Health Canada Santé Canada

Canada

Pest Management Regulatory Agency

Pest Control Products Sales Report for 2018

Protecting the health and environment of Canadians

Protéger la santé des Canadiens et l'environnement

Health Canada is the federal department responsible for helping the people of Canada maintain and improve their health. We assess the safety of drugs and many consumer products, help improve the safety of food, and provide information to Canadians to help them make Health Canada is responsible for helping Canadians maintain and improve their health. It ensures that high-quality health services are accessible, and works to reduce health risks.

Health Canada's Pest Management Regulatory Agency (PMRA) is the federal authority responsible for regulating pest control products in Canada, under the *Pest Control Products Act*. PMRA's primary objective is to prevent unacceptable risks to Canadians and the environment from the use of pesticides.

PMRA's VISION

Canadians are confident that Canada's pesticide regulatory system protects their health and the environment.

PMRA's MISSION

To protect the health and environment of Canadians by using modern, evidence-based, scientific approaches to pesticide regulation, in an open and transparent manner.

7 October 2020

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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.

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Introduction

This eleventh Pest Control Products Sales Report provides an overview of pesticides sold in Canada for the 2018 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

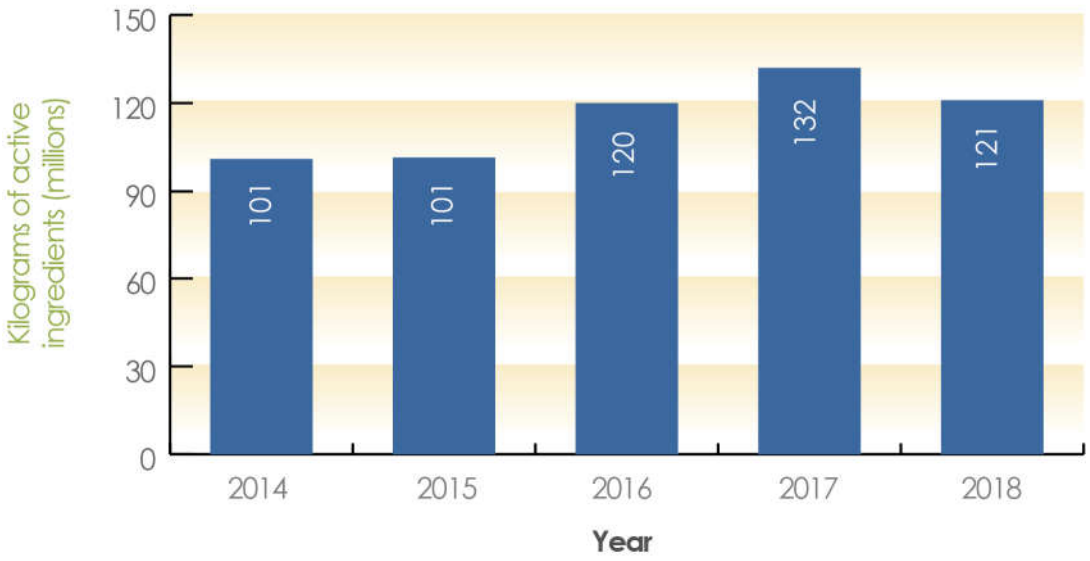
There were 7447 products registered with the PMRA for use in Canada in the 2018 calendar year. Registrants submitted sales data in different units depending on the product (for example, kilograms, litres). To standardize across varying products, the data have been converted into kilograms of active ingredient (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 2737 products reported as sold, the overall pesticide sales in Canada in 2018 were 121 258 940 kg a.i., which is an 8% decrease from the 132 135 115 kg a.i. sold in 2017 (Figure 1). While a decrease was seen in 2018, there is a general increasing trend in pesticide sales over time. Changes in overall pesticide sales are driven by changes in agricultural herbicide sales.

Figure 1

Quantity of pesticides sold in Canada (2014-2018)



In 2018, the 50 products with the greatest sales accounted for 70.5% of the total kg a.i. sold in Canada (85 546 744 kg a.i.). This was a decrease in the overall quantity and relative amount from 2017, where the top 50 products accounted for 73.7% of total sales (97 322 165 kg a.i.). The top 10 active ingredients sold, presented in decreasing order of quantity in Table 1, made up 68.7% of total sales (83 345 526 kg a.i.). A comprehensive list with the rankings for all active ingredients sold in Canada in 2018 is provided in Appendix I. Six active ingredients have remained on the top 10 list over the past five years (since 2014): glyphosate, available chlorine, present as sodium hypochlorite, creosote, 2,4-D, surfactant blend, and glufosinate ammonium.

Table 1: Top 10 active ingredients sold in Canada in 2018

Active ingredient	Product type
Glyphosate	Herbicide
Available chlorine, present as sodium hypochlorite	Antimicrobial
Creosote	Antimicrobial
Prothioconazole	Fungicide
Glufosinate ammonium	Herbicide
Bromoxynil	Herbicide
MCPA	Herbicide
Surfactant blend	Other
Borates	Insecticide/Fungicide/Antimicrobial
2,4-D	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 2018, 71.1% of pesticide sales in Canada were of Agricultural sector products (see Figure 2), whereas 24.3% were of Non-agricultural sector products and 4.5% were of Domestic sector products. The relative sales of products in the Agricultural sector decreased between 2017 and 2018 (decreasing from 73% to 71%), while the Non-agriculture sector increased from 21% to 24%, and the Domestic sector decreased from 2017 to 2018 (decreasing from 5% to 4% (see Figure 3 for data from 2014 to 2018).

