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# Pest Control Products Sales Report for 2019



*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.

**17 December 2021**

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For further information, please contact:

### **Publications**

Pest Management Regulatory Agency  
Health Canada  
2720 Riverside Drive  
A.L. 6607 D  
Ottawa, Ontario K1A 0K9  
E-mail: [pmra.publications-arla@hc-sc.gc.ca](mailto:pmra.publications-arla@hc-sc.gc.ca)  
Facsimile: 613-736-3758

### **Pest Management Information Service**

1-800-267-6315 or 613-736-3799  
E-mail: [pmra.info-arla@hc-sc.gc.ca](mailto:pmra.info-arla@hc-sc.gc.ca)

Internet: [canada.ca/pesticides](http://canada.ca/pesticides)

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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 12<sup>th</sup> Pest Control Products Sales Report provides an overview of pesticides sold in Canada for the 2019 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

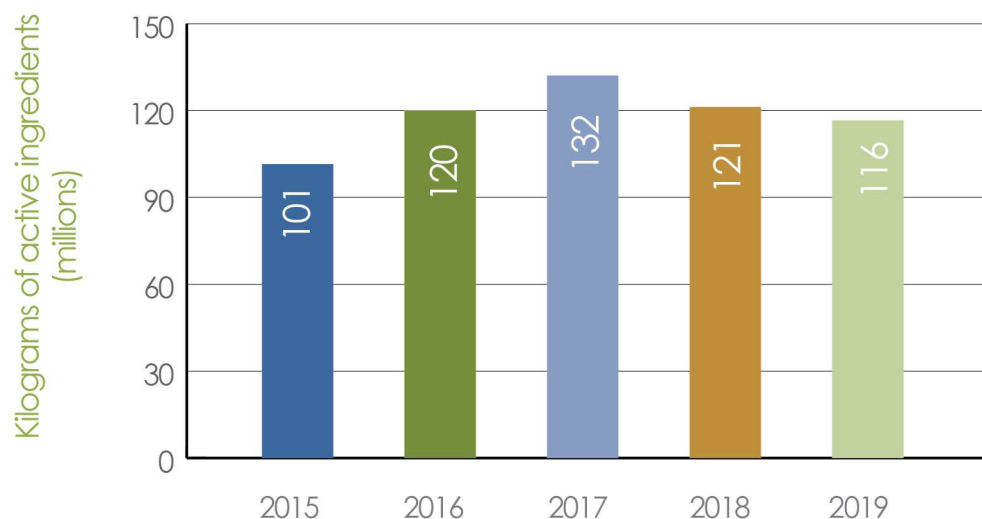
### Overview

There were 7593 products registered with the PMRA for use in Canada in the 2019 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 2706 products reported as sold, the overall pesticide sales in Canada in 2019 were 116 605 281 kg a.i., which is a 3.8% decrease from the 121 258 940 kg a.i. sold in 2018 (Figure 1). While a decrease was seen over the past two years, 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 (2015-2019)



In 2019, the 50 products with the greatest sales accounted for 70.5% of the total kg a.i. sold in Canada (82 263 883 kg a.i.). This was a decrease in the overall quantity from 2018, where the top 50 products accounted for 85 546 744 kg a.i. of total sales. The top 10 active ingredients sold, presented in decreasing order of quantity in Table 1, made up 71.1% of total sales (82 914 840 kg a.i.). A comprehensive list with the rankings for all active ingredients sold in Canada in 2019 is provided in Appendix I. Six active ingredients have remained on the top 10 list over the past five years (since 2015): 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 2019**

Active ingredient	Product type
Glyphosate	Herbicide
Available chlorine, present as sodium hypochlorite	Antimicrobial
Creosote	Antimicrobial
Copper (as elemental)	Herbicide/Fungicide/Antimicrobial
Glufosinate ammonium	Herbicide
Borates	Insecticide/Fungicide/Antimicrobial
Surfactant blend	Other
2,4-D	Herbicide
MCPA	Herbicide
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 2019, 66.5% of pesticide sales in Canada were of Agricultural sector products (see Figure 2), whereas 27.7% were of Non-agricultural sector products and 5.8% were of Domestic sector products. The relative sales of products in the Agricultural sector decreased between 2018 and 2019 (decreasing from 71% to 66%), while the Non-agriculture sector increased from 24% to 28%, and the Domestic sector increased from 2018 to 2019 (increasing from 4% to 6%) (see Figure 3 for data from 2015 to 2019).

Figure 2. Quantity of Pesticides Sold in Canada in 2019 by Sector

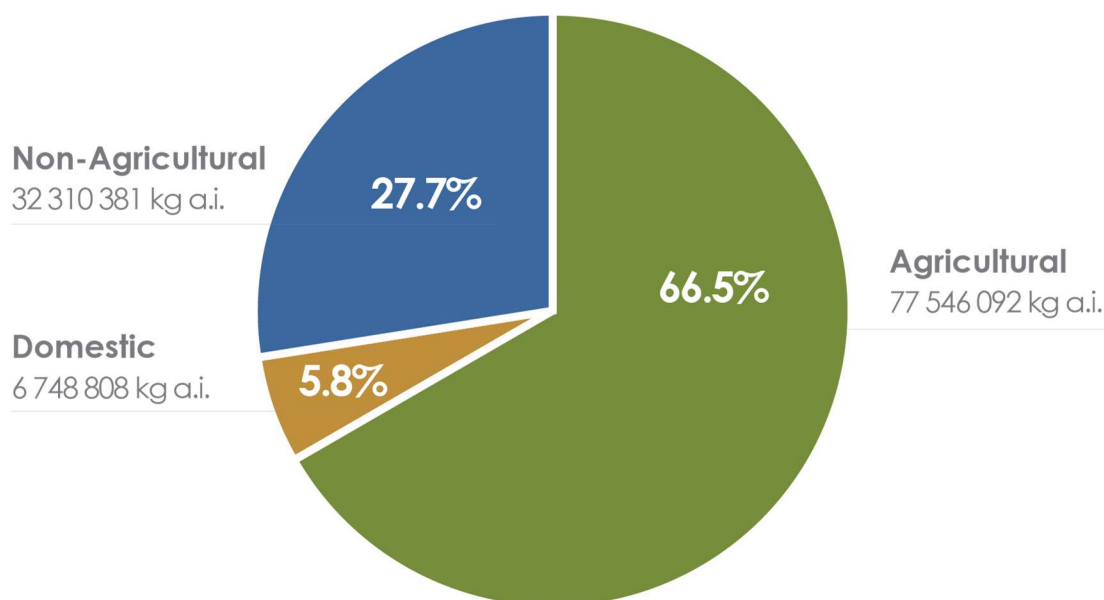
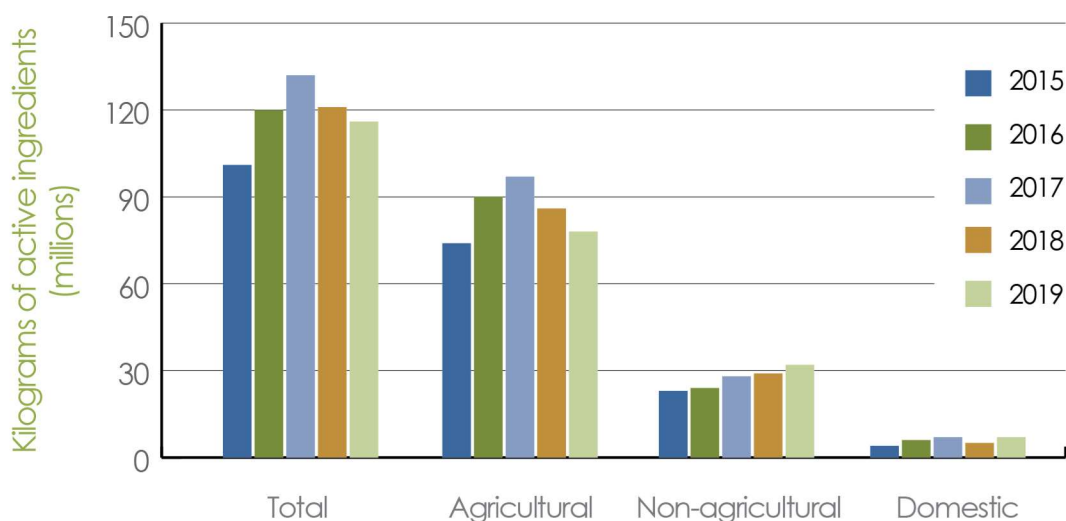


Figure 3. Quantity of pesticides sold in Canada by sector (2015-2019)



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 2019, as an over-reporting would occur.

