Re-evaluation Note REV2016-08

Special Review of 2,4-D: Proposed Decision for Consultation

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1.0 Introduction

Pursuant to subsection 17(2) of the *Pest Control Products Act*, the Pest Management Regulatory Agency (PMRA) has initiated a special review of pest control products containing (2,4-dichlorophenoxy)acetic acid, commonly known as 2,4-D based on the decision taken by Norway in 2000 (Rotterdam Convention, 2001) to prohibit the use of this active ingredient due to human health and environmental concerns. The initiation of the special review for 2,4-D was announced in December 2013 (Canada, 2013a).

As required by subsection 18(4) of the *Pest Control Products Act*, the PMRA has evaluated the aspects(s) of concern related to the pest control products containing 2,4-D that prompted the special review. The aspects of concern related to the environment were identified as:

- High mobility and the potential for runoff of 2,4-D to aquatic habitats from treated areas
- The potential risk to aquatic plants following runoff.

No concerns for potential risk to aquatic organisms, other than aquatic plants, or for leaching of 2,4-D to groundwater were identified based on information provided by Norway.

In addition, with respect to effects on human health, Norway (Rotterdam Convention, 2001) concluded that "2.4-D is moderate acute toxic and irritating to eyes, but these characteristics is comparable to the alternative preparations or active substances. In addition there are some studies indicating a risk of cancer in soft tissue and lymph, but the evidence isn't strong enough to label the product for risk of cancer". Further, the Prior Informed Consent (PIC) Circular XIII (Rotterdam Convention, 2001) indicated that the expected effect of the final regulatory action in relation to human health was "reduced risk of cancer in people normally using pesticides with the agricultural needs covered by Weedar 64".

Taking into consideration that no specific concerns related to acute properties of 2,4-D were identified based on information provided by Norway, this aspect was not considered in this special review. Also, Norway made no conclusion as to the carcinogenic potential of 2,4-D, and indicated that the "evidence isn't strong enough to label the product for risk of cancer" (Rotterdam Convention, 2001). However, given that the PIC Circular XIII also indicated a reduced risk of cancer in people as an expected effect of the final regulatory action relevant to human health, the potential carcinogenicity of 2,4-D is considered as part of this special review.

2.0 Uses of 2,4-D in Canada

2,4-D, a selective systemic herbicide, is currently registered in Canada for use on turf, forests and woodlots, terrestrial feed and food crops, and industrial and domestic non-food sites. 2,4-D is present in currently registered pest control products as free acid, as amine (dimethylamine, DMA; isopropylamine, IPA; or triisopropanolamine, TIPA) or choline salts, or in ester form (2-ethylhexyl, EHE; butoxyethyl ester, BEE). All currently registered pest control products containing the above forms of 2,4-D (Appendix I) are considered in this special review.

The PMRA published the re-evaluation decision and an update for 2,4-D in 2008 and 2013, respectively (Canada, 2008; Canada, 2013b). As a result of the re-evaluation, the PMRA determined that products containing 2,4-D do not present unacceptable risks to human health and

the environment when used according to the revised conditions of use. The revised use conditions implemented as a result of the re-evaluation included discontinuation of pest control products containing the diethanolamine form of 2,4-D, removal of aquatic uses, restriction on the number of applications, and addition of buffer zones to protect the environment.

3.0 Aspect of the Pest Control Product that Prompted the Special Review

The concerns identified in the 2000 Norwegian decision to prohibit all uses of 2,4-D (Rotterdam Convention, 2001) were considered for this special review, and they were related to:

- Potential carcinogenicity of 2,4-D;
- High mobility and the potential for runoff of 2,4-D to aquatic habitats from treated areas;
- The potential risk to aquatic plants following runoff.

4.0 PMRA Evaluation of the Aspect of the Pest Control Product that Prompted the Special Review

Following the initiation of the special review of 2,4-D, the PMRA requested information from provinces and other relevant federal departments and agencies, in accordance with subsection 18(2) of the *Pest Control Products Act*. In response, water monitoring data for 2,4-D were received.

In order to evaluate the aspects of concern for 2,4-D, the PMRA has considered currently available relevant scientific information, which includes information considered for the re-evaluation of 2,4-D (Canada 2005; Canada 2006; Canada, 2007; Canada, 2008; Canada, 2013b) and any relevant information obtained since then, such as the information on Canadian incident reports, surface water monitoring data, and reviews of epidemiological studies on 2,4-D and other phenoxy herbicides available in the public domain (see Section 4.1).