Figure 2

Quantity of pesticides sold in Canada in 2018 by sector

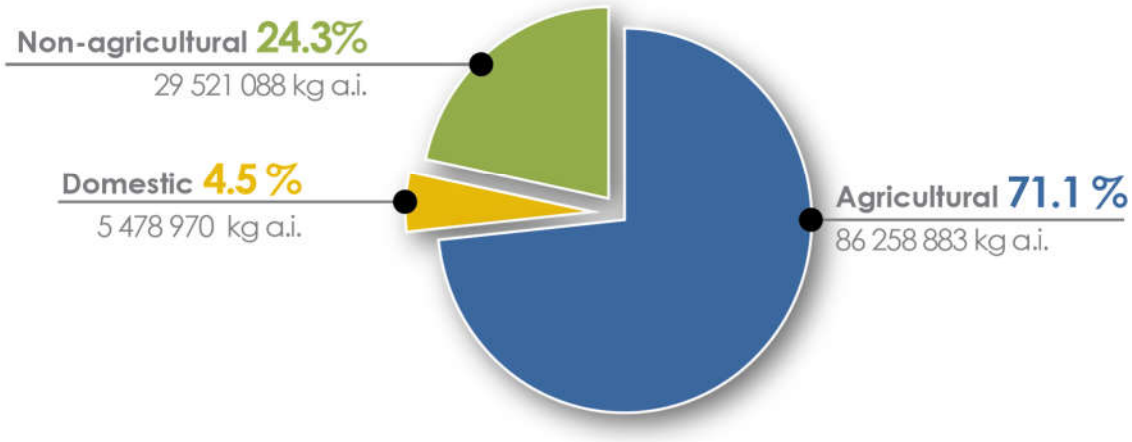
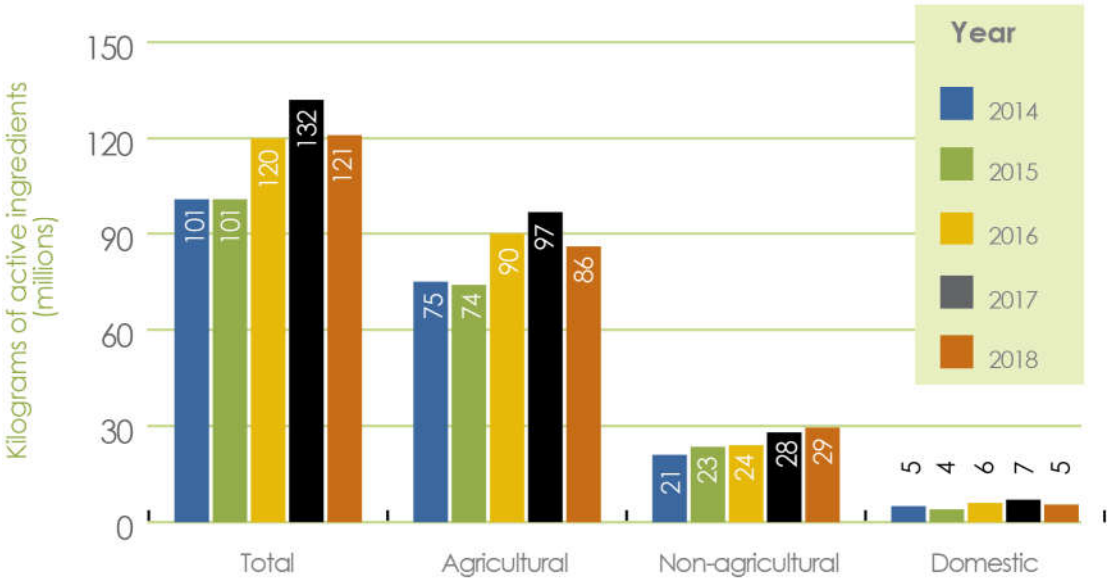


Figure 3

Quantity of pesticides sold in Canada by sector (2014-2018)



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 2018, as an over-reporting would occur.

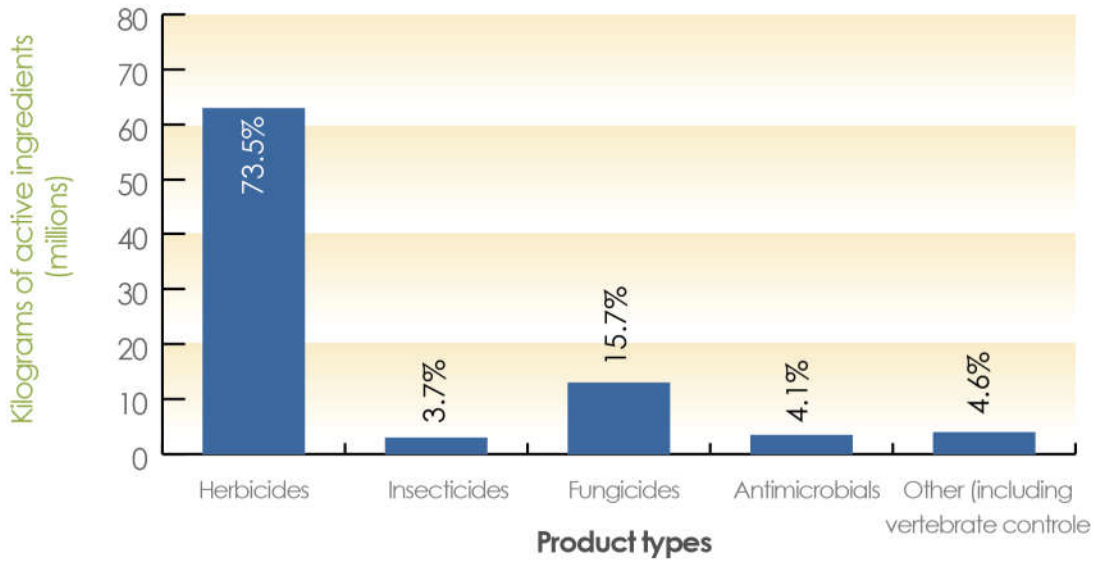
Agricultural sector

Products with agricultural uses accounted for 71.1% of pesticide sales in Canada in 2018. There was an 11.0% decrease in Agricultural sector pesticide sales from 2017 (96 953 819 kg a.i.) to 2018 (86 258 883 kg a.i.).

Herbicides accounted for 73.5% of agricultural sector pesticide sales, followed by fungicides (15.7%), insecticides (3.7%), antimicrobials (4.1%), and others (4.5%) (Figure 4). Vertebrate controls (0.03%) accounted for very small quantities of agricultural pesticides sold in 2018 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

Agricultural sector



The top 10 active ingredients sold with agricultural uses are shown in Table 2 in decreasing order of quantity. 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 76.2% of the Agricultural sector pesticides sold. Six active ingredients have remained in the top 10 over the last five years: glyphosate, 2,4-D, MCPA, glufosinate ammonium, mineral oil, and surfactant blend.

Table 2: Top 10 active ingredients sold in Canada in 2018 in the Agricultural sector

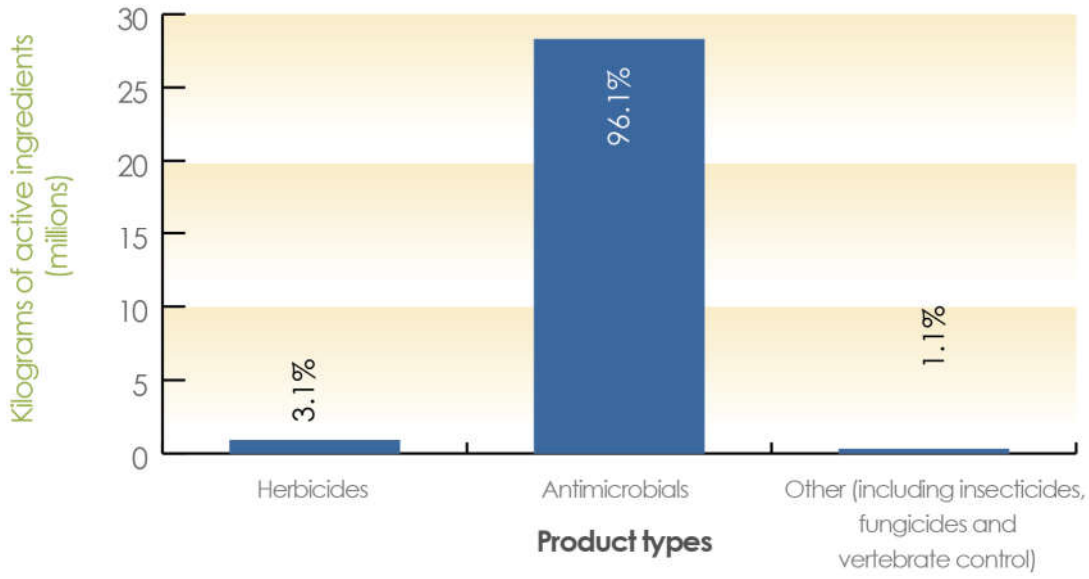
Active ingredient	Product type
Glyphosate	Herbicide
Prothioconazole	Fungicide
Glufosinate ammonium	Herbicide
Available chlorine, present as sodium hypochlorite	Antimicrobial
Bromoxynil	Herbicide
MCPA	Herbicide
Surfactant blend	Other
2,4-D	Herbicide
Tebuconazole	Fungicide
Mineral oil	Insecticide/Fungicide/Other