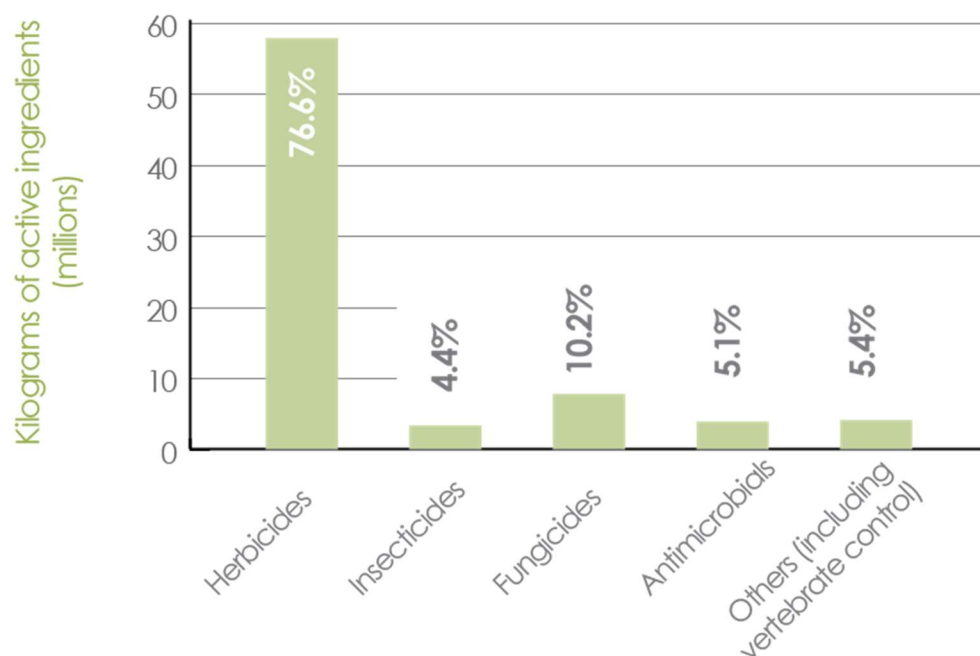
## Agricultural sector

Products with agricultural uses accounted for 66.5% of pesticide sales in Canada in 2019. There was a 10.1% decrease in Agricultural sector pesticide sales from 2018 (86 258 883 kg a.i.) to 2019 (77 546 092 kg a.i.).

Herbicides accounted for 76.6% of Agricultural sector pesticide sales, followed by fungicides (10.2%), insecticides (4.4%), antimicrobials (5.1%), and others (5.4%) (Figure 4). Vertebrate controls (0.04%) accounted for very small quantities of agricultural pesticides sold in 2019 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 78.2% 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 2019 in the Agricultural sector**

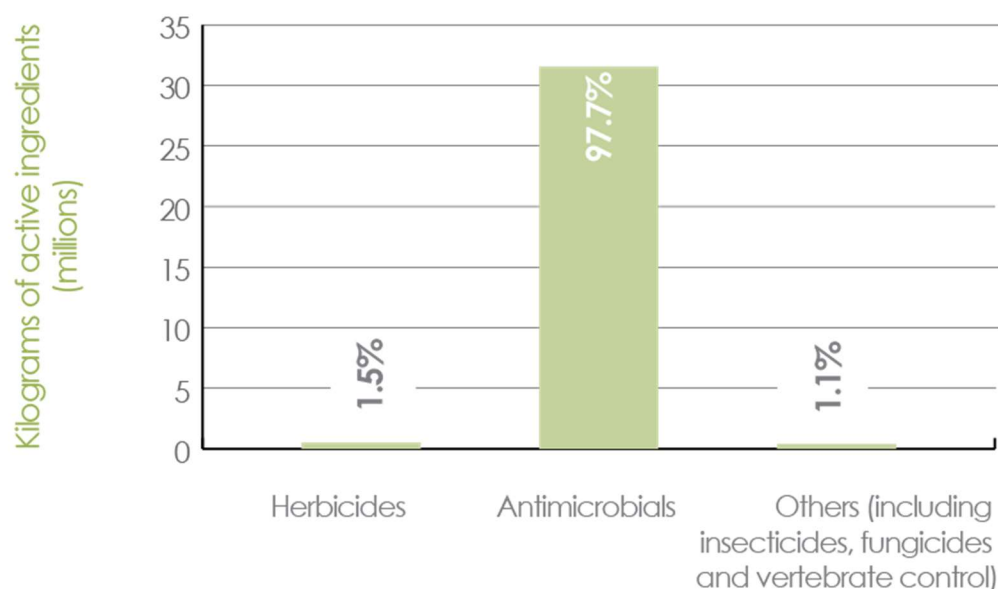
Active ingredient	Product type
Glyphosate	Herbicide
Available chlorine, present as sodium hypochlorite	Antimicrobial
Glufosinate ammonium	Herbicide
Surfactant blend	Other
MCPA	Herbicide
2,4-D	Herbicide
Mineral oil	Insecticide/Fungicide/Other
Mancozeb	Fungicide
S-metolachlor and R-enantiomer	Herbicide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

## Non-agricultural sector

Commercial products with non-agricultural uses accounted for 27.7% of all pesticides sold in Canada in 2019 (compared to 24.3% in 2018). Non-agricultural sector pesticide sales increased 9.4% from 2018 to 2019 (from 29 521 087 kg a.i. to 32 310 381 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 97.7% of Non-agricultural sector sales followed by herbicides (1.5%), fungicides (0.6%), insecticides (0.2%), 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 97.7%).

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 89.5% 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, borates, and copper as elemental.

**Table 3 Top 10 active ingredients sold in Canada in 2019 in the Non-agricultural sector**

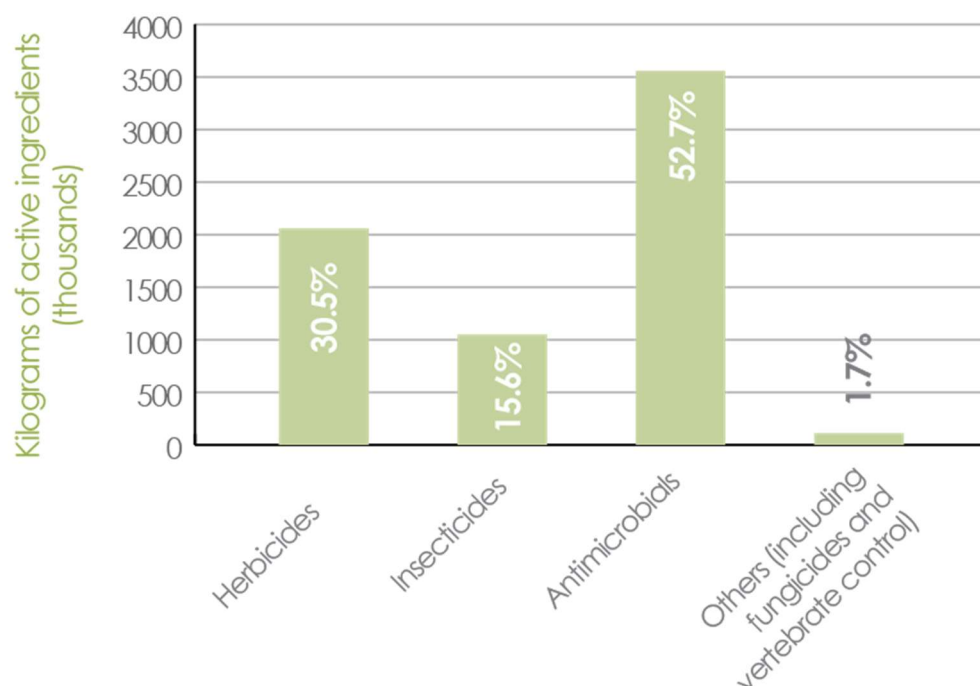
Active ingredient	Product type
Available chlorine, present as sodium hypochlorite	Antimicrobial
Creosote	Antimicrobial
Copper as elemental	Antimicrobial/Herbicide/Fungicide
Borates	Antimicrobial/Insecticide/Fungicide
Glutaraldehyde	Antimicrobial
2,2-dibromo-3-nitrilopropionamide	Antimicrobial/Fungicide
Chromic acid	Antimicrobial
Alkyl-1,3-propylene diamine acetates	Antimicrobial
Arsenic acid	Antimicrobial
Pentachlorophenol	Antimicrobial

