Proposed Registration Decision PRD2022-17

Florpyrauxifen-benzyl, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide, and ProcellaCOR FX Herbicide

(*publié aussi en français*)

15 December 2022

This document is published by the Health Canada Pest Management Regulatory Agency. For further information, please contact:

Publications
Pest Management Regulatory Agency
Health Canada
2720 Riverside Drive
A.L. 6607 D
Ottawa, Ontario K1A 0K9

Internet: canada.ca/pesticides
pmra.publications-arla@hc-sc.gc.ca
Facsimile: 613-736-3758
Information Service:
1-800-267-6315 or 613-736-3799
pmra.info-arla@hc-sc.gc.ca

Canada

ISSN: 1925-0878 (print)
1925-0886 (online)

Catalogue number: H113-9/2022-17E (print version)
H113-9/2022-17E-PDF (PDF version)

Table of contents

Overview

Proposed registration decision for Florpyrauxifen-benzyl

Health Canada's Pest Management Regulatory Agency (PMRA), under the authority of the *Pest Control Products Act*, is proposing registration for the sale and use of Rinskor Active, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, containing the technical grade active ingredient florpyrauxifen-benzyl, for weed management in hazelnut and non-agricultural/industrial vegetation management including many invasive species, as well as for aquatic vegetation management to control invasive plants both in and around water.

The proposed end-use products Milestone NXT Herbicide and Restore NXT Herbicide are coformulations of florpyrauxifen-benzyl and aminopyralid present as potassium salt. Aminopyralid is a registered herbicide active ingredient (REG2007-01 *Aminopyralid*). The potassium salt represents a new salt form of aminopyralid. The proposed registrations do not represent expansions of use from currently registered uses of aminopyralid.

An evaluation of available scientific information found that, under the approved conditions of use, the health and environmental risks and the value of the pest control products are acceptable.

This Overview describes the key points of the evaluation, while the Science evaluation provides detailed technical information on the human health, environmental and value assessments of florpyrauxifen-benzyl and Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide.

What does Health Canada consider when making a registration decision?

The key objective of the *Pest Control Products Act* is to prevent unacceptable risks to people and the environment from the use of pest control products. Health or environmental risk is considered acceptable[1] if there is reasonable certainty that no harm to human health, future generations or the environment will result from use or exposure to the product under its proposed conditions of registration. The Act also requires that products have value[2] when used according to the label directions. Conditions of registration may include special precautionary measures on the product label to further reduce risk.

---

[1] "Acceptable risks" as defined by subsection 2(2) of the *Pest Control Products Act.*

[2] "Value" as defined by subsection 2(1) of the *Pest Control Products Act*: "the product's actual or potential contribution to pest management, taking into account its conditions or proposed conditions of registration, and includes the product's (*a*) efficacy; (*b*) effect on host organisms in connection with which it is intended to be used; and (*c*) health, safety and environmental benefits and social and economic impact."

To reach its decisions, the PMRA applies modern, rigorous risk-assessment methods and policies. These methods consider the unique characteristics of sensitive subpopulations in humans (for example, children) as well as organisms in the environment. These methods and policies also consider the nature of the effects observed and the uncertainties when predicting the impact of pesticides. For more information on how the Health Canada regulates pesticides, the assessment process and risk-reduction programs, please visit the Pesticides section of the Canada.ca website.

Before making a final registration decision on florpyrauxifen-benzyl, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, Health Canada's PMRA will consider any comments received from the public in response to this consultation document.[3] Health Canada will then publish a Registration Decision[4] on florpyrauxifen-benzyl, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, which will include the decision, the reasons for it, a summary of comments received on the proposed registration decision and Health Canada's response to these comments.

For more details on the information presented in this Overview, please refer to the Science evaluation of this consultation document.

What is Florpyrauxifen-benzyl?

Florpyrauxifen-benzyl is a new selective herbicide belonging to the arylpicolinate class of herbicides. It acts as a synthetic plant hormone by mimicking the natural plant hormone auxin and disrupting growth processes in susceptible plants. Excessive auxin causes alterations in cell wall elasticity resulting in leaf curling and interference with nutrient transport.

Health considerations

Can approved uses of Florpyrauxifen-benzyl affect human health?

End-use products containing florpyrauxifen-benzyl are unlikely to affect your health when used according to proposed label directions.

Potential exposure to florpyrauxifen-benzyl may occur through the diet (food and drinking water), when handling and applying the end-use products, or when coming into contact with treated water and surfaces. When assessing health risks, two key factors are considered: the levels where no health effects occur and the levels to which people may be exposed.

---

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

4 "Decision statement" as required by subsection 28(5) of the *Pest Control Products Act*.

The dose levels used to assess risks are established to protect the most sensitive human population (for example, children and nursing mothers). As such, sex and gender are taken into account in the risk assessment. Only uses for which the exposure is well below levels that cause no effects in animal testing are considered acceptable for registration.

Toxicology studies in laboratory animals describe potential health effects from varying levels of exposure to a chemical and identify the dose level at which no effects are observed. The health effects noted in animals occur at dose levels more than 100-times higher (and often much higher) than levels to which humans are normally exposed when pesticide products are used according to label directions.

In laboratory animals, the technical grade active ingredient florpyrauxifen-benzyl was of low acute toxicity by the oral, dermal and inhalation routes. Florpyrauxifen-benzyl was minimally irritating to the eyes and non-irritating to the skin. It did cause an allergic skin reaction; consequently, the hazard statement "POTENTIAL SKIN SENSITIZER" is required on the label.

The acute toxicity of GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide containing florpyrauxifen-benzyl, was low via the oral, dermal and inhalation routes of exposure. They were minimally irritating to the eyes and skin and did not cause an allergic skin reaction.

The acute toxicity of GF-3206 Herbicide containing florpyrauxifen-benzyl was low via the oral, dermal and inhalation routes of exposure. It was minimally irritating to the eyes, slightly irritating to the skin and did not cause an allergic skin reaction.

The acute toxicity of Milestone NXT Herbicide containing florpyrauxifen-benzyl and aminopyralid (present as potassium salt) was low via the oral, dermal and inhalation routes of exposure. It was minimally irritating to the eyes, slightly irritating to the skin and did not cause an allergic skin reaction.

The acute toxicity of Restore NXT Herbicide containing florpyrauxifen-benzyl and aminopyralid (present as a potassium salt) was low via the oral, dermal and inhalation routes of exposure. It was non-irritating to the eyes and skin and was not a dermal sensitizer.

Applicant-supplied short- and long-term (lifetime) animal toxicity tests, as well as information from the published scientific literature, were assessed for the potential of florpyrauxifen-benzyl to cause neurotoxicity, immunotoxicity, chronic toxicity, cancer, reproductive and developmental toxicity, and various other effects. The most sensitive endpoints for risk assessment were effects on body weight. There was no evidence of increased sensitivity of the young compared to adult animals. The risk assessment is protective against the effects noted above and other potential effects by ensuring that the level of exposure to humans is well below the lowest dose level at which these effects occurred in animal tests.

Residues in water and food

Dietary risks from food and drinking water are not of health concern.

Studies in laboratory animals showed no acute health effects. Consequently, a single dose of florpryrauxifen-benzyl is not likely to cause acute health effects in the general population (including infants and children).

Aggregate chronic dietary (food plus drinking water) intake estimates indicated that the general population and all population subgroups are exposed to less than 1% of the acceptable daily intake (ADI), and therefore are not of health concern.

The *Food and Drugs Act* prohibits the sale of adulterated food, that is, food containing a pesticide residue that exceeds the established maximum residue limit (MRL). Pesticide MRLs are established for *Food and Drugs Act* purposes through the evaluation of scientific data under the *Pest Control Products Act.* Given that dietary risks from the consumption of foods are shown to be acceptable when florpyrauxifen-benzyl is used according to the supported label directions, MRLs are being proposed as a result of this assessment (refer to PMRL2022-23, *Florpyrauxifen-benzyl*).

MRLs for florpyrauxifen-benzyl determined from the acceptable residue trials conducted throughout Canada and the United States, which also includes growing regions representative of Canada, and in Australia, Southern Europe, Argentina, Brazil, China and Japan, can be found in the Science evaluation section of this document.

A number of these florpyrauxifen-benzyl products are also formulated with the active ingredient aminopyralid, present as potassium salt. Aminopyralid is already registered for these uses in Canada, and residues in treated commodities will be covered under the existing MRLs.

Occupational risks from handling GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

Occupational risks are not of health concern when GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are used according to the proposed label directions, which include protective measures.

Workers mixing, loading or applying GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide and workers entering areas recently treated with these end-use products can come in direct contact with florpyrauxifen-benzyl. Therefore, the label specifies that anyone mixing, loading and applying GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide must wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes. For GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, the label also requires that workers do not enter or be allowed into treated areas during the restricted-entry interval (REI) of 12 hours, except for industrial and other non-crop areas where entry is permitted once sprays have dried. Taking into consideration the label instructions and the duration of exposure for handlers and postapplication workers, the risks to these individuals are not of health concern.

Risks in residential and other non-occupational environments

Risks in residential and other non-occupational environments are not of health concern when GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are used according to the proposed label directions.

Water treated with GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide can be used to irrigate golf courses and residential turf and gardens. As such, individuals can come into direct contact with florpyrauxifen-benzyl when golfing in the irrigated turf, irrigating residential turf and gardens, and entering irrigated residential turf and gardens. Taking into consideration the label instructions and the duration of exposure, the risks to these individuals are not of health concern.

Risks from swimming in treated water are also not of health concern.

Risks to bystanders

Bystander risks are not of health concern when GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are used according to the proposed label directions and spray drift restrictions are observed.

Risks to bystanders in non-crop areas (in other words, hikers) are not of health concern. In addition, a standard label statement to protect against drift during application is on the label. Therefore, health risks to other bystanders are also not of concern.

Environmental considerations

What happens when Florpyrauxifen-benzyl is introduced into the environment?

When used according to label directions, environmental risks associated with florpyrauxifen-benzyl and its associated end-use products are acceptable.

Florpyrauxifen-benzyl enters the environment when its end-use products are used to control aquatic and terrestrial weeds, including invasive plant species.

- The aquatic end-use products (GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide) are applied to water by foliar spray using boat or ground equipment, or by direct injection into water. Treated waters can also be used for irrigation.

- The terrestrial end-use products (GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide) are applied to agricultural and non-agricultural areas using aerial or ground equipment.

In the environment, florpyrauxifen-benzyl is quickly broken down to its acid form (florpyrauxifen acid) and other transformation products by microorganisms and via interactions with water and sunlight. Florpyrauxifen acid is both an active form of the pesticide and a transformation product of florpyrauxifen-benzyl, and degrades more slowly than florpyrauxifen-benzyl. Most transformation products of florpyrauxifen-benzyl also degrade relatively quickly in water and sediment. Certain transformation products of florpyrauxifen-benzyl, namely florpyrauxifen acid, hydroxy acid, and nitro hydroxy acid, may move through soil and reach groundwater. Florpyrauxifen-benzyl and its transformation products are not expected to be found in air or to travel long distances in the atmosphere from its application sites. They are also not expected to accumulate in the tissues of animals.

When used according to label directions, florpyrauxifen-benzyl and its transformation products do not pose a risk to wild mammals, birds, beneficial invertebrates, earthworms, bees, aquatic invertebrates, fish, amphibians, or algae. While florpyrauxifen-benzyl and florpyrauxifen acid may pose risks to sensitive non-target terrestrial plants and aquatic vascular plants, the PMRA recognizes that control of invasive species is necessary to help protect habitats for native species. When used according to label directions, florpyrauxifen-benzyl products will have the desired effect of controlling invasive terrestrial and aquatic plant species that pose a risk to sensitive habitats, which will benefit the aquatic plant community. Preventative measures and use restrictions are required to reduce exposure to plants that are not pests.

Value considerations

What is the value of GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide?

GF-3206 Herbicide is formulated as an emulsifiable concentrate containing 19.91 g/L florpyrauxifen (present as benzyl ester). It provides selective control of many annual and perennial broadleaf weeds and invasive plants and shrubs in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas. GF-3206 Herbicide can also be used in hazelnut production for weed management.

Milestone NXT Herbicide is formulated as a wettable granule containing 4.77% florpyrauxifen (present as benzyl ester) and 60% aminopyralid (present as potassium salt). It provides selective control of many annual and perennial broadleaf weeds and invasive plants and shrubs in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas.

Restore NXT Herbicide is formulated as a soluble concentrate and also contains both florpyrauxifen (6.36 g/L, present as benzyl ester) and aminopyralid (80 g/L, present as potassium salt). Restore NXT Herbicide also provides selective control of many annual and perennial broadleaf weeds and invasive plants and shrubs in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas.

GF-3301 Aquatic Herbicide is formulated as a soluble concentrate containing 238.4 g/L florpyrauxifen (present as benzyl ester). It is intended as a selective herbicide for the management of invasive freshwater aquatic vegetation in still or slow-moving waters of ponds, lakes, reservoirs, streams, rivers, and canals (including shoreline and riparian areas in or adjacent to these waterbodies).

ProcellaCOR FX Herbicide is also formulated as a soluble concentrate containing 238.4 g/L florpyrauxifen (present as benzyl ester) and shares an identical use pattern to GF-3301 Aquatic Herbicide.

Terrestrial and aquatic invasive plants are a global phenomenon that have received more attention in Canada in the last decade. Registrations of GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide provide users with options to control a wide range of annual and perennial broadleaf weeds and invasive plants and shrubs in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas. GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide will provide provincial authorities and partners with a valuable tool and long-term solution to manage invasive aquatic species in and around aquatic sites.

Measures to minimize risk

Labels of registered pesticide products include specific instructions for use. Directions include risk-reduction measures to protect human and environmental health. These directions must be followed by law.

The key risk-reduction measures being proposed on the labels of Rinskor Active, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide to address the potential risks identified in this assessment are as follows.

Key risk-reduction measures

Human health

To reduce the potential of workers coming into direct contact with florpyrauxifen-benzyl dermally, workers mixing, loading and applying GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide and performing cleaning and repair activities must wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes. For GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide, the label also requires that workers do not enter or be allowed entry into treated orchards, pastures and rangelands during the REI of 12 hours; and do not enter or allow others to enter treated industrial and other non-crop areas until sprays have dried. Furthermore, a standard label statement to protect against drift during application is present on the label.

Environment

To minimize exposure and reduce risks to non-target terrestrial plants and aquatic vascular plants from the aquatic end-use products, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, the following mitigation measures are included on product labels:

- Classification of the products as restricted:
    - GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are registered for use by, or under permit from, and after consultation with provincial and federal fish and wildlife agencies.
    - Nature of Restriction: This is a restricted product that must be used in the manner authorized. This product is only to be used by individuals holding an appropriate pesticide applicator certificate or license recognized by the provincial/territorial pesticide regulatory authority where the pesticide application is to occur. This registration is granted under the *Pest Control Products Act* and does not exempt the user from any other legislative requirements. Use of this product in or immediately adjacent to water bodies must be appropriately authorized and used in accordance with the *Fisheries Act* and Regulations, such as the Aquatic Invasive Species Regulations, and in accordance with any other required federal and provincial authorizations. Consult with provincial regulatory authorities on any authorizations required prior to use of this product.
- Precautionary statements indicating toxicity to terrestrial and aquatic vascular plants
- Advisory distances to reduce exposure from spray drift to sensitive terrestrial plants
- Precautionary label statements against irrigating lawns that contain sensitive, non-grass, plants

To minimize exposure and reduce risks to non-target terrestrial plants and aquatic vascular plants from the terrestrial end-use products, GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide, the following mitigation measures are included on product labels:

- Mandatory spray buffer zones to minimize exposure of terrestrial and aquatic habitats from spray drift
- Precautionary label statements for runoff, leaching to groundwater, and contamination of water sources
- Precautionary statements indicating toxicity to terrestrial and aquatic vascular plants

Next steps

Before making a final registration decision on florpyrauxifen-benzyl, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, Health Canada's PMRA will consider any comments received from the public in response to this consultation document. Health Canada will accept written comments on this proposal up to 45 days from the date of publication of this document. Please note that, to comply with Canada's international trade obligations, consultation on the proposed MRLs will also be conducted internationally via a notification to the World Trade Organization. Please forward all comments to Publications (contact information on the cover page of this document). Health Canada will then publish a Registration Decision, which will include its decision, the reasons for it, a summary of comments received on the proposed decision and Health Canada's response to these comments.

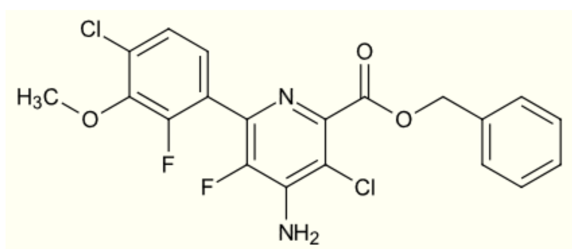
Other information

When the Health Canada makes its registration decision, it will publish a Registration Decision on florpyrauxifen-benzyl, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide (based on the Science evaluation of this consultation document). In addition, the test data referenced in this consultation document will be available for public inspection, upon application, in the PMRA's Reading Room. For more information, please contact the PMRA's Pest Management Information Service.

Science evaluation

1.0 The active ingredient, its properties and uses

1.1 Identity of the active ingredient

Active substance:	Florpyrauxifen-benzyl
Function	Herbicide
Chemical name	
1. International Union of Pure and Applied Chemistry (IUPAC)	benzyl 4-amino-3-chloro-6-(4-chloro-2-fluoro--methoxyphenyl)-5-fluoropyridine-2-carboxylate or benzyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropicolinate
2. Chemical Abstracts Service (CAS)	phenylmethyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoro-2-pyridinecarboxylate
CAS number	1390661-72-9
Molecular formula	$C_{20}H_{14}Cl_2F_2N_2O_3$
Molecular weight	439.24 g/mol
Structural formula	
Purity of the active ingredient	75.74% as florpyrauxifen

1.2 Physical and chemical properties of the active ingredient and end-use product

Technical product—Rinskor Active

Property	Result
Colour and physical state	Tan solid
Odour	Mild
Melting point	138.52°C

Property	Result
Boiling point or range	The product is solid and decomposes at 285.87°C
Bulk density	0.202 g/ mL at 20°C
Vapour pressure at 20°C	0.032 mPa (20°C) 0.046 mPa (25°C)
Ultraviolet (UV)-visible spectrum	Medium / Wavelength (λmax, nm) / Molar absorption coefficient ε, L/(mol*cm) Neutral 212, 245 40 878, 41 089 Acidic 212, 245 42 009, 40 872 Alkaline 217, 241 35 739, 42 503
Solubility in water at 20°C	pH Solubility (mg/L) Purified Water 0.015 5 0.014 7 0.011 9 0.012
Solubility in organic solvents at 20°C	Solvent Solubility (g/L) methanol 13 acetone 210 xylene 14 1,2-dichloroethane 95 ethyl acetate 120 n-heptane 0.053 n-octanol 4.9
n-Octanol-water partition coefficient (K_{ow}) at 20°C	pH log K_{ow} 5 5.4 7 5.5 9 5.5
Dissociation constant (pK_a)	Does not dissociate in the environmental pH range of 4–10
Stability (temperature, metal)	The product is stable in contact with metals and metal ions, and at elevated temperature (54°C).

End-use product—Milestone NXT Herbicide

Property	Result
Colour	Tan
Odour	Mild odour
Physical state	Solid
Formulation type	Wettable granules
Label concentration	Aminopyralid 60.00%, present as potassium salt Florpyrauxifen 4.77%, present as benzyl ester

Property	Result
Container material and description	Plastic jugs, bottles, drums 0.1 kg to bulk
Density	0.5962–0.6062 g/mL
pH of 1% dispersion in water	9.83
Oxidizing or reducing action	The end-use product is compatible with monoammonium phosphate, zinc and water; minor reaction with potassium permanganate but the product is not considered to have either strong oxidizing or reducing properties.
Storage stability	The product is stable when stored in HDPE bottles for 2 weeks at 54°C.
Corrosion characteristics	No significant weight loss or corrosion to HDPE bottles over 2 weeks storage at 54°C.
Explodability	The product is not explosive

End-use product—GF-3301 Aquatic Herbicide

Property	Result
Colour	Tan
Odour	Solvent odour
Physical state	Liquid
Formulation type	Suspension
Label concentration	Florpyrauxifen 238.4 g/L, present as benzyl ester
Container material and description	Plastic jugs, bottles, drums 0.1 L to Bulk
Density	1.1278 g/mL at 20°C
pH of 1% dispersion in water	5.47
Oxidizing or reducing action	The end-use product is compatible with monoammonium phosphate, zinc and water; minor reaction with potassium permanganate but the product is not considered to have either strong oxidizing or reducing properties.
Storage stability	The product is stable when stored for two weeks at 54°C in HDPE and F-HDPE.
Corrosion characteristics	No corrosion to packaging materials when stored for two weeks at 54°C in HDPE and F-HDPE.
Explodability	The product is not explosive.