4.1. Aspect of concern related to human health

Potential carcinogenicity of 2,4-D

The PMRA review of the available toxicological database for 2,4-D determined that based on in vitro and in vivo studies, all forms of 2,4-D (acid, salt, or ester forms) are not mutagenic or genotoxic and, that the overall weight of evidence indicates that 2,4-D is not carcinogenic in rats, mice, and dogs (Canada, 2007).

In addition to the toxicity studies in animals, the PMRA considered expert assessments of the evidence available from numerous epidemiological studies on 2,4-D and other phenoxy herbicides. These studies historically focused on an association between human exposure to chlorophenoxy herbicides (group of chemicals including 2,4-D and 2,4,5-trichlorophenoxyacetic acid [2,4,5-T]), and the development of two broad classes of cancer, soft-tissue sarcoma and non-Hodgkin lymphoma (NHL) in humans. Reviews of epidemiological studies available in the public domain have concluded that while some of the studies suggest a possible association between 2,4-D exposure and increase in these tumors in humans, other epidemiological studies fail to support such association (Canada, 2005; Canada, 2006, Canada, 2007; Burns and Swaen, 2012; Pahwa et al. 2012; Ntzani et al. 2013; von Stackelberg, 2013; Schinasi and Leon, 2014).

Furthermore, it was concluded that the available epidemiological studies provide equivocal or no evidence for an association between exposure to 2,4-D (and other chlorophenoxy herbicides) and other human cancers, including prostate, breast, pancreatic, colorectal, and brain cancers (Canada, 2008, Weichenthal et al., 2010; Burns and Swaen, 2012, von Stackelberg, 2013). None of the epidemiological studies relating to 2,4-D exposure in humans have been able to exclude other confounding factors, including other pesticides, contaminants, fertilizers and fuels, infectious agents, or lifestyle, that may have contributed to the etiology of reported cancer cases.

The PMRA has also considered assessments of 2,4-D exposure and human cancer conducted by other regulatory bodies (Canada, 2007) including the most recent assessment from the European Food Safety Authority (European Commission, 2014), which concluded that 2,4-D is unlikely to be carcinogenic in humans.

In addition, the PMRA considered the recent information from the International Agency for Research on Cancer (IARC) (Loomis et al., 2015), which classified 2,4-D as possibly carcinogenic to humans (IARC Monograph not available as of March 2, 2016). While, the IARC indicated that there is limited evidence in animals (due to concerns with the conduct of the positive studies) and inadequate evidence in humans for the carcinogenicity of 2,4-D, the findings that 2,4-D induces oxidative stress and causes immunosuppression were cited as the basis for the IARC hazard classification (Loomis et al., 2015). The IARC hazard classifications are not health risk assessments and the levels of human exposure, which determine the actual risk, are not taken into account in the IARC assessments.

There are no Canadian human incident reports related to the aspect of concern in the PMRA's incident report database.

Overall, taking into consideration, the inconsistent epidemiological associations, the recognition that there are many other factors that may contribute to the etiology of the reported cancer cases, information from the PMRA's incident report database, and the fact that the weight of evidence from animal studies designed to show causality did not support a carcinogenic effect, the PMRA has concluded that 2,4-D cannot be classified as a human carcinogen.

4.2 Aspects of concern related to the environment

High mobility and the potential for runoff of 2,4-D to aquatic habitats from treated areas

With respect to their behaviour in the environment, 2,4-D derivatives can be grouped into two main categories, the acid/amine group (acid, DMA, IPA, TIPA) and the ester group (EHE, BEE). 2,4-D acid and the amine forms are very soluble in water, while the ester forms are insoluble in water (Canada, 2005; Canada, 2007). Various forms of 2,4-D are non-volatile or have low volatility. The dissociation constant of 2,4-D (pKa 2.8) indicates that 2,4-D will be present in its ionic form under the pH conditions prevailing in most Canadian soils and water bodies. The amine and choline forms dissociate to the acid form in the presence of water within a few minutes.

Hydrolysis is not an important route of transformation for 2,4-D acid and the amine forms, or for the esters under acidic or neutral pH levels. However, it is an important route of transformation of the esters to the acid under alkaline pH conditions (half-lives of EHE and BEE are 2 days and

0.07 day, respectively). Phototransformation is also not an important route of transformation for 2,4-D in the environment (Canada, 2007). Aerobic biotransformation is the major route of transformation of 2,4-D in soil and water. 2,4-D acid and its derivatives are classified as non-persistent to slightly persistent in soil and water (half-lives 0.22 -31 days soil; 0.25-29 days in water). Major biotransformation products of 2,4-D are carbon dioxide (CO_2) in soil and, CO_2, 2,4-dichlorophenol (2,4-DCP) and chlorohydroquinone (CHQ) in water. Under anaerobic soil and aquatic systems, 2,4-D is considered to be persistent.

