb Methomyl Oxadiazon Oxamyl Propamocarb hydrochloride Icaridin Triallate
Chromenones	Brodifacoum Bromadiolone Difethialone Rotenone Warfarin
Cyclohexanedione Oximes	Clethodim Sethoxydim Tepraloxydim Tralkoxydim
Diazines	Aminocyclopyrachlor Ancymidol 6-benzylaminopurine (or: 6-benzyladenine) Maleic hydrazide Pyridaben Pyrazon Triforine
Dinitrobenzenes	Bromethalin Dinocap (plus related active compounds) 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 Pyrimethanil 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 Coppers	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 Copper (present as mixed copper ethanolamine complexes or as bis(2-aminoethanolate)) Copper (present as copper sulfate pentahydrate) Copper, present as basic copper carbonate Copper (present as picro cupric ammonium formate and tannate complex) Copper (present as copper oxychloride) Copper (present as copper hydroxide)
Inorganic Zincs	Zinc as elemental (present as zinc naphthenate) Zinc (present as zinc oxide) Zinc phosphide

Chemical Group	Active Ingredient Name
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 Borax or disodium tetraborate decahydrate Fosetyl-Al Ferrous sulfate monohydrate Ferric phosphate Hydrogen peroxide Iron (present as ferric phosphate) Iron (present as FeHEDTA) Kaolin Potassium peroxymonosulfate present as potassium peroxymonosulfate sulfate Available chlorine, present as lithium hypochlorite Mono- and dipotassium phosphite Magnesium phosphide Sodium chloride Phosphine Potassium bicarbonate Sodium bromide Sodium chlorite Sodium chlorate Sodium cyanide Sodium fluoride Sulfuryl fluoride Available chlorine, present as sodium hypochlorite Silicon dioxide (present as 100% diatomaceous earth) - fresh water fossils Silica gel (amorphous) Silicon dioxide (present as 100% diatomaceous earth) - salt water fossils Sulphur Lime sulphur Zinc borate
Methoxyacrylates	Azoxystrobin Fluoxastrobin Kresoxim-methyl Pyraclostrobin Picoxystrobin Trifloxystrobin

Chemical Group	Active Ingredient Name
Microbials	*Agrobacterium radiobacter* *Aureobasidium pullulans* DSM 14940 *Aureobasidium pullulans* DSM 14941 *Aureobasidium pullulans* DSM 14940 and DSM 14941 (ACMNPV) cabbage looper *Beauveria bassiana* strain ANT 03 *Bacillus firmus* I-1582 *Beauveria bassiana* strain GHA *Beauveria bassiana* strain HF23 *Bacillus amyloliquefaciens*, strain D747 *Pseudomonas fluorescens* A506 *Pseudomonas syringae* - strain ESC-10 *Pseudomonas fluorescens* CL145A *Bacillus subtilis* QST 713 *Bacillus subtilis* (strain GB03) *Bacillus subtilis* MB1600 *Bacillus subtilis* var. *amyloliquefaciens* strain FZB24 *Bacillus thuringiensis Berliner* spp. *kurstaki* *Bacillus thuringiensis* serotype H-14 *Bacillus sphaericus* *Bacillus thuringiensis* sp. *tenebrionis* *Bacillus thuringiensis* ssp. *aizawai* *Coniothyrium minitans* strain CON/M/91-08 *Cydia pomonella* granulovirus (strain M) *Cydia pomonella* granulosis virus (strain CMGV4) *Chondrostereum purpureum* (strain: North American; pathovar: PFC2139) Fungus: *Gliocladium catenulatum* *Sclerotina minor* IMI 3144141 *Trichoderma harzianum* strain KRL-AG2 *Lactobacillus casei* strain LPT-111 *Lactobacillus rhamnosus* (strain LPT-21) *Lactococcus lactis* ssp. *lactis* strain LL64/CSL *Lactococcus lactis* ssp. *cremoris* strain M11/CSL *Lactococcus lactis* ssp. *lactis* strain LL102/CSL *Metarhizium anisopliae* (strain F52) *Phoma macrostoma* *Neodiprion abietis* nucleopolyhedrovirus *Nosema locustae* canning (spore of) Nucleopolyhedrovirus for gypsy moth larvae Nuclear polyhedrosis virus of red-headed pine sawfly Nucleopolyhedrovirus for Douglas-fir tussock moth *Pantoea agglomerans* C9-1 *Pantoea agglomerans* strain E325 (NRRL B-21856) *Phlebiopsis gigantea* *Paecilomyces fumosoroseus* strain FE 9901 *Pasteuria nishizawae* Pn1 *Streptomyces acidiscabies* strain RL-110T cells and spent fermentation media *Streptomyces griseoviridis* strain K61