End-use product—Restore NXT Herbicide

Property	Result
Colour	Pink opaque
Odour	Mild
Physical state	Liquid
Formulation type	Solution
Label concentration	Aminopyralid 80.0 g/L, present as potassium salt Florpyrauxifen 6.36 g/L, present as benzyl ester
Container material and description	Plastic Jugs, Bottles, Drums 1 L to bulk
Density	1.06 g/mL at 20°C
pH of 1% dispersion in water	7.11
Oxidizing or reducing action	The end-use product is compatible with monoammonium phosphate, zinc and water; minor reaction with potassium permanganate but the product is not considered to have either strong oxidizing or reducing properties.
Storage stability	The product is stable when stored in HDPE bottles for 2 weeks at 54°C.
Corrosion characteristics	No significant weight loss or corrosion to HDPE bottles over 2 weeks storage at 54°C.
Explodability	The product is not explosive.

End-use product—GF-3206 Herbicide

Property	Result
Colour	Yellow to clear
Odour	Solvent odour
Physical state	Liquid
Formulation type	Emulsifiable concentrate
Label concentration	Florpyrauxifen 19.91 g/L, present as benzyl ester
Container material and description	Jugs, bottles, drums 0.1 L-bulk
Density	0.9257 g/mL at 20°C
pH of 1% dispersion in water	4.24
Oxidizing or reducing action	The end-use product is compatible with monoammonium phosphate, zinc and water; minor reaction with potassium permanganate but the product is not considered to have either strong oxidizing or reducing properties.

Property	Result
Storage stability	The product is stable when stored for one year in PET and F-HDPE at warehouse ambient storage condition.
Corrosion characteristics	No significant weight loss or corrosion when stored for one year in PET and F-HDPE at warehouse ambient storage conditions.
Explodability	The product is not explosive.

End-use product—ProcellaCOR FX Herbicide

Property	Result
Colour	Tan
Odour	Solvent odour
Physical state	Liquid
Formulation type	Suspension
Label concentration	Florpyrauxifen 238.4 g/L, present as benzyl ester
Container material and description	Plastic jugs, bottles, drums 0.1 L to bulk
Density	1.1278 g/mL at 20°C
pH of 1% dispersion in water	5.47
Oxidizing or reducing action	The end-use product is compatible with monoammonium phosphate, zinc and water; minor reaction with potassium permanganate but the product is not considered to have either strong oxidizing or reducing properties.
Storage stability	The product is stable when stored for two weeks at 54°C in HDPE and F-HDPE.
Corrosion characteristics	No corrosion to packaging materials when stored for two weeks at 54°C in HDPE and F-HDPE.
Explodability	The product is not explosive.

1.3 Directions for use

1.3.1 GF-3206 Herbicide

The application of GF-3206 Herbicide provides control of Canada fleabane, velvetleaf, common waterhemp, cleavers, common lambsquarters, annual sow thistle, wild chervil, wild caraway, wild parsnip, tall buttercup, dandelion rosettes, wild buckwheat, shepherd’s purse, kochia, barnyard grass, redroot pigweed, and suppression of tansy in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas. GF-3206 Herbicide can also be used in hazelnut production for weed management.

GF-3206 Herbicide is recommended for application post-emergence to target vegetation that is actively growing at rates of 0.2–2.4 L/ha. Application rate is based on the target plant species. GF-3206 Herbicide can also be applied in tank mix with Arsenal Herbicide or glyphosate herbicides registered for use on non-cropland areas for improved burndown weed control and to broaden the spectrum of vegetation controlled. Additionally, GF-3206 Herbicide can be used at rates of 0.2–0.4 L/ha to control labelled weeds in hazelnut.

One of the following recommended surfactants is required with GF-3206 Herbicide: Gateway Adjuvant or other non-ionic surfactant (NIS) at 0.25–0.5% v/v, or methylated seed oil (such as MSO Adjuvant) at 0.5–1% v/v.

Efficacy of GF-3206 Herbicide is maximized when target vegetation is actively growing.

1.3.2 Milestone NXT Herbicide

The application of Milestone NXT Herbicide provides control or suppression of a number of plant species (refer to Appendix I, Table 58 for specific claims) in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas.

Milestone NXT Herbicide is recommended for application post-emergence to target vegetation that is actively growing at rates of 100–200 g/ha. Application rate is based on the target plant species. Milestone NXT Herbicide can also be applied in tank-mix with Arsenal Herbicide, Garlon XRT, or glyphosate or 2,4-D herbicides registered for use on non-cropland areas to broaden the spectrum of vegetation controlled.

One of the following recommended surfactants is required with Milestone NXT Herbicide: Gateway Adjuvant or other non-ionic surfactant (NIS) at 0.25–0.5% v/v, or methylated seed oil (such as MSO Adjuvant) at 0.5–1% v/v.

Efficacy of Milestone NXT Herbicide is maximized when target vegetation is actively growing.

1.3.3 Restore NXT Herbicide

The application of Restore NXT Herbicide provides control or suppression of a number of plant species (refer to Appendix I, Table 59 for specific claims) in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas.

Restore NXT Herbicide is recommended for application post-emergence to target vegetation that is actively growing at rates of 0.75–1.5 L/ha. Application rate is based on the target plant species. Restore NXT Herbicide can also be applied in tank-mix with 2,4-D herbicides registered for use on non-cropland areas to broaden the spectrum of vegetation controlled.

One of the following recommended surfactants is required with Restore NXT Herbicide: Gateway Adjuvant or other non-ionic surfactant (NIS) at 0.25–0.5% v/v, or methylated seed oil (such as MSO Adjuvant) at 0.5–1% v/v.

Efficacy of Restore NXT Herbicide is maximized when target vegetation is actively growing.

1.3.4 GF-3301 Herbicide and ProcellaCOR FX Herbicide

GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide share an identical use pattern and provide control of a number of invasive aquatic plant species (refer to Appendix I, Table 60 for specific claims) in still or slow-moving waters of ponds, lakes, reservoirs, streams, rivers, and canals, including shoreline and riparian areas in or adjacent to these sites. Applications may be foliar to floating vegetation or via in-water application to submergent vegetation.

Aquasurf Non-ionic Spray Adjuvant is required for foliar applications only at 0.5% v/v and all applications should be made when target plants are actively growing for the greatest efficacy.

1.4 Mode of action

Florpyrauxifen-benzyl, also referred to as Rinskor, is a new selective herbicide belonging to the arylpicolinate class of herbicides. Florpyrauxifen-benzyl is classified as an auxin-type herbicide and is considered a Group 4 herbicide by the Weed Science Society of America (WSSA) and the Herbicide Resistance Action Committee (HRAC). Although florpyrauxifen-benzyl shares some characteristics with existing synthetic auxins, there are some important differences. Florpyrauxifen-benzyl is rapidly absorbed into plant foliage and once in the plant it acts as a synthetic plant hormone by mimicking auxins, natural plant hormones that regulate numerous plant functions including growth and development. Excess plant hormones disrupt growth processes in susceptible plants and excessive auxin causes alterations in cell wall elasticity resulting in leaf curling and interference with nutrient transport resulting in plant death within days or weeks. Arylpicolinate herbicides disrupt plant growth regulation processes, as do other synthetic auxins however they preferentially bind to different auxin receptors. This difference is not enough to make it a unique mode of action however but does differentiate it from older synthetic auxin chemistries.

2.0 Methods of analysis

2.1 Methods for analysis of the active ingredient

The methods provided for the analysis of the active ingredient and impurities in the technical product have been validated and assessed to be acceptable.

2.2 Method for formulation analysis

The methods provided for the analysis of the active ingredients in the formulations have been validated and assessed to be acceptable for use as enforcement analytical methods.

2.3 Methods for residue analysis

High performance liquid chromatography methods with tandem mass spectrometric detection (HPLC-MS/MS, Methods 130794.02 and QuEChERS in plant matrices, Methods CAM-0137/001 and QuEChERS in animal matrices, and Method 140954 in fish, clam and crayfish matrices) were developed and proposed for data generation and enforcement purposes. These methods fulfilled the requirements with regards to specificity, accuracy and precision at the respective method limit of quantitation. Acceptable recoveries (70–120%) were obtained in plant and animal matrices. The proposed enforcement methods were successfully validated in plant and animal matrices by an independent laboratory. Adequate extraction efficiencies were demonstrated using radiolabelled fish samples. Extraction solvents used in the plant and animal methods were similar to those used in the metabolism studies; thus, further demonstration of extraction efficiency with radiolabelled crops and livestock matrices was not required for the enforcement method.

For environmental media, HPLC-MS/MS methods were developed and proposed for data generation and enforcement purposes. These methods fulfilled the requirements with regards to selectivity, accuracy and precision at the respective method limit of quantitation. Acceptable recoveries (70–120%) were obtained in environmental media.

Methods for residue analysis in plant, animal and aquatic species and environment are summarized in Appendix I, Tables 1A and 1B.

3.0 Impact on human and animal health

3.1 Hazard assessment

3.1.1 Toxicology summary

Florpyrauxifen-benzyl is a novel arylpicolinate herbicide and is subgroup of the synthetic auxin herbicides. It acts as a synthetic plant hormone by mimicking the natural plant hormone auxin and disrupting growth processes in susceptible plants. Excessive auxin causes alterations in cell wall elasticity resulting in leaf curling and interference with nutrient transport.

A detailed review of the toxicology database for florpyrauxifen-benzyl was conducted. The database is complete, consisting of the full array of toxicity studies currently required for hazard assessment purposes. Additionally, in vitro comparative metabolism and phototoxicity studies were submitted and a partial toxicokinetic assessment was added to each of the core studies. The studies were carried out in accordance with currently accepted international testing protocols and Good Laboratory Practices. The scientific quality of the data is acceptable and the database is adequate to characterize the potential health hazards associated with florpyrauxifen-benzyl.

Metabolism and toxicokinetics were assessed following single oral low and high dose and repeat oral low dose administration using florpyrauxifen-benzyl labelled on the phenyl ring. Preliminary studies were performed on mice, rabbits and rats, which indicated that internal exposure was highest in the male rat and urinary excretion was highest in the female rabbit.

In main toxicokinetics studies in rats, florpyrauxifen-benzyl was rapidly but incompletely absorbed and excreted without tissue retention. There were no significant sex differences. There was an apparent saturation of absorption between 10 and 300 mg/kg bw and evidence of biphasic elimination from the plasma, but not from the red blood cells. Elimination was complete and rapid with feces as the primary route, with an increasing proportion excreted in the feces with increasing dose. In a preliminary biliary excretion study, excretion via the urine and bile was low and in conjunction with the main studies, it can be assumed that biliary excretion did not contribute significantly to the fecal excretion. Generally, the majority of the urinary excretion occurred within the first 12 hours and the majority of the fecal excretion occurred within the first 24 hours after dosing.

Following oral administration of radiolabeled florpyrauxifen-benzyl, the major metabolite was X11438848 (florpyrauxifen acid) in the urine. In feces, the majority of the radioactivity (up to 93% of the administered dose, was unchanged florpyrauxifen-benzyl, and the metabolite formed following O-demethylation of florpyrauxifen-benzyl accounted for 2% to 11% of the administered radioactivity. In the metabolism study, no unchanged florpyrauxifen-benzyl or metabolites formed from its O-demethylation were found in the urine; however, florpyrauxifen-benzyl was seen in the urine in the repeat-dose toxicology studies. The highest concentrations of residual radioactivity occurred in the plasma, GI tract, bladder, kidneys, liver and lungs.

In acute toxicity testing, the technical grade active ingredient florpyrauxifen-benzyl was of low acute toxicity by the oral, dermal and inhalation routes in rats. It was minimally irritating to the eyes and non-irritating to the skin of rabbits. It was a dermal sensitizer in mice; consequently, the hazard statement “POTENTIAL SKIN SENSITIZER” is required on the label.

The end-use products GF-3301 Aquatic Herbicide and Procellacor FX Herbicide, containing florpyrauxifen-benzyl, were of low acute toxicity via the oral, dermal and inhalation routes of exposure in rats. They were minimally irritating to the eyes and skin of rabbits and were not dermal sensitizers in guinea pigs.

The end-use product GF-3206 Herbicide, containing florpyrauxifen-benzyl, was of low acute toxicity via the oral, dermal and inhalation routes of exposure in rats. It was minimally irritating to the eyes and slightly irritating to the skin of rabbits and was not a dermal sensitizer in guinea pigs.

The end-use product Milestone NXT Herbicide, containing florpyrauxifen-benzyl and aminopyralid (present as potassium salt), was of low acute toxicity via the oral, dermal and inhalation routes of exposure in rats. It was minimally irritating to the eyes and slightly irritating to the skin of rabbits and was not a dermal sensitizer in mice.

The end-use product Restore NXT Herbicide, containing florpyrauxifen-benzyl and aminopyralid (present as a potassium salt), was of low acute toxicity via the oral, dermal and inhalation routes of exposure in rats. It was non-irritating to the eyes and skin of rabbits and was not a dermal sensitizer in mice.

The applicant selected doses for many of the core studies based on a Kinetically-derived Maximum Dose approach. They proposed that there was a shift to non-linear kinetics at doses ≥ 100 mg/kg bw/day in the rat, which they then used to justify a high dose level of 300 mg/kg bw/day. The PMRA was concerned that the argument for dose selection was based on saturation of absorption, as opposed to saturation of elimination or metabolism, and that systemic exposure continued to increase in a sublinear manner beyond the maximum dose selected for these studies; therefore, the Applicant was asked to provide additional information to support the dose selection in the rat 2-year dietary chronic toxicity/oncogenicity and reproductive toxicity studies. The applicant cited the OECD Guideline 116 on the Conduct and Design of Chronic Toxicity and Carcinogenicity Studies, which states that dose selection can incorporate saturation of absorption and that toxicokinetic non-linearity should also be considered, as metabolic saturation represents an equivalent indicator of biological stress. The applicant further stated that the selection of a dose higher than 300 mg/kg bw/day would limit the characterization of a potential dose-response relationship for any observed effects due to non-linearity in systemic dose versus the administered dose. However, the PMRA concluded, based on all of the available information, that there was insufficient evidence to support non-linearity of kinetic processes at the dose levels tested, and that a more appropriate high dose for these studies would have been 500 mg/kg bw/day based on the fact that internal exposure continues to increase beyond that reached at 300 mg/kg bw/day. However, based on the lack of findings at up to 1000 mg/kg bw/day in the short-term rat toxicity studies and the findings in the mouse oncogenicity study, there is sufficient information to characterize the toxicity of florpyrauxifen-benzyl.

Toxicokinetic assessments were performed throughout the database in either the main or range-finding studies. In the rat, blood and urine samples were analysed in the dermal short-term and dietary short- and long-term studies. Blood from the male and female adults and pups and milk samples from the lactating dams were analysed in the 2-generation dietary reproductive toxicity study. Blood samples were analysed in dams and fetuses in the dietary developmental toxicity study in rats and rabbits. In mice and dogs dietary studies, blood and urine samples were analysed.

Generally, florpyrauxifen-benzyl was not found in the blood, but was found in the urine. However, small amounts of florpyrauxifen-benzyl were found in the blood in the dog and in the 2-generation reproductive toxicity study in adult rats at the highest dose level tested of 300 mg/kg bw/day. Additionally, florpyrauxifen-benzyl was found in the milk in the range-finding and main 2-generation reproductive toxicity study at doses ≥ 67 mg/kg bw/day.

The acid metabolite, florpyrauxifen acid, was found at the highest concentrations in the urine where analysed. The metabolite was also found in the blood in all studies with toxicokinetic analysis. Levels were higher in dams than offspring in the reproductive and developmental toxicity studies.

Repeat-dose dietary toxicity studies with florpyrauxifen-benzyl were available in mice, rats and dogs. All short-term studies were performed up to the limit dose. Body weight and body weight gains were decreased in male mice in the 90-day study at the limit dose; otherwise, there were no treatment-related, adverse findings in any of the other short-term studies in rats or dogs or in the 28-day mouse study. There were no findings at the limit dose in the 28-day dermal toxicity study in rats.

In the 18-month oncogenicity study in mice, treatment-related changes were limited to decreased body weight and body weight gain and increased severity of extramedullary hematopoiesis at the limit dose. There was no evidence of tumourigenicity.

There were no treatment-related findings in the 2-year rat combined chronic and carcinogenicity study up to the highest dose tested of 300 mg/kg bw/day, and there was no evidence of tumourigenicity.

There was no evidence of genotoxicity in a battery of in vitro and in vivo genotoxicity studies conducted with florpyrauxifen-benzyl, nor was there evidence of tumourigenicity in mice or rats after long-term dietary administration.

In the dietary 2-generation reproductive toxicity study, there was no evidence of toxicity to the parental animals or offspring, or evidence of reproductive toxicity based on the lack of findings up to 300 mg/kg bw/day in the main study or up to 1000 mg/kg bw/day in the range-finding study.

In developmental toxicity studies, animals were tested approaching and above the limit dose in rats and rabbits, respectively, and there were no findings up to the highest doses tested in either dams or fetuses in either species when administered in the diet.

A waiver was submitted for neurotoxicity studies based on the lack of neurotoxic findings in the 90-day dietary rat toxicity with extended functional observation battery and histology, in the pups in the 2-generation reproductive toxicity study and in the rest of the database. The waiver was considered acceptable.

The identification of select transformation products and metabolites and synonyms of the active are presented in Appendix I, Tables 2 and 23. Results of the toxicology studies conducted on laboratory animals with florpyrauxifen-benzyl and its associated end-use products are summarized in Appendix I, Tables 4 and 5, respectively. The toxicology reference values for use in the human health risk assessment are summarized in Appendix I, Table 6.

3.1.1 *Pest Control Products Act* hazard characterization

For assessing risks from potential residues in food or from products used in or around homes or schools, the *Pest Control Products Act* requires the application of an additional 10-fold factor to threshold effects to take into account completeness of the data with respect to the exposure of, and toxicity to, infants and children, and potential prenatal and postnatal toxicity. A different factor may be determined to be appropriate on the basis of reliable scientific data.[5]

With respect to the completeness of the toxicity database as it pertains to the toxicity to infants and children, the database contains the full complement of required studies, including dietary developmental toxicity studies in rats and rabbits and a dietary 2-generation reproductive toxicity study in rats. Dosing was considered adequate in the studies as discussed above.

With respect to potential prenatal and postnatal toxicity, there was no indication of increased sensitivity of fetuses or offspring compared to parental animals in the dietary reproductive and prenatal developmental toxicity studies. There were no treatment-related effects observed in any of the studies.

Overall, there was low concern for sensitivity of the young due to lack of treatment-related findings in the relevant studies. On the basis of this information, the *Pest Control Products Act* factor (PCPA factor) was reduced to onefold.

3.2 Toxicology reference values

3.2.1 Route and duration of exposure

For mixers, loaders and applicators, occupational exposure to GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide is characterized as short- to intermediate-term in duration and is predominantly by the dermal and inhalation routes. For postapplication workers, occupational exposure to these products is characterized as short- to intermediate-term in duration and is predominantly by the dermal route. Water treated with GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide can also be used to irrigate golf courses and residential turf and gardens. As such, for golfers, contact with turf irrigated with treated water primarily occurs via the dermal route of exposure. From residential turf and gardens, homeowners irrigating areas may be exposed by the dermal and inhalation routes; and adults, youth and children entering irrigated areas may be exposed dermally and via incidental ingestion (children 1 to <2 years old only). The duration of exposure is expected to be of intermediate-term in duration. During swimming, the public could also be exposed through dermal and ingestion routes; exposure is characterized as intermediate-term in duration.

---

5 SPN2008-01. *The Application of Uncertainty Factors and the Pest Control Products Act Factor in the Human Health Risk Assessment of Pesticides*.

3.2.2 Occupational and residential toxicology reference values

Short- and intermediate-term dermal

For short- and intermediate-term dermal occupational and residential risk assessment, a NOAEL of 1000 mg/kg bw/day from the 28-day dermal toxicity study in rats was selected, which was the highest dose level tested in this study. This study was conducted via the relevant route and was of an appropriate duration of exposure. For occupational and residential scenarios, the target margin of exposure (MOE) is 100, which includes standard uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability. For residential scenarios, the PCPA factor was reduced to onefold as discussed in the *Pest Control Products Act* hazard characterization Section. The selection of this study and target MOE is considered to be protective of all populations, including nursing infants and unborn children of exposed women.