Non-agricultural sector

Commercial products with non-agricultural uses accounted for 24.3% of all pesticides sold in Canada in 2018 (compared to 21.4% in 2017). Non-agricultural sector pesticide sales increased 4.2% from 2017 to 2018 (from 28 329 167 kg a.i. to 29 521 087 kg a.i.). Over the past few years, there has been some fluctuation in Non-agricultural sector sales, with a large decrease in 2012 and smaller increases and decreases in other years.

Antimicrobials accounted for 96.1% of Non-agricultural sector sales followed by herbicides (3.1%), fungicides (0.5%), insecticides (0.3%), vertebrate control (0.1%), and others (0.2%) (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
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 of quantity. 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 85.3% of the Non-agricultural sector pesticides sold. Six 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, tetrakis (hydroxymethyl) phosphonium sulfate (THPS), and copper as elemental.

Table 3: Top 10 active ingredients sold in Canada in 2018 in the Non-agricultural sector

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

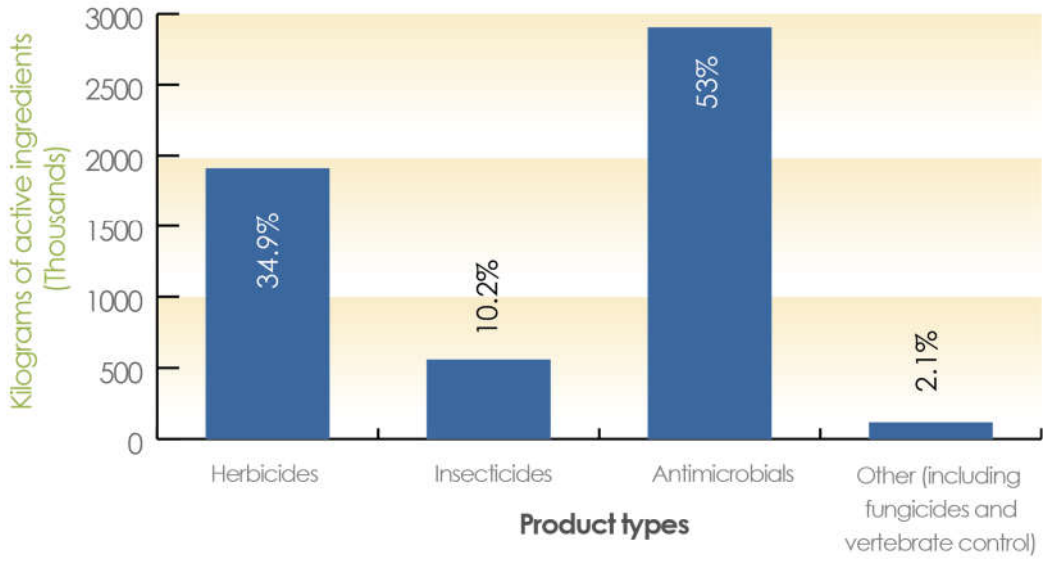
Domestic sector

The Domestic Class products accounted for 4.5% of overall pesticide sales in Canada for 2018. There was a 20% decrease from 2017 (6 852 128 kg a.i.) to 2018 (5 478 970 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 53.0% of domestic pesticides sold in Canada (Figure 6) (mainly sales of swimming pool and spa products) followed by herbicides (34.9%), insecticides (10.2%), vertebrate controls (1.8%), 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

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 of quantity. These active ingredients accounted for 90.9% 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- triazinetrione, n-alkyl (40% C12, 50% C14, 10% C16) dimethylbenzylammonium 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 2018 in the Domestic sector

Active ingredient	Product type
Corn gluten meal	Herbicide
Available chlorine, present as trichloro-s-triazinetrione	Antimicrobial
Available chlorine, present as calcium hypochlorite	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) dimethylbenzylammonium chloride	Antimicrobial
DEET*	Insecticide
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	Antimicrobial
Paradichlorobenzene	Insecticide
Cellulose (from powdered corn cobs)	Vertebrate control

*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 2018, as an over-reporting would occur.

Herbicides

Herbicides accounted for 54.6% (66 232 905 kg a.i.) of all pesticides sold in Canada in 2018. This is a decrease from 2017 when herbicides accounted for 58.8% of all pesticides sold. This translates into a decrease of 14.8% in the quantities of herbicides sold from 2017 (77 765 728 kg a.i.) to 2018 (66 232 905 kg a.i.).

The top 10 herbicides sold in 2018, as listed in Table 5 in decreasing order of quantity, accounted for 87.4% of all herbicide sales in Canada and 47.8% of all pesticide sales. 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 2018

Active Ingredient
Glyphosate
Glufosinate ammonium
Bromoxynil
MCPA
2,4-D
Corn gluten meal
S-metolachlor and R-enantiomer
Bentazon
Metam-sodium
Clethodim

Insecticides

Insecticides accounted for 3.2% (3 836 995 kg a.i.) of all pesticides sold in Canada in 2018. 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 2018. Many of the insecticides are

used in agricultural settings, though the fourth-most sold insecticide (DEET) is used only in the Domestic sector.

The top 10 insecticides sold in 2018, as listed in Table 6 in decreasing order of quantity, accounted for 78.5% of all insecticides sales in Canada and 2.5% of pesticide sales overall. Five insecticides have remained in the top 10 during the last five years of reporting: mineral oil, hydrogen peroxide, silicon dioxide, DEET, and sulphur.

Table 6: Top 10 insecticide active ingredients sold in Canada in 2018

Active Ingredient
Mineral oil
Hydrogen peroxide
Sulphur
DEET*
Chlorpyrifos
Thiamethoxam
Paradichlorobenzene
Imidacloprid
Cyantraniliprole
Silicon dioxide

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

Fungicides

Fungicides accounted for 11.3% (13 724 886 kg a.i.) of all pesticides sold in Canada in 2018. Fungicide sales have remained relatively low throughout the reporting years, with a high in 2018 and a low in 2010 (5 784 829 kg a.i.). The vast majority of fungicides are used in the Agricultural sector (98.8%).

The top 10 fungicides sold in Canada in 2018, as listed in Table 7 in decreasing order of quantity, accounted for 80.9% of fungicide sales and 9.1% 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, prothioconazole, chloropicrin, and sulphur.