The organic carbon adsorption coefficient of 2,4-D (K_{oc} <150) indicates that 2, 4-D is weakly absorbed to soil and it is not expected to partition significantly to soil and sediment. On this basis, 2,4-D is expected to be highly mobile in soils and it is expected to runoff from the treated areas into aquatic systems following irrigation or rainfall (Canada 2005; Canada, 2007).

The potential risk to aquatic plants following runoff

To assess the potential risk to aquatic plants from runoff, the PMRA considered the surface water monitoring and modelling information as well as the toxicity to aquatic plants from exposure to 2,4-D.

The PMRA calculated the potential estimated environmental concentrations (EECs) of acid/salt and esters forms of 2,4-D in surface water using the PRZM/EXAM model or assuming a direct overspray. In addition, robust surface water monitoring data for 2,4-D from Canada and the United States were considered.

The PMRA assessed the risk to aquatic plants using the risk quotient (RQ) method which is expressed as the ratio of the EEC to the most sensitive endpoints for the different derivatives of 2,4-D for aquatic plants. The estimated risk quotient is then compared to the level of concern (LOC). For exposures to aquatic organisms, the PMRA's LOC is 1.0.

For turf uses, the calculated RQs range from 0.3 to 2.9 for the acid and amine forms, and 3.0 to 5.8 for the ester forms based on the conservative (direct overspray) EECs ranging from 0.543 to 0.788 mg a.e./L and the NOECs of 2.03 and 0.27 mg a.e./L (*Lemna gibba*) for the acid amine forms, respectively, 0.094 mg a.e./L (*Skeletonema costatum*) for EHE, and 0.20 mg a.e./L (*Lemna gibba*) for BEE.

For agriculture/non-crop/forestry uses, the calculated RQs for aquatic plants range from 0.04 to 1.4 for the acid and amine forms, 0.05 to 1.5 for EHE, and from 0.04 to 1.3 for BHE forms based on the runoff EECs ranging from 0.008 to 0.345 mg a.i./L and the static 14-day EC_{50} ($0.5 \times EC_{50}$ values used in the risk assessment) of 0.48 mg a.i./L (*Lemna gibba*) for the acid and amine forms, 0.33 mg a.i./L (*Lemna gibba*) for EHE, and 0.40 mg a.i./L (*Lemna gibba*) for BHE.

The estimated amine RQs (0.04-1.4) are representative of the risk posed by the choline form since these two forms are considered to be toxicologically equivalent.

It should be noted that the EECs were generated using conservative assumptions and, therefore, the potential risk to aquatic plants is considered unlikely. This is further supported by the available monitoring information. When the available surface water monitoring information was considered, the risk to aquatic plants was deemed to be unlikely. Based on the highest

concentration detected in Canada in urban runoff (0.0469 mg/L) and in the most recent (2002-2014) surface water monitoring (0.011 mg/L), the risk to aquatic plants from 2,4-D is not a concern.

To minimize the potential runoff from treated areas into aquatic habitats, advisory label statements are currently included on the products labels advising the users of measures that can help reduce runoff.

No concerns related to the aspect of concern (mobility and potential risk to aquatic plants following runoff) were identified in the information received through the Canadian incident report database.

Consequently, based on the results of the risk assessment and taking into consideration the current conditions of use for pest control products containing 2,4-D, the PMRA has determined that the risk to aquatic plants from 2,4-D in runoff is not of concern.

5.0 Proposed Special Review Decision for 2,4-D

Evaluation of available scientific information related to the aspects of concern for human health and the environment, indicated that the registered products containing 2,4-D are acceptable for continued registration taking into account the current conditions of use. On this basis, the PMRA is proposing to confirm the current registration of products containing 2,4-D for sale and use in Canada pursuant to subsection 21(1) of the *Pest Control Product Act*.

This proposed special review decision is a consultation document[1]. The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document. Please forward all comments to Publications (please see contact information on the cover page of this document).

6.0 Next Steps

Before making a special review decision on 2,4-D, the PMRA will consider any comments received from the public in response to this consultation document. A science-based approach will be applied in making a final decision on 2,4-D. The PMRA will then publish a special review decision document, which will include the decision, the reasons for it, a summary of the comments received on the proposed decision and the PMRA's response to these comments.