Chemical Group	Active Ingredient Name
	Streptomyces lydicus strain WYEC 108 *Trichoderma asperellum*, strain T34 *Trichoderma virens* strain G-41 *Trichoderma harzianum* Rifai strain T-22 *Clavibacter michiganensis* (spp *michiganensis*) bacteriophage *Typhyla phacorrhiza* (strain 94671) *Verticillium albo-atrum* isolate WCS850
Morpholines, Oxathiines	Dimethomorph Fenpropimorph Oxycarboxin Carbathiin Spiroxamine
Nitrobenzenes	Acifluorfen-sodium Dichloran Fomesafen Tembotrione Mesotrione Oxyfluorfen Quintozene
Oils, Minerals, Vegetable	Oil of black pepper Citronella oil Clove 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

Chemical Group	Active Ingredient Name
	Prohexadione calcium 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
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) Aromatics 2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane) Dried blood *Brassica hirta* 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 Diallyl disulfide and related sulfides 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

Chemical Group	Active Ingredient Name
	2,2'-(1-methyltrimethylenedioxy)bis-(4-methyl-1,3,2-dioxaborinane) Methyl nonyl ketone Oriental mustard seed meal Meat meal mixture Piperonyl butoxide Extract of *Reynoutria sachalinensis* Sodium alpha-olefin sulfonate Saponins of *Chenopodium quinoa*
Phenols/Chlorophenols	2-bromo-4'-hydroxyacetophenone 2-phenylphenol 2-phenylphenol (present as sodium salt) Pentachlorophenol plus related active chlorophenols From nanogen: chlorocresol (or: parachlorocresol) 4-chloro-3-methylphenol (sodium salt) Sodium 2-phenylphenate 4-nitro-3-(trifluoromethyl)phenol sodium salt
Phenoxy Acids	4-CPA Cloquintocet-mexyl 2,4-DB Dichlorprop (present as butoxyethyl ester, as isooctyl ester, or as ethylhexyl ester) Dichlorprop-P (present as dimethylamine salt) Dichlorprop-P Dichlorprop P-isomer (present as 2-ethylhexyl ester) 2,4-D (present as acid) 2,4-D (present as amine salts : dimethylamine salt, diethanolamine salt, or other amine salts) 2,4-D (present as low volatile esters) 2,4-D present as choline salt MCPA (present as acid) MCPA (present as amine salts: diethanolamine, dimethylamine or mixed amines) MCPA (present as esters) MCPA (present as potassium salt or sodium salt) MCPB (present as sodium salt) MCPB (present as isomer specific) Mecoprop P-isomer (present as acid) Mecoprop-P (present as dimethylamine salt) Mecoprop-P (present as potassium salt) Mecoprop-P (present as amine salt) Triclopyr-butotyl

Chemical Group	Active Ingredient Name
Pheromones	E-8-dodecenyl acetate (E,Z)-2,13-octadecadien-1-yl acetate (E,Z)-2,13-octadecadien-1-ol German cockroach extract S-kinoprene (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 Pheromone pine shoot borer (E,Z)-3,13-octadecadien-1-yl acetate (Z,Z)-3,13-octadecanien-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
Phtalic Acids	Captan Chlorthal-dimethyl Folpet Octylbicyclo heptene dicarboximide

Chemical Group	Active Ingredient Name
Pyrethroids, Pyrethrins	D-cis, trans allethrin D-trans-allethrin Bifenthrin Cyfluthrin Lambda-cyhalothrin Cypermethrin Cyphenothrin Deltamethrin Imiprothrin Etofenprox 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 Quinoxyfen 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 Primisulfuron-methyl Prosulfuron Sulfometuron methyl Triflusulfuron-methyl

Chemical Group	Active Ingredient Name
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-triazinetrione Simazine plus related active triazines Available chlorine, present as trichloro-s-triazinetrione
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 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.