Table 7: Top 10 fungicide active ingredients sold in Canada in 2018

Active ingredient
Prothioconazole
Tebuconazole
Mancozeb
Metam-sodium

Active ingredient
Chlorothalonil
Chloropicrin
Trifloxystrobin
Mono- and dibasic sodium, potassium, and ammonium phosphites
Sulphur
Metiram

Antimicrobials

Antimicrobials accounted for 28.7% (34 822 207 kg a.i.) of all pesticides sold in Canada in 2018. 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 2018, as listed in Table 8 in decreasing order of quantity, accounted for 85.4% of all antimicrobial sales in Canada and 24.5% 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, creosote, glutaraldehyde, and copper as elemental.

Table 8: Top 10 antimicrobial active ingredients sold in Canada in 2018

Active ingredient
Available chlorine, present as sodium hypochlorite
Creosote
Borates
Copper as elemental
Available chlorine, present as trichloro-s-triazinetrione
Glutaraldehyde
Available chlorine, present as calcium hypochlorite
2,2-dibromo-3-nitrilopropionamide
Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)

Vertebrate control

Vertebrate controls accounted for 0.13% (156 629 kg a.i.) of all pesticides sold in Canada in 2018. 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 of quantity, accounted for 96.4% of all vertebrate control sales in 2018 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 2018

Active ingredient
Cellulose (from powdered corn cobs)
Aluminum phosphide
4-nitro-3-(trifluoromethyl)phenol sodium salt
Carbon dioxide gas
Dried blood
Sulphur
Fish meal mixture
Niclosamide
Thiram
Zinc phosphide

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 3.3% (3 980 511 kg a.i.) of pesticide sales in Canada in 2018. 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 (98.6%).

The top 10 active ingredients sold in Canada in 2018 that fall into this type are listed in Table 10 in decreasing order of quantity and accounted for 99.5% of "other" type sales and 3.3% of pesticide sales overall. Six 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, triglyceride ethoxylate, and ethoxylated alcohol, C9-11.

Table 10: Top 10 other active ingredients sold in Canada in 2018

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

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.

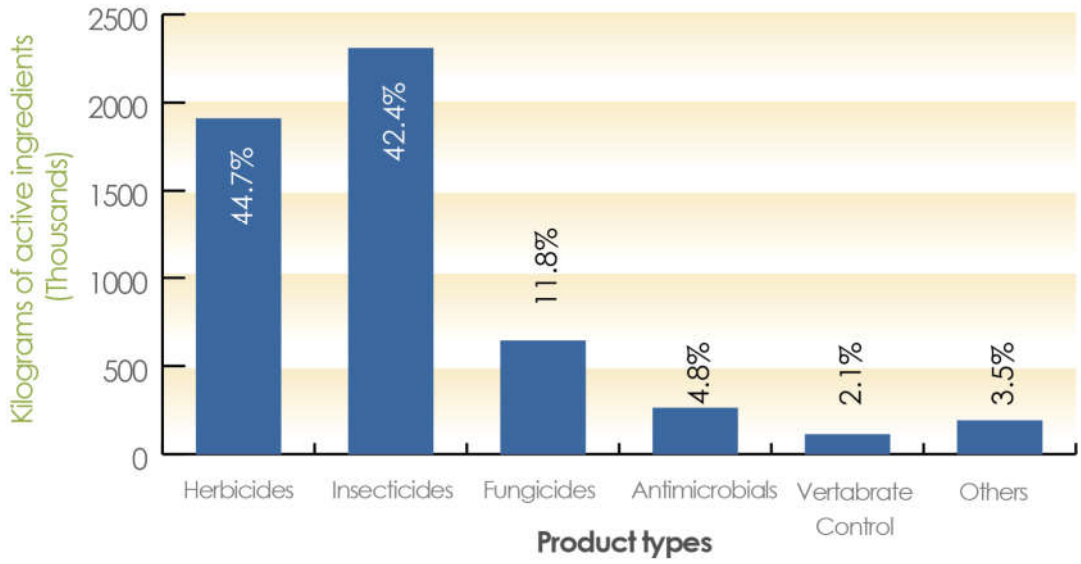
In 2018, there were 181 active ingredients identified as biopesticides, which accounted for 1028 registered products.

The 366 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 306 products that could be converted to kg a.i. accounted for 4.5% of total pesticide sales (5 451 560 kg a.i.) in 2018. There was a 27.6% decrease in biopesticide sales from 2017 (7 533 464 kg a.i.) to 2018. The sales of biopesticides have fluctuated over the years in which data have been collected. Herbicides accounted for 44.7% of the biopesticide sales in 2018 (Figure 7), followed by insecticides (42.4%), fungicides (11.8%), antimicrobials (4.8%), "others" (3.5%), and vertebrate controls (2.1%).

Figure 7

Quantity of biopesticides sold in Canada in 2018



The top 10 biopesticide active ingredients sold in Canada are listed in Table 11 in decreasing order of quantity. The top 10 active ingredients accounted for 91.7% of sales of biopesticides that could be converted to kg a.i. and 4.1% of pesticide sales overall. Six 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, and cellulose (from powdered corn cobs).

Table 11: Top 10 biopesticide active ingredient sold in Canada in 2018

Active ingredient	Product type
Corn gluten meal	Herbicide
Mineral oil	Fungicide/Insecticide/Other
Hydrogen peroxide	Herbicide/Insecticide/Fungicide/Antimicrobial
Sulphur	Fungicide/Insecticide/Vertebrate Control
N-decanol	Herbicide
Ammonia (present as ammonium sulfate)	Antimicrobial
Cellulose (from powdered corn cobs)	Vertebrate control
Soap	Herbicide/Insecticide/Fungicide
Silicon dioxide	Insecticide
Sodium Chloride	Herbicide

The remaining 60 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 2018 of these is listed in Table 12.

Table 12: Quantity of microbials sold in Canada in 2018

Units of product sold	Total
Litres (microbials)	3 782 282
Kilograms (microbials)	1 145 160

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

In 2018, the chemical group with the largest proportion of sales was the "Phosphonic and phosphinic acids" group at 37%, followed by the "Inorganics" group at 18%. The third group was the "Hydrocarbons" at 7% which were followed by the "Triazoles" at just over 5%. The remaining chemical groups were all under 5% and 41 out of 54 chemical groups were less than 1% of total sales. Nine chemical families remained in the top 10 from 2017 to 2018.