## Domestic sector

The Domestic Class products accounted for 5.8% of overall pesticide sales in Canada for 2019. There was a 23% increase from 2018 (5 478 970 kg a.i.) to 2019 (6 748 808 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 52.7% of domestic pesticides sold in Canada (Figure 6) (mainly sales of swimming pool and spa products) followed by herbicides (30.5%), insecticides (15.6%), vertebrate controls (1.2%), fungicides (0.4%), and "other" products (0.02%). 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 89.8% of the Domestic sector pesticides sold. Of the top 10 products, seven are used for swimming pools and spas. Seven 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, available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins, 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 2019 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
DEET*	Insecticide
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
Available chlorine, present as sodium dichloro-s-triazinetrione	Antimicrobial
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	Antimicrobial
Silicon Dioxide	Insecticide

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

## Sales information by product type

In the following sections, all pesticides are discussed according to their product type (including herbicides, insecticides, fungicides, antimicrobials, vertebrate controls, and other product types). As previously discussed, a product may have a number of different uses on the label. As the sales reporting does not collect data on the relative amount of a product used for a specific label use, the data may not necessarily be separated into only one product type. This means that there may be overlap between the product type groupings and these numbers should not be summed to obtain total quantities sold in Canada in 2019, as an over-reporting would occur.

### Herbicides

Herbicides accounted for 53.2% (61 985 371 kg a.i.) of all pesticides sold in Canada in 2019. This is a decrease from 2018 when herbicides accounted for 54.6% of all pesticides sold. This translates into a decrease of 6.4% in the quantities of herbicides sold from 2018 (66 232 905 kg a.i.) to 2019 (61 985 371 kg a.i.).

The top 10 herbicides sold in 2019, as listed in Table 5 in decreasing order of quantity, accounted for 88.8% of all herbicide sales in Canada and 47.2% 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 2019**

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

## Insecticides

Insecticides accounted for 3.9% (4 525 291 kg a.i.) of all pesticides sold in Canada in 2019. 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 (3 836 995 kg a.i.). Many of the insecticides are used in agricultural settings, though the second-most sold insecticide (DEET) is used only in the Domestic sector.

The top 10 insecticides sold in 2019, as listed in Table 6 in decreasing order of quantity, accounted for 80.7% of all insecticides sales in Canada and 3.1% of pesticide sales overall. Six insecticides have remained in the top 10 during the last five years of reporting: mineral oil, hydrogen peroxide, silicon dioxide, DEET, thiamethoxam, and sulphur.

**Table 6 Top 10 insecticide active ingredients sold in Canada in 2019**

Active Ingredient
Mineral oil
DEET*
Hydrogen peroxide
Sulphur
Silicon dioxide
Thiamethoxam
Clothianidin
Cyantraniliprole
Paradichlorobenzene
Malathion

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

## Fungicides

Fungicides accounted for 6.9% (8 103 961 kg a.i.) of all pesticides sold in Canada in 2019. Fungicide sales have remained relatively low throughout the reporting years, with a high in 2018 (13 724 886 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 (97.3%).

The top 10 fungicides sold in Canada in 2019, as listed in Table 7 in decreasing order of quantity, accounted for 76.2% of fungicide sales and 5.3% 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 2019**

Active ingredient
Mancozeb
Chlorothalonil
Metam-sodium
Chloropicrin
Prothioconazole
Mono- and dibasic sodium, potassium, and ammonium phosphites
Sulphur
Tebuconazole
Captan
Mineral Oil

## Antimicrobials

Antimicrobials accounted for 33.5% (39 088 403 kg a.i.) of all pesticides sold in Canada in 2019. 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 2019, as listed in Table 8 in decreasing order of quantity, accounted for 88% of all antimicrobial sales in Canada and 29.5% 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-triazinetriene, creosote, glutaraldehyde, and copper as elemental.



**Table 8 Top 10 antimicrobial active ingredients sold in Canada in 2019**

Active ingredient
Available chlorine, present as sodium hypochlorite
Creosote
Copper as elemental
Borates
Available chlorine, present as trichloro-s-triazinetriene
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
Chromic Acid

## Vertebrate control

Vertebrate controls accounted for 0.13% (152 586 kg a.i.) of all pesticides sold in Canada in 2019. 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 97.2% of all vertebrate control sales in 2019 and 0.13% 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 2019**

Active ingredient
Cellulose (from powdered corn cobs)
Aluminum phosphide
4-nitro-3-(trifluoromethyl)phenol sodium salt
Carbon dioxide gas
Sulphur
Zinc phosphide
Dried blood
Fish meal mixture
Thiram
<i>Brassica hirta</i> white mustard seed powder

## 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 3.6% (4 236 725 kg a.i.) of pesticide sales in Canada in 2019. 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 (98.3%).

The top 10 active ingredients sold in Canada in 2019 that fall into this type are listed in Table 10 in decreasing order of quantity and accounted for 98.8% of "other" type sales and 3.6% of pesticide sales overall. Seven 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, methylated seed oil of soybean, and ethoxylated alcohol, C9-11.

**Table 10 Top 10 other active ingredients sold in Canada in 2019**

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

## Biopesticides

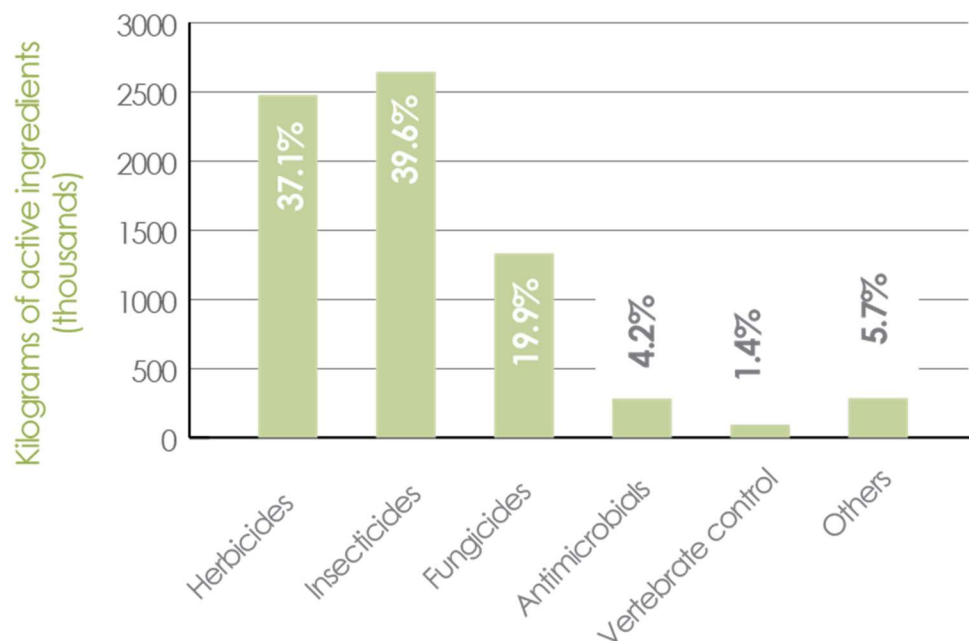
Biopesticides include microbial pesticides (which contain a bacterium, fungus, virus, protozoan, or alga as the active ingredient), pheromones and other semiochemical pesticides, and other non-conventional (formerly biochemical) pesticides.