Short- and intermediate-term inhalation

For short- and intermediate-term inhalation occupational and residential exposures, the NOAELs of 303 mg/kg bw/day and 300 mg/kg bw/day from the 90-day oral mouse and rat dietary reproductive toxicity studies, respectively, were selected for risk assessment. Toxicity was observed in the mouse study in the form of decreased body weight and body weight gain in both sexes at the LOAEL of 1012 mg/kg bw/day. In the rat dietary reproductive toxicity study the NOAEL was the highest dose level tested in the study. A repeat-dose inhalation toxicity study was not available and thus, use of a NOAEL from an oral study was appropriate.

The target MOE for these scenarios is 100, which includes uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability. For residential scenarios, the PCPA factor was reduced to onefold as discussed in the *Pest Control Products Act* hazard characterization Section. The selection of this study and target MOE is considered to be protective of all populations, including nursing infants and the unborn children of exposed female workers.

Short- and intermediate-term non-dietary incidental oral ingestion

For short- and intermediate-term, non-dietary incidental oral residential exposures, NOAELs of 303 mg/kg bw/day and 300 mg/kg bw/day from the 90-day oral mouse and rat dietary reproductive toxicity studies, respectively, were selected for risk assessment. Toxicity was observed in the mouse study in the form of decreased body weight and body weight gain in both sexes at the LOAEL of 1012 mg/kg bw/day. In the rat dietary reproductive toxicity study the NOAEL was the highest dose level tested in the study.

The target MOE for these scenarios is 100, which includes uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability. The PCPA factor was reduced to onefold as discussed in the *Pest Control Products Act* hazard characterization Section. The selection of this study and target MOE is considered to be protective of all populations, including nursing infants and unborn children of exposed women.

3.2.3 Acute reference dose (ARfD)

Establishment of an acute reference dose is not required, as an endpoint of concern attributable to a single exposure was not identified in the oral toxicity studies.

3.2.4 Acceptable daily intake (ADI)

To estimate risk following repeated dietary exposure, the NOAEL of 200 mg/kg bw/day from the 18-month dietary oncogenicity study in the mouse was selected. At the LOAEL of 1001 mg/kg bw/day, reductions in body weight, body weight gain and food efficiency, as well as increases in severity of extramedullary haematopoiesis, were observed in the males. This study provides the lowest NOAEL in the database. Standard uncertainty factors of 10-fold for interspecies extrapolation and 10-fold for intraspecies variability were applied. As discussed in the *Pest Control Products Act* hazard characterization Section, the PCPA factor was reduced to onefold.

The composite assessment factor (CAF) is thus 100.

The ADI is calculated according to the following formula:

$$\text{ADI} = \frac{\text{NOAEL}}{\text{CAF}} = \frac{200 \text{ mg/kg bw/day}}{100} = 2.0 \text{ mg/kg bw/day of florpyrauxifen-benzyl}$$

3.2.5 Cancer assessment

There was no evidence of tumourigenicity and, therefore, a cancer risk assessment was not necessary.

3.2.6 Aggregate toxicology reference values

Aggregate exposure is the total exposure to a single pesticide that may occur from dietary (food and drinking water), residential and other non-occupational sources, and from all known or plausible exposure routes (oral, dermal and inhalation). Short- and intermediate-term aggregate exposure may be comprised of food, drinking water and residential exposure via the dermal, inhalation and incidental oral routes. No endpoint was selected for the dermal route, in the absence of effects at the limit dose in the repeat-dose dermal toxicity study. The toxicology endpoint selected for oral and inhalation for all populations was changes in body weight. For both routes, the NOAEL of 303 mg/kg bw/day from the 90-day dietary mouse toxicity study was selected with a target MOE of 100. The PCPA factor for all routes was onefold as set out in the *Pest Control Products Act* hazard characterization Section.

3.3 Dermal absorption

A dermal absorption value was not used in the risk assessment since the dermal toxicology reference value for florpyrauxifen-benzyl is based on a dermal toxicity study.

3.4 Occupational and residential exposure assessment

3.4.1 Acute hazards of end-use products and mitigation measures

3.4.1.1 GF-3206 Herbicide

The acute hazard assessment indicated that GF-3206 Herbicide is of low toxicity via the oral, dermal and inhalation routes of exposure. It is minimally irritating to the eyes, slightly irritating to the skin and does not cause an allergic skin reaction. Based on these acute hazards, a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes are required for workers during mixing, loading, application, clean-up and repair.

3.4.1.2 Milestone NXT Herbicide

The acute hazard assessment indicated that Milestone NXT Herbicide is of low toxicity via the oral, dermal and inhalation routes of exposure. It is minimally irritating to the eyes, slightly irritating to the skin and does not cause an allergic skin reaction. Based on these acute hazards, a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes are required for workers during mixing, loading, application, clean-up and repair.

3.4.1.3 Restore NXT Herbicide

The acute hazard assessment indicated that Restore NXT Herbicide is of low toxicity via the oral, dermal and inhalation routes of exposure. It is non-irritating to the eyes and skin and is not a dermal sensitizer. Based on these acute hazards, a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes are required for workers during mixing, loading, application, clean-up and repair.

3.4.1.4 GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

The acute hazard assessment indicated that GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are of low toxicity via the oral, dermal and inhalation routes of exposure. They are non-irritating to the eyes and skin and are not dermal sensitizers. Based on these acute hazards, a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes are required for workers during mixing, loading, application, clean-up and repair.

3.4.2 Occupational exposure and risk assessment

3.4.2.1 Mixer, loader and applicator exposure and risk assessment

Individuals have potential for exposure to florpyrauxifen-benzyl during mixing, loading, application, clean-up and repair. Dermal and inhalation exposure estimates were generated using unit exposure values from the Agricultural Handlers Exposure Task Force (AHETF) database, the Outdoor Residential Task Force (ORETF) database and the Pesticide Handlers Database (PHED, v1.1) for mixers, loaders and applicators applying GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide.

The following application equipment were assessed: groundboom equipment, right-of-way sprayers, and handheld equipment (manually-pressurized handwand, backpack sprayer, and mechanically-pressurized handgun), boom-type equipment (assessed using unit exposure values for groundboom equipment as a surrogate), and handgun equipment (assessed using unit exposure values for high volume turf handgun as a surrogate). Note that there are no exposure data for application using trailing hose and sub-surface injection, but it is expected to be minimal considering that the equipment are submerged in water. As such, only mixing/loading exposure was assessed for these application methods. The unit exposure values in the risk assessment are based on handlers wearing a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes (Appendix I, Tables 7 and 8).

Dermal exposure was estimated using the unit exposure values with the amount of product handled per day. Inhalation exposure was estimated by coupling the unit exposure values with the amount of product handled per day with 100% inhalation absorption. Exposure was normalized to mg/kg bw/day by using 80 kg adult body weight.

Exposure estimates were compared to the selected toxicology reference values to obtain the margin of exposure (MOE); the target MOE for both the dermal and inhalation routes is 100. Calculated MOEs are greater than the target MOE of 100 for all chemical handler scenarios and are therefore not of health concern (Appendix I, Tables 9 and 10).

Taking into account both the acute toxicity of the end-use product and the risk assessment of florpyrauxifen-benzyl, workers are required to wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes.

3.4.2.2 Exposure and risk assessment for workers entering treated areas

3.4.2.2.1 GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide

There is potential for exposure to workers scouting pasture, rangeland and non-crop areas treated with GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide. Given the nature of activities performed, exposure should be primarily via the dermal route based on contact with treated foliage. Inhalation exposure is not expected as florpyrauxifen-benzyl is considered non-volatile with a vapour pressure of 4.6×10^{-8} kPa (at 25°C), which is less than the North American Free Trade Agreement (NAFTA) criterion for a non-volatile product for outdoor scenarios [1×10^{-4} kPa (7.5×10^{-4} mm Hg) at 20–30°C]. As such, a quantitative postapplication inhalation risk assessment is not required. Inhalation risk is not of health concern for postapplication workers as florpyrauxifen-benzyl is considered to be non-volatile and the restricted-entry intervals of 12 hours for rangeland and pasture, and “until sprays have dried” for non-crop areas, will allow residues to dry, suspended particles to settle and vapours to dissipate.

Dermal exposure to workers entering treated areas is estimated using dislodgeable foliar residue (DFR) values with activity-specific transfer coefficients (TCs). Activity-specific TCs are based on data from the Agricultural Re-entry Task Force (ARTF). As chemical-specific DFR data were not submitted, a default DFR value of 25% of the application rate coupled with 10% daily dissipation of residues were used in the exposure assessment.

The exposure estimate was compared to the toxicology reference value to obtain the margin of exposure (MOE); the target MOE is 100. The calculated MOE for scouting pasture, rangeland and non-crop areas is greater than the target MOE, and thus, not of health concern (Appendix I, Table 11).

3.4.2.2.2 GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

Based on the proposed uses on the GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide labels:

A) Workers will be exposed to residues of florpyrauxifen-benzyl when monitoring/testing levels of the chemical in the treated water or scouting to examine the efficacy of the herbicide.
B) Dependent on the irrigation equipment, workers may be exposed to florpyrauxifen-benzyl when irrigating with the treated water.
C) Workers may also go into the area after treatment to manually remove the dead debris using a cutter or rake, or mechanically with a harvester.
D) In addition, treated water can be used for irrigation of crops and non-food areas. As such, postapplication workers will be exposed when conducting activities after areas are irrigated, such as scouting and harvesting field or greenhouse crops, or mowing or conducting other turf maintenance on golf courses, etc.

Given the nature of activities performed, exposure should be primarily via the dermal route based on contact with treated foliage. Inhalation exposure is not expected as florpyrauxifen-benzyl is considered non-volatile with a vapour pressure of 4.6×10^{-8} kPa (at 25°C), which is less than the North American Free Trade Agreement (NAFTA) criterion for a non-volatile product for outdoor scenarios [1×10^{-4} kPa at 20–30°C] and indoor scenarios [1×10^{-5} kPa at 20–30°C]. As such, a quantitative postapplication inhalation risk assessment is not required.

3.4.2.2.2.1 Workers directly in contact with treated water

For workers monitoring/testing levels of florpyrauxifen-benzyl or scouting in the treated water, it is expected that their exposure to the chemical would be less than those swimming in treated waters. The quantitative risk assessment for swimmers would cover off the exposure to workers directly in contact with the treated water (see Section 3.4.3.2.5).

3.4.2.2.2.2 Workers irrigating areas with treated water

For workers irrigating with the treated water, the highest exposure is expected to occur to those using handheld irrigation equipment. Workers may or may not be wearing PPE (at least a single layer and chemical-resistant gloves). Nevertheless, a risk assessment for these workers are not expected to result in MOEs below the target MOE of 100, considering the magnitude of the MOEs for:

- mixer/loader/applicators who treat water with GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide using handheld equipment (MOEs of 326 000–50 000 000; see Appendix I, Table 10), and
- homeowners who handle 50,800 L of water, treated with FPB at the maximum concentration of 151 ppb a.e., per day to irrigate turf (MOEs of 601 000 [dermal] and 33 200 000 [inhalation]; see Appendix I, Table 16).

As such, exposure to workers irrigating areas with treated water are not expected to result in health risks of concern.

3.4.2.2.2.3 Workers removing dead debris (treated foliage) after treatment

Dermal exposure to workers removing dead debris after treatment is estimated using dislodgeable foliar residue (DFR) values with a surrogate TC based on data from the Agricultural Re-entry Task Force (ARTF). The surrogate TC used to estimate exposure when removing dead debris while raking and cutting was 1100 cm^2/hr, based on hand harvesting cranberries by raking. As chemical-specific DFR data were not submitted, a default DFR value of 25% of the foliar application rate coupled with 10% daily dissipation of residues were used in the exposure assessment.

The exposure estimate was compared to the toxicology reference value to obtain the MOE; the target MOE is 100. The calculated MOE for removing the dead debris is greater than the target MOE, and thus, not of health concern (Appendix I, Table 12).

3.4.2.2.2.4 Workers entering areas irrigated with treated water

In order to assess postapplication worker exposure from contacting crops/turf irrigated with the treated water, the following parameters are required to determine the application rate to the irrigated crops/turf:

a) **Concentration of the treated water**
For agricultural irrigation, greenhouse and nursery irrigation, irrigation of landscape vegetation and other forms of non-food irrigation, the concentration of 2 ppb a.e. (equivalent to 2.5 µg a.i./L) was used for all irrigation events, as per the restriction on the labels.

For turf, water can be used to irrigate immediately after treatment. As such, the peak Level 1 EEC based on combined residues of 151 µg a.e./L (190 µg a.i./L) from the aquatic in-water application use was used following three applications with a re-treatment interval of 42 days. Using this concentration for each irrigation event is conservative, as it does not take into account the lower EECs that would result after the first and second applications nor the dissipation of residues in the treated water after applications.

b) Irrigation rate

The irrigation rate is the volume of water used to irrigate the crop/area per event. Based on use information from the applicant, government websites, academia and other relevant websites, the following irrigation rates were used for the risk assessment: 75 000 L/ha/day for cereals, 60 000 L/ha/day for grapes (chosen to represent other crops based on its high exposure potential), 162 983 L/ha/day for greenhouse cut flowers (chosen to represent greenhouse and nursery crops), and 70 000 L/ha/day for sod farms and golf courses.

Using the calculated application rates to irrigated crops/turf, DFR/TTR values were determined. As chemical-specific DFR/TTR data were not submitted:

- DFR values were calculated using the default 25% of application rate after each irrigation event, and daily dissipation rates of 10% for field crops and 2% for greenhouse cut flowers, and
- TTR values were calculated using the default 1% of application rate after each irrigation event and 10% daily dissipation.

Crops and turf were assumed to be irrigated during two months of sustained irrigation (60 days of irrigation), except for greenhouse cut flowers which were assumed to be irrigated during four months of sustained irrigation (120 days of irrigation). Although irrigation may occur throughout the growing season, these assumptions were considered appropriate, since the peak irrigation rate (which was used for the risk assessments) would only be used during the summer months.

Dermal exposure to workers entering treated areas is estimated using DFR/TTR values with activity-specific TCs, based on data from the ARTF. The exposure estimates were compared to the toxicology reference value to obtain the MOEs; the target MOE is 100. The calculated MOEs for workers entering areas irrigated with treated water is greater than the target MOE, and thus, not of health concern (Appendix I, Tables 13 and 14).

3.4.3 Residential exposure and risk assessment

3.4.3.1 Handler exposure and risk assessment

GF-3206 Herbicide, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are not domestic class products; therefore, a residential handler exposure assessment is not required.

3.4.3.2 Postapplication exposure and risk assessment

GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are proposed for use on aquatic sites where the public may swim. In addition, the water treated with GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide may be used to irrigate golf courses and residential areas. As such, a postapplication residential risk assessment is required.

3.4.3.2.1 Golf courses irrigated with water treated with GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide

Since the water treated with GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide may be used to irrigate golf courses, there is the potential for recreational postapplication dermal exposure to florpyrauxifen-benzyl for golfers (adults, youth and children).

Dermal exposure to golfers is estimated using the TTR value with the activity-specific TCs based on the 2012 United States Environmental Protection Agency Residential Standard Operating Procedures (USEPA Residential SOP).

As described in Section 3.4.2.2.2.4 (Workers Entering Areas Irrigating with Treated Water), TTR values in golf courses were calculated using a default TTR value of 1% of the application rate coupled with 10% daily dissipation of residues. The application rate to the irrigated golf course was calculated using the peak Level 1 EEC of 151 µg a.e./L (190 µg a.i./L) from the aquatic in-water application use and an irrigation rate of 70 000 L/ha/day. Golf course turf was assumed to be irrigated during two months of sustained irrigation (60 days of irrigation).

Exposure estimates were compared to the toxicology reference value to obtain the MOE; the target MOE is 100. The calculated MOEs for dermal exposure are presented in Appendix I, Table 15. The estimated MOEs were all greater than the target MOE. Therefore, health risks are not of concern for golfers entering golf courses that are irrigated with treated water.

3.4.3.2.2 Homeowners irrigating residential areas

Homeowners may water turf and gardens with the water treated with GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide. To estimate exposure from this scenario, the following parameters were used: residential applicator unit exposure values and area treated per day from the USEPA Res SOP (2012) (scenario: lawns/turf, ready-to-use, hose-end sprayer), the peak Level 1 EEC of 151 µg a.e./L (190 µg a.i./L) from the aquatic in-water application use, and the Health Canada-recommended irrigation rate of 2.54 cm (0.0254 m) once a week for residential turf. The exposure of watering residential turf is adequate for assessing the exposure of watering residential gardens, since the irrigation rate is the same for residential gardens.

Exposure estimates were compared to the toxicology reference value to obtain the MOE; the target MOE is 100. The calculated MOE for dermal exposure are presented in Appendix I, Table 16. The estimated MOE is greater than the target MOE. Therefore, health risks are not of concern for homeowners irrigating turf and gardens with treated water.

3.4.3.2.3 Residential turf irrigated with treated water

Individuals may be exposed to florpyrauxifen-benzyl when entering residential lawns irrigated with treated water.

The application rate to the irrigated residential turf of 4.83×10^{-6} kg a .i./m^2 was calculated using the peak Level 1 EEC based on combined residues of 151 µg a.e./L (190 µg a.i./L) from the aquatic in-water application use and an irrigation rate of 2.54 cm/week (254 000 L/ha/week). The turf is assumed to be irrigated weekly with the treated water for two months, in other words, 9 irrigation events per year. Based on the application rate and the default TTR values (1% of the application rate on the day of application, and 10% daily dissipation), the peak TTR was 0.00924 µg/cm^2.

The residential turf postapplication dermal and incidental oral risk assessments (Appendix I, Tables 17 and 18) were conducted using the 2012 USEPA Residential SOP (Section 3 Lawns/Turf) with the peak TTR and application rate for residential turf. Using the toxicology reference values, calculated MOEs were greater than the target MOE of 100 for all residential turf postapplication exposure scenarios. As such, health risks are not of concern for adults, youth and children (1 to <2 yrs) who enter residential turf irrigated with treated water.

3.4.3.2.4 Residential gardens irrigated with treated water

Individuals may be exposed to florpyrauxifen-benzyl when entering residential gardens irrigated with treated water.

The application rate to the irrigated residential gardens of 6.35×10^{-8} kg a.i./m^2 was calculated using the label restriction of 2 ppb a.e. (equivalent to 2.5 µg a.i./L) for irrigation of landscape vegetation (other than turf) and an irrigation rate of 2.54 cm/week (254,000 L/ha/week). The residential garden is assumed to be irrigated weekly with the treated water for two months, in other words, 9 irrigation events per year. Based on the application rate and the default DFR values (25% of the application rate on the day of application, and 10% daily dissipation), the peak DFR was 0.00304 µg/cm^2 (Appendix I, Table 19).

The residential garden postapplication risk assessment was conducted using the 2012 USEPA Residential SOP (Section 4 Gardens and Trees) with the peak DFR. Using the dermal toxicology reference value, calculated MOEs were greater than the target MOE of 100 and therefore not of health concern for the general public entering residential gardens irrigated with treated water.

3.4.3.2.5 Swimming

Individuals may be exposed to florpyrauxifen-benzyl while swimming in treated water.

Exposure estimates were based on the USEPA Swimmer Exposure Model (SWIMODEL). The model uses well-accepted exposure assessment equations to calculate swimmers' total exposure expressed as a mass-based intake value (mg/day), or lifetime average daily dose (mg/kg/day).

SWIMODEL focuses on potential chemical intakes only; it does not take into account metabolism or excretion of the chemical of concern.

Quantitative exposure estimates were based on the dermal and oral route of exposure. A risk assessment for inhalation exposure is not required since florpyrauxifen-benzyl is not volatile.

Oral exposure was estimated by coupling the maximum water concentration (the peak Level 1 EEC based on combined residues of 151 µg a.e./L ([190 µg a.i./L]), ingestion rate and exposure time. Dermal exposure was estimated using the maximum water concentration, permeability constant of florpyrauxifen-benzyl, body surface area for each subpopulation, and exposure time. Exposure was normalized to mg/kg bw/day by using default body weight values for each subpopulation.

Exposure estimates were compared to the toxicology reference values to obtain the MOE; the target MOE is 100. Calculated MOEs were greater than the target MOE of 100 (Appendix I, Table 20) for all subpopulations. As such, health risks are not of concern for the public swimming in water treated with florpyrauxifen-benzyl.

3.4.4 Bystander exposure and risk assessment

The postapplication occupational risk assessment is protective of the risk associated with dermal exposure to bystanders in non-crop areas (for example, hikers). As such, a quantitative risk assessment is not required and risks to bystanders in non-crop areas are not of health concern.

For other use sites, bystander exposure is considered negligible as application is limited when there is low risk of drift beyond the area to be treated, taking into consideration wind speed, wind direction, temperature inversions, application equipment, and sprayer settings. Therefore, bystander exposure and risk are not of health concern since the potential for drift is expected to be minimal.