Table 13: Summary of pesticide sales by chemical group (all sectors) in 2018

Chemical grouping	Kilograms of active ingredients	Rank
Phosphonic acids, phosphinic acids	44 810 271	1
Inorganic	21 309 959	2
Hydrocarbons	8 224 462	3
Triazoles	6 200 668	4
Phenoxy acids	5 774 779	5
Fatty acids, surfactants	4 121 838	6
Benzonitriles	3 675 051	7
Acylureas	3 046 794	8
Others	2 025 769	9
Oils, minerals, vegetable	1 992 798	10
Anilides	1 978 081	11
Biscarbamates	1 471 406	12
Ammoniums, quaternary	1 469 941	13
Dithiocarbamates	1 148 002	14
Alcohols	1 106 519	15
Cyclohexanedione oximes	997 221	16
Methoxyacrylates	931 912	17
Aldehydes	901 672	18

Chemical grouping	Kilograms of active ingredients	Rank
Organochlorines	XXX	19
Dinitrobenzenes	861 330	20
Triazines, tetrazines	826 109	21
Amides	796 826	22
Azoles, oxazoles, thiazoles	731 252	23
Chlorotriazines	XXX	24
Thiocarbamates	XXX	25
Sulfonylureas	492 733	26
Aryloxyphenoxyl acids	450 859	27
Benzamides	444 979	28
Guanidines	413 314	29
Phenols/chlorophenols	408 874	30
Benzoic acid and derivatives	361 446	31
Imidazolinones	312 069	32
Urea derivatives	252 190	33
Phthalic acids	245 897	34
Carbamates	227 076	35
Thiophosphates	189 659	36
Organic acids	174 312	37
Pyrethroids, pyrethrins	147 805	38
Dithiophosphates	XXX	39
Halogenated organic acids	128 780	40
Nitrobenzenes	111 615	41
Morpholines & oxathiines	XXX	42
Diazines	64 832	43
Pyridines	52 458	44
Phosphates	XXX	45
Organohalogens	14 013	46
Phosphoramidothioates	XXX	47
Oximes-carbamates	XXX	48
Anilines	1 493	49
Pheromones	976	50
Organometallics	XXX	51

Chemical grouping	Kilograms of active ingredients	Rank
Chromenones	402	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.

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 2018

Active name	Kilograms of active ingredients
Glyphosate	>25 000 000
Available chlorine, present as sodium hypochlorite	>10 000 000
Creosote	>5 000 000
Prothioconazole	>1 000 000
Glufosinate-ammonium	
Bromoxynil	
MCPA	
Surfactant blend	
Borates	
2,4-D	
Tebuconazole	
Corn gluten meal	
Mineral oil	
S-metolachlor and R-enantiomer	
Mancozeb	
Copper (as elemental)	
Available chlorine, present as trichloro-s-triazinetrione	>500 000
Metam-sodium	
Glutaraldehyde	
Bentazon	
Chlorothalonil	
Available chlorine, present as calcium hypochlorite	
2,2-dibromo-3-nitrilopropionamide	
Chloropicrin	
Clethodim	
Atrazine (plus related active triazines)	
Trifloxystrobin	
Diquat	
Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	
Fluroxypyr-meptyl	
Ethalfluralin	
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)	
Chromic acid	>100 000
Triallate	

Active name	Kilograms of active ingredients
Alkyl-1,3-propylene diamine acetate	
Mono- and dibasic sodium, potassium, and ammonium phosphites	
Hydrogen peroxide	
Metribuzin	
Arsenic pentoxide	
Pentachlorophenol	
Chlorsulfuron	
Poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio)ethylene dichloride]	
N-alkyl (40% C12, 50% C14, 10% C16) dimethylbenzylammonium chloride	
Sulphur	
Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine	
N-decanol	
Paraffin base petroleum oil	
Dicamba	
Chlormequat chloride	
Fenoxaprop-P-ethyl	
Metiram	
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	
Ammonia (present as ammonium sulfate)	
Metalaxyl	
Triglyceride ethoxylate	
Nonylphenoxypolyethoxyethanol	
Captan	
Sodium bromide	
Boscalid	
DEET	
Pyraclostrobin	
Ammonium bromide	
Chlorpyrifos	
Propiconazole	
Pyrasulfotole	
Thiamethoxam	
Trifluralin	
Dimethenamid-P	
Linuron	
Bronopol	
Imazamox	
Sodium chlorate	

Active name	Kilograms of active ingredients
Tralkoxydim	
Imazethapyr	
Paradichlorobenzene	
Clodinafop-propargyl	
Potassium dimethyldithiocarbamate	
Methylated seed oil of soybean	
Pinoxaden	
Sethoxydim	
Imidacloprid	
Cyantraniliprole	
Available chlorine present as 1,3-dichloro-5,5-dimethylhydantoin and 1,3- dichloro-5-ethyl-5-methylhydantoin	
Clopyralid	
Mecoprop	
Saflufenacil	>25 000
Silicon dioxide	
Pendimethalin	
Pyrimethanil	
Iprodione	
Metconazole	
Cellulose (from powdered corn cobs)	
Soap	
Acrolein	
Fluxapyroxad	
Sulfentrazone	
Sodium chloride	
Iron	
Fluopyram	
Chlorpropham	
Carbathiin	
Sodium chlorite	
Ferrous sulfate monohydrate	
Fosetyl-Al	
Difenoconazole	
Permethrin	
Alcohols, C9-11, ethoxylated	
Mesotrione	
Quizalofop-P-ethyl	
Acetic acid	

Active name	Kilograms of active ingredients
Dazomet	
Azoxystrobin	
EPTC	
2,4-DB	
Propamocarb hydrochloride	
Malathion	
5,5-dimethylhydantoin	
Didecyldimethylammonium present as carbonate and bicarbonate salts	
Thiram	
Available chlorine, present as sodium dichloro-s-triazinetrione	
1,2-benzisothiazolin-3-one	
Octhilinone	
Clothianidin	
Pyroxasulfone	
Didecyldimethylammonium chloride	
Quinclorac	
Mono- and dipotassium phosphite	
Iodocarb	
Dimethoate	
Fomesafen	
Fluazinam	
Chlorantraniliprole	
Aminocyclopyrachlor	
Flumioxazin	
Isoxaflutole	
Lime sulphur	
Triclopyr-butotyl	
Octadec-9-enoic acid	
Clomazone	
2-(hydroxymethyl)-2-nitro-1,3-propanediol	
Carbaryl	
Tribenuron-methyl	
N-alkyl (60% C14, 30% C16, 5% C12, 5% C18)dimethyl benzyl ammonium chloride	
Kaolin	
Ethephon	
Flucarbazone (present as flucarbazone-sodium)	
5-chloro-2-methyl-4-isothiazolin-3-one	
Picoxystrobin	
Carfentrazone-ethyl	

Active name	Kilograms of active ingredients
Deltamethrin	
Aluminum phosphide	
N-alkyl(68% C12, 32% C14)dimethyl ethylbenzyl ammonium chloride	
Sedaxane	
Imazamethabenz-methyl	
Potassium bicarbonate	
Sodium dimethyldithiocarbamate	>10 000
Nabam	
Thiophanate-methyl	
Phorate	
Maleic hydrazide	
Metam-potassium	
Hexazinone	
Thiencarbazone-methyl	
Thiabendazole	
Phosmet	
Fludioxonil	
Lambda-cyhalothrin	
Flupyradifurone	
Formic acid	
Oxydiethylene bis(alkyl dimethyl ammonium chloride)	
Sodium omadine	
Mandipropamid	
Dichlorprop	
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	
Florasulam	
Garlic juice	
Simazine plus related active triazines	
Bifenthrin	
Piperonyl butoxide	
Picloram	
Penflufen	
Siloxylated polyether	
Dichlobenil	
Pyroxsulam	
Octylphenoxypolyethoxyethanol	
2-methyl-4-isothiazolin-3-one	
4,5-dichloro-2-n-octyl-3(2H)isothiazolone	