In 2019, there were 189 active ingredients identified as biopesticides, which accounted for 1047 registered products.

The 372 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 309 products that could be converted to kg a.i. accounted for 5.7% of total pesticide sales (6 672 161 kg a.i.) in 2019. There was a 22.4% increase in biopesticide sales from 2018 (5 451 560 kg a.i.) to 2019. The sales of biopesticides have fluctuated over the years in which data have been collected. Insecticides accounted for 39.6% of the biopesticide sales in 2019 (Figure 7), followed by herbicides (37.1%), fungicides (19.9%), antimicrobials (4.2%), "others" (5.7%), and vertebrate controls (1.4%).

Figure 7. Quantity of Biopesticides Sold in Canada in 2019



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 92.2% of sales of biopesticides that could be converted to kg a.i. and 5.3% 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 ammonia (present as ammonium sulfate).

**Table 11 Top 10 biopesticide active ingredient sold in Canada in 2019**

Active ingredient	Product type
Corn gluten meal	Herbicide
Mineral oil	Fungicide/Insecticide/Other
Hydrogen peroxide	Herbicide/Insecticide/Fungicide/Antimicrobial
Mono- and dibasic sodium, potassium, and ammonium phosphites	Fungicide
Sulphur	Fungicide/Insecticide/Vertebrate Control
N-decanol	Herbicide
Ammonia (present as ammonium sulfate)	Antimicrobial
Mono- and dipotassium phosphite	Fungicide
Silicon dioxide	Insecticide
Soap	Herbicide/Insecticide/Fungicide

The remaining 63 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 2019 of these is listed in Table 12.

**Table 12 Quantity of microbials sold in Canada in 2019**

Units of product sold	Total
Litres (microbials)	1 761 887
Kilograms (microbials)	514 822

## 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 2019, the chemical group with the largest proportion of sales was the "Phosphonic and phosphinic acids" group at 38%, followed by the "Inorganics" group at 23%. The third group was the "Hydrocarbons" at 7%. The remaining chemical groups were all under 5% and 42 out of 54 chemical groups were less than 1% of total sales. Nine chemical families remained in the top 10 from 2018 to 2019.

**Table 13 Summary of pesticide sales by chemical group (all sectors) in 2019**

Chemical grouping	Kilograms of active ingredients	Rank
Phosphonic acids, phosphinic acids	43 827 887	1
Inorganic	26 605 168	2
Hydrocarbons	7 793 330	3
Phenoxy acids	5 729 387	4
Fatty acids and surfactants	4 357 426	5
Acylureas	3 121 234	6
Oils, minerals and vegetable	2 146 201	7
Others	2 141 774	8
Benzonitriles	2 095 947	9
Biscarbamates	1 820 722	10
Anilides	1 598 205	11
Ammoniums, quaternary	1 586 492	12
Triazoles	1 155 265	13
Dithiocarbamates	1 065 203	14
Organochlorines	XXX	15
Dinitrobenzenes	933 497	16
Aldehydes	930 881	17
Triazines, tetrazines	810 074	18
Benzamides	778 239	19
Alcohols	702 103	20
Amides	652 121	21
Chlorotriazines	XXX	22

Chemical grouping	Kilograms of active ingredients	Rank
Azoles, oxazoles, thiazoles	536 657	23
Benzoic acid and derivatives	527 416	24
Cyclohexanedione oximes	520 793	25
Thiocarbamates	XXX	26
Phenols/chlorophenols	418 598	27
Guanidines	376 257	28
Aryloxyphenoxy acids	277 716	29
Methoxyacrylates	269 346	30
Phtalic acids	259 764	31
Urea derivatives	214 183	32
Organic acids	202 949	33
Carbamates	178 340	34
Dithiophosphates	XXX	35
Nitrobenzenes	136 634	36
Imidazolinones	129 664	37
Halogenated organic acids	98 078	38
Thiophosphates	92 227	39
Pyrethroids, pyrethrins	91 259	40
Morpholines and oxathiines	XXX	41
Sulfonylureas	67 278	42
Pyridines	35 011	43
Diazines	28 341	44
Phosphates	XXX	45
Organohalogens	8 296	46
Phosphoramidothioates	XXX	47
Oximes-carbamates	XXX	48
Pheromones	2 115	49
Anilines	XXX	50
Organometallics	XXX	51
Chromenones	180	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/> April 2018.



## Appendix I Ranking of all active ingredients sold in Canada in 2019

Active name	Kilograms of active ingredients
Glyphosate	>25 000 000
Available chlorine, present as sodium hypochlorite	>10 000 000
Creosote	>5 000 000
Copper (as elemental)	
Glufosinate-ammonium	>1 000 000
Borates	
Surfactant blend	
2,4-D	
MCPA	
Corn gluten meal	
Mineral oil	
Mancozeb	
Available chlorine, present as trichloro-s-triazinetriene	
S-metolachlor and R-enantiomer	
Bromoxynil	
Chlorothalonil	>500 000
Glutaraldehyde	
Metam-sodium	
Chloropicrin	
Available chlorine, present as calcium hypochlorite	
Diquat	
Fluroxypyr-meptyl	
Bentazone	
2,2-dibromo-3-nitrilopropionamide	
DEET	
Ethalfuralin	
Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	
Atrazine (plus related active triazines)	
Chromic acid	
Hydrogen peroxide	
Prothioconazole	
Dicamba	
Alkyl-1,3-propylene diamine acetates	>100 000
Mono- and dibasic sodium, potassium, and ammonium phosphites	
Triallate	
Arsenic acid	

Active name	Kilograms of active ingredients
Poly[oxyethylene(dimethyliminio)ethylene(dimethyliminio)ethylene dichloride]	
Pentachlorophenol	
Chlormequat chloride	
Sulphur	
Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine	
Clethodim	
Nonylphenoxypolyethoxyethanol	
N-decanol	
Triglyceride ethoxylate	
N-alkyl (40% C12, 50% C14, 10% C16)dimethylbenzylammonium chloride	
Tebuconazole	
Ammonia (present as ammonium sulfate)	
Captan	
Sodium bromide	
Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins	
Metribuzin	
Trifluralin	
Paraffin base petroleum oil	
Available chlorine, present as sodium dichloro-s-triazinetriene	
Metiram	
Mono- and dipotassium phosphite	
Silicon dioxide	
Thiamethoxam	
Dimethenamid-p	
Tetrakis (hydroxymethyl) phosphonium sulfate (THPS)	
Sodium chlorate	
Clothianidin	
Cyantraniliprole	
Bronopol	
Propiconazole	
Clodinafop-propargyl	
Linuron	
Mecoprop	
Pinoxaden	
Paradichlorobenzene	
Tralkoxydim	
Soap	
Ammonium bromide	
Malathion	
Trifloxystrobin	
Acrolein	

Active name	Kilograms of active ingredients
Boscalid	>50 000
Saflufenacil	
Pyraclostrobin	
Sulfentrazone	
Sulfuryl fluoride	
Fenoxaprop-P-ethyl	
Pendimethalin	
Mesotrione	
Chlorpyrifos	
Iprodione	
Potassium dimethyldithiocarbamate	
Dazomet	
Clopyralid	
Acetic acid	
Sethoxydim	
Iron	
Methylated seed oil of soybean	
Difenoconazole	
Metconazole	
Cellulose (from powdered corn cobs)	
Alcohols, C9-11, ethoxylated	
EPTC	
Pyrasulfotole	
Carbathiin	
Imazethapyr	
Metalaxyl	
Imazamox	
2,4-DB	
Didecyldimethylammonium chloride	
Chlorpropham	
Ferrous sulfate monohydrate	
5,5-dimethylhydantoin	
Lime sulphur	>25 000
Permethrin	
Pyroxasulfone	
Didecyldimethylammonium present as carbonate and bicarbonate salts	
1,2-benzisothiazolin-3-one	
Iodocarb	
Azoxystrobin	
Thiram	
Fluazinam	