[1] "Consultation statement" as required by subsection 28(2) of the *Pest Control Products Act*.

Appendix I Registered Products Containing 2,4-D as of March 2, 2016

Table 1 Pest control products containing 2,4-D present as acid

Registration Number	Marketing Class[1]	Registrant	Product Name	Formulation	Guarantee[2]
16981	T	Dow Agrosciences Canada Inc.	2,4-Dichlorophenoxyacetic Acid Flake Technical Herbicide	Solid	97.0%
17007	T	Nufarm Agriculture Inc.	Growell 2,4-D Technical Acid	Solid	98.5%
17044	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Technical Acid	Solid	98.5%
17134	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Dry Powder Acid Herbicide	Solid	97.5%
17291	T	PBI/Gordon Corp	2,4-Dichlorophenoxyacetic Acid Technical	Solid	98.2%
24562	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Technical Acid	Solid	96.0%
24836	T	Dow Agrosciences Canada Inc.	2,4-Dichlorophenoxyacetic Acid Molten Technical Herbicide	Solution	74.8%
27437	T	Albaugh Inc.	Albaugh 2,4-D Technical Acid Herbicide	Solid	97.63%
28491	T	Nufarm Agriculture Inc.	Nufarm 2,4-D Technical Acid Herbicide	Solid	97.0%
25783	M	Dow Agrosciences Canada Inc.	Striker Manufacturing Concentrate	Wettable Granules	FLM-9.3% DXA-50.0 % DPI-25.0%
27991	M	PBI/Gordon Corp.	Trimec DMB #2 Herbicide Powder Plus	Dust or Powder	MEP-10.20% DXA-45.59% DIC-4.30%
9342	C	Nufarm Agriculture Inc.	Nufarm Calmix Pellets Weed Killer & Soil Sterilant	Pellets	DXA-5.0% BBU-3.0%
27634	C	Dow Agrosciences Canada Inc.	Grazon Herbicide	Solution	PID-65 g/L DXA-240 g a.e./L
31641	C	Dow Agrosciences Canada Inc.	Aspect Herbicide	Solution	PID-97.5 g/L DXA-360 g a.e./L
31642	C	Dow Agrosciences Canada Inc.	Grazon XC Herbicide	Solution	PID-97.5 g/L DXA-360 g a.e./L
11852	D	Les Produits De Controle Superieur Inc./ Superior Control Products Inc.	Weedex Dandelion Bar	Solid	14.55%

Registration Number	Marketing Class[1]	Registrant	Product Name	Formulation	Guarantee[2]
21738	D	Les Produits De Controle Superieur Inc./ Superior Control Products Inc.	Weedex Dandelion Stick	Solid	6.79%

[1] T - Technical grade; M – Manufacturing concentrate; C – Commercial; D – domestic
[2] a.e. – acid equivalent; DXA - 2,4-D (present as acid); BBU – Bromacil; DPI - Clopyralid; DIC - Dicamba; FLM - Flumetsulam; MEP - Mecoprop-P; PID – Picloram;