Active name	Kilograms of active ingredients
Oxirane derivatives (50% minimum)	
Metsulfuron-methyl	
Fenamidone	
1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride	
Prometryne plus related active triazines	
Icaridin	
4-nitro-3-(trifluoromethyl)phenol sodium salt	
Carbon dioxide gas	
Carbendazim	
Acephate	
4-chloro-3-methylphenol (sodium salt)	>5 000
Triticonazole	
Naled	
Napropamide	
Diuron	
Imazapyr	
Indaziflam	
Aminopyralid	
N-alkyl(67% C12, 25% C14, 7% C16, 1%Cc18)dimethylbenzylammonium chloride	
Fluazifop-P-butyl	
2-phenylphenol	
MCPB	
2-(thiocyanomethylthio)benzothiazole	
Diflufenzopyr	
Thifensulfuron-methyl	
Ferbam	
1,2-dibromo-2,4-dicyanobutane	
Potassium peroxymonosulfate (present as potassium peroxymonosulfate sulfate)	
3-decen-2-one	
Dimethomorph	
Mineral spirits	
Folpet	
Spiroxamine	
Tebufenozide	
Zinc	
Dichlorvos	
Spirotetramat	
Silica gel (amorphous)	
Formaldehyde	

Active name	Kilograms of active ingredients
Canola oil	
Penthiopyrad	
Benzovindiflupyr	
1,3-bis(hydroxymethyl)-5,5-dimethylhydantoin	
Sulfoxaflor	
Ametoctradin	>1 000
Methylene bis(thiocyanate)	
Dried blood	
Zoxamide	
Pyrethrins	
Chlorthal-dimethyl	
Pyraflufen-ethyl	
Ethofumesate	
Flumetsulam	
Chlorimuron-ethyl	
Terbacil	
Acifluorfen-sodium	
D-phenothrin	
Fenhexamid	
Daminozide	
Oxathiapiprolin	
Octylbicyclo heptene dicarboximide	
Rimsulfuron	
Diazinon	
Peracetic acid	
Phenmedipham	
Desmedipham	
Fluoxastrobin	
Metrafenone	
Cypermethrin	
Garlic powder	
Trinexapac-ethyl	
Spinosad	
Thiacloprid	
Tetrachlorvinphos	
Streptomycin present as sulphate	
Topramezone	
Spiromesifen	
Ethaboxam	

Active name	Kilograms of active ingredients
Tetramethrin	
Methyl bromide	
Tembotrione	
Sodium 2-phenylphenate	
Halauxifen-methyl	
Methomyl	
2,6-diisopropylnaphthalene	
Acetamiprid	
Propyzamide	
Cyprodinil	
Bicyclopyrone	
Fish meal mixture	
Cyazofamid	
Halosulfuron (present as methyl ester)	
Barium metaborate monohydrate	
D-cis,trans-allethrin	
Niclosamide	
Oxalic acid	
4-chloroindole-3-acetic acid	
Acequinocyl	
Novaluron	
Isofetamid	
Dodecylguanidine hydrochloride	
Methoxyfenozide	
Tetraconazole	
Hydroxymethyl-5,5-dimethylhydantoin	
Tefluthrin	
Polyoxyalkylated alkyl phosphate ester	
Oxyfluorfen	
Metaldehyde	
Quinoxyfen	
Ipconazole	
Bifenazate	
Bromacil (present in free form, as dimethylamine salt, or as lithium salt)	
Naphthalene	>500
P-menthane-3,8-diol	
Diphenylamine	
Dithiopyr	
Beta-cyfluthrin	

Active name	Kilograms of active ingredients
Zinc phosphide	
Cymoxanil	
Flonicamid	
Fluopicolide	
Cyflumetofen	
Brassica hirta white mustard seed powder	
Oil of black pepper	
1,4-dimethylnaphthalene	
Oil of lemon eucalyptus, hydrated, cyclized	
Ammonia (present as ammonium carbamate)	
BLAD polypeptide	
Prohexadione-calcium	
Citronella oil	
Azadirachtin	
Famoxadone	
Polyoxin D zinc salt, Polyoxorim-zinc	
Foramsulfuron	
2,2'-(1-methyltrimethylenedioxy)bis-(4-methyl-1,3,2-dioxaborinane)	
10,10'-oxybis(phenoxarsine)	
Magnesium phosphide	
Kresoxim-methyl	
Dried eggs	
Amitraz	
Sodium alpha-olefin sulfonate	
Azamethiphos	<500
(S)-methoprene	
Mandestrobin	
Diodofon	
Pyridaben	
Artificial grape extract	
Rotenone	
Fenbutatin oxide	
Capsaicin	
Spirodiclofen	
Citronella terpene	
Lactic acid	
Natamycin	
Tea tree oil	
Ethametsulfuron-methyl	

Active name	Kilograms of active ingredients
Liquid corn gluten	
Methyl nonyl ketone	
Cyfluthrin	
Etridiazole	
Octenol	
Codlelure	
Gibberellic acid	
2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane)	
Chlorfenapyr	
Meat meal mixture	
Pyriofenone	
Related capsaicinoids	
Kasugamycin hydrochloride hydrate	
Abamectin	
Wintergreen oil	
Citric acid	
Propoxur	
6-benzylaminopurine (or: 6-benzyladenine)	
Garlic oil	
Buprofezin	
Phosphine	
(Z)-9-dodecenyl acetate + (Z)-11-tetradecenyl acetate	
Polybutene	
From nanogen: chlorocresol (or: parachlorocresol)	
Oxadiazon	
3-(trimethoxysilyl)-propyldimethyloctadecyl ammonium chloride	
N-coco-alkyltrimethylene diamines present as monobenzoate salt	
Denatonium benzoate	
Fish oil mixture	
Castor oil	
Z-8-dodecen-1-yl acetate	
1-methylcyclopropene	
Metofluthrin	
Naphthylacetic acid	
Fluensulfone	
Pyriproxyfen	
Cyclaniliprole	
1-dodecanol	
S-kinoprene	

Active name	Kilograms of active ingredients
Verbenone	
Fenpyroximate	
Diisobutylphenoxyethoxyethyldimethylbenzylammonium chloride	
Paclobutrazol	
Piperine	
Butoxypolypropylene glycol	
Di-n-propyl isocinchomeronate	
Triflusulfuron-methyl	
Bromadiolone	
Bispyribac-sodium	
N-dialkyl(5% C12, 60% C14, 30% C16, 5% C18)methylbenzylammonium chloride	
Pine needle oil	
Lemon oil	
Oil of geranium	
Eucalyptus oil	
3-methyl-2-cyclohexen-1-one	
Diflubenzuron	
D-limonene	
Spinetoram	
Etoxazole	
(Z,Z)-3,13-octadecadien-1-yl acetate	
Warfarin	
Tau-fluvalinate	
1-tetradecanol	
Garlic	
Chlorophacinone	
4-aminopyridine	
(E,Z)-3,13-octadecadien-1-yl acetate	
E-8-Dodecen-1-yl acetate	
Camphor oil	
Muscalure	
Diphacinone (present in free form or as sodium salt)	
Bromethalin	
Nicarbazin	
Difethialone	
Brodifacoum	
Myclobutanil	
Z-8-Dodecen-1-ol	
Prosulfuron	