Active name	Kilograms of active ingredients
Quizalofop-P-ethyl	
Octhilinone	
Imidacloprid	
Pyrimethanil	
Fomesafen	
Potassium bicarbonate	
Carbaryl	
Flumioxazin	
Sodium chlorite	
Fosetyl-Al	
Kaolin	
Aluminum phosphide	
Metam-potassium	
Formic acid	
Phorate	
Sedaxane	
Polyoxyalkylated alkyl phosphate ester	
Icaridin	
5-chloro-2-methyl-4-isothiazolin-3-one	
Hexazinone	
Triclopyr-butotyl	
Fluxapyroxad	
2-(hydroxymethyl)-2-nitro-1,3-propanediol	
Maleic hydrazide	
4-nitro-3-(trifluoromethyl)phenol sodium salt	
Sodium dimethyldithiocarbamate	>10 000
Nabam	
Mineral spirits	
Dimethoate	
Available chlorine present as 1,3-dichloro-5,5-dimethylhydantoin and 1,3-dichloro-5-ethyl-5-methylhydantoin	
Picoxystrobin	
Carfentrazone-ethyl	
Fludioxonil	
Octylphenoxypolyethoxyethanol	
Chlorantraniliprole	
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	
Lambda-cyhalothrin	
Fluopyram	
N-alkyl(67% C12, 25% C14, 7% C16, 1% C18)dimethylbenzylammonium chloride	

Active name	Kilograms of active ingredients
Thiophanate-methyl	
Florasulam	
Oxydiethylene bis(alkyl dimethyl ammonium chloride)	
Tribenuron-methyl	
2-methyl-4-isothiazolin-3-one	
Fluazifop-P-butyl	
Siloxyated polyether	
Triticonazole	
Sodium omadine	
Flucarbazone (present as flucarbazone-sodium)	
Garlic juice	
Piperonyl butoxide	
Ethephon	
Dichlobenil	
Formaldehyde	
Sodium chloride	
Thifensulfuron-methyl	
Dichlorprop	
Oxirane derivatives (50% minimum)	
Picloram	
Napropamide	
Octadec-9-enoic acid	
Thiabendazole	
4,5-dichloro-2-n-octyl-3(2H)isothiazolone	
4-chloro-3-methylphenol (sodium salt)	
N-alkyl (60% C14, 30% C16, 5% C12, 5% C18)dimethyl benzyl ammonium chloride	
Carbendazim	
Diuron	>5000
Canola oil	
Carbon dioxide gas	
Silica gel (amorphous)	
Mandipropamid	
2-phenylphenol	
Acephate	
Prometryne plus related active triazines	
Pyroxsulam	
MCPB	
2-(thiocyanomethylthio)benzothiazole	
Deltamethrin	
Penflufen	
N-alkyl(68% C12, 32% C14)dimethyl ethylbenzyl ammonium chloride	

Active name	Kilograms of active ingredients
Naled	
Propamocarb hydrochloride	
Penthiopyrad	
Methylene bis(thiocyanate)	
3-decen-2-one	
Thiencarbazone-methyl	
Zinc	
Chlorimuron-ethyl	
Dichlorvos	
Quinclorac	
Acifluorfen-sodium	
Ferbam	
Fenamidone	
Folpet	
1,3-bis(hydroxymethyl)-5,5-dimethylhydantoin	
Bicyclopyrone	
Peracetic acid	
Pyraflufen-ethyl	>1000
Metaldehyde	
Aminopyralid	
Diflufenzopyr	
Flumetsulam	
Oxathiapiprolin	
Spirotetramat	
Rimsulfuron	
Chlorthal-dimethyl	
Acetamiprid	
Pydiflumetofen	
Pyrethrins	
Topramezone	
Potassium peroxymonosulfate (present as potassium peroxymonosulfate sulfate)	
Fenhexamid	
Novaluron	
Simazine plus related active triazines	
Spinosad	
Daminozide	
Sulfoxaflor	
Clomazone	
Indaziflam	
D-phenothrin	
Dimethomorph	

Active name	Kilograms of active ingredients
N-octyl bicycloheptene dicarboximide	
Zinc phosphide	
Dried blood	
Ethylene oxide	
Propyzamide	
Terbacil	
Benzovindiflupyr	
Imazapyr	
Isoxaflutole	
Diazinon	
Oil of lemon eucalyptus, hydrated, cyclized	
1,4-dimethylnaphthalene	
Oxamyl	
D-cis,trans-allethrin	
Flupyradifurone	
Sodium 2-phenylphenate	
Aminocyclopyrachlor	
Metrafenone	
Halosulfuron (present as methyl ester)	
Methyl bromide	
Flonicamid	
Oxyfluorfen	
Thiacloprid	
1,2-dibromo-2,4-dicyanobutane	
Metsulfuron-methyl	
Streptomycin present as sulphate	
Tefluthrin	
Halauxifen-methyl	
Tebufenozide	
Ametoctradin	
Fish meal mixture	
Trinexapac-ethyl	
Garlic powder	
Tetrachlorvinphos	
Cypermethrin	
Quinoxifen	
Methomyl	
Tetramethrin	
Methoxyfenozide	
(s)-methoprene	
Cyazofamid	

Active name	Kilograms of active ingredients
Isofetamid	
Phenmedipham	
Desmedipham	
Ammonia (present as ammonium carbamate)	
Acequinocyl	
Hydroxymethyl-5,5-dimethylhydantoin	
Propoxycarbazone-sodium	
Bifenazate	
Tembotrione	
Ethofumesate	
Ethaboxam	
Diodofon	
Cyprodinil	
Spiromesifen	
Fluoxastrobin	>500
Liquid corn gluten	
Bromacil (present in free form, as dimethylamine salt, or as lithium salt)	
Ipconazole	
4-chloroindole-3-acetic acid	
<i>Brassica hirta</i> white mustard seed powder	
BLAD polypeptide	
Prohexadione-calcium	
Fluopicolide	
Diphenylamine	
Dodecylguanidine hydrochloride	
Oxalic acid	
P-menthane-3,8-diol	
Butoxypolypropylene glycol	
Nicosulfuron	
Oil of black pepper	
Extract of <i>Reynoutria sachalinensis</i>	
Magnesium phosphide	
Azadirachtin	
Dried eggs	
Strychnine	
10,10'-oxybis(phenoxarsine)	<500
Imazamethabenz-methyl	
Sodium alpha-olefin sulfonate	
Spiroxamine	
Gibberellic acid	
Spirodiclofen	



Active name	Kilograms of active ingredients
Azamethiphos	
Kresoxim-methyl	
Fenbutatin oxide	
Abamectin	
Tea tree oil	
Amitraz	
Natamycin	
Foramsulfuron	
Lactic acid	
Tetraconazole	
Polyoxin D zinc salt, polyoxorim-zinc	
Clove oil	
Polybutene	
Beta-cyfluthrin	
Pyridaben	
From Nanogen: chlorocresol (or: parachlorocresol)	
2,2'-(1-methyltrimethylenedioxy)bis-(4-methyl-1,3,2-dioxaborinane)	
Cyfluthrin	
Methyl nonyl ketone	
Afidopyropen	
Etridiazole	
Cyflumetofen	
Kasugamycin hydrochloride hydrate	
Codlure	
1-octanol	
Meat meal mixture	
Wintergreen oil	
Citric acid	
Citronella oil	
Chlorfenapyr	
Phosphine	
6-benzylaminopurine (or: 6-benzyladenine)	
Chlorsulfuron	
Tolpyralate	
Cyclaniliprole	
Naphthylacetic acid	
Garlic oil	
Capsaicin	
Cymoxanil	
Pyriofenone	
Rotenone	

Active name	Kilograms of active ingredients
3-methyl-2-cyclohexen-1-one	
Famoxadone	
2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane)	
(Z)-9-dodecenyl acetate + (Z)-11-tetradecenyl acetate	
Propoxur	
S-kinoprene	
Verbenone	
Metofluthrin	
Citronella terpene	
Fish oil mixture	
Castor oil	
Related capsaicinoids	
Octenol	
Di-n-propyl isocinchomeronate	
1-methylcyclopropene	
Flazasulfuron	
Z-8-dodecen-1-yl acetate	
Mandestrobin	
Buprofezin	
Denatonium benzoate	
Triflurosulfuron-methyl	
Hydramethylnon	
Pyriproxyfen	
Lemon oil	
Pine needle oil	
Oil of geranium	
Eucalyptus oil	
Artificial grape extract	
Fenpyroximate	
Ethamsulfuron-methyl	
1-dodecanol	
D-limonene	
Paclobutrazol	
Bromadiolone	
Bispyribac-sodium	
Muscalure	
Piperine	
Camphor oil	
Chlorophacinone	
N-dialkyl(5% C12, 60% C14, 30% C16, 5% C18)methylbenzylammonium chloride	
Warfarin	