3.5 Dietary exposure and risk assessment

3.5.1 Exposure from residues in food of plant and animal origin

Residue definitions

The residue definition for enforcement and risk assessment for plant commodities (except livestock feed items), and livestock and fish commodities is florpyrauxifen-benzyl including the metabolite florpyrauxifen acid (free and conjugated, expressed as parent equivalents). The residue definition for risk assessment for livestock feed items to be included in the dietary burden calculations, is florpyrauxifen-benzyl including the metabolites florpyrauxifen acid (free and conjugated) and florpyrauxifen hydroxy acid (free and conjugated), expressed as parent equivalents.

Analytical methods and freezer storage stability

The enforcement and data-gathering analytical methods were developed and proposed for the quantitation of florpyrauxifen-benzyl, florpyrauxifen acid (free and conjugated forms) and florpyrauxifen hydroxyl acid (free and conjugated forms) residues in crop commodities, and for the quantitation of residues of florpyrauxifen-benzyl and florpyrauxifen acid (free and conjugated forms) in animal commodities. These methods fulfilled the requirements with regards to specificity, accuracy and precision at the respective method limit of quantitation. Acceptable recoveries (70–120%) were obtained in plant commodities. The proposed enforcement methods were successfully validated in plant commodities by an independent laboratory. Residues of florpyrauxifen-benzyl, florpyrauxifen acid and florpyrauxifen hydroxyl acid are stable in the four livestock commodities as per OECD guidelines, muscle, liver, milk and eggs, for at least 65 days at ≤-18°C. The residues of florpyrauxifen-benzyl, florpyrauxifen acid and florpyrauxifen hydroxyl acid are stable in the five representative commodity categories (high water, high oil, high protein, high starch and high acid content) for up to 34 months when stored at -20°C. Therefore, florpyrauxifen-benzyl, florpyrauxifen acid and florpyrauxifen hydroxyl acid residues are considered stable in all raw agricultural commodities and processed commodities for up to 34 months.

Residues in food commodities of plant origin – Direct treatment and use of treated irrigation water

Residue trials were conducted throughout Canada and the United States which includes growing regions representative of Canada, as well as in Australia, Argentina, Brazil, Southern Europe, China and Japan, using end-use products containing florpyrauxifen-benzyl at proposed rates for the aquatic uses, at scaled up proportional rates for grass in pasture and rangeland, and at exaggerated rates for rice (used as a surrogate crop to represent large field crops irrigated with treated water). A weight-of-evidence approach was developed to assess the potential residues in food commodities using the rice and grass residue data in addition to the 1) plant metabolism studies in the cereal/grass and oilseed/pulse categories demonstrating negligible translocation of residues within plants, 2) the apple metabolism study (used as a surrogate orchard crop in support of the hazelnut use), and the confined and field accumulation studies demonstrating negligible uptake of residues from the soil, and 3) residue characterization from trials conducted on treated water of lakes, ponds, rivers and canals demonstrating complete dissipation of residues within a few days up to a maximum of 1 month (supporting the 42-day retreatment interval). The information was found sufficient to support the proposed maximum residue limits in food commodities of plant origin included in crop groups 1, 6, 15 and 20. The raw agricultural commodity (RAC) of rice treated at exaggerated rates was processed into hulls, brown rice, bran and flour. Residue data in the RAC and all processed commodities were adequate to demonstrate that there is no need for separate MRLs in processed commodities. Field rotational crop studies were conducted with root vegetables (radish and turnip), leafy vegetables (kale and mustard greens), legumes (soybeans) and cereals (sorghum and wheat). These data are adequate to demonstrate that no plant-back interval is required.

The use of treated water for irrigation was supported for crop groups 1, 6, 15, 18 and 20, and direct application was supported to pasture and rangeland (crop group 17). This was determined based on the following (i) volume of irrigation water used in irrigating different crops, (ii) no translocation of residues within plants, (iii) available residue data from direct application of the product to pasture and rangeland, (iv) residues in irrigation water must be ≤2 ppb before use, and (v) the overall weight of evidence.

Residues in food commodities of animal origin

Adequate feeding studies were carried out to estimate the anticipated residues in cattle, goat, horse and sheep as per the supported uses in plants as well as the consumption of water from treated water bodies. In addition, potential residues in fish, shellfish and mollusks living in treated water bodies were estimated based on results from residue and bioaccumulation studies, and the modelled concentrations of florpyrauxifen-benzyl and florpyrauxifen acid residues in treated water. As the potential to consume aquatic species can only result from recreational fishing, it is not expected that these food commodities will enter commercial channels. As such, although the dietary exposure from these foods was included in the human health risk assessment, no MRLs are proposed for fish and other aquatic species.

3.5.2 Concentrations in drinking water

Estimated environmental concentrations (EECs) of florpyrauxifen-benzyl and its transformation products in water were calculated for use in the human health risk assessments using the Pesticide in Water Calculator (PWC) version 1.52.

The highest terrestrial and aquatic uses were selected for modelling (Table 3.5.2.1). Use on permanent grass pastures and in-water application via injection represent the highest terrestrial and aquatic uses, respectively, and cover the additional terrestrial uses and foliar application to water.

Table 3.5.2.1 Modelled use patterns

Use	Application method	Application rate	Unit[1]	No. applications	Interval
Permanent grass pasture	Ground foliar spray	60	g a.i./ha	1	Not Applicable
		48	g a.e./ha		
In-water	Sub-surface injection	500	g a.i./ha/m	3	6 weeks (42 days)
		397	g a.e./ha/m		

[1] a.i. = florpyrauxifen-benzyl (FPB)
a.e. = florpyrauxifen (X11438848) acid equivalents (florpyrauxifen-benzyl converted to acid equivalents)

The drinking water residue definition was determined as the combined residue of florpyrauxifen-benzyl and its major transformation products, florpyrauxifen acid, hydroxy benzyl ester, hydroxy acid, and nitro hydroxy acid. This residue definition is also applicable to other aspects of the human health risk assessment.

Considering the different mobility in the soil for the parent and four transformation products, drinking water modelling used the P-D-GD (parent-daughter-granddaughter) approach.

For the human health assessment, EECs in potential drinking water sources are calculated for both groundwater and surface water. The surface water EECs are also applicable to other aspects of the human health risk assessment where humans may be exposed to treated water immediately after application, including during swimming activities in surface waters, or after turf is irrigated with surface waters.

For surface water exposed via terrestrial applications, PWC calculates the amount of pesticide entering the water body by runoff and spray drift, and the subsequent transformation and degradation of the pesticide in the water system. EECs are calculated by modelling a total land area of 173 ha draining into a 5.3 ha reservoir with a depth of 2.74 m. Groundwater EECs are calculated by simulating leaching through a layered soil profile and reporting the average concentration in the top 1 m of a water table.

For in-water applications to surface water, PWC calculates the amount of pesticide entering the water body by spraying on or injecting into water, and the subsequent transformation and degradation of the pesticide in the water system. EECs are calculated by modelling a total reservoir area of 5.3 ha with a depth of 2.74 m. Since the application rate is dependent on the water depth, the effect of water depth on surface water EECs was also analyzed as shown in Figure 1. It is observed that surface water EECs increase as the water depth is increased from 0.5 to 10 m; however, the increase in surface water EECs becomes progressively smaller as water depths exceed the average depth (2.74 m) of a typical water body. Furthermore, the average depth of 2.74 m is consistent with the treated water bodies and depths at which vascular plant species would typically be found. Level 1 EECs corresponding to 2.74 m water depth are provided for each of the modelled application methods in Table 3.5.2.2.

Drinking water modelling follows a tiered approach consisting of progressive levels of refinement. Level 1 EECs are conservative values intended to screen out pesticides that are not expected to pose any concern related to drinking water. These are calculated using conservative inputs with respect to application rate, application timing, and geographic scenario.

For this chemical, only Level 1 modelling was required. For terrestrial uses, EECs for surface water were calculated based on a single standard scenario, while EECs in groundwater were calculated for several scenarios representing different regions of Canada. Only the highest EECs from across these scenarios are reported. For in-water applications, EECs were calculated based on eleven scenarios. Only the highest EECs from across these scenarios are reported. All scenarios were run for 50 years.

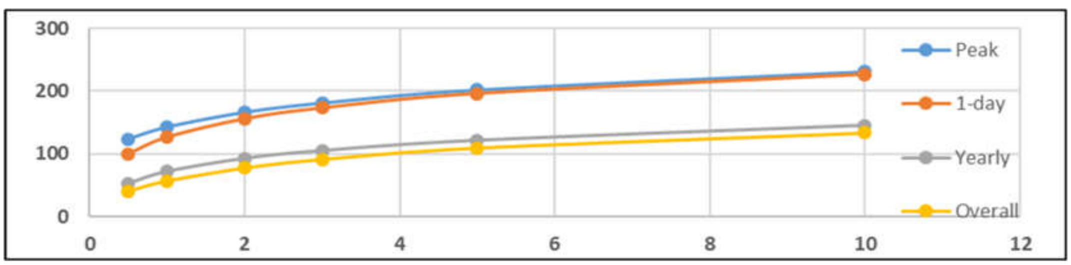
Details of water modelling inputs and calculations are available upon request.

Table 3.5.2.2 Level 1 EECs of the combined residue of florpyrauxifen-benzyl, florpyrauxifen acid, hydroxy benzyl ester, hydroxy acid and nitro hydroxy acid in potential sources of drinking water, reported as florpyrauxifen acid equivalents

Use pattern (Application method)	Water depth (m)	Groundwater (µg a.e./L)		Surface water (µg a.e./L)		
		Daily[1]	Yearly[2]	Daily[3]	Yearly[4]	Overall[5]
Permanent grass pasture (ground foliar application)	-	6.9	6.9	2.5	0.45	0.36
In-water (sub-surface injection) for 3 applications at 42-day intervals	2.74	NM[6]	NM[6]	151	98	84

1 90th percentile of daily concentrations
2 90th percentile of 365-day moving average concentrations
3 90th percentile of the highest 1-day average concentration from each year
4 90th percentile of yearly average concentrations
5 Average of all yearly average concentrations
6 Not modelled for the direct in-water application

Surface Water EEC (µg a.e./L)



Water depth (m)

Figure 1 Effect of water depth (m) on drinking water EECs (µg/L) of the combined residue, as florpyrauxifen acid equivalent

3.5.3 Dietary risk assessment

Chronic dietary risk assessments were conducted using the Dietary Exposure Evaluation Model (DEEM–FCID™, Version 4.02, 05-10-c), which incorporates consumption data from the National Health and Nutrition Examination Survey/What We Eat in America (NHANES/WWEIA) for the year 2005-2010.

3.5.3.1 Acute dietary exposure results and characterization

No appropriate toxicological reference value attributable to a single dose for the general population (including children and infants) was identified. Hence, an acute dietary exposure assessment was not required.

3.5.3.2 Chronic dietary exposure results and characterization

The following assumptions were applied to the basic chronic dietary analysis for florpyrauxifen-benzyl: 100% crop treated, default processing factors, proposed MRLs for filberts (hazelnuts) and edible livestock commodities, anticipated residues in fish, shellfish and mollusks, and on supported field crops that can be irrigated with treated water. The basic chronic dietary exposure (food alone) from all supported florpyrauxifen-benzyl food commodities for the total population, including infants and children, and all representative population subgroups is up to 0.1% of the acceptable daily intake (ADI). The PMRA estimates that chronic dietary exposure to florpyrauxifen-benzyl from food and drinking water is 0.2% (0.003264 mg/kg bw/day) of the ADI for the general population. The highest exposure and risk estimate is for all infants (<1 year old) at 0.5% (0.009429 mg/kg bw/day) of the ADI. Therefore, there are no dietary risks of concern and exposure from food and drinking water is considered acceptable.

3.6 Aggregate exposure and risk assessment

There is potential for individuals to be exposed to florpyrauxifen-benzyl via different routes of exposure concurrently.

As such, the chronic dietary exposures (food plus drinking water) for specific subpopulations were aggregated with the following exposures:

- inhalation exposure from homeowners (adults) irrigating residential areas with treated water, and
- incidental oral exposure from swimming in treated waters (adults, youth 11 to <16 years old and children 6 to <11 years old) and residential turf irrigated with treated water (children 1 to <2 years old).

Aggregate exposure estimates were compared to the aggregate toxicology reference value to obtain the MOE. The results of the aggregate risk assessment are presented in Appendix I, Table 21. The calculated MOEs were greater than the target MOE of 100. Therefore, there are no health risks of concern from these aggregated exposure scenarios.

3.7 Cumulative assessment

The *Pest Control Products Act* requires that the PMRA consider the cumulative effects of pest control products that have a common mechanism of toxicity. Accordingly, an assessment of a potential common mechanism of toxicity with other pesticides was undertaken for florpyrauxifen-benzyl. Based on its chemical structure, florpyrauxifen-benzyl has been classified as an arylpicolinate herbicide, and is a subgroup of the synthetic auxin herbicides. The synthetic auxins are a large group of herbicides; however, for the current evaluation, florpyrauxifen-benzyl only exhibited a generalized effect on body weight and the PMRA did not identify information indicating that florpyrauxifen-benzyl shares a common toxicological endpoint or common mechanism of action with other pest control products. Therefore, no cumulative health risk assessment is required at this time.

3.8 Maximum residue limits

Dietary risks from the consumption of food commodities listed in Table 3.8.1 were shown to be acceptable when florpyrauxifen-benzyl is used according to the supported label directions. Therefore, foods containing residues at these levels are safe to eat, and the PMRA recommends that the following MRLs be specified for residues of florpyrauxifen-benzyl.

Table 3.8.1 Recommended maximum residue limits

MRL (ppm)	Food commodity
0.06	Meat byproducts of cattle, goats, horses and sheep
0.02	Crop group 1 (root and tuber vegetables); crop group 6–21 (legume vegetables); crop group 15–21 (cereal grains); crop group 20 (oilseeds); fat and meat of cattle, goats, horses and sheep; hazelnuts; milk

MRLs are proposed for each commodity included in the listed crop groupings in accordance with the Residue Chemistry Crop Groups webpage in the Pesticides section of the Canada.ca website.

For additional information on maximum residue limits (MRLs) in terms of the international situation and trade implications, refer to Appendix II.

The nature of the residues in animal, fish and plant commodities, analytical methodologies, residue data, and chronic dietary risk estimates are summarized in Appendix I, Tables 1B, 22 and 23.

3.9 Health incident reports

Florpyrauxifen-benzyl is a new active ingredient pending registration in Canada, and as of 5 April 2022, no incident reports had been submitted to the PMRA.

4.0 Impact on the environment

The environmental assessment was conducted based on data and information from the applicant, as well as other regulatory agencies, including the USEPA, European Chemicals Agency, the European Food Safety Authority, and Australian Pesticides and Veterinary Medicines Authority.

4.1 Fate and behaviour in the environment

A summary of the major transformation products of florpyrauxifen-benzyl is provided in Appendix I, Table 24. The environmental fate parameters for florpyrauxifen-benzyl and its transformation products are provided in Appendix I, Table 25.

Terrestrial environment:

Florpyrauxifen-benzyl is relatively stable to hydrolysis at acidic and neutral pH, but hydrolyzes rapidly under alkaline conditions. Florpyrauxifen acid and benzyl alcohol are the major transformation products (formed at >10%), and are both stable to further hydrolysis. Florpyrauxifen acid is the acid form of florpyrauxifen-benzyl and is both an active form of the pesticide and a transformation product of florpyrauxifen-benzyl.

In soil, phototransformation of florpyrauxifen-benzyl occurs slowly and is not expected to be an important route of degradation in terrestrial environments.

Florpyrauxifen-benzyl is degraded by microbial activity in soil, producing florpyrauxifen acid, hydroxy benzyl ester, hydroxy acid, nitro hydroxy acid, and CO_2 as major transformation products under laboratory conditions. Based on laboratory-determined DT_{50} values, florpyrauxifen-benzyl is classified as non-persistent to slightly persistent in various types of aerobic soils and as non-persistent in anaerobic and flooded paddy soils (considered as surrogates for shoreline areas). Florpyrauxifen acid is classified as slightly to moderately persistent in aerobic and anaerobic soils, and as non-persistent in flooded paddy soils. Hydroxy benzyl ester is classified as non-persistent to moderately persistent, and hydroxy acid is moderately persistent to persistent in flooded paddy soils. Nitro hydroxy acid is stable to biotransformation in aerobic soils.

Under terrestrial field conditions, florpyrauxifen-benzyl is non-persistent to slightly persistent in soil and non-persistent in grass samples. Carryover to the following growth season is minimal. Microbial degradation is considered as the primary dissipation route, forming minor amounts of florpyrauxifen acid and the hydroxy acid. In the presence of sufficient water input, neither the parent nor the transformation products moved below a 15-cm depth in soil.

The potential for florpyrauxifen-benzyl and its major transformation products in soil to leach to groundwater was determined based on their K_{oc} values, the criteria of Cohen et al. (1984), groundwater ubiquity scores, and depth of detection in terrestrial field dissipation studies. Based on these lines of evidence, florpyrauxifen-benzyl and hydroxy benzyl ester are not expected to leach to groundwater. However, florpyrauxifen acid, hydroxy acid, and nitro hydroxy acid are expected to be mobile in soil and may leach to groundwater. As these transformation products are part of the residue definition for drinking water, a precautionary label statement on the GF-3206 Herbicide, Milestone NXT Herbicide, and Restore NXT Herbicide product labels is required to address the potential for transformation products of florpyrauxifen-benzyl to leach through soil.

Aquatic environment:

Florpyrauxifen-benzyl is practically insoluble in water. Under laboratory conditions, it undergoes rapid aqueous phototransformation, producing dechlorinated benzyl ester, dechlorinated acid, benzyl alcohol, and CO_2 as major transformation products.

The aerobic and anaerobic aquatic biotransformation of florpyrauxifen-benzyl also occurs rapidly (within days), producing florpyrauxifen acid, hydroxy benzyl ester, hydroxy acid, benzyl alcohol, benzoic acid, and CO_2 as major transformation products. Florpyrauxifen-benzyl is non-persistent under laboratory conditions. Florpyrauxifen acid is classified as non-persistent to slightly persistent in water-sediment systems. However, when tested in water-only systems, biotransformation of florpyrauxifen acid occurred more slowly. The hydroxy benzyl ester and benzoic acid are non-persistent, and the hydroxy acid is moderately persistent in water-sediment systems. Substantial amounts (>10%) of florpyrauxifen-benzyl, hydroxy benzyl ester and hydroxy acid were measured in the sediment phase, indicating that these substances may partition to sediment or are formed in sediment as florpyrauxifen-benzyl partitions there.

Florpyrauxifen-benzyl dissipates rapidly under aquatic field conditions, producing florpyrauxifen acid as a major transformation product, and hydroxy benzyl ester, hydroxy acid, dechlorinated benzyl ester and dechlorinated acid as minor transformation products (formed at <10%). Based on measurements in the water phase, florpyrauxifen-benzyl, the hydroxy benzyl ester, hydroxy acid, dechlorinated benzyl ester, and dechlorinated acid are non-persistent, and florpyrauxifen acid was non-persistent to slightly persistent. Carryover to the following growing season is minimal.

Air:

Florpyrauxifen-benzyl is non-volatile. It has low vapour pressure and, in a laboratory volatility study, less than 0.5% of applied florpyrauxifen-benzyl was measured in air 24 hours after application to glass, water, and soil surfaces.

Except for dechlorinated benzyl ester, benzyl alcohol, and benzoic acid, the major transformation products of florpyrauxifen-benzyl are considered non-volatile under field conditions. Dechlorinated benzyl ester has low vapour pressure, but its Henry's law constant indicates a potential to volatilize from water and moist soil surfaces. Benzyl alcohol and benzoic acid have intermediate to high volatility based on their vapour pressures. However, they are very soluble in water and are expected to be non-volatile from a water surface or moist soil based on their Henry's law constants. Given that these transformation products were only formed above 10% in aquatic systems, and that dechlorinated benzyl ester binds strongly to soil and sediment, long range atmospheric transport is unlikely to occur.

Bioaccumulation:

The *n*-octanol/water partitioning coefficient of florpyrauxifen-benzyl (log K_{ow} = 5.4 to 5.5) indicates that it may have the potential to bioaccumulate. However, the measured bioconcentration in bluegill sunfish (*Lepomis macrochirus*) was low (whole body steady state bioconcentration factors (BCFs) = 279 to 356). Residues of florpyrauxifen-benzyl also depurated rapidly in whole fish tissues, with half-lives of ≤0.39 days, and 95% depuration by 1.7 days. Florpyrauxifen-benzyl is therefore not expected to bioaccumulate.

Based on their log K_{ow} values, the dechlorinated benzyl ester (≤3.5) and hydroxy benzyl ester (≤2.7) have the potential to bioaccumulate. However, the estimated BCFs calculated using EPISuite v4.11 (BCFBAF v3.01) for these chemicals were 94.69 and 28.1 L/kg, respectively. Furthermore, the dechlorinated benzyl ester was only formed above 10% in the aqueous photolysis study and the maximum amount formed in aquatic field dissipation studies was less than 0.5% of applied. Given this information and their structural similarity to florpyrauxifen-benzyl, the dechlorinated ester and hydroxy benzyl ester are not expected to bioaccumulate.