Active name	Kilograms of active ingredients
Uniconazole-P	
Pymetrozine	
Fenbuconazole	
Cloransulam-methyl	
Aviglycine hydrochloride	
(E,Z)-2,13-octadecadien-1-yl acetate	
(9Z,12E)-9,12-tetradecadien-1-yl acetate	
(Z,Z)-3,13-octadecadien-1-ol	
Ancymidol	
4-CPA	
(E,Z)-2,13-octadecadien-1-ol	
Sodium monofluoroacetate	
Nosema locustae canning, (spore of)	
Metarhizium anisopliae (strain F52)	
Propoxycarbazone-sodium	
Sodium cyanide	
Nicosulfuron	
1r-trans prallethrin	
N-alkyl(25% C12, 60% C14, 15% C16)dimethylbenzylammonium chloride	
Octyldecyldimethylammonium chloride	
Nucleopolyhedrovirus for gypsy moth larvae	
Tioxazafen	
Nuclear polyhedrosis virus of red-headed pine sawfly	
Lactococcus lactis	
(E)-4-tridecenyl acetate + (Z)-4-tridecenyl acetate	
Extract of *Reynoutria sachalinensis*	
Lactobacillus *rhamnosus* (strain LPT-21)	
Saponins of *Chenopodium quinoa*	
Streptomyces lydicus strain WYEC108	
Naphthaleneacetamide	
Prallethrin	
Strychnine	
Triforine	
Pasteuria nishizawae PN1	
Nucleopolyhedrovirus for Douglas-fir tussock moth	
Lactobacillus casei strain LPT-111	
Momfluorothrin	
Verticillium albo-atrum, isolate WCS850	
Sulfuric acid	

Active name	Kilograms of active ingredients
Thymol	
Propylene glycol	
(Z)-11-tetradecen-1-ol	
Petroleum hydrocarbon blend	
R-(-)-1-octen-3-ol	
3-(trihydroxysilyl)-propyldimethyloctadecyl ammonium chloride	
Ziram	
Trichoderma asperellum, strain T34	
3-ketopetromyzonol-24-sulfate, ammonium salt	
Oxamyl	
Trichoderma virens strain G-41	
(E)-11-tetradecenyl acetate	
Thidiazuron	
Triethylene glycol	
Neodiprion abietis nucleopolyhedrovirus	
Oriental mustard seed meal	
Paraformaldehyde	
Paraquat	
Sodium fluoride	
Phoma macrostoma	
Isoxaben	
Sulfometuron methyl	
Phlebiopsis gigantea	
Picolinafen	
Sulfuryl fluoride	
Prohydrojasmon	
Methyl salicylate	
Quintozene	
(E,Z)-11-tetradecenal	
Available chlorine, present as lithium hypochlorite	
Noviflumuron	
Sodium lauryl sulfate	
N-alkyl(40% C12, 50% C14, 10% C16)dimethylbenzylammonium saccharinate	
Propetamphos	
Mesosulfuron-methyl	
(Z)-11-tetradecenal	
Thyme oil	
(Z)-9-tetradecen-1-yl acetate	
Trichoderma harzianum	

Active name	Kilograms of active ingredients
Tolpyralate	
(E,E)-8,10-dodecadien-1-ol + 1-dodecanol + 1-tetradecanol	
Clavibacter michiganensis (spp *michiganensis*) bacteriophage	
Paecilomyces fumosoroseus strain FE 9901	
Tepraloxydim	
(Z)-8-dodecenyl acetate + (E)-8-dodecenyl acetate + (Z)-8-dodecen-1-ol	
Tributyl tetradecyl phosphonium chloride	
Pyrazon	
Dioctyldimethylammonium chloride	
(Z)-11-tetradecenyl acetate	
Pantoea agglomerans	
Triclopyr triethylamine salt	
N-alkyl(5% C5-18, 61% C12, 23% C14, 11% C16)dimethylbenzylammonium chloride	
Soybean oil	
Pepino mosaic virus, strain CH2, isolate 1906	
Streptomyces acidiscabies strain RL-110T cells and spent fermentation media	
Streptomyces griseoviridis strain K61	
Afidopyropen	
Available chlorine present as trichloro-s-triazinetrione and sodium dichloro-s-triazinetrione	
Ethylene oxide	
Clove oil	
1-alkyl(C6-C18)-1,3-propanediamine	
Cyromazine	
(E,Z)-9-dodecenyl acetate	
Flazasulfuron	
Pseudomonas fluorescens	
Aureobasidium pullulans	
Bacillus amyloliquefaciens	
1-(alkyl-amino)-3-aminopropane hydrochloride (component of AMPHO 443-31)	
Alkyl(C12-16)dimethylamine oxide	
Iodosulfuron-methyl-sodium	
Bacillus thuringiensis	
Ferrous sulfate heptahydrate	
Pseudomonas *syringae* - strain ESC-10	
Endothall	
Chondrostereum purpureum (strain: North American; pathovar: PFC2139)	
Fenpropimorph	
Benzyl benzoate	

Active name	Kilograms of active ingredients
1,4-bis(bromoacetoxy)-2-butene	
Cyprosulfamide	
Bensulide	
Disodium cyanodithioimidocarbonate	
Aminocyclopyrachlor-potassium	
Isopropyl alcohol	
Beauveria bassiana	
Fungus: *Gliocladium catenulatum*	
Cydia pomonella granulosis virus	
Sclerotinia minor IMI 3144141	
1-(alkyl-amino)-3-carboxymethylaminopropane (component of AMPHO 443-31)	
Flutriafol	
Bacillus mycoides isolate J	
2-bromo-4'-hydroxyacetophenone	
Cyphenothrin	
Flumethrin	
Bacillus sphaericus	
German cockroach extract	
Imiprothrin	
Flufenacet	
Cornmint oil	
Acibenzolar-s-methyl	
Bacillus firmus strain I-1582	
Pydiflumetofen	
Bacillus subtilis	
Bis(trichloromethyl)sulfone	
3-chloro-p-toluidine hydrochloride	
Helicoverpa armigera nucleopolyhedrovirus BV-0003	
Clofentezine	
Formetanate hydrochloride	
Hydramethylnon	
(ACMNPV) cabbage looper	
Cloquintocet-mexyl	
Coniothyrium minitans strain CON/M/91-08	
Beauveria bassiana strain PPRI 5339	
Etofenprox	
Amitrole	
Putrescent whole egg solids	
Agrobacterium radiobacter	

Active name	Kilograms of active ingredients
Alcohol anhydrous	
Dodine	
Coumaphos	

Appendix II Chemical groups and active ingredients–2018

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 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