Active name	Kilograms of active ingredients
Nicarbazin	
(Z,Z)-3,13-octadecadien-1-yl acetate	
1-tetradecanol	
Etoxazole	
Garlic	
Ancymidol	
Spinetoram	
Difethialone	
Diphacinone (present in free form or as sodium salt)	
E-8-dodecen-1-yl acetate	
Saponins of <i>Chenopodium quinoa</i>	
(E,Z)-3,13-octadecadien-1-yl acetate	
Myclobutanil	
Bromethalin	
Brodifacoum	
4-aminopyridine	
Coumaphos	
(9Z,12E)-9,12-tetradecadien-1-yl acetate	
Uniconazole-p	
Z-8-dodecen-1-ol	
(Z)-11-tetradecenyl acetate	
Prosulfuron	
Pymetrozine	
Fenbuconazole	
(E,Z)-2,13-octadecadien-1-yl acetate	
Aviglycine hydrochloride	
Cloransulam-methyl	
Thymol	
(Z,Z)-3,13-octadecadien-1-ol	
(Z)-9-tetradecen-1-yl acetate	
Tau-fluvalinate	
4-CPA	
(Z)-11-tetradecen-1-ol	
(Z)-11-tetradecenal	
(E,Z)-2,13-octadecadien-1-ol	
Sodium monofluoroacetate	
Sodium cyanide	
Sodium lauryl sulfate	
(E)-4-tridecenyl acetate + (Z)-4-tridecenyl acetate	
<i>Pantoea agglomerans</i>	
1R-trans prallethrin	

Active name	Kilograms of active ingredients
<i>Verticillium albo-atrum</i> , isolate WCS850	
<i>Streptomyces lydicus</i> strain WYEC108	
Momfluorothrin	
Noviflumuron	
Sulfometuron methyl	
Mesosulfuron-methyl	
Oriental mustard seed meal	
Sulfuric acid	
Mefentrifluconazole	
(E,E)-8,10-dodecadien-1-ol + 1-dodecanol + 1-tetradecanol	
3-(trimethoxysilyl)-propyldimethyloctadecyl ammonium chloride	
<i>Phoma macrostoma</i>	
3-(trihydroxysilyl)-propyldimethyloctadecyl ammonium chloride	
Triforine	
<i>Trichoderma asperellum</i> , strain T34	
Soybean oil	
<i>Trichoderma virens</i> strain G-41	
<i>Phlebiopsis gigantea</i>	
Picolinafen	
<i>Streptomyces griseoviridis</i> strain K61	
Naphthalene	
<i>Nosema locustae</i> Canning, (spore of)	
Dioctyldimethylammonium chloride	
Methyl salicylate	
Available chlorine, present as lithium hypochlorite	
Oxadiazon	
(E)-11-tetradecenyl acetate	
<i>Paecilomyces fumosoroseus</i> strain FE 9901	
Triethylene glycol	
<i>Neodiprion abietis</i> nucleopolyhedrovirus	
Sodium fluoride	
Tioxazafen	
Prallethrin	
Prohydrojasmon	
(E,Z)-11-tetradecenal	
<i>Lactobacillus rhamnosus</i> (strain LPT-21)	
Paraquat	
<i>Metarhizium anisopliae</i> (strain F52)	
N-alkyl(25% C12, 60% C14, 15% C16)dimethylbenzylammonium chloride	
(Z)-8-dodecenyl acetate + (E)-8-dodecenyl acetate + (Z)-8-dodecen-1-ol	
Octyldecyldimethylammonium chloride	

Active name	Kilograms of active ingredients
Mild pepino mosaic virus	
Thyme oil	
<i>Lactococcus lactis</i>	
<i>Trichoderma harzianum</i>	
Paraformaldehyde	
N-alkyl(40% C12, 50% C14, 10% C16)dimethylbenzylammonium saccharinate	
Phosmet	
R-(-)-1-octen-3-ol	
3-ketopetromyzonol-24-sulfate, ammonium salt	
Nuclear polyhedrosis virus of red-headed pine sawfly	
<i>Streptomyces acidiscabies</i> strain RL-110T cells and spent fermentation media	
<i>Lactobacillus casei</i> strain LPT-111	
Nucleopolyhedrovirus for gypsy moth larvae	
<i>Clavibacter michiganensis</i> (spp <i>michiganensis</i> ) bacteriophage	
Quintozene	
Tepraloxym	
Tributyl tetradecyl phosphonium chloride	
Ziram	
Pepino mosaic virus, strain CH2, isolate 1906	
Nucleopolyhedrovirus for Douglas-fir tussock moth	
Zoxamide	
Diisobutylphenoxyethoxyethyl dimethylbenzylammonium chloride	
Petroleum hydrocarbon blend	
Caprylic acid	
Triclopyr triethylamine salt	
Thidiazuron	
<i>Pasteuria nishizawae</i> PN1	
Isoxaben	
Pyrazon	
Propylene glycol	
<i>Bacillus thuringiensis</i>	
Fluensulfone	
Putrescent whole egg solids	
<i>Pseudomonas syringae</i> - strain ESC-10	
Imiprothrin	
Capric acid	
Endothal or endothall	
Clofentezine	
<i>Bacillus mycoides</i> isolate J	
Aromatics	
Etofenprox	

Active name	Kilograms of active ingredients
<i>Bacillus amyloliquefaciens</i>	
1-(alkyl-amino)-3-aminopropane hydrochloride (component of AMPHO 443-31)	
Dithiopyr	
Formetanate hydrochloride	
Niclosamide	
Cloquintocet-mexyl	
<i>Sclerotinia minor</i> IMI 3144141	
Bensulide	
(E,Z)-9-dodecenyl acetate	
<i>Bacillus sphaericus</i>	
<i>Agrobacterium radiobacter</i>	
2,6-diisopropylnaphthalene	
<i>Pseudomonas fluorescens</i>	
2-bromo-4'-hydroxyacetophenone	
Cyprosulfamide	
HOP beta acids, present as potassium salts	
Amitrole	
<i>Beauveria bassiana</i>	
Cyromazine	
Benzyl benzoate	
Bifenthrin	
1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride	
<i>Bacillus subtilis</i>	
3-chloro-P-toluidine hydrochloride	
Alkyl(C12-C16)dimethylamine oxide	
Available chlorine present as trichloro-s-triazinetriene and sodium dichloro-s-triazinetriene	
Diflubenzuron	
Ferrous sulfate heptahydrate	
Dinotefuran	
Dodine	
1,4-bis(bromoacetoxy)-2-butene	
Fungus: <i>Gliocladium catenulatum</i>	
Acibenzolar-s-methyl	
German cockroach extract	
1-alkyl(C6-C18)-1,3-propanediamine	
<i>Cydia pomonella</i> granulovirus	
N-coco-alkyltrimethylene diamines present as monobenzoate salt	
Flutriafol	
<i>Aureobasidium pullulans</i>	
(ACMNPV) cabbage looper	

Active name	Kilograms of active ingredients
Flumethrin	
Bixafen	
Flufenacet	
<i>Helicoverpa armigera</i> nucleopolyhedrovirus BV-0003	
Bis(trichloromethyl)sulfone	
Alcohol anhydrous	
1-(alkyl-amino)-3-carboxymethylaminopropane (component of AMPHO 443-31)	
Cyphenothrin	
<i>Chondrostereum purpureum</i> (strain: North American; pathovar: PFC2139)	
Isopropyl alcohol	
Iodosulfuron-methyl-sodium	
Cornmint oil	
<i>Bacillus firmus</i> strain I-1582	
<i>Bacillus licheniformis</i> strain FMCH001	
Fenpropimorph	
<i>Coniothyrium minitans</i> strain CON/M/91-08	