All other major transformation products are unlikely to bioaccumulate based on their log K_{ow} values.

4.2 Environmental risk characterization

The environmental risk assessment integrates the environmental exposure and ecotoxicology information to estimate the potential for adverse effects on non-target species.

Estimated environmental concentrations (EECs) are calculated in various environmental media, such as food, water, and soil. The EECs are estimated using standard models that take into consideration the application rates, chemical properties, and environmental fate properties, including the dissipation of the pesticide between applications.

Ecotoxicology information includes acute and chronic toxicity data for various organisms or groups of organisms from both aquatic and terrestrial habitats including invertebrates, vertebrates, and plants. A summary of the available toxicity endpoints for aquatic and terrestrial organisms are presented in Appendix I, Tables 26 and 27, respectively. In the risk assessment, toxicity endpoints were adjusted to calculate an effects metric. Effect metrics account for potential differences in species sensitivity as well as varying protection goals (in other words, protection at the community or population level). For characterizing acute risk, the effects metric was calculated by dividing $LC_{50}/LD_{50}/LR_{50}$ and $EC_{50}/ED_{50}/ER_{50}$ values by an uncertainty factor (UF; for example, 10 for fish, 2 for aquatic plants). Chronic risks were assessed using NOEL/NOEC/NOED values with an UF of 1.

Initially, a screening-level risk assessment was performed to identify the chemicals and/or specific uses that do not pose a risk to non-target organisms, and to identify those groups of organisms for which there may be a potential risk. Toxicity data for the relevant end-use products were also considered. The screening level risk assessment used simple methods, conservative exposure scenarios (for example, direct application at a maximum cumulative application rate), and sensitive effect metrics. Risk quotients (RQs) were calculated by dividing the exposure estimate by an appropriate effect metric (RQ = EEC/effect metric), and the risk quotient was then compared to the level of concern (LOC). If the screening level risk quotient was below the level of concern, the risk was considered to be negligible and no further risk characterization is necessary. If the screening level risk quotient was equal to or greater than the level of concern, additional sources of information were considered and a refined risk assessment was conducted if necessary. The refined risk assessments took into consideration more realistic exposure scenarios and effects metrics. These considerations may include further characterization of risk based on exposure modelling, monitoring data, results from field or mesocosm studies, and consideration of endpoints for additional species that were more reflective of potential exposure.

The parent compound (florpyrauxifen-benzyl), parent acid (florpyrauxifen acid), and all major transformation products were considered in the screening-level assessment. As described in Section 4.1, florpyrauxifen-benzyl is practically insoluble in water, which limited the concentrations that could be applied in toxicity tests, and it degrades rapidly to florpyrauxifen acid and other transformation products.

In contrast, florpyrauxifen acid, which is considered both an active form of the pesticide and a transformation product, is very soluble in water and degrades more slowly in the environment. These differences in the environmental fate and behaviour of florpyrauxifen-benzyl and florpyrauxifen acid were considered in the risk assessments presented below.

Five end-use products are being proposed for registration:

Aquatic end-use products (Use-site category) 2, (Aquatic Non-Food Sites))
- GF-3301 Aquatic Herbicide
- ProcellaCOR FX Herbicide

Terrestrial end-use products (Use-site categories 13 (Terrestrial Feed Crops), 14 (Terrestrial Food Crops) and 16 (Industrial and Domestic Vegetation Control Non-food Sites))
- GF-3206 Herbicide
- Milestone NXT Herbicide
- Restore NXT Herbicide

The risk assessment for GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide is presented in Section 4.2.1. The risk assessment for GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide is presented in Section 4.2.2.

4.2.1 Risks from aquatic end-use products

The following risk assessment focuses on risks from the two end-use products proposed for registration in Canada under use-site category 2: GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide.

4.2.1.1 Screening-level risk assessment

The highest exposure scenarios for aquatic and terrestrial organisms resulting from aquatic uses were considered in the screening-level risk assessment.

For aquatic organisms, the risks from the maximum supported use of three in-water applications of 500 g a.i./ha-m (397 g a.e./ha-m) per year with a minimum 42-day interval between applications was assessed.

For terrestrial organisms, the risks from the following exposure scenarios were assessed:

- Two foliar spray applications to aquatic plants (by boat or ground equipment) of 60 g a.i./ha (48 g a.e./ha) per year with a minimum 42-day retreatment interval
- Irrigation of turf with treated water immediately after in-water applications of the product (630 g a.i./ha, 501 g a.e./ha). Irrigation rates over a 2-month period were estimated by multiplying the irrigation water volume by the estimated concentration in treated water following in-water applications (Appendix I, Table 28).

Negligible exposure to terrestrial organisms is expected from the in-water applications of florpyrauxifen-benzyl. As such, these uses were not considered when evaluating risks to terrestrial organisms.

Aquatic organisms

Aquatic organisms, such as invertebrates, fish, amphibians, and aquatic plants, are directly exposed via in-water applications of florpyrauxifen-benzyl. GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide are not proposed for use in brackish/saltwater. As the proposed uses for both products are limited to still or slow-flowing water bodies and higher water renewal rates in tidal/estuarine areas would further dilute pesticide concentrations, exposure to marine organisms is expected to be negligible and risks to these organisms were not evaluated.

The screening-level EECs were calculated assuming direct application of florpyrauxifen-benzyl. Note that since the in-water application rate is expressed as a concentration, the depth of the water body has no effect on the resulting screening-level EECs. Screening-level EECs in surface water were estimated using the fate input parameters presented in Appendix I, Table 29. For uses with multiple applications, half-lives were used to estimate the dissipation of florpyrauxifen-benzyl between applications. EECs for the transformation products were calculated using the conservative assumption of 100% conversion (molecular w/w) from florpyrauxifen-benzyl with no dissipation between applications. The calculated EECs were compared to the most sensitive effect metric for each group of organisms.

The aquatic endpoints and uncertainty factors used in the risk assessment are presented in Appendix I, Table 30. The screening-level risk quotients for aquatic organisms are summarized in Appendix I, Table 31.

Freshwater pelagic invertebrates, fish, amphibians, and algae

Acute and chronic risk quotients for freshwater pelagic invertebrates (<1.6), freshwater fish (<9.7), freshwater algae (<1.6), and amphibians (<7.5) exposed to florpyrauxifen-benzyl potentially exceeded the level of concern. However, the estimated exposure concentrations for the in-water application use (0.05 mg a.i./L) exceeded the reported water solubility for florpyrauxifen-benzyl (0.015 mg/L). In addition, risk quotients for GF-3301, florpyrauxifen acid, and all other major transformation products except for dechlorinated benzyl ester were below the level of concern for freshwater pelagic invertebrates, freshwater fish and freshwater algae. The risk quotient for fish exposed to dechlorinated benzyl ester (<1.4) potentially exceeded the level of concern, but was also a non-definitive value limited by the water solubility of this chemical.

In studies conducted with GF-3301, higher concentrations of the active ingredient in water could be achieved compared to studies conducted with the technical grade active ingredient, Rinskor Technical Herbicide. Therefore, the risk quotients based on effects metrics for GF-3301, which did not exceed the level of concern for freshwater pelagic invertebrates, freshwater algae, and freshwater fish, are considered more reflective of actual risks from in-water applications of the product than those based on effects metrics for the technical grade active ingredient. Although studies with GF-3301 Aquatic Herbicide were not available for amphibians, the GF-3301Aquatic Herbicide data for freshwater fish can be used in the absence of data for this taxon.

Based on these results, the acute and chronic risks of florpyrauxifen-benzyl, its end-use products and transformation products to freshwater pelagic invertebrates, freshwater fish, freshwater algae, and amphibians are considered to be negligible and were not evaluated further in the refined assessment.

Freshwater benthic invertebrates

Acute and chronic risk quotients for freshwater benthic invertebrates exposed to florpyrauxifen-benzyl via spiked sediment and spiked water exceeded the level of concern. Benthic invertebrates were considerably less sensitive to hydroxy benzyl ester and hydroxy acid compared to florpyrauxifen-benzyl, and risk quotients for these transformation products did not exceed the level of concern. In the screening-level assessment, effects metrics based on overlying water concentrations were compared to aquatic EECs. However, this approach likely overestimates risk quotients based on the spiked sediment effects metrics. Florpyrauxifen-benzyl, in particular, has very low water solubility and adsorbs to sediment. Thus, the overlying water concentrations of florpyrauxifen-benzyl in the spiked sediment study with *Chironomus dilutus* are likely not representative of the exposure concentrations associated with effects to benthic invertebrates. Acute and chronic risks of florpyrauxifen-benzyl to benthic invertebrates based on pore water effects metrics and EECs were therefore considered in the refined assessment.

Freshwater vascular plants

Freshwater vascular plants were the most sensitive aquatic taxon to florpyrauxifen-benzyl, its end-use products, and major transformation products. Risk quotients for freshwater vascular plants exposed to florpyrauxifen-benzyl, GF-3301 Aquatic Herbicide, florpyrauxifen acid, hydroxy benzyl ester, hydroxy acid, and dechlorinated benzyl ester exceeded the level of concern, but the level of concern was not exceeded for aquatic vascular plants exposed to the dechlorinated acid or nitro hydroxy acid.

Risk quotients for florpyrauxifen-benzyl and florpyrauxifen acid were two to six orders of magnitude higher than those for the other transformation products. Based on the conservative nature of the screening-level assessment, which assumed 100% transformation and no degradation or dissipation of the major transformation products, and the reduced toxicity of transformation products compared to florpyrauxifen-benzyl and florpyrauxifen acid, risk to freshwater vascular plants from the transformation products was not considered further in the refined assessment. Risk to freshwater vascular plants was further characterized for florpyrauxifen-benzyl and florpyrauxifen acid in the refined assessment, which is expected to cover any potential risks from the other transformation products.

Terrestrial organisms

Terrestrial organisms can be exposed to florpyrauxifen-benzyl and its transformation products from aquatic uses through:

- direct contact with spray drift from foliar spray applications (by boat or ground equipment) adjacent to terrestrial land,
- direct contact with treated waters used for irrigation,
- contact with sprayed or treated surfaces, or
- ingestion of contaminated food.

The screening-level risk assessment determined the potential risk to non-target terrestrial organisms assuming direct application of the pesticide. The calculated EECs were compared to the most sensitive effect metric for each group of organisms.

Screening-level EECs in soil and vegetation were estimated using the fate input parameters presented in Appendix I, Table 29. For uses with multiple applications, half-lives were used to estimate the dissipation of florpyrauxifen-benzyl between applications. EECs for the transformation products were calculated assuming 100% conversion (molecular w/w) from florpyrauxifen-benzyl and no dissipation between applications.

The terrestrial endpoints and uncertainty factors used in the risk assessment are presented in Appendix I, Table 30. The results of the screening-level risk assessment for terrestrial organisms are shown in Appendix I, Tables 32 and 33. When potential risks were identified in the screening-level assessment, further characterization was conducted and is presented in Section 4.2.1.2.

Soil-dwelling invertebrates

Soil-dwelling invertebrates may be exposed to florpyrauxifen-benzyl and its transformation products through contact with residues in soil. Soil EECs were calculated assuming direct application to soil, even distribution of the product in the 0–15 cm depth of the soil, and a bulk density of 1.5 g/cm^3 for soil.

As presented in Appendix I, Table 32, risk quotients for soil-dwelling invertebrates exposed to florpyrauxifen-benzyl, its major transformation products, and end-use products in soil did not exceed the level of concern for any of the exposure scenarios considered (foliar spray applications and irrigation). Therefore, risks to soil-dwelling invertebrates from the aquatic uses of florpyrauxifen-benzyl are considered to be negligible.

Leaf-dwelling beneficial invertebrates

In the screening-level risk assessment, it was assumed that leaf-dwelling invertebrates would be exposed via contact to surface residues resulting from a direct spray of florpyrauxifen-benzyl.

The risk quotient for leaf-dwelling invertebrates (beneficial arthropods) exposed to GF-3301 Aquatic Herbicide did not exceed the level of concern for foliar applications. However, the maximum application rate for turf irrigation was above the highest rate tested in glass plate studies with leaf-dwelling invertebrates (beneficial arthropods) exposed to GF-3301 Aquatic Herbicide. Thus, the risk quotient (<4.2) potentially exceeded the level of concern (Appendix I, Table 32). Risk to leaf-dwelling invertebrates from the irrigation uses was further characterized in the refined assessment.

Bees

Foraging bees may be exposed directly to florpyrauxifen-benzyl via spray droplets during application, residues on the surface of the leaves (contact exposure), or ingestion of contaminated pollen and nectar (oral exposure). In addition, brood may be exposed to florpyrauxifen-benzyl or florpyrauxifen acid as foraging bees bring contaminated pollen and nectar back to the hive. Florpyrauxifen-benzyl is systemic, and therefore application before bloom may result in residues in pollen and/or nectar.

The calculation of contact and oral exposure to bees was conducted according to the *Guidance for Assessing Pesticide Risks to Bees* and was based on the maximum single application rate of 0.06 kg a.i./ha for foliar application of GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, and the maximum rate for turf irrigation of 0.630 kg a.i./ha. Exposure to bees was calculated by multiplying the application rate (kg a.i./ha) by adjustment factors (2.4 µg a.i./bee per kg a.i./ha for adult contact, and 29 µg a.i./bee per kg a.i./ha for adult oral and 12 µg a.i./larva per kg/ha for larvae).

Due to the low solubility of florpyrauxifen-benzyl, chronic adult and chronic larval studies were conducted with GF-3206 Herbicide instead of the technical grade active ingredient. Although the formulation for GF-3206 Herbicide differs from the aquatic end-use product being considered in this assessment, available toxicity data indicates that GF-3206 Herbicide is more toxic to beneficial arthropods than GF-3301 Aquatic Herbicide (Appendix I, Table 27). As such, it is expected that GF-3206 Herbicide would also be more toxic to bees, and that the effects metrics derived from the chronic adult and larval studies conducted with GF-3206 Herbicide are acceptable surrogates for GF-3301 Aquatic Herbicide.

The acute and chronic risk quotients for adult and larval bees exposed to florpyrauxifen-benzyl, florpyrauxifen acid, and GF-3206 Herbicide did not exceed the level of concern for foliar applications.

Considering the maximum rate for irrigation of turf, the oral and contact risk quotients for adult bees exposed to florpyrauxifen-benzyl and the acute risk quotient for larval bees exposed to florpyrauxifen acid did not exceed the level of concern. However, the acute and chronic risk quotient for adult bees, and chronic risk quotient for larval bees exposed to GF-3206 Herbicide exceeded the level of concern (Appendix I, Table 32). Risk to bees from irrigation uses was further characterized in the refined assessment.

Birds and mammals

Birds and small mammals may be exposed directly to florpyrauxifen-benzyl via spray droplets during application or to residues on the surface of leaves. Foraging birds and small mammals could also be exposed to florpyrauxifen-benzyl through the ingestion of a contaminated diet. To assess the risk of florpyrauxifen-benzyl to birds and mammals, the estimated concentration on food items was used to determine the amount of pesticide in the diet. Exposure is dependent on the body weight of the organism and the amount and type of food consumed. Therefore, the estimated daily exposure (EDE) is based on a set of generic body weights to represent a range of species (20, 100, 1000 g for birds and 15, 35, 1000 g for small mammals). Also, specialized feeding guilds (herbivore, frugivore, insectivore, granivore) are considered for each category of animal weights. As animals may consume large quantities of food if they encounter an abundant and/or desirable food source, it is assumed that the diet is comprised entirely (100%) of a particular dietary item that is contaminated.

The risk quotients for birds and mammals from acute oral, acute dietary, and chronic exposure to florpyrauxifen-benzyl and GF-3301 Aquatic Herbicide did not exceed the level of concern for any of the exposure scenarios considered (Appendix I, Table 33). Therefore, risks to birds and mammals from the aquatic uses of florpyrauxifen-benzyl are considered to be negligible.

Non-target terrestrial plants

In the screening-level risk assessment, it was assumed that non-target terrestrial plants would be exposed to a direct spray of florpyrauxifen-benzyl. Terrestrial plants may also be exposed to florpyrauxifen-benzyl and its transformation products through contact with residues in soil.

Risk quotients for terrestrial vascular plants exposed to GF-3301 Aquatic Herbicide and all major transformation products exceeded the level of concern for all exposure scenarios considered (Appendix I, Table 32). However, it is noted that the risk quotients for hydroxy benzyl ester, dechlorinated benzyl ester, dechlorinated acid, and nitro hydroxy acid were non-definitive values as ER_{25} values for these chemicals were greater than the highest treatment rates.

Risk quotients for florpyrauxifen-benzyl and florpyrauxifen acid were two to four orders of magnitude higher than those for the other transformation products. Based on the conservative nature of the screening-level assessment, which assumed 100% formation and no degradation or dissipation of the major transformation products, and the reduced toxicity of transformation products compared to florpyrauxifen-benzyl and florpyrauxifen acid, risk to terrestrial plants from the transformation products was not considered further in the refined assessment. Risk to terrestrial plants was further characterized for florpyrauxifen-benzyl and florpyrauxifen acid in the refined assessment, which is expected to cover any potential risks from the other transformation products.

4.2.1.2 Refined risk assessment

Based on the results of the screening-level risk assessment, risk to the following taxa were further characterized in the refined assessment:

- Freshwater benthic invertebrates and freshwater vascular plants exposed via in-water application
- Non-target terrestrial plants exposed via spray drift to adjacent terrestrial habitats from foliar pesticide applications
- Non-target terrestrial plants, leaf-dwelling invertebrates, and bees exposed via direct application of treated waters used for irrigation

The same general methods and uncertainty factors used in the screening-level risk assessment were applied in the refined assessment. Where data were available, risks to additional species or groups of organisms were considered in addition to the most sensitive species.

Aquatic vascular plant endpoints for all non-target species, including those not native to Canada, were included in the refined risk assessment. In addition to these species, the Eurasian milfoil (*Myriophyllum spicatum*), a target pest of the aquatic florpyrauxifen-benzyl products, was considered as a surrogate for the most sensitive native aquatic macrophyte species based on the results of available field and mesocosm studies. These studies indicated that native watermilfoil species were more sensitive to florpyrauxifen-benzyl than other common aquatic plant species and have similar sensitivity to the invasive milfoil species intended to be controlled by florpyrauxifen-benzyl.

For freshwater benthic invertebrates, effects metrics based on pore water concentrations were compared to modelled pore water EECs.

The endpoints and uncertainty factors used in the refined assessment are presented in Appendix I, Table 34.

Residues relevant to the environment for the refined assessment

Both florpyrauxifen-benzyl and florpyrauxifen acid are included in the residue definition for the refined assessment and in surface water modelling, based on the risks identified in the screening-level assessment and the differences in their environmental fate and behaviour. These compounds were assessed separately since acute and chronic environmental toxicology data are available for both florpyrauxifen-benzyl and florpyrauxifen acid.

Aquatic organisms

Surface water modelling

Exposure of aquatic organisms was evaluated for the highest exposure scenario of three in-water applications of 500 g a.i./ha-m (397 g a.e./ha-m) with a 6-week (42-day) interval between applications. These rates and EECs are higher than those for the foliar applications.

Refined surface water EECs for florpyrauxifen-benzyl and florpyrauxifen acid were calculated using the Pesticide in Water Calculator (PWC) version 1.52. Considering the requirement of separate ecological risk assessment for florpyrauxifen-benzyl and florpyrauxifen acid, ecological modelling used the P-D (parent-daughter) approach.

EECs in water are calculated by modelling direct application to a 1-ha water body with a depth of 80 cm (shallow pond; for model inputs see Appendix I, Table 35 and 36). For in-water applications, the PWC model calculates the subsequent transformation and degradation of the pesticide in the water and sediment. In ecological modelling, pesticide enters the water by direct spray on water or injection into water. The model is run for 50 years.

For each year of the simulation, PWC calculates peak (or daily maximum) and time-averaged concentrations. The time-averaged concentrations are calculated by averaging the peak concentrations over different time periods (24-hour, 96-hour, 21-day, 60-day, 90-day, and 1 year). The highest value of these averages for each calendar year is then calculated. The 90^{th} percentiles of these yearly maxima are reported as the EECs for that period. In addition, the peak and 21-day average EECs in sediment pore water are generated by the model.

Eleven scenarios for in-water applications are selected for modelling different regions of Canada. The highest EECs of florpyrauxifen-benzyl and florpyrauxifen acid from all modelled scenarios are reported in Appendix I, Table 37. This table reports only the peak, 24-hour, 96-hour, 21-day, and 60-day EECs, as these are generally found to be the most relevant for the environmental assessment based on the exposure length to aquatic organisms in toxicity studies.