Chemical group	Active ingredient name
	Napropamide
	Related capsaiciniods
	Saflufenacil
Ammoniums, Quaternary	Chlormequat chloride
	1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride
	Alkyl(C12-16)dimethylamine oxide
	Denatonium benzoate
	Diquat
	Paraquat
	N-alkyl (25% C12, 60% C14, 15% C16) dimethylbenzylammonium chloride
	N-alkyl (40% C12, 50% C14, 10% C16) dimethylbenzylammonium chloride
	N-alkyl (68% C12, 32% C14) dimethyl ethylbenzyl ammonium chloride
	Didecyldimethylammonium chloride
	N-alkyl (60% C14, 30% C16, 5% C12, 5% C18) dimethyl benzyl ammonium chloride
	N-alkyl (67% C12, 25% C14, 7% C16, 1% C18) dimethylbenzylammonium chloride
	Diisobutylphenoxyethoxyethyldimethylbenzylammonium chloride
	N-alkyl (5% C5-18, 61% C12, 23% C14, 11% C16) dimethylbenzylammonium chloride
	N-alkyl (40% C12, 50% C14, 10% C16) dimethylbenzylammonium saccharinate
	Didecyldimethylammonium present as carbonate and bicarbonate salts
	Dioctyldimethylammonium chloride
	Octyldecyldimethylammonium chloride
	N-dialkyl (5% C12, 60% C14, 30% C16, 5% C18) methylbenzylammonium chloride
	Oxydiethylene bis(alkyl dimethyl ammonium chloride)
	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

Chemical group	Active ingredient name
	Metalaxyl-m and s-isomer Metalaxyl Picolinafen Penflufen Penthiopyrad Sedaxane
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 Pydiflumetofen 2-methyl-4-isothiazolin-3-one 5-chloro-2-methyl-4-isothiazolin-3-one 4,5-dichloro-2-n-octyl-3(2H)isothiazolone Tioxazafen Isoxaflutole Topramezone Octhilinone Oxathiapiprolin Pyraflufen-ethyl Pinoxaden Pyrasulfotole Pyroxasulfone Spirotetramat Strychnine 2-(thiocyanomethylthio)benzothiazole Tolpyralate Etridiazole Thiabendazole

Chemical group	Active ingredient name
Benzamides	Cyantraniliprole Cyclaniliprole Cyprosulfamide DEET Fluopicolide Fluopyram Isoxaben Chlorantraniliprole Propyzamide Methoxyfenozide Tebufenozide Zoxamide
Benzoic Acid And Derivatives	Acibenzolar-s-methyl Benzyl benzoate Bispyribac-sodium Dicamba (present as BAPMA salt) Dicamba (present as acid, amine salt, ester or sodium salt) Methyl salicylate Quinclorac
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

Chemical group	Active ingredient name
	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 Aminocyclopyrachlor-potassium Ancymidol 6-benzylaminopurine (or: 6-benzyladenine) Buprofezin Maleic hydrazide Pyridaben Pyrazon Triforine
Dinitrobenzenes	Bromethalin Ethalfluralin Fluazinam Pendimethalin Trifluralin
Dithiocarbamates	Dazomet Disodium cyanodithioimidocarbonate Potassium dimethyldithiocarbamate Metam-potassium Metam-sodium Sodium dimethyldithiocarbamate Ziram
Dithiophosphates	Bensulide Dimethoate Malathion Phorate

Chemical group	Active ingredient name
	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
Halogenated Organic Acids	Aminopyralid 1,4-bis(bromoacetoxy)-2-butene Cyflumetofen Clopyralid Fluroxypyr-meptyl Halauxifen-methyl Picloram (present as potassium salts)

Chemical group	Active ingredient name
	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, 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 Copper (present as mixed copper ethanolamine complexes or as bis(2-

Chemical group	Active ingredient name
	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) Borax or disodium tetraborate decahydrate Fosetyl-Al Ferrous sulfate monohydrate Ferrous sulfate heptahydrate 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 Sulfuric acid Zinc borate Zinc as elemental (present as zinc naphthenate) Zinc (present as zinc oxide) Zinc phosphide

Chemical group	Active ingredient name
Methoxyacrylates	Azoxystrobin Fluoxastrobin Kresoxim-methyl Mandestrobin Pyraclostrobin Picoxystrobin Trifloxystrobin
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 *Bacillus amyloliquefaciens* strain MBI600 *Bacillus amyloliquefaciens* strain F727 *Bacillus mycoides* isolate J *Pseudomonas fluorescens* A506 *Pseudomonas syringae* - strain ESC-10 *Pseudomonas fluorescens* CL145A *Bacillus subtilis* QST 713 *Bacillus subtilis* (strain GB03) *Bacillus subtilis* (strain BU 1814) *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* *Helicoverpa armigera* nucleopolyhedrovirus BV-0003 *Sclerotinia minor* IMI 3144141 *Trichoderma harzianum* strain KRL-AG2

Chemical group	Active ingredient name
	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 *Pepino mosaic* virus, strain CH2, isolate 1906 *Streptomyces acidiscabies* strain RL-110T cells and spent fermentation media *Streptomyces griseoviridis* strain K61 *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 *Verticillium albo-atrum* isolate WCS850
Morpholines, Oxathiines	Dimethomorph Fenpropimorph Carbathiin Spiroxamine
Nitrobenzenes	Acifluorfen-sodium Fomesafen Tembotrione Mesotrione Oxyfluorfen Quintozene

Chemical group	Active ingredient name
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 Natamycin Spinosad Spiromesifen Spinetoram Sodium monofluoroacetate Trinexapac-ethyl Ferric sodium EDTA

Chemical group	Active ingredient name
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 *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 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-Methylcyclopropene

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-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-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-octadecanien-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-dodecen-1-yl 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

Chemical group	Active ingredient name
	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
Pyrethroids, Pyrethrins	D-cis, trans allethrin Bifenthrin Beta-cyfluthrin Cyfluthrin Lambda-cyhalothrin Cypermethrin Cyphenothrin Deltamethrin Imiprothrin Etofenprox Flumethrin Tau-fluvalinate Tetramethrin Metofluthrin Prallethrin Permethrin 1r-trans prallethrin D-phenothrin Pyrethrins Momfluorothrin Tefluthrin
Pyridines	Afidopyropen 4-aminopyridine Bicyclopyrone Dithiopyr Flupyradifurone Di-n-propyl isocinchomeronate Acetamiprid Sodium omadine Pyriproxyfen Quinoxyfen Sulfoxaflor

Chemical group	Active ingredient name
	Thiacloprid Flonicamid
Sulfonylureas	Chlorimuron-ethyl Chlorsulfuron Rimsulfuron Ethametsulfuron-methyl Flucarbazone (present as flucarbazone-sodium) Foramsulfuron Flazasulfuron Halosulfuron (present as methyl ester) Iodosulfuron-methyl-sodium Mesosulfuron-methyl Metsulfuron-methyl Tribenuron-methyl Thifensulfuron-methyl Nicosulfuron Propoxycarbazone-sodium Prosulfuron Sulfometuron methyl Triflusulfuron-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-triazinetrione Simazine plus related active triazines Available chlorine, present as trichloro-s-triazinetrione Available chlorine present as trichloro-s-triazinetrione and sodium dichloro-s-triazinetrione

Chemical group	Active ingredient name
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
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.

Active ingredient	That ingredient of a pesticide that actually controls the targeted pest.
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.