## Appendix II Chemical groups and active ingredients – 2019

Chemical group	Active ingredient name
Acylureas	<p>Bromacil (present in free form as dimethylamine salt or as lithium salt)</p> <p>Available chlorine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins</p> <p>Available bromine present as 1-bromo-3-chloro-5,5-dimethylhydantoin and related hydantoins</p> <p>Bentazon (present as sodium salt)</p> <p>Bentazone</p> <p>Cymoxanil</p> <p>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</p> <p>Available chlorine present as 1,3-dichloro-5,5-dimethylhydantoin and 1,3-dichloro-5-ethyl-5-methylhydantoin</p> <p>Diflubenzuron</p> <p>Iprodione</p> <p>Noviflumuron</p> <p>Novaluron</p> <p>Saflufenacil</p> <p>Terbacil</p> <p>Available chlorine, present as trichloro-s-triazinetriene</p> <p>Hexazinone</p>
Alcohols	<p>Alcohols, C9-11, ethoxylated</p> <p>Bronopol</p> <p>Butoxypolypropylene glycol</p> <p>Alcohol anhydrous</p> <p>Ethylene oxide</p> <p>N-decanol</p> <p>1-octanol</p> <p>Tetrakis (hydroxymethyl) phosphonium sulphate (THPS)</p> <p>Isopropyl alcohol</p> <p>Octenol</p> <p>Oil of lemon eucalyptus, hydrated, cyclized</p> <p>P-menthane-3,8-diol</p> <p>Propylene glycol</p> <p>Siloxylated polyether</p>



Chemical group	Active ingredient name
	Saponins of <i>Chenopodium quinoa</i> Triethylene glycol 2-(hydroxymethyl)-2-nitro-1,3-propanediol
Aldehydes	Formaldehyde Glutaraldehyde Metaldehyde Paraformaldehyde
Amides	Bixafen 2,2-dibromo-3-nitrilopropionamide Capsaicin Piperine Daminozide Isofetamid Mandipropamid Napropamide Related capsaicinoids
Ammoniums, Quaternary	Chlormequat chloride 1-(3-chloroallyl)-3,5,7-triaza-1-azoniaadamantane chloride Alkyl(C12-C16)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 Diisobutylphenoxyethoxyethyl 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 3-(trihydroxysilyl)-propyldimethyloctadecyl ammonium chloride

Chemical group	Active ingredient name
Anilides	S-Metolachlor and R-Enantiomer Niclosamide Benzovindiflupyr Boscalid 3-chloro-P-toluidine hydrochloride Dimethenamid-P Fenhexamid Flufenacet Flumioxazin Fluxapyroxad Metalaxyl-m and s-isomer Metalaxyl Picolinafen Penflufen Penthiopyrad Sedaxane
Anilines	Amitraz Diphenylamine
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 4-chloroindole-3-acetic acid, present as potassium salt Carbendazim Clomazone Fluensulfone Ethaboxam Etoxazole Fenpyroximate Fludioxonil Pydiflumetofen Metconazole Oxirane derivatives (50% minimum) 2-methyl-4-isothiazolin-3-one 5-chloro-2-methyl-4-isothiazolin-3-one 4,5-dichloro-2-n-octyl-3(2H)isothiazolone Tioxazafen

Chemical group	Active ingredient name
	Isoxaflutole Topramezone Oethilinone Oxathiapiprolin Pinoxaden Pyrasulfotole Pyroxasulfone Spirotetramat Strychnine 2-(thiocyanomethylthio)benzothiazole Tolpyralate Etridiazole Thiabendazole
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-olamine Dicamba (present as BAPMA salt) Dicamba (present as acid, amine salt, ester or sodium salt) Artificial grape extract Methyl salicylate Quinclorac
Benzonitriles	Bromoxynil Dichlobenil Chlorothalonil

Chemical group	Active ingredient name
Biscarbamates	Desmedipham Ferbam Mancozeb Metiram Nabam Phenmedipham Thiram Thiophanate-methyl
Carbamates	Ammonia (present as ammonium carbamate) Propoxur Bifenazate Carbaryl Chlorpropham Famoxadone Formetanate hydrochloride Iodocarb Oxadiazon Propamocarb hydrochloride Icaridin Polyoxin D zinc salt, Polyoxorim-zinc
Chlorotriazines	Atrazine (plus related active triazines) Pymetrozine Simazine plus related active triazines
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

Chemical group	Active ingredient name
	Pyridaben Pyrazon Triforine
Dinitrobenzenes	Bromethalin Ethalfuralin Fluazinam Pendimethalin Trifluralin
Dithiocarbamates	Dazomet 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 acids Capric acid Fatty acids Nonylphenoxypolyethoxyethanol Caprylic acid Octadec-9-enoic acid, methyl ester Octadec-9-enoic acid, ethyl ester Octylphenoxypolyethoxyethanol 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

Chemical group	Active ingredient name
	Triglyceride ethoxylate 10 POE Surfactant blend Surfactant mixture
Guanidines	Hydramethylnon Clothianidin Cyprodinil Dinotefuran Dodine Dodecylguanidine hydrochloride Imidacloprid Pirimethanil Streptomycin present as sulphate Thiamethoxam
Halogenated Organic Acids	Aminopyralid 1,4-bis(bromoacetox)-2-butene Cyflumetofen Clopypalid Halauxifen-methyl Picloram (present as potassium salts) Picloram (present as acid) Picloram (present as amine salts) Spirodiclofen
Hydrocarbons	Citronella terpene Creosote 1,4-dimethylnaphthalene 2,6-diisopropylnaphthalene 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 acid

Chemical group	Active ingredient name
	Ammonia (present as ammonium sulfate)
	Borax pentahydrate
	Borax
	Boracic acid (boric acid)
	Disodium octaborate tetrahydrate
	Available chlorine, present as calcium hypochlorite
	Copper (present as cupric ammonium formate and tannate complex)
	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-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)
	Kaolin
	Potassium peroxymonosulfate (present as potassium peroxymonosulfate sulfate)
	Available chlorine, present as lithium hypochlorite
	Mono- and dipotassium phosphite
	Magnesium phosphide
	Mono- and dibasic sodium, potassium, and ammonium phosphites
	Sodium chloride
	Phosphine
	Potassium bicarbonate
	Sodium bromide

Chemical group	Active ingredient name
	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
Methoxyacrylates	Azoxystrobin Fluoxastrobin Kresoxim-methyl Mandestrobin Pyraclostrobin Picoxystrobin Trifloxystrobin
Microbials	<i>Aureobasidium pullulans</i> DSM 14940 <i>Aureobasidium pullulans</i> DSM 14941 <i>Aureobasidium pullulans</i> DSM 14940 and DSM 14941 <i>Agrobacterium radiobacter</i> (ACMNPV) cabbage looper <i>Bacillus amyloliquefaciens</i> strain F727 <i>Beauveria bassiana</i> strain ANT 03 <i>Beauveria bassiana</i> strain PPRI 5339 <i>Bacillus subtilis</i> strain FMCH002 <i>Bacillus firmus</i> I-1582 <i>Beauveria bassiana</i> strain GHA <i>Beauveria bassiana</i> strain HF23 <i>Bacillus licheniformis</i> strain FMCH0001 <i>Bacillus amyloliquefaciens</i> , strain D747 <i>Bacillus mycoides</i> isolate J <i>Pseudomonas fluorescens</i> A506 <i>Pseudomonas syringae</i> - strain ESC-10 <i>Pseudomonas fluorescens</i> CL145A