Table 2 Pest control products containing 2,4-D as amine salt

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
16988	M	Dow Agrosciences Canada Inc.	2,4-D DMA 720 Unsequestered Weed Killer	Solution	55.7%
17107	M	Dow Agrosciences Canada Inc.	2,4-D DMA 720 Sequestered Weed Killer	Solution	55.5%
17138	M	Nufarm Agriculture Inc.	Nufarm 2,4-D Amine Unsequestered Manufacturing Concentrate	Solution	683 g a.e./L
17401	M	Nufarm Agriculture Inc.	Nufarm 2,4-D DMA Manufacturing Concentrate	Solution	720 g a.e./L
18352	M	Nufarm Agriculture Inc.	Growell 2,4-D Dimethylamine Salt 720 Formulation	Solution	720 g a.e./L
19530	M	Dow Agrosciences Canada Inc.	2,4-D Isopropylamine Salt	Solution	39.4%
27165	M	Nufarm Agriculture Inc.	Growell 2,4-D Dimethylamine Salt 683 Formulation	Solution	683 g a.e./L
27721	M	Scotts Canada Ltd.	Killex 3x Manufacturing Concentrate Ii	Solution	MEQ-157.5 g a.e./L DXB-285 g a.e./L DIC-27 g a.e./L
27808	M	Interprovincial Cooperative Limited	IPCO 2,4-D/ Mecoprop-P Formula 3 XP	Solution	MEQ-180 g a.e./L DXB-360 g a.e./L
27867	M	Loveland Products Canada Inc.	Mecoprop-P + 2,4-D Manufacturing Concentrate	Solution	MEQ-180 g a.e./L DXB-360 g a.e./L
5931	C	Loveland Products Canada Inc.	2,4-D Amine 600 Herbicide	Solution	564 g a.e./L
9007	C	Dow Agrosciences Canada Inc.	Tordon 101 Herbicide	Solution	PID-65 g /L DXB-240 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
9528	C	Dow Agrosciences Canada Inc.	2,4-D Amine 500 Herbicide	Solution	470 g a.e./L
14167	C	Dow Agrosciences Canada Inc.	Tordon 202c Liquid Herbicide	Solution	PID-12 g/L DXB-200 g a.e./L
14725	C	Nufarm Agriculture Inc.	Nufarm 2,4-D Amine 500 Liquid Herbicide	Solution	470 g a.e./L
14726	C	Nufarm Agriculture Inc.	Nufarm 2,4-D Amine 600 Liquid Herbicide	Solution	564 g a.e./L
15730	C	Agrium Advanced Technologies RP Inc.	Wilson 2,4-D Amine 500 Liquid Weed Killer	Solution	470g a.e./L
17511	C	Interprovincial Cooperative Limited	IPCO 2,4-D Amine 600 Liquid Herbicide	Solution	560 g a.e./L
19536	C	Monsanto Canada Inc.	Rustler Summerfallow Herbicide	Solution	GPI-108 g a.e./L DXB-182 g a.e./L
25898	C	Monsanto Canada Inc.	Mon 77790 Herbicide	Solution	GPI-132 g a.e./L DXB-82 g a.e./L
26163	C	Interprovincial Cooperative Limited	Weedaway 2,4-D Amine 600 Liquid Herbicide	Solution	560 g a.e./L
26649	C	Dow Agrosciences Canada Inc.	Ram Herbicide	Solution	PID-65 g a.e./L DXB-240 g a.e./L
27779	C	Interprovincial Cooperative Limited	IPCO Premium 2-Way XP Turf Herbicide Liquid	Solution	MEQ-200g a.e./L DXB-200g a.e./L
27846	C	Interprovincial Cooperative Limited	IPCO Premium 3-Way XP Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27848	C	Interprovincial Cooperative Limited	Weedaway Premium 3-Way XP Turf Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27856	C	Basf Canada Inc.	Dyvel DSP Liquid Herbicide	Solution	MEQ-80g a.e./L DXB-295g a.e./L DIC-110g a.e./L
27884	C	Loveland Products Canada Inc.	Par III Turf Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27972	C	Nufarm Agriculture Inc.	Nufarm Trillion Turf Herbicide	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27969	C	Agrium Advanced Technologies RP Inc.	Wilson Turf Rite 2+2 Double Strength Herbicide	Solution	DXB-200 g a.e./L MEQ-200 g a.e./L
27970	C	Agrium Advanced Technologies RP Inc.	Pro Tri-Kil Turf Herbicide	Solution	MEQ-100 g a.e./L DXB-190 g a.e./L DIC-18 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
27972	C	Nufarm Agriculture Inc.	Nufarm Trillion Turf Herbicide	Solution	MEQ-100 g a.e./L DXB-190 g a.e./L DIC-18 g a.e./L
27975	C	Scotts Canada Ltd.	Green Cross Killex 500 Liquid Turf Herbicide Concentrate	Solution	MEQ-75.0g a.e./L DXB-385.25g a.e./L DIC-18.75g a.e./L
27976	C	Scotts Canada Ltd.	Green Cross Killex Liquid Turf Herbicide Concentrate	Solution	MEQ-100g a.e./L DXB-190g a.e./L DIC-18g a.e./L
27987	C	Syngenta Canada Inc.	Target Ds Liquid Herbicide	Solution	MEQ-80g a.e./L DXB-295g a.e./L DIC-110g a.e./L
28271	C	Dow Agrosciences Canada Inc.	2,4-D Amine 600 Herbicide	Solution	564g a.e./L
28295	C	Dow Agrosciences Canada Inc.	Formula 40F Herbicide	Solution	470g a.e./L
28296	C	Dow Agrosciences Canada Inc.	Formula 40C Herbicide	Solution	470g a.e./L
28552	C	Dow Agrosciences Canada Inc.	Restore B Herbicide (A Component Of Restore Herbicide)	Solution	564g a.e./L
29248	C	Interprovincial Cooperative Limited	Viterra 2,4-D Amine 600 Liquid Herbicide	Solution	560g a.e./L
30532	C	Intelligro	Civitas Weedfree Brand Concentrate	Emulsifiable Concentrate Or Emulsion	MEQ-4.04g a.e./L DXB-6.33g a.e./L DIC-0.78g a.e./L
30632	C	Dow Agrosciences Canada Inc.	Restore II Herbicide	Solution	DXB-400g a.e./L AMD-50.0g a.e./L
31332	C	Albaugh Inc.	Albaugh 2,4-D Amine 600	Solution	560g a.e./L
27799	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Lawn Weed Control Herbicide With Quick Connect Sprayer	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
27800	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Lawn Weed Control Herbicide	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
27801	D	Scotts Canada Ltd.	Ortho Killex Lawn Weed Control Concentrate	Solution	MEQ-52.52g a.e./L DXB-95g a.e./L DIC-9g a.e./L
27809	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Spray Lawn Weed Control	Solution	MEQ-52.52 g a.e./L DXB-95 g a.e./L DIC-9 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
27811	D	Scotts Canada Ltd.	Ortho Killex With Pull N' Spray Applicator Ready-To-Use	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
27914	D	Interprovincial Cooperative Limited	Co-Op Premium Spot Weed Killer XP Herbicide	Solution	MEQ-1.00 g a.e./L DXB-1.90 g a.e./L DIC-0.18 g a.e./L
27915	D	Interprovincial Cooperative Limited	Co-Op Premium Lawn Weed Killer XP Herbicide	Solution	MEQ-50 g a.e./L DXB-95 g a.e./L DIC-9 g a.e./L
27974	D	Sure-Gro IP Inc.	Wilson Lawn Weedout Ready To Use	Solution	MEQ-3.0 g a.e./L DXB-3.0 g a.e./L DIC-0.3 g a.e./L
28000	D	Sure-Gro IP Inc.	Wilson Lawn Weedout (2) Ready To Use	Solution	MEQ-3.0 g a.e./L DXB-3.0 g a.e./L DIC-0.3 g a.e./L
28078	D	Sure-Gro IP Inc.	Wilson Lawn Weedout Attach & Spray Concentrate	Solution	MEQ-25 g a.e./L DXB-50 g a.e./L DIC-4.5 g a.e./L
28081	D	Sure-Gro IP Inc.	Wilson Lawn Weedout Concentrate	Solution	MEQ-50 g a.e./L DXB-95 g a.e./L DIC-9 g a.e./L
28204	D	Les Produits De Controle Superieur Inc/ Superior Control Products Inc.	Concentrated Weedex Weed Control For Lawns II	Solution	MEQ-50 g a.e./L DXB-95.0 g a.e./L DIC-9 g a.e./L
28209	D	Les Produits De Controle Superieur Inc/ Superior Control Products Inc.	Ready To Use Weedex Weed Control For Lawns II	Solution	MEQ-1.0 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28310	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Herbicide II	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28311	D	Scotts Canada Ltd.	Ortho Killex With Pull'n Spray Applicator Ready-To-Use Herbicide II	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28312	D	Scotts Canada Ltd.	Ortho Killex Lawn Weed Control Ready-To-Use Herbicide II	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28374	D	Scotts Canada Ltd.	Ortho Killex Ready-To-Use Herbicide	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
28513	D	Les Produits De Controle Superieur Inc./ Superior Control Products Inc.	Ready To Use Weedex With 1 Touch Power Sprayer	Solution	MEQ-1.0 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
30536	D	Intelligro	Clear Choice(Tm) Ready-To-Use Selective Herbicide	Emulsifiable Concentrate	MEQ-0.30 g a.e./L DXB-0.47 g a.e./L DIC-0.058 g a.e./L
30541	D	Scotts Canada Ltd.	Ortho® Killex® Ready-To-Use With Wand Applicator	Solution	MEQ-1.05 g a.e./L DXB-1.9 g a.e./L DIC-0.18 g a.e./L
31028	D	Sure-Gro IP Inc.	Smartones Lawn Weeder	Solution	MEQ-1.0 g a.e./L DXB-1.90 g a.e./L DIC-0.18 g a.e./L

[1] T - Technical grade =, M – Manufacturing concentrate; C – Commercial; D – domestic
[2] a.e. – acid equivalent; DXB - 2,4-D (present as amine salts: dimethylamine salt, diethanolamine salt, or other amine salts); AMD – Aminopyralid; DIC – Dicamb); GPI – Glyphosate; MEQ – Mecoprop-p-dimethylammonium; PID – Picloram;

Table 3 Pest control products containing 2,4-D present as choline salt

Registration Number	Marketing Class[1]	Registrant	Product Name	Formulation	Guarantee[2]
30956	M	Dow Agrosciences Canada Inc.	GF-2668 Manufacturing Concentrate	Solution	44.5%
30957	C	Dow Agrosciences Canada Inc.	GF-2654 TC Herbicide	Solution	456 g a.e./L
30958	C	Dow Agrosciences Canada Inc.	Enlist Duo Herbicide	Solution	GPX-204 g a.e./L DXJ-194 g a.e./L
30959	C	Dow Agrosciences Canada Inc.	GF-2654 Tsoy Herbicide	Solution	456 g a.e./L
30960	C	Dow Agrosciences Canada Inc.	FGf-2726 Tsoy Herbicide	Solution	GPX-204 g a.e./L DXJ-194 g a.e./L

[1] M – Manufacturing concentrate; C – Commercial
[2] a.e. – acid equivalent; DXJ – 2,4-D (present as choline salt); GPX – Glyphosate

Table 4 Pest control products containing 2,4-D present as ester

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
16982	T	Dow Agrosciences Canada Inc.	Dow 2,4-D 2-Ethylhexyl Ester	Emulsifiable Concentrate Or Emulsion	63.9% a.e.
16990	T	Dow Agrosciences Canada Inc.	2,4-D Butoxy Ethanol Esters	Liquid	66.4% a.e.
17012	T	Nufarm Agriculture Inc.	Growell 2,4-D 2-Ethylhexyl Ester Technical	Solution	64.0% a.e.
17135	T	Nufarm Agriculture Inc.	Nufarm 2,4-D 2-Ethylhexyl Ester Technical	Liquid	64.3% a.e.
27263	T	Nufarm Agriculture Inc.	Nufarm 2,4-D 2-Ethylhexyl Ester Technical	Emulsifiable Concentrate	64.0% a.e.
28490	T	Nufarm Agriculture Inc.	Nufarm 2,4-D 2-Ethylhexyl Ester Technical Herbicide	Emulsifiable Concentrate	63.9%

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
29964	T	Albaugh Inc.	Albaugh 2,4-D 2-Eh Ester Technical	Liquid	62.12% a.e.
15981	R	Dow Agrosciences Canada Inc.	Esteron Herbicide	Emulsifiable Concentrate	564 g a.e./L
27818	C+R	Loveland Products Canada Inc.	Salvo 2,4-D Ester 700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
27819	C+R	Interprovincial Cooperative Limited	IPCO 2,4-Dester 700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
27820	C+R	Nufarm Agriculture Inc.	Nufarm 2,4-D Ester 700 Liquid Herbicide	Emulsifiable Concentrate	660 g a.e./L
29007	C+R	Interprovincial Cooperative Limited	Weedaway 2,4-D Ester 700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
29264	C+R	Dow Agrosciences Canada Inc.	2,4-D LV-700 Herbicide	Emulsifiable Concentrate	660 g a.e./L
31698	C+R	Adama Agricultural Solutions Canada Ltd.	Adama 2,4-D Ester 700 Liquid Herbicide	Emulsifiable Concentrate	660 g a.e./L
6330	C	Dow Agrosciences Canada Inc.	2,4-D Bee-4 Herbicide	Emulsifiable Concentrate	500 g a.e./L
9560	C	Dow Agrosciences Canada Inc.	2,4-D LV-600 Herbicide	Emulsifiable Concentrate	564 g a.e./L
15027	C	Nufarm Agriculture Inc.	Nufarm Desormone Liquid Herbicide	Emulsifiable Concentrate	DXF-330 g a.e./L DIH-350 g a.e./L
20310	C	Interprovincial Cooperative Limited	IPCO 2,4-D Ester 700 Low Volatile Liquid Herbicide	Emulsifiable Concentrate	660 g a.e./L
22659	C	Bayer Cropscience Inc.	Thumper Emulsifiable Selective Weedkiller	Emulsifiable Concentrate	DXF-280 g a.e./L BRY-280 g a.e./L
24833	C	Dow Agrosciences Canada Inc.	Attain B Herbicide (A Component of Attain Herbicide Tank Mix)	Emulsifiable Concentrate	564 g a.e./L
27243	C	Dow Agrosciences Canada Inc.	Frontline 2,4-D B Emulsifiable Concentrate Herbicide (A Component of Frontline 2,4-D Herbicide Tank Mix)	Emulsifiable Concentrate	564 g a.e./L
27879	C	Basf Canada Inc.	Adrenalin SC Herbicide	Emulsifiable Concentrate	IMZ-20 g a.e./L DXF-560 g a.e./L
27966	C	Interprovincial Cooperative Limited	IPCO Dichlorprop-D Herbicide	Emulsifiable Concentrate	DXF-282 g a.e./L DIH-300 g a.e./L
27967	C	Loveland Products Canada Inc.	Turboprop	Emulsifiable Concentrate	DXF-282 g a.e./L DIH-300 g a.e./L
28123	C	Nufarm Agriculture Inc.	Approve Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
28779	C	Adama Agricultural Solutions Canada Ltd.	Thrasher	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
28853	C	Interprovincial Cooperative Limited	IPCO Leader Liquid Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
28947	C	Interprovincial Cooperative Limited	IPCO Leader 450 Liquid Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
29513	C	Bayer Cropscience Inc.	Thumper Total 2 Herbicide (A Component of Thumper Total Herbicide Tank Mix)	Emulsifiable Concentrate	DXF-280 g a.e./L BRY-280 g a.e./L
29660	C	Nufarm Agriculture Inc.	Nufarm Estaprop XT Liquid Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
29663	C	Nufarm Agriculture Inc.	Desormone XT Liquid Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
29664	C	Interprovincial Cooperative Limited	IPCO Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
29750	C	Dow Agrosciences Canada Inc.	Reclaim B Herbicide	Emulsifiable Concentrate	564 g a.e./L
29972	C	Dow Agrosciences Canada Inc.	Attain XC B Herbicide	Emulsifiable Concentrate	660 g a.e./L
29979	C	Albaugh Inc.	Agri Star 2,4-D Ester 700	Emulsifiable Concentrate	660 g a.e./L
30005	C	Interprovincial Cooperative Limited	Weedaway Leader Herbicide	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
30061	C	Dow Agrosciences Canada Inc.	Frontline 2,4-D Xc B Herbicide (A Component of Frontline 2,4-D XC Herbicide)	Emulsifiable Concentrate	660.0 g a.e./L
30063	C	Dow Agrosciences Canada Inc.	Reclaim Ii B Herbicide (A Component of Reclaim II Herbicide)	Emulsifiable Concentrate	660 g a.e./L
30077	C	Dow Agrosciences Canada Inc.	Octtain XL Herbicide	Emulsifiable Concentrate	FLR-90 g a.e./L DXF-360 g a.e./L
30103	C	Interprovincial Cooperative Limited	Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
30111	C	Interprovincial Cooperative Limited	Weedaway Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
30112	C	Interprovincial Cooperative Limited	Viterra Dichlorprop-DX Herbicide	Emulsifiable Concentrate	DXF-400 g a.e./L DPZ-210 g a.e./L
30372	C	Adama Agricultural Solutions Canada Ltd.	Thrasher II	Emulsifiable Concentrate	DXF-225 g a.e./L BRY-225 g a.e./L
30460	C	Newagco Inc.	Mpower 2,4-D Ester 700	Emulsifiable Concentrate	660 g a.e./L
30690	C	Nufarm Agriculture Inc.	Enforcer D Herbicide	Emulsifiable Concentrate	FLR-80 g a.e./L DXF-240 g a.e./L BRY-190 g a.e./L
31626	C	Dow Agrosciences Canada Inc.	Scuttle Herbicide	Emulsifiable Concentrate	FLR-90 g a.e./L DXF-360 g a.e./L
31673	C	Syngenta Canada Inc.	Traxos®Two Broadleaf Component	Emulsifiable Concentrate	FLR-90 g a.e./L DXF-360 g a.e./L

Registration Number	Marketing Class	Registrant	Product Name	Formulation	Guarantee
32111	C	Nufarm Agriculture Inc.	Blackhawk herbicide	Emulsifiable Concentrate	DXF 473 g a.e./L PFE 6.1 g/L

[1] T – Technical grade; M – Manufacturing concentrate; R – Restricted; C + R – Commercial plus Restricted uses; C – Commercial
[2] a.e. – acid equivalent; DXF – 2,4-D (present as low volatile esters); BRY – Bromoxynil; DIH – Dichlorprop; DPZ - Dichlorprop-P-2-ethylhexyl; FLR- Fluroxypyr; IMZ – Imazamox; PFE - Pyraflufen-ethyl

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