For the refined assessment, rather than comparing all effects metrics to peak EECs, the 96-hour or 21-day average water column EECs were also selected based on the exposure duration evaluated in the toxicity study. The averaging period for the selected EEC was either equal to or less than the exposure duration for the corresponding effect metric.

Refined risk quotients for benthic invertebrates and aquatic vascular plants considering modelling EECs are presented in Appendix I, Table 38. The risk quotients for benthic invertebrates were below the level of concern. When considering florpyrauxifen-benzyl and florpyrauxifen acid and their respective effects metrics for a variety of non-target aquatic vascular plants, the risk quotients exceeded the level of concern for the most sensitive species (Eurasian milfoil) and for some, but not all, non-target species. Comparatively, the risk quotients were much higher for the Eurasian milfoil, which was considered as a surrogate for native milfoil species.

In addition to assessing risks using modelled EECs, risks to aquatic vascular plants were characterized considering information on the residues of florpyrauxifen-benzyl and florpyrauxifen acid measured following aquatic applications to lakes and ponds in Canada and the United States. Effects of florpyrauxifen-benzyl and florpyrauxifen acid to non-target aquatic vascular plants from mesocosm studies were also considered in the refined risk assessment.

Aquatic field exposure data

Several field studies reported concentrations of florpyrauxifen-benzyl and florpyrauxifen acid following in-water or foliar applications in Canada and the United States. These studies applied different formulations of florpyrauxifen-benzyl at in-water application rates of 2 to 150 µg a.i./L, representing the lowest single rate (2 PDU/ha-m; 20 g a.i./ha-m) to the maximum annual rate of GF-3301 Aquatic Herbicide/ProcellaCOR FX Herbicide (150 PDU/ha-m; 1500 g a.i./ha-m) proposed in Canada. One study applied florpyrauxifen-benzyl at a foliar rate of 50 g a.i./ha, which was within the range of the proposed single application rates in Canada (3–6 PDU/ha; 30 to 60 g a.i./ha). All studies demonstrated rapid dissipation of florpyrauxifen-benzyl, with residues declining to below 1 µg a.i./L by 1 day to 6 weeks after treatment, depending on the rate applied and water body treated. Florpyrauxifen acid dissipated more slowly and declined to below l µg/L by 1 day to 4 months after treatment.

Refined risk quotients for aquatic vascular plants considering residues from monitoring, dissipation and efficacy studies are presented in **Error! Reference source not found.** I, Tables 39 and 40. Risk quotients based on peak exposures for florpyrauxifen-benzyl exceeded the level of concern for most aquatic plant species, but were lower and often below the level of concern for chronic exposures based on 7- to 21-day concentrations, which are more relevant for comparison to the aquatic vascular plant effects metrics from 7- to 21-day studies.

Risk quotients based on peak and chronic exposures of florpyrauxifen acid exceeded the level of concern for certain scenarios, particularly those with high application rates to closed pond systems. However, risk quotients were much lower and fewer exceedances of the level of concern were observed for exposure to florpyrauxifen acid as compared to florpyrauxifen-benzyl. Florpyrauxifen acid is expected to be the predominant form of the active in water given that florpyrauxifen-benzyl transforms quickly to florpyrauxifen acid.

Risk quotients for native species (duckweed, common hornwart, Elodea, Megalodonta) were lower compared to those for the non-native species (Carolina fanwort and Eurasian milfoil). In all cases, the risk quotients for the Eurasian milfoil exceeded the level of concern, suggesting that native milfoil species are likely to be affected at the proposed rates of application.

Mesocosm and field effects data

Many of the available mesocosm/field studies were designed to evaluate the efficacy of florpyrauxifen-benzyl products in controlling target aquatic plants species in various locations in the United States, including ecozones relevant to Canada. However, some of these studies also described effects to non-target plant species.

Mesocosm EC_{50} values for non-target species (*Bidens beckii*, *Alternanthera philoxeroides*, *Bacopa monnieri*, *Cabomba caroliniana*, *Justicia americana*) ranged from 0.96 to >81 µg a.i./L for GF-3301 and from 2.5 to >81 µg/L for florpyrauxifen acid. The most sensitive EC_{50} values for target species (*Myriophyllum spicatum*, *Hydrilla verticillata*, *Myriophyllum aquaticum*, and *Myriophyllum heterophyllum*) ranged from 0.09 to 0.71 µg a.i./L and from 0.38 to 21.3 µg/L for GF-3301 Aquatic Herbicide and florpyrauxifen acid, respectively. There was no overlap in the range of EC_{50} values between target and non-target species exposed to GF-3301 Aquatic Herbicide, and although there is some overlap for florpyrauxifen acid, non-target species are still generally less sensitive than target species.

In mesocosm and field studies, target and non-target plant species were exposed to formulations of florpyrauxifen-benzyl at applied concentrations ranging from 2 to 48 µg a.i./L, which approximated the range of single application rates proposed for GF-3301 Aquatic Herbicide/ProcellaCOR FX Herbicide (2–50 PDU/ha-m; 20–500 g a.i./ha-m). The results of these studies indicate that a small number of native species have high sensitivity to treatment with GF-3301 Aquatic Herbicide, but that most native species monitored have low to moderate sensitivity (Appendix I, Table 41). Native watermilfoils have similar sensitivity to florpyrauxifen-benzyl as invasive watermilfoils (*Myriophyllum spicatum*, *Myriophyllum heterophyllum*) and were significantly reduced following florpyrauxifen-benzyl applications at and above 1.5 µg a.i./L. Significant reductions in the biomass and frequency of observation of other native species (for example, watershield (*Brasenia scherberi*), American lotus (*Nelumbo lute*a), white waterlily (*Nymphaea odorata*), yellow pond lily (*Nuphar* spp.), pickerel weed (*Pontederia cordata*), and Sago pondweed (*Stuckenia pectinata*)) were observed at applied concentrations at and above 5 µg a.i./L. However, effects in most species were temporary and limited to the management area. In addition, most native species were unaffected or increased following florpyrauxifen-benzyl exposure and increases in native species richness were also observed following exposure.

Overall, the mesocosm studies showed limited effects to most non-target, native species relevant to Canada, and in cases where density or biomass was reduced in the treatment areas, recovery was often observed within 2 to 5 months following treatment. In certain cases, increases in native species abundance and richness were observed, which was likely a result of reduced competition with target invasive species. Thus, despite temporary effects to certain sensitive species, the use of florpyrauxifen-benzyl to control aquatic invasive plants is expected to have benefits for the native plant community.

Overall conclusion of risk to aquatic vascular plants

Considering the available data, there are potential risks to some non-target aquatic vascular plants. Florpyrauxifen acid is expected to be the predominant chemical in water following application of the end-use products. In general, the risk to aquatic vascular plant species was lower when considering exposure to florpyrauxifen acid as opposed to florpyrauxifen-benzyl. Observations from the mesocosm and efficacy studies showed that effects in most species were temporary and limited to the management area. In addition, most native species were unaffected or increased following florpyrauxifen-benzyl exposure. Increased native species richness was also observed following exposure, likely due to less competition from invasive plants and reduced sensitivity to treatments. While there are potential risks to some sensitive, native aquatic plant species from the use of GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide to control invasive aquatic plants, the control of invasive species is necessary in order to help protect aquatic habitats for native species. When used according to label directions, GF-3301 Aquatic Herbicide or ProcellaCOR FX Herbicide will have the desired effect of controlling target aquatic plant species that pose a risk to aquatic habitats, which is expected to have benefits for the native aquatic plant community.

Terrestrial organisms

Exposure to spray drift from foliar applications

For the foliar application of aquatic products (2 × 60 g a.i./ha (48 g a.e./ha) with a 42-day retreatment interval), it was assumed that non-target terrestrial plants would be exposed via off-site drift of florpyrauxifen-benzyl (present as formulated product).

The amount of spray drift depends on the type of equipment used and the size of the spray droplets. To calculate off-site EECs, spray drift factors were applied to the on-site EECs. The spray drift factor is defined as the maximum percentage of spray drift deposition at 1 m downwind from the point of application. For florpyrauxifen-benzyl, the end-use products should be applied using a minimum American Society of Agricultural Engineers (ASAE) coarse spray quality. The corresponding spray drift factor of 3% for ground boom sprayers was used to determine estimated exposure due to spray drift.

Refined risk quotients for terrestrial vascular plants exposed to GF-3301 Aquatic Herbicide and florpyrauxifen acid via spray drift from foliar applications are presented in Appendix I, Table 42. Risk quotients based on the most sensitive dicot and monocot effect metrics exceeded the level of concern, indicating potential risks to plants from spray drift exposure. Risk quotients for the most sensitive monocot were lower and did not exceed the level of concern as frequently compared to dicots.

Based on these results, advisory distances between treated areas and potentially affected areas were calculated and will be indicated on product labels. These distances are intended to inform applicators of zones of potential harm to non-target terrestrial plants from a spray drift event and should be considered in the context of protecting any desirable non-target terrestrial plant species at or around the application sites. However, as opposed to spray buffer zones, these distances are not mandatory as this may limit the use of the products to control target invasive plant species.

Exposure from irrigation

Non-target terrestrial plants, bees, and leaf-dwelling beneficial invertebrates may be exposed to florpyrauxifen-benzyl and florpyrauxifen acid following irrigation of field grown crops and residential and other non-food vegetation, such as turf and landscape vegetation.

The product labels state that turf can be irrigated with treated water immediately after treatment of the water body. Therefore, in the refined assessment, EECs for florpyrauxifen-benzyl and florpyrauxifen acid from water modelling (Appendix I, Table 37) were used to calculate application rates for the turf irrigation uses. These EECs considered dissipation of florpyrauxifen-benzyl and florpyrauxifen acid in surface water following direct in-water applications. Application rates for a single irrigation event were calculated using peak EECs, and rates for repeated irrigation over a 2-month period were calculated using 60-day average EECs (Appendix I, Table 37). Based on modelled surface water EECs and relevant irrigation water volumes, application rates of up to 12 g a.i./ha (single irrigation event with peak florpyrauxifen-benzyl EEC) and 11 g a.e./ha (repeated irrigation with 60-day average florpyrauxifen acid EEC) were calculated based on concentrations of florpyrauxifen-benzyl and florpyrauxifen acid, respectively (Appendix I, Table 43). These represented the highest application rates of florpyrauxifen-benzyl and florpyrauxifen acid for turf irrigation, and were used in the refined assessment to evaluate risk for this exposure scenario.

The application rates for other irrigation uses, including greenhouse and nursery crops, landscape vegetation or other non-food vegetation, and field grown crops range from 8.7 to 25 g a.i./ha (6.9 to 19.6 g a.e./ha; Appendix I, Table 51). Since the product labels specify that the maximum concentrations of florpyrauxifen-benzyl and florpyrauxifen acid in water must be less than 1 to 2 µg/L for these uses, these rates were not refined further based on surface water modelling results.

Refined risk quotients for leaf-dwelling invertebrates, bees, and terrestrial vascular plants exposed via direct application of treated waters for irrigation are presented in Appendix I, Table 44. The risk quotients for leaf-dwelling invertebrates and bees were below the level of concern for all irrigation uses. Risk quotients for non-target terrestrial plants based on the most sensitive dicot effect metrics exceeded the level of concern for all irrigation uses. Risk quotients based on the most sensitive monocot effect metrics also exceeded the level of concern in certain cases (florpyrauxifen-benzyl seedling emergence and florpyrauxifen acid vegetative vigour).

Since refined risk quotients also exceeded the level of concern, additional information on the sensitivity of plant species to florpyrauxifen-benzyl, florpyrauxifen acid, and its end-use products from simulated irrigation, field and greenhouse studies was taken into consideration.

The results of simulated irrigation studies indicated that the most sensitive crops (for example, soybean, carrot, and tomato) and ornamental species can tolerate irrigation for two to three weeks with water containing low levels (1 to 2 µg/L) of florpyrauxifen-benzyl and florpyrauxifen acid, individually.

In field and greenhouse studies evaluating effects to monocot grass species, florpyrauxifen-benzyl caused less than 4% injury to annual grass species at rates of 64 g a.e./ha. Average percent injury to perrenial grass species was 3.25 and 8% at rates of 48 and 96 g a.e./ha, respectively, which was considered below the commercially acceptable level of injury of 10%. Finally, no injury to trees was observed in orchards treated with up to 24 g a.e./ha.

Thus, based on the proposed label restrictions of 1 to 2 µg/L for field grown crops, greenhouse and nursery crops, landscape vegetation or other non-food vegetation (as summarized in Appendix I, Table 28), and the estimated application rates for application to turf, significant effects to most terrestrial plants from irrigation with treated waters are not expected to occur. However, as dicots are more sensitive to florpyrauxifen-benzyl and florpyrauxifen acid compared to monocots, additional label statements are required to protect these species from injury following turf irrigation.

4.2.2 Risks from terrestrial end-use products

The following risk assessment focuses on risks from the three end-use products proposed for registration in Canada under use-site categories 13, 14, and 16: GF-3206 Herbicide, Milestone NXT Herbicide, and Restore NXT Herbicide.

Milestone NXT Herbicide and Restore NXT Herbicide are coformulated products containing both florpyrauxifen-benzyl and aminopyralid (present as potassium salt) as active ingredients. The use patterns for aminopyralid in the coformulated products are within those currently registered for this active ingredient. Therefore, the risk assessment presented below focuses solely on florpyrauxifen-benzyl.

4.2.2.1 Screening-level risk assessment

Potential risks from the highest exposure scenario, a single foliar application of GF-3206 Herbicide at 60 g a.i./ha (48 g a.e./ha) per year, were considered in the screening-level risk assessment.

Aquatic organisms

Aquatic organisms, such as invertebrates, fish, amphibians, and aquatic plants, can be exposed to the terrestrial uses of florpyrauxifen-benzyl via spray drift or runoff to aquatic habitats.

The screening-level EECs were calculated assuming direct overspray of florpyrauxifen-benzyl to a 1-hectare water body with depths of 15 and 80 cm, which is intended to be a simple, conservative, and reasonable worst-case estimate of pesticide concentrations in water. EECs at 15-cm and 80-cm depths were used to determine risk to amphibians and all other aquatic organisms, respectively. EECs for the transformation products were calculated assuming 100% conversion (molecular w/w) from florpyrauxifen-benzyl. The calculated EECs were compared to the most sensitive effect metric for each group of organisms.

The aquatic endpoints and uncertainty factors used in the risk assessment are presented in Appendix I, Table 45. The screening-level risk quotients for aquatic organisms are summarized in Appendix I, Table 46. Since most of the aquatic effect metrics were non-definitive values greater than the highest test concentrations, risk quotients were also reported as "less than" values.

Freshwater pelagic invertebrates and algae

Acute and chronic risk quotients for freshwater pelagic invertebrates, freshwater algae, and marine algae did not exceed the level of concern.

Freshwater benthic invertebrates

In the screening-level assessment, effect metrics based on overlying water concentrations were compared to aquatic EECs. The acute risk quotient for *Chironomus dilutus* exposed to florpyrauxifen-benzyl exceeded the level of concern, but chronic risk quotients for *Chironomus riparius* exposed to florpyrauxifen-benzyl, hydroxy benzyl ester, and hydroxy acid were below the level of concern.

As previously explained in Section 4.2.1, pore water concentrations are more representative of florpyrauxifen-benzyl exposure to *Chironomus dilutus* in the spiked sediment study. The peak pore water EEC calculated for direct application of the aquatic end-use products (GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide) to water at maximum single rates of 500 g a.i./ha-m (0.00041 mg a.i./L; (Appendix I, Table 37) was well below the *Chironomus dilutus* NOEC based on pore water concentrations (0.0133 mg a.i./L). Therefore, aquatic exposures resulting from a maximum application of 60 g a.i./ha are unlikely to result in adverse effects to benthic invertebrates, and risk to benthic invertebrates was not evaluated further in the refined assessment.

Fish and amphibians

Acute risk quotients for freshwater fish (<1.4), amphibians (<5.9), and marine fish (<1.9) exposed to florpyrauxifen-benzyl potentially exceeded the level of concern. The apparent exceedance of the level of concern is caused by the limited water solubility of the active ingredient (0.015 mg/L). No significant effects to fish or amphibians were observed at any treatment in acute or chronic studies conducted with the technical grade active ingredient.

When tested with GF-3206 Herbicide, higher concentrations of the active ingredient in water could be achieved compared to studies conducted with the technical grade active ingredient. As a result, the risk quotient for freshwater fish exposed to GF-3206 Herbicide is below the level of concern. The chronic risk quotients for freshwater fish exposed to florpyrauxifen-benzyl (<0.2) also did not exceed the level of concern.

Risk quotients for the acid (florpyrauxifen acid) and all other major transformation products were below the level of concern for freshwater fish.

Based on the lack of effects observed in toxicity studies, low risk quotients, and absence of any exceedances of the level of concern for GF-3206 Herbicide, the acute and chronic risks of florpyrauxifen-benzyl, its end-use products, and transformation products to freshwater fish, amphibians, and marine fish are considered to be negligible and were not evaluated further in the refined assessment.

Freshwater aquatic vascular plants

Freshwater vascular plants were the most sensitive aquatic taxon to florpyrauxifen-benzyl, its end-use products, and major transformation products. Risk quotients for freshwater vascular plants exposed to florpyrauxifen-benzyl, GF-3206 Herbicide, florpyrauxifen acid, and hydroxy benzyl ester exceeded the level of concern. Levels of concern were not exceeded for aquatic vascular plants exposed to hydroxy acid, dechlorinated benzyl ester, dechlorinated acid or nitro hydroxy acid.

Risk quotients for florpyrauxifen-benzyl and florpyrauxifen acid were two to six orders of magnitude higher than those for the other transformation products. Based on the conservative nature of the screening-level assessment, which assumed no degradation or dissipation of the major transformation products, and the reduced toxicity of transformation products compared to florpyrauxifen-benzyl and florpyrauxifen acid, risk to freshwater vascular plants from the transformation products was not considered further in the refined assessment. Risk to freshwater vascular plants was further characterized for florpyrauxifen-benzyl and florpyrauxifen acid in the refined assessment, which is expected to cover any potential risks from the other transformation products.

Marine invertebrates

Risk quotients for marine invertebrates exposed to florpyrauxifen-benzyl were below the level of concern for acute effects but exceeded the level of concern for chronic effects. Based on these results, only chronic risk to marine invertebrates was considered in the refined assessment.

Terrestrial organisms

Terrestrial organisms can be exposed to florpyrauxifen-benzyl and its transformation products through direct contact with spray, spray drift, runoff, contact with sprayed surfaces, or from ingestion of contaminated food.

The screening-level risk assessment determines the potential risk to non-target terrestrial organisms assuming they are within the area that will receive direct application of the pesticide. The calculated EECs were compared to the most sensitive effect metric for each group of organisms. EECs for the transformation products were calculated assuming 100% conversion (molecular w/w) from florpyrauxifen-benzyl.

The terrestrial endpoints and uncertainty factors used in the risk assessment are presented in Appendix I, Table 45. The results of the screening-level risk assessment for terrestrial organisms are shown in Appendix I, Tables 47 and 48. When the level of concern was exceeded, further characterization of the risks was completed and presented in Section 4.2.2.2.

Soil-dwelling invertebrates

Soil-dwelling invertebrates may be exposed to florpyrauxifen-benzyl and its transformation products through contact with residues in soil. Soil EECs were calculated assuming direct application to soil, even distribution of the product in the 0–15-cm depth of the soil, and a bulk density of 1.5 g/cm^3 for soil.

As presented in Appendix I, Table 47, risk quotients for soil-dwelling invertebrates exposed to florpyrauxifen-benzyl, florpyrauxifen acid, their major transformation products, and end-use products in soil did not exceed the level of concern for the highest exposure scenario. Therefore, risks to soil-dwelling invertebrates from the terrestrial uses of florpyrauxifen-benzyl are considered to be negligible.

Leaf-dwelling beneficial invertebrates

In the screening-level risk assessment, it was assumed that leaf-dwelling invertebrates would be exposed to florpyrauxifen-benzyl via contact with surface residues resulting from a direct spray of florpyrauxifen-benzyl (present as formulated product).

The acute risk quotient (2.5) based on effects of the end-use product, GF-3206 Herbicide, to *Typhlodromus pyri* in a glass plate study slightly exceeded the level of concern of 2 for glass plate tests using either of two standard beneficial arthropod species. However, the acute risk quotient based on effect metrics from the extended laboratory study with *Typhlodromus pyri* exposed to GF-3206 Herbicide did not exceed the level of concern. A non-definitive risk quotient of <1.1 based on chronic exposure of GF-3206 Herbicide to *Chrysoperla carnea* may have slightly exceeded the level of concern of 1. However, as no effects to *Chrysoperla carnea* were observed up to the highest treatment, chronic risks are considered to be negligible. Based on these results, the terrestrial uses of florpyrauxifen-benzyl are not expected to pose a risk to leaf-dwelling beneficial invertebrates.

Bees

During foliar application, foraging bees may be exposed directly to florpyrauxifen-benzyl via spray droplets during application, to residues on the surface of the leaves (contact exposure), or through ingestion of contaminated pollen and nectar (oral exposure). In addition, brood may be exposed to florpyrauxifen-benzyl when foraging bees bring contaminated pollen and nectar back to the hive. Florpyrauxifen-benzyl is a systemic pesticide, and therefore application before bloom may result in residues in pollen and/or nectar.

The calculation of contact and oral exposure to bees was conducted according to the *Guidance for Assessing Pesticide Risks to Bees* and was based on the maximum application rate of 0.06 kg a.i./ha for GF-3206 Herbicide. Exposure to bees was calculated by multiplying the application rate (kg a.i./ha) by adjustment factors (2.4 µg a.i./bee per kg a.i./ha for adult contact, 29 µg a.i./bee per kg a.i./ha for adult oral, and 12 µg a.i./larva per kg/ha for larvae).

Risk quotients for the highest proposed use did not exceed the level of concern for acute oral and contact exposure of adult bees to florpyrauxifen-benzyl and GF-3206 Herbicide, chronic oral exposure of adult bees to GF-3206 Herbicide, and acute and chronic exposure of bee larvae to florpyrauxifen acid and GF-3206 Herbicide, respectively (Appendix I, Table 47). Therefore, risks to bees from the terrestrial uses of florpyrauxifen-benzyl are considered to be negligible.

Birds and mammals

Birds and small mammals may be exposed directly to florpyrauxifen-benzyl via spray droplets during application or to residues on the surface of leaves. Foraging birds and small mammals may also be exposed to florpyrauxifen-benzyl through the ingestion of a contaminated diet. To assess the risk of florpyrauxifen-benzyl to birds and mammals, the estimated concentration on food items was used to determine the amount of pesticide in the diet. Exposure is dependent on the body weight of the organism and the amount and type of food consumed. Therefore, the estimated daily exposure (EDE) is based on a set of generic body weights to represent a range of species (20, 100, 1000 g for birds and 15, 35, 1000 g for small mammals). Also, specialized feeding guilds (herbivore, frugivore, insectivore, granivore) are considered for each category of animal weights. As animals may consume large quantities of food if they encounter an abundant and/or desirable food source, it is assumed that the diet is comprised entirely (100%) of a particular dietary item.

The risk quotients for birds and mammals from acute oral, acute dietary, and chronic exposure to florpyrauxifen-benzyl and GF-3206 Herbicide did not exceed the level of concern for the highest proposed use (Appendix I, Table 48). Therefore, risks to birds and mammals from the terrestrial uses of florpyrauxifen-benzyl are considered to be negligible.

Non-target terrestrial plants

In the screening-level risk assessment, it was assumed that non-target terrestrial plants would be exposed to a direct spray of florpyrauxifen-benzyl (present as formulated product). Terrestrial plants may also be exposed to florpyrauxifen-benzyl and its transformation products through contact with residues in soil.

Risk quotients for terrestrial vascular plants exposed to GF-3206 Herbicide and florpyrauxifen acid exceeded the level of concern, but the level of concern was not exceeded for the other major transformation products (Appendix I, Table 47). Risk to terrestrial plants from exposure to GF-3206 Herbicide and florpyrauxifen acid was further characterized in the refined assessment.

4.2.2.2 Refined risk assessment

Based on the results of the screening-level risk assessment, risk to the following taxa were further characterized in the refined assessment:

- Freshwater vascular plants
- Marine invertebrates (chronic)
- Non-target terrestrial plants

The refined assessment considered potential off-field exposures via spray drift and runoff.

The same general methods and uncertainty factors used in the screening-level risk assessment were applied in the refined assessment. Where data were available, risks to additional species or groups of organisms were considered in addition to the most sensitive species.

Aquatic vascular plant endpoints for all non-invasive species, including those not native to Canada, were included in the refined risk assessment. In addition to these species, the Eurasian milfoil (*Myriophyllum spicatum*) was also considered as a surrogate for the most sensitive native aquatic macrophyte species based on the results of available field and mesocosm studies. These studies indicated that native watermilfoil species were more sensitive to florpyrauxifen-benzyl than other native aquatic plant species and have similar sensitivity to the invasive milfoil species intended to be controlled by the aquatic end-use products containing florpyrauxifen-benzyl.

For chronic marine invertebrates, the NOEC of 0.0035 mg a.i./L for offspring per female was used instead of the more sensitive endpoint for female length (NOEC of <0.0011 mg a.i./L). Although the effects to female length were statistically significant and considered to be treatment-related, the magnitude of the effect was very small. Body length was reduced by approximately 3% relative to controls in the 0.0011, 0.0020, 0.0035 and 0.0078 mg a.i./L treatments, and by approximately 5% in the 0.013 mg a.i./L treatment. In addition, no corresponding effects on body weight were observed during the study. Thus, the reported effects on female length are not considered biologically relevant for the refined risk assessment.

In contrast, the reductions on offspring per female (15.8 to 45% compared to controls) were considered biologically relevant. Due to the low potential of chronic exposure in marine habitats resulting from higher water renewal rates in tidal/estuarine areas, chronic risk to marine invertebrates was not evaluated for spray drift.

The endpoints and uncertainty factors used in the refined assessment are presented in Appendix I, Table 49.

Residues relevant to the environment for the refined assessment

As described in Section 4.2.1.2, the refined assessment considered environmental risks from florpyrauxifen-benzyl and florpyrauxifen acid.

Spray drift

Further characterization of exposure was conducted considering off-target spray drift from all terrestrial uses at the maximum proposed application rates:

Rangeland, permanent pasture, industrial and other non-crop areas:

- Single application of GF-3206 Herbicide at 60 g a.i./ha (48 g a.e./ha) using aerial and ground equipment
- Single application of Milestone NXT Herbicide or Restore NXT Herbicide at 12 g a.i./ha (10 g a.e./ha) using aerial and ground equipment

Filbert: single application of GF-3206 Herbicide at 10 g a.i./ha (8 g a.e./ha) using ground equipment

The amount of spray drift depends on the application equipment, spray droplet size, and crop. To calculate off-field EECs, spray drift factors were applied to the in-field EECs. The spray drift factor is defined as the maximum percentage of spray drift deposition 1 m downwind from the point of application. For florpyrauxifen-benzyl, the end-use products should be applied using a minimum American Society of Agricultural Engineers (ASAE) coarse spray quality. The corresponding spray drift factors of 60% for aerial application on non-crop fields and 3% for field sprayers were used to determine estimated exposure due to spray drift.

Aquatic Vascular Plants

Refined risk quotients for aquatic organisms exposed to florpyrauxifen-benzyl, GF-3206, and florpyrauxifen acid via spray drift are presented in Appendix I, Table 50. Risk quotients for freshwater vascular plants exposed to florpyrauxifen-benzyl via spray drift exceeded the level of concern for all uses. However, for ground applications, only risk quotients for the Eurasian milfoil exceeded the level of concern.

Terrestrial Plants

Refined risk quotients for terrestrial vascular plants exposed to GF-3206 and florpyrauxifen acid via off-field spray drift are presented in Appendix I, Table 51. Based on effect metrics for either GF-3206 Herbicide or florpyrauxifen acid, risk quotients exceeded the level of concern for all proposed uses of GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide, indicating there may be potential risks to non-target terrestrial plants from the use of florpyrauxifen-benzyl. Risk quotients for both monocot and dicot plant species exceeded the level of concern for aerial applications of the products, but only risk quotients for dicot plant species exceeded the level of concern for ground applications.

Overall conclusion on potential risks from spray drift

To inform users of the potential risk to non-target terrestrial plants and aquatic vascular plants, label statements pertaining to the toxicity of florpyrauxifen-benzyl to these groups of organisms are required on the labels for GF-3206 Herbicide, Milestone NXT Herbicide, and Restore NXT Herbicide. Additionally, ground and aerial spray buffer zones of 3 to 80 m and 70 to 800 m, respectively, are required to mitigate the risk to non-target terrestrial and aquatic habitats as a result of spray drift. With the implementation of these proposed mitigation measures, the risks are considered acceptable.

Runoff

Exposure of aquatic organisms via runoff to water bodies were evaluated based on a single application of 60 g a.i./ha (48 g a.e./ha) per year.

Refined EECs from surface runoff of florpyrauxifen-benzyl and florpyrauxifen acid were calculated using the Pesticide in Water Calculator (PWC) version 1.52. Considering the different soil mobilities for the parent and transformation products, and the requirement of separate ecological risk assessment for florpryauxifen-benzyl and florpyrauxifen acid, ecological modelling used the P-D (parent-daughter) approach.

EECs in water are calculated by modelling a 10-ha field adjacent to a 1-ha water body with a depth of 80 cm (shallow pond; for model inputs see Appendix I, Tables 52 and 53). PWC calculates the amount of pesticide entering the water body and the subsequent transformation and degradation of the pesticide in the water and sediment. In ecological modelling, the pesticide enters the water by runoff only, and deposition of pesticide on the water body due to spray drift is not included. The model is run for 50 years.

For each year of the simulation, PWC calculates peak (daily maximum) and time-averaged concentrations. The time-averaged concentrations are calculated by averaging the peak concentrations over different time periods (24-hour, 96-hour, 21-day). The highest value of these averages for each calendar year is then calculated. The 90th percentiles of these yearly maxima are reported as the EECs for that period.

Six representative scenarios for terrestrial uses are selected for modelling different regions of Canada. The highest EECs of florpyrauxifen-benzyl and florpyrauxifen acid from all modelled scenarios are reported in Appendix I, Table 54. This table reports only the peak, 24-hour, 96-hour, 21-day, and 60-day EECs, as these are generally found to be the most relevant for the environmental assessment.

For the runoff assessment, rather than comparing all effect metrics to peak EECs, the 96-hour or 21-day average water column EECs were selected based on the toxicity study's exposure duration. The averaging period for the selected EEC was either equal to or less than the exposure duration for the corresponding effect metric.

With the exception of the most sensitive aquatic plant species, Eurasian milfoil, risk quotients for exposure based on runoff did not exceed the level of concern for any tested species (Appendix I, Table 55).

Overall conclusion on potential risks from runoff

The risk to aquatic organisms associated with runoff following the use of florpyrauxifen-benzyl is acceptable. However, standard label statements pertaining to best management practices for runoff are required on the labels for GF-3206 Herbicide, Milestone NXT Herbicide, and Restore NXT Herbicide. When used according to label directions, the risks from the use of florpyrauxifen-benzyl are considered acceptable from the viewpoint of environmental protection.

4.2.3 Environmental incident reports

Florpyrauxifen-benzyl is a new active ingredient pending registration for use in Canada, and as of 5 April 2022, no incident reports had been submitted to the PMRA.

5.0 Value

GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide provide post-emergence control of many annual and perennial broadleaf weeds and invasive plants and shrubs in rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas.

GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide are Group 4 herbicides that may help users to manage serious weeds which are resistant to other modes of action, including Group 2 resistant kochia and wild mustard, Group 5 resistant redroot pigweed and lamb's-quarters, and Group 4 and Group 5 resistant wild mustard.

5.1 GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide

Value information submitted for review included data from >100 efficacy trials conducted in the United States and Canada since 2009. These trials represent a range of soil types and climate conditions and were conducted with different formulations of florpyrauxifen-benzyl and various adjuvants. Scientific rationales were also presented in support of aerial application, bridging between different formulations, tank mixes, and the use in hazelnut (GF-3206 Herbicide).

The efficacy trials demonstrated that post-emergence applications of all three herbicides at the rates proposed, with an adjuvant, provided acceptable control of the target vegetation (refer to Appendix I, Table 57 for specific claims on the GF-3206 Herbicide label, Appendix I, Table 58 for claims on the Milestone NXT Herbicide label and Appendix I, Table 59 for claims on the Restore NXT Herbicide label).

5.2 GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

Value information submitted for review included scientific rationales, published literature and data from extensive growth chamber and mesocosm studies under controlled conditions, and large-scale operational trials in lakes and ponds. The progression of the experimental work was a step-wise process beginning with growth chamber studies to determine the sensitivity of various aquatic weed species to florpyrauxifen-benzyl. Once sensitivity was determined, larger mecocosm studies were undertaken to determine a rate structure. Finally, actual studies in the field under natural conditions confirmed the efficacy of the rates. The trials summarized were scientifically designed and appropriately reflective of actual field conditions. The information was found supportive of the two application methods proposed: foliar application to plants standing in/floating on water and application directly to water to target submerged species as well as the overall rate structure. Up to three applications may be made per year, 42 days apart.

6.0 Pest control product policy considerations

6.1 Toxic substances management policy considerations

The Toxic Substances Management Policy (TSMP) is a federal government policy developed to provide direction on the management of substances of concern that are released into the environment. The TSMP calls for the virtual elimination of Track 1 substances that meet all four criteria outlined in the policy: persistent (in air, soil, water and/or sediment), bioaccumulative, primarily a result of human activity and toxic as defined by the *Canadian Environmental Protection Act*. The *Pest Control Products Act* requires that the TSMP be given effect in evaluating the risks of a product.

During the review process, the active ingredient, florpyrauxifen-benzyl, and its transformation products were assessed in accordance with the PMRA Regulatory Directive DIR99-03[6] and evaluated against TSMP Track 1 criteria. Florpyrauxifen-benzyl and its transformation products do not meet all TSMP Track 1 criteria (Appendix I, Table 56).

6.2 Formulants and contaminants of health or environmental concern

During the review process, contaminants in the active ingredient as well as formulants and contaminants in the end-use products are compared against Parts 1 and 3 of the *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern.*[7] The list is used as described in the PMRA Science Policy Note SPN2020-01[8] and is based on existing policies and regulations, including the Toxic Substance Management Policy and Formulants Policy,[9] and taking into consideration the Ozone-Depleting Substance Regulations, 1998, of the *Canadian Environmental Protection Act* (substances designated under the Montreal Protocol).

The end-use products GF-3301 Aquatic Herbicide, ProcellaCOR FX Herbicide, and Restore NXT Herbicide contain the preservative 1,2-benzisothiazoline-3-one, which contains low levels of polychlorinated dibenzodioxins and furans (TSMP Track 1 substances).

---

6 DIR99-03, *The Pest Management Regulatory Agency's Strategy for Implementing the Toxic Substances Management Policy*

7 SI/2005-114, last amended on 25 June 2008. See Justice Laws website, Consolidated Regulations, *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern.*

8 PMRA's Science Policy Note SPN2020-01, *Policy on the List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern* under paragraph 43(5)(b) of the *Pest Control Products Act*.

9 DIR2006-02, *Formulants Policy and Implementation Guidance Document*.

The use of this preservative in pest control products at a maximum of 0.1% was reassessed by the PMRA in 2012 and found to be acceptable because dioxin and furan levels are low and being managed as outlined in the PMRA Regulatory Directive DIR99-03 for the implementation of TSMP. The Agency position at this time is that no further action is required.

The technical grade active ingredient, Rinskor Technical Herbicide, and the end-use products, GF-3206 Herbicide and Milestone NXT Herbicide, do not contain any formulants or contaminants identified in Parts 1 or 3 of the *List of Pest Control Product Formulants and Contaminants of Health or Environmental Concern*.

The use of formulants in registered pest control products is assessed on an ongoing basis through PMRA formulant initiatives and Regulatory Directive DIR2006-02.

7.0 Proposed regulatory decision

Health Canada's PMRA, under the authority of the *Pest Control Products Act*, is proposing registration for the sale and use of Rinskor Active, Milestone NXT Herbicide, Restore NXT Herbicide, GF-3206 Herbicide, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide, containing the technical grade active ingredient florpyrauxifen-benzyl, for weed management in hazelnut and non-agricultural/industrial vegetation management including many invasive species, as well as for aquatic vegetation management to control invasive plants both in and around water.

An evaluation of available scientific information found that, under the approved conditions of use, the health and environmental risks and the value of the pest control products are acceptable.

Additional information being requested

Since this technical product is manufactured only at pilot scale before registration, five-batch data representing commercial-scale production will be required as post-market information after registration.

List of abbreviations

↑	Increased
↓	Decreased
µg	microgram(s)
µm	micrometre(s)
♀	Female
♂	Male
$1/2C_{max}$	point where the blood concentrations of the exogenous substance are half of their maximum concentrations
1/n	exponent for the Freundlich isotherm
a.e.	acid equivalents
a.i.	active ingredient
AD	administered dose
ADI	acceptable daily intake
ADME	absorption, distribution, metabolism and elimination
AHETF	Agricultural Handler Exposure Task Force
ALS	acetolactate synthase
ARfD	acute reference dose
ARTF	Agricultural Re-entry Task Force
atm	Atmosphere
ATPD	Area Treated Per Day
AUC	area under the curve
BAF	Bioaccumulation Factor
BBCH	Biologishe Bundesanstalt, Bundessortenamt and Chemical industry
BCF	Bioconcentration Factor
BCF_k	Kinetic Bioconcentration Factor
BCF_{SS}	Steady-state Bioconcentration Factor
bw	body weight
bwg	bodyweight gain
CAF	composite assessment factor
CAS	Chemical Abstracts Service
CEPA	*Canadian Environmental Protection Act*
CHO	Chinese hamster ovary
cm	Centimetres
cm^3	cubic centimetres
C_{max}	highest concentration of exogenous substance in the blood
CMC	Carboxymethylcellulose
CO_2	carbon dioxide

d	Day
DALA	days after last application
DF	dry flowable
DFOP	double first order in parallel
DFR	Dislodgeable Foliar Residue
DMSO	dimethyl sulfoxide
DNA	deoxyribonucleic acid
DT_{50}	dissipation time 50% (the time required to observe a 50% decline in concentration)
DT_{90}	dissipation time 90% (the dose required to observe a 90% decline in concentration)
EC	emulsifiable concentrate formulation
EC_{25}	effective concentration on 25% of the population
EC_3	concentration required to induce a threshold positive sensitization response (SI=3)
EC_{50}	effective concentration on 50% of the population
EC_x	effective concentration on x% of the population
EDE	estimated daily exposure
ED_x	effective dose on x% of the population
EEC	estimated environmental concentration
ER_{25}	effective rate for 25% of the population
ER_x	effective rate on x% of the population
F0	parental generation
F1	first offspring generation
F2	second offspring generation
fe	food efficiency
FOB	functional observational battery
FPB	florpyrauxifen-benzyl
g	gram(s)
GAP	good agricultural practice
GD	gestation day
h	hour
ha	hectare(s)
ha	hectare
HAFT	highest average field trial
HDPE	high-density polyethylene
HDT	highest dose tested
Hg	mercury
HGPRT	hypoxanthine-guanine phosphoribosyltransferase
HPLC	high performance liquid chromatography

high performance liquid chromatography with tandem mass spectrometry

hr	Hour
hr(s)	hour(s)
HRAC	Herbicide Resistance Action Committee
ILV	independent laboratory validation
IORE	indeterminate order rate equation
IUPAC	International Union of Pure and Applied Chemistry
K_d	soil-water partition coefficient
K_F	Freundlich adsorption coefficient
kg	kilogram(s)
km	Kilometre
K_{oc}	organic-carbon partition coefficient
K_{ow}	*n*–octanol-water partition coefficient
kPa	Kilopascal
L	litre(s)
LAFT	lowest average field trial
LC_{50}	concentration estimated to be lethal to 50% of the test population

Liquid chromatography coupled with tandem mass spectrometry

LC_x	lethal concentration x%
LD_{50}	dose estimated to be lethal to 50% of the test population
LD_x	lethal dose x%
LLDPE	Linear low-density polyethylene
LLNA	local lymph node assay
LOAEL	lowest observed adverse effect level
LOC	level of concern
LOD	limit of detection
LOEC	lowest observed effect concentration
LOEL	lowest observed effect level
LOQ	limit of quantitation
LR_{50}	lethal rate 50%
LR_x	lethal rate x%
LSC	liquid scintillation counting
m	Meter
M/L	Mixer/Loader
M/L/A	Mixer/Loader/Applicator
m/z	mass-to-charge ratio of an ion
MAS	maximum average score for 24, 48 and 72 hrs
mg	milligram(s)

MIS	maximum irritation score
mL	millilitre(s)
MMAD	mass median aerodynamic diameter
MOE	margin of exposure
MRL	maximum residue limit
MRM	multiresidue method
MS	mass spectrometry
MTD	maximum tolerated dose
MWCF	molecular weight conversion factor
N_Replen	Replenishment Interval per Hour
N/R	not required
NA	not applicable
NAFTA	North American Free Trade Agreement
ND	Not detected
NER	non-extractable residues
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
NOER	no observed effect rate
NR	Not Reported
NZW	New Zealand white
OC	organic carbon content
°C	degree Celsius
OM	organic matter content
PBI	plantback interval
PCPA	*Pest Control Product Act*
PDU	prescription dose units
PHED	Pesticide Handler Exposure Database
PHI	preharvest interval
p*K*a	dissociation constant
PMRA	Pest Management Regulatory Agency
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
PPO	Protoporphyrinogen oxidase
PWC	Pesticide in Water Calculator
RAC	raw agricultural commodity
RD	residue definition
REI	Restricted-Entry Interval
RQ	risk quotient

RSD	relative standard deviation
RTI	Retreatment Interval
R_v	volatility value
S9	mammalian metabolic activation system
SC	soluble concentrate formulation
SFO	single first order
SI	stimulation index
SOP	Standard Operating Procedures
Std.Dev.	standard deviation
STMdR	supervised trial median residue
STMR	supervised trial mean residue
$t_{1/2}$	half-life
T3	tri-iodothyronine
T4	Thyroxine
TC	Transfer Coefficient
TP	transformation product
TRR	total radioactive residue
TSMP	Toxic Substances Management Policy
TTR	Transferrable Turf Residue
UAN	urea ammonium nitrate
UF	uncertainty factor
USEPA	United Stated Environmental Protection Agency
UV	ultraviolet
v/v	volume per volume dilution
WG	wettable granule formulation
w/w	weight by weight
WBC	white blood cells
WSSA	Weed Science Society of America
wt	Weight
yrs	Years

Appendix I Tables and figures

Table 1A Residue analysis

Matrix	Method ID	Analyte	Method type	LOQ	Reference
Soil, Sediment	HPLC-MS/MS	XDE-848 Benzyl Ester	HPLC-MS/MS	3 ppb	PMRA# 3070790
		X11438848			
		X12300837			
		X11966341			
Surface water, Ground Water, Drinking Water	HPLC-MS/MS	XDE-848 Benzyl Ester	HPLC-MS/MS	0.02 ppb	PMRA# 3070795
		X11438848		0.05 ppb	
		X12300837			
		X11966341			
		X12131932			
		X12393505			
Crayfish Edible, Clams Edible, Fish Edible	HPLC-MS/MS	XDE-848 Benzyl Ester	HPLC-MS/MS	10 ppb	PMRA# 3070792
		X11438848			
		X12482999			

Table 1B Residue analysis in plant and animal matrices

Analytical methods	Matrix	Analytes	Method ID/ Type	LOQ	Reference
Livestock commodities					
Enforcement Methods	Whole milk Milk cream Muscle Liver Kidney Fat Eggs	Florpyrauxifen-benzyl (X11959130), florpyrauxifen acid (X11438848) and florpyrauxifen hydroxy acid (X11966341)	CAM-0137/001 [LC-MS/MS]	0.01 ppm in all matrices for all analytes	PMRA# 3070793

Analytical methods	Matrix	Analytes	Method ID/ Type	LOQ	Reference
	Poultry eggs Bovine fat, liver, meat and whole milk	Florpyrauxifen-benzyl (X11959130) and florpyrauxifen acid (X11438848)	QuEChERS [LC-MS/MS]	0.01 ppm in all matrices, both analytes	PMRA# 3070794
ILV of Enforcement Method	Bovine milk Poultry liver	Florpyrauxifen-benzyl (X11959130), florpyrauxifen acid (X11438848) and florpyrauxifen hydroxy acid (X11966341)	CAM-0137/001 [LC-MS/MS]	0.01 ppm in all matrices for all analytes	PMRA# 3070796
	Poultry eggs Bovine fat, liver, meat and whole milk	Florpyrauxifen-benzyl and florpyrauxifen acid (X11438848)	QuEChERS [LC-MS/MS]	0.01 ppm in all matrices, both analytes	PMRA# 3070797
Radiovalidation	Although no radiovalidation data were provided, extraction solvents used in both proposed enforcement methods were similar to those used in the metabolism studies (organic solvent-based, either acetonitrile- or methanol-based). Extraction efficiencies from poultry and goat excreta and from goat kidney and liver from the metabolism studies using these extraction solvents were 66–110%. Therefore, further demonstration of extraction efficiency with radiolabelled animal matrices is not required for the either enforcement method.				
Fish and edible aquatic species					
Data-Gathering Method	Fish, crayfish, clams	Florpyrauxifen-benzyl, X11438848 (florpyrauxifen acid) and taurine conjugate of florpyrauxifen acid (X12482999)	140954 [LC-MS/MS]	0.01 ppm in all matrices for all analytes	PMRA# 3070792

Analytical methods	Matrix	Analytes	Method ID/ Type	LOQ	Reference
Radiovalidation	Bluegill fish fillets	Florpyrauxifen acid taurine conjugate (X12482999), florpyrauxifen acid (X11438848), and florpyrauxifen-benzyl	NA	NA	PMRA# 3070798
Plant commodities					
Enforcement Methods	Wheat grain, lettuce, lemon and oilseed rape seed	Florpyrauxifen-benzyl and florpyrauxifen acid (X11438848)	QuEChERS [LC-MS/MS]	0.01 ppm in all matrices, both analytes	PMRA# 3070794
	Rice grain and processed commodities (bran, cleaned rice, brown rice, polished rice, flour, parboiled rice, hulls)	Florpyrauxifen-benzyl, florpyrauxifen acid (X11438848, free and conjugated forms) and florpyrauxifen hydroxy acid (X11966341, free and conjugated forms)	130794.02 [LC-MS/MS]	0.01 ppm in all matrices, both analytes	PMRA# 3070789

Analytical methods	Matrix	Analytes	Method ID/ Type	LOQ	Reference
Data-Gathering Method	Rice grain and straw	Florpyrauxifen-benzyl, florpyrauxifen acid (X11438848, free and conjugated forms) and florpyrauxifen hydroxy acid (X11966341, free and conjugated forms)	130794.01 [LC-MS/MS]	0.01 ppm for all analytes in all tested matrices	PMRA# 3070791
ILV of Enforcement Methods	Barley grain (high starch content), lettuce (high water content), lemon fruit (high acid content) and oilseed rape seed (high oil content)	Florpyrauxifen-benzyl and florpyrauxifen acid (X11438848)	QuEChERS [LC-MS/MS]	0.01 ppm in all matrices, both analytes	PMRA# 3070797
	Rice straw and hulls	Florpyrauxifen-benzyl, florpyrauxifen acid (X11438848, free and conjugated forms), florpyrauxifen hydroxyl acid (X11966341, free and conjugated forms) and X12300837	130794.02 [LC-MS/MS]	0.01 ppm in all matrices, both analytes	PMRA# 3070799

Analytical methods	Matrix	Analytes	Method ID/ Type	LOQ	Reference
Radiovalidation	Although no radiovalidation data were provided, extraction solvents used in both proposed enforcement methods were similar to those used in the plant metabolism studies (acetonitrile-based). Extraction efficiencies for all labels and matrices examined from the rice, wheat, and oilseed rape metabolism studies ranged from 60.4–5.1%, with the exception of wheat straw, where initial extractions recovered 31–48% of the TRR. In these samples, hydrolysis with 1M HCl followed by extraction with ACN released an additional 5–9% of the TRR. Therefore, further demonstration of extraction efficiency with radiolabelled plant matrices is not required for the either plant enforcement method.				

Table 2 Identification of select metabolites of Florpyrauxifen-benzyl

Code	Chemical Name
X11438848	Florpyrauxifen acid

Table 3 Identification of synonyms of Florpyrauxifen-benzyl

Chemical name
Rinksor
XDE-848 BE
XDE-848 BE TGAI
XDE-848 Benzyl Ester
XR-848 Benzyl
XR-848 Benzyl Ester
XR-848 Benzyl Ester Technical

Table 4 Toxicity profile of end-use products containing Florpyrauxifen-benzyl

(Effects are known or assumed to occur in both sexes unless otherwise noted)

Study type/Animal/PMRA#	Study results
Acute toxicity studies – Milestone NXT Herbicide	
Acute oral toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♀ Low toxicity There were no clinical signs of toxicity.

Study type/Animal/PMRA#	Study results
Acute dermal toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♂/♀ Low toxicity There were no clinical signs of toxicity.
Acute inhalation toxicity Wistar rats	LC_{50} > 5.46 mg/L Low toxicity There were no clinical signs of toxicity.
Eye irritation New Zealand White rabbits	MAS = 1.11/110 MIS = 4/110 @ 1 hr Minimally irritating
Dermal irritation New Zealand White rabbits	MAS = 0.8/8 MIS = 2/8 @ 1 and 24 hrs Slightly irritating
Dermal sensitization CBA/J mice	Negative
Acute toxicity studies – GF-3301 Aquatic Herbicide and Procellacor FX Herbicide	
Acute oral toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♀ Low toxicity There were no clinical signs of toxicity.
Acute dermal toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♂/♀ Low toxicity There were no clinical signs of toxicity.
Acute inhalation toxicity Wistar rats	LC_{50} > 5.66 mg/L - ♂/♀ Low toxicity There were no clinical signs of toxicity.
Eye irritation New Zealand White rabbits	MAS = 0.44/110 MIS = 2/110 at 1 hr Minimally irritating

Study type/Animal/PMRA#	Study results
Dermal irritation New Zealand White rabbits	MAS = 0.22/8 MIS = 1/8 Minimally irritating
Dermal sensitization - Buehler Hartley Guinea Pigs	Negative
Acute toxicity studies – Restore NXT Herbicide	
Acute oral toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♀ Low toxicity There were no clinical signs of toxicity.
Acute dermal toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♀ Low toxicity There were no clinical signs of toxicity.
Acute inhalation toxicity Wistar rats	LC_{50} > 5.35 mg/L - ♂/♀ Low toxicity There were no clinical signs of toxicity.
Eye irritation New Zealand White rabbits	MAS = 0/110 MIS = 2/110 at 1 hr Non-irritating
Dermal irritation New Zealand White rabbits	MAS = 0/8 MIS = 1/8 at 1 hr Non-irritating
Dermal sensitization CBA/J mice PMRA 3070950	Negative
Acute toxicity studies – GF-3206 Herbicide	
Acute oral toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♀ Low toxicity There were no clinical signs of toxicity.

Study type/Animal/PMRA#	Study results
Acute dermal toxicity Wistar rats	LD_{50} > 5000 mg/kg bw - ♂/♀ Low toxicity There were no clinical signs of toxicity.
Acute inhalation toxicity Wistar rats	LC_{50} > 5.40 mg/L - ♂/♀ Low toxicity There were no clinical signs of toxicity.
Eye irritation New Zealand White rabbits PMRA# 3067787	MAS = 2/110 MIS = 4/110 at 1 hr Minimally irritating
Dermal irritation New Zealand White rabbits PMRA# 3067788	$MAS_{24\text{-}72hrs}$ = 0.67/8 Slightly irritating
Dermal sensitization - Buehler Hartley Guinea Pigs PMRA# 3067789	Negative

Table 5 Toxicity profile of technical Florpyrauxifen-benzyl

Effects observed in both sexes are presented first followed by sex-specific effects in males, then females, each separated by semi-colons. Organ weight effects reflect both absolute organ weights and relative organ to bodyweights unless otherwise noted. Effects seen above the LOAEL(s) have not been reported in this table for most studies for reasons of brevity.

Study type/Animal/PMRA#	Study results
Metabolism	Absorption, distribution, metabolism and excretion were investigated primarily in F344/NTac rats with florpyrauxifen-benzyl radiolabelled on the phenyl ring at dose levels of 10 mg/kg bw (single low and repeat low dose) and 300 mg/kg bw (single high dose). In a preliminary study in rats, female rabbits and mice, it was determined that no to small amounts of radioactivity were found in the expired air and carcass of rats and mice. There were distinct sex differences between male and female

Study type/Animal/PMRA#	Study results
	rats, and female rats and rabbits exhibit an apparent enterohepatic recirculation resulting in higher C_{max} and AUC values than in the male rat. The feces was the primary route of excretion in the male and female rats, the urine was the primary route of excretion in the female rabbit and excretion was balanced between urine and feces in mice. In an ADME study in F344 rats, florpyrauxifen-benzyl (XDE-benzyl ester) was rapidly but incompletely absorbed and excreted without tissue retention. There were few sex differences; however, there was an apparent saturation of absorption between 10 and 300 mg/kg bw. There was evidence of biphasic elimination in the plasma, but not in the red blood cells. Elimination was complete and rapid. The primary route of elimination was the feces and comprised a greater proportion on the recovered dose at the high dose than at the low dose. The majority of the urinary excretion occurred within the first 12 hrs and the majority of the fecal excretion occurred within the first 24 hrs. Major metabolites were the unmetabolized florpyrauxifen-benzyl in the feces and X11438848 (florpyrauxifen acid) in the urine, with parent found at up to 93% of the administered dose in the feces at high dose. No parent or associated o-demethylations of the parent were found in the urine. In the feces, 2.6–5.9% of the administered dose was found as X11438848 after low or repeat dosing; however, no X11438848 was found following the high dose. O-demethylation of the parent accounted for 1.7–10.6% of the administered radioactivity found in the feces. In a tissue distribution study on F344 rats, based on the comparisons of residual radioactivity between low and high doses and Cmax and ½Cmax, there was no evidence of major sex differences or bioaccumulation. There was evidence of saturation of absorption at some point between 10 and 300 mg/kg bw. The highest concentrations of residual radioactivity occurred in the plasma, GI tract, bladder, kidneys, liver and lungs. Levels in all these tissues were lower at ½Cmax than at Cmax. In a preliminary investigation of biliary excretion, excretion via the urine and bile was low. It was higher in males than in females and higher in urine than in bile in both sexes. In conjunction with the main ADME study, which showed low tissue retention and elimination primarily in the feces, this study indicates that absorption was low and that biliary excretion did not contribute significantly to the fecal excretion.
In vitro comparative metabolism study Liver microsomes	Supplemental study – non-guideline In an in vitro study, the metabolism of XDE-848 BE was compared between mouse, rat, rabbit, dog and human liver microsome cultures. There were no

Study type/Animal/PMRA#	Study results
	major species differences and no human-specific metabolites. The active ingredient was found at below 4% of the administered dose and the major metabolite in the toxicology studies, XDE-848 acid (X11438848), accounted for 69 – 98% of the administered dose. The enzyme activity in all cultures was low compared to that achieved by the vendor, with the human microsomal activity at 40% that of the vendor.
Acute studies	
Acute oral toxicity Wistar rats	LD_{50} > 5000 mg/kg bw ♀ Low toxicity There were no clinical signs of toxicity
Acute dermal toxicity Wistar rats	LD_{50} > 5000 in ♂/♀ Low toxicity There were no clinical signs of toxicity
Acute inhalation toxicity F322/DuCrl rats	LC_{50} > 5.23 mg/L in ♂/♀ Low toxicity Urine staining in females until Day 3 and initial body weight loss with recovery by Day 8
Eye irritation NZW rabbits	MAS = 0.89/110 MIS = 2/110 at 1 and 24 hrs Minimally irritating
Skin irritation NZW rabbits	MAS = 0/8 MIS = 0.67/8 at 1 hr Non-irritating
Dermal sensitization – LLNA CBA/J mice	Dermal sensitizer
Short-term studies	
7-day dietary palatability probe F344/DuCrl rats and Crl:CD1(ICR) mice	There were no treatment-related findings in this study.

Study type/Animal/PMRA#	Study results
28-day mouse dietary Cr1:CD1(ICR) Mice	NOAEL = 1000 mg/kg bw/day (1025/979 mg/kg bw/day ♂/♀) LOAEL = not established There were no treatment-related adverse findings in this study There was no evidence of increased micronucleated reticulocytes. XR-848 was not detected in the blood of males or females, but was detected in small amounts in the urine. The metabolite, X11438848, was detected in both the blood and urine with a sublinear increase with dose in the blood and a linear increase with dose in the urine.
90-day mouse dietary Cr1:CD1(ICR) Mice	NOAEL = 303 mg/kg bw/day ♀; 1003 mg/kg bw/day ♂ LOAEL = 1012 mg/kg bw/day ♀; not established ♂ Effects at the LOAEL: ↓ bw /bwg ♀ No blood levels of florpyrauxifen-benzyl, urine levels were apparently sublinear. The acid metabolite was apparently linear in blood and urine, concentrations were an order of magnitude higher in urine than in blood.
28-day rat dietary F344/DuCrl Rats	NOAEL = 1065/1043 mg/kg bw/day in ♂/♀ LOAEL - not established There were no treatment-related adverse findings in this study Florpyrauxifen-benzyl was linear in urine in males and females and the acid metabolite was sublinear in blood and urine in females at approximately 500 mg/kg bw/day and sublinear in blood at approximately 500 mg/kg bw/day and in urine at approximately 1000 mg/kg bw/day in males.
90-day rat dietary F344/DuCrl Rats	NOAEL = 1055/1018 mg/kg bw/day in ♂/♀ LOAEL = not established There were no treatment-related adverse findings in this study No evidence of immunotoxicity Florpyrauxifen-benzyl was apparently linear in urine in males and females and metabolite is sublinear in blood and urine in females at approximately 300 mg/kg bw/day and sublinear in blood at approximately 300 mg/kg bw/day and in urine at approximately 1000 mg/kg bw/day in males.
21/28-day dietary palatability and range-finding Beagle dogs	Supplementary – range finding study One mortality – considered due to extensive degeneration and necrosis of the muscle fibres. May be related to epilepsy; determined to be unrelated to treatment

Study type/Animal/PMRA#	Study results
	30 000 ppm: bw loss on day 14 Limitations: No control group
90-day dietary Beagle dogs	NOAEL = 30 000 ppm (1008/1216 mg/kg bw/day in ♂/♀) LOAEL – not established There were no treatment-related adverse findings in this study Metabolite X11438848 was found at much higher concentrations than florpyrauxifen-benzyl. Dose proportionality was apparently lost at 10 000 ppm, except for florpyrauxifen-benzyl in urine of males where dose proportionality was apparently lost at 30 000 ppm.
28-day dermal F344/DuCrl Rats	NOAEL = 1000 mg/kg bw/day in ♂/♀ LOAEL – not established There were no treatment-related adverse findings in this study Florpyrauxifen-benzyl not found in blood but is found in the urine. The metabolite X11438848 was found in both the blood and urine and florpyrauxifen-benzyl was found in the urine
Chronic toxicity/Oncogenicity studies	
18-month dietary Crl:CD1(ICR) mice	NOAEL ♂ = 200 mg/kg bw/day LOAEL ♂ = 1001 mg/kg bw/day NOAEL ♀ = 803 mg/kg bw/day LOAEL ♀ - not established Effects at the LOAEL: ↓bw/bwg, fe, ↑ severity of extramedullary haematopoiesis ♂ Toxicokinetics: No florpyrauxifen-benzyl was found in blood of males or blood or urine of females. Apparently sublinear kinetics occurred at the high dose in males and females at 6 months, apparently linear kinetics was observed in females at 12 months, and sublinear kinetics was observed at approximately 200–1000 mg/kg bw/day in males at 12 months. Urine levels of the acid metabolite were an order of magnitude higher than blood, except in the 12 month females where urine was sixfold higher than blood. Females were less susceptible to saturation. **No evidence of oncogenicity**

Study type/Animal/PMRA#	Study results
Two-year dietary chronic toxicity/oncogenicity F344/DuCrl Rats	NOAEL = 303/304 mg/kg bw/day in ♂/♀, the highest dose tested LOAEL - not established There were no treatment-related adverse findings in this study Toxicokinetics: No florpyrauxifen-benzyl was found in the blood. Increases in the urine were apparently linear in males and females; however, urine concentrations at 6 months were higher in females at approximately 50 and 300 mg/kg bw/day. Blood levels of the acid metabolite were sublinear at approximately 200 mg/kg bw/day after 6 months of treatment and at approximately 50 mg/kg bw/day after 12 months of treatment in males and females. Urine levels of the metabolite were sublinear at approximately 300 mg/kg bw/day at both time points in males and females with concentrations higher in females than males at all doses. **No evidence of carcinogenicity**
Developmental/ Reproductive toxicity studies	
One-generation reproductive dietary toxicity Crl:CD(SD) rats	Supplemental – Range-finding study No parental findings at highest dose tested No reproductive findings at highest dose tested No offspring findings at highest dose tested Toxicokinetics in blood and milk Florpyrauxifen-benzyl was not found in any of the blood samples in parents or pups but was found at low concentrations in the milk. Toxicokinetics were sublinear at approximately 1000 mg/kg bw/day in milk. The acid metabolite was found in all treated groups. The dose of florpyrauxifen-benzyl was 40% higher in females, but concentrations of the acid metabolite were twice as high in females than in males. Blood concentrations of the acid metabolite in pups was an order of magnitude lower than in parents. Toxicokinetics were sublinear at approximately 300 mg/kg bw/day in parents and milk and approximately 1000