Chemical group	Active ingredient name
	<i>Bacillus subtilis</i> QST 713 <i>Bacillus subtilis</i> (strain GB03) <i>Bacillus subtilis</i> (strain BU 1814) <i>Bacillus subtilis</i> MB1600 <i>Bacillus subtilis</i> var. <i>amyloliquefaciens</i> strain FZB24 <i>Bacillus thuringiensis</i> Berliner spp. <i>kurstaki</i> <i>Bacillus thuringiensis</i> serotype H-14 <i>Bacillus sphaericus</i> <i>Bacillus thuringiensis</i> subsp. <i>galleriae</i> strain SDS-502 <i>Bacillus thuringiensis</i> sp. <i>tenebrionis</i> <i>Bacillus thuringiensis</i> ssp. <i>aizawai</i> <i>Coniothyrium minitans</i> strain CON/M/91-08 <i>Cydia pomonella</i> granulovirus (strain M) <i>Cydia pomonella</i> granulosis virus (strain CMGV4) <i>Chondrostereum purpureum</i> (strain: North American; pathovar: PFC2139) Fungus: <i>Gliocladium catenulatum</i> <i>Sclerotinia minor</i> IMI 3144141 <i>Trichoderma harzianum</i> strain KRL-AG2 <i>Helicoverpa armigera</i> nucleopolyhedrovirus BV-0003 <i>Lactobacillus casei</i> strain LPT-111 <i>Lactobacillus rhamnosus</i> (strain LPT-21) <i>Lactococcus lactis</i> ssp. <i>lactis</i> strain LL64/CSL <i>Lactococcus lactis</i> ssp. <i>cremoris</i> strain M11/CSL <i>Lactococcus lactis</i> ssp. <i>lactis</i> strain LL102/CSL <i>Metarhizium anisopliae</i> (strain F52) <i>Phoma macrostoma</i> <i>Neodiprion abietis</i> nucleopolyhedrovirus <i>Nosema locustae</i> Canning (spore of) Nucleopolyhedrovirus for gypsy moth larvae Nuclear polyhedrosis virus of red-headed pine sawfly Nucleopolyhedrovirus for Douglas-fir tussock moth <i>Pantoea agglomerans</i> C9-1 <i>Pantoea agglomerans</i> strain E325 (NRRL B-21856) <i>Phlebiopsis gigantea</i> <i>Paecilomyces fumosoroseus</i> strain FE 9901 Pepino mosaic virus, strain CH2, isolate 1906 <i>Pasteuria nishizawae</i> PN1 <i>Streptomyces acidiscabies</i> strain RL-110T cells and spent fermentation media <i>Streptomyces griseoviridis</i> strain K61 <i>Streptomyces lydicus</i> strain WYEC 108 <i>Trichoderma asperellum</i> , strain T34

Chemical group	Active ingredient name
	<i>Trichoderma virens</i> strain G-41 <i>Trichoderma harzianum</i> Rifai strain T-22 <i>Clavibacter michiganensis</i> (spp <i>michiganensis</i> ) bacteriophage Mild pepino mosaic virus isolate VC1 <i>Verticillium albo-atrum</i> isolate WCS850 Mild pepino mosaic virus isolate VX1
Morpholines, Oxathiines	Dimethomorph Fenpropimorph Carbathiin Spiroxamine
Nitrobenzenes	Acifluorfen-sodium Fomesafen Mesotrione Oxyfluorfen Quintozene
Oils, Minerals, Vegetable	Oil of black pepper Citronella oil Clove oil Canola oil Camphor oil Cornmint oil Castor oil Eucalyptus oil Fish oil mixture Oil of geranium Garlic oil D-limonene Lemon oil Mineral oil - paraffin base (adjuvants) Mineral oil Methylated seed oil of soybean Paraffin based petroleum oil Verbenone Pine needle oil Thymol Soybean oil Thyme oil Tea tree oil Wintergreen oil

Chemical group	Active ingredient name
Organic Acids	Abamectin Acetic acid Acequinocyl Aviglycine hydrochloride Azadirachtin Citric acid Formic acid Gibberellic acid Gibberellins A4A7 HOP beta acids, present as potassium salts Iron (present as FeHEDTA) Kasugamycin hydrochloride hydrate Lactic acid Naphthylacetic acid Oxalic acid dihydrate Oxalic acid Peracetic acid Prohexadione calcium Prohydrojasmon Natamycin Spinosad Spiromesifen Spinetoram Sodium monofluoroacetate Trinexapac-ethyl Ferric sodium EDTA
Organochlorines	Chloropicrin Paradichlorobenzene
Organohalogens	1,2-dibromo-2,4-dicyanobutane Diodofon Tembotrione Methyl bromide Metrafenone Pyriofenone
Organometallics	Fenbutatin oxide 10,10'-oxybis(phenoxarsine)
Others	Acrolein 1-(alkyl-amino)-3-aminopropane hydrochloride (component of AMPHO 443-31)

Chemical group	Active ingredient name
	1-(alkyl-amino)-3-carboxymethylaminopropane (component of AMPHO 443-31) Aromatics 2,2-oxybis(4,4,6-trimethyl-1,3,2-dioxaborinane) BLAD polypeptide Dried blood <i>Brassica hirta</i> white mustard seed powder Bis(trichloromethyl)sulfone Cellulose (from powdered corn cobs) Corn gluten meal Carbon dioxide gas 3-methyl-2-cyclohexen-1-one 3-decen-2-one Putrescent whole egg solids Dried eggs Endothall or endothal Ethofumesate Fish meal mixture Garlic powder Garlic juice Garlic Liquid corn gluten Methylene bis(thiocyanate) 1-Methylcyclopropene 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 <i>Reynoutria sachalinensis</i> Sodium alpha-olefin sulfonate
Oximes-carbamates	Methomyl Oxamyl
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

Chemical group	Active ingredient name
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 Fluroxypyr-meptyl 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) Pyraflufen-ethyl Triclopyr-butotyl Triclopyr triethylamine salt

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 (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)-11-tetradecenol (E,Z)-3,13-octadecadien-1-yl acetate (Z,Z)-3,13-octadecadien-1-yl acetate R-(-)-1-octen-3-ol (E)-11-tetradecenyl acetate Muscalure (Z)-11-tetradecenol (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 (9Z,12E)-9,12-tetradecadien-1-yl acetate (E,Z)-11-tetradecenol (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

Chemical group	Active ingredient name
	Glyphosate present as potassium salt Glyphosate Glyphosate present as dimethylamine salt
Phosphoramidothioates	Acephate
Phthalic Acids	Captan Chlorthal-dimethyl Folpet N-octyl bicycloheptene 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 D-phenothrin 1R-trans prallethrin Pyrethrins Momfluorothrin Tefluthrin
Pyridines	Afidopyropen 4-aminopyridine Bicyclopypnone Dithiopyr Flupyradifurone Di-n-propyl isocinchomeronate Acetamiprid Sodium omadine Pyriproxyfen Quinoxifen

Chemical group	Active ingredient name
	Sulfoxaflor 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 Propoxycarbazine-sodium Prosulfuron Thiencarbazine-methyl Sulfometuron methyl Triflurosulfuron-methyl
Thiocarbamates	EPTC Triallate
Thiophosphates	Azamethiphos Coumaphos Diazinon Chlorpyrifos
Triazines, Tetrazines	Metribuzin Clofentezine Available chlorine present as trichloro-s-triazinetriene and sodium dichloro-s-triazinetriene Cyromazine Hexahydro-1,3,5-tris(2-hydroxyethyl)-s-triazine Indaziflam Prometryne plus related active triazines Available chlorine, present as sodium dichloro-s-triazinetriene



Chemical group	Active ingredient name
Triazoles	Amitrole Ametoctradin Cloransulam-methyl Difenoconazole Fenbuconazole Flutriafol Flumetsulam Florasulam Ipconazole Pyroxsulam Mefentrifluconazole Myclobutanil Paclobutrazol Propiconazole Prothioconazole Sulfentrazone Tebuconazole Triticonazole Tetraconazole Uniconazole-P
Urea Derivatives	Carfentrazone-ethyl Cyazofamid Diflufenzopyr Diflufenzopyr (present as sodium salt) 5,5-dimethylhydantoin 1,3-bis(hydroxymethyl)-5,5-dimethylhydantoin Diuron Linuron Hydroxymethyl-5,5-dimethylhydantoin Nicarbazin Thidiazuron

## Appendix III

## Glossary

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

Vertebrate control	A product used to control vertebrates.
Water treatment	Products to control microorganisms in swimming pools and industrial process waters (for example, paper mill whitewater, wastewater systems, cooling water).
Wood preservative	Antimicrobials applied to wood to control wood-destroying organisms and increase the service life of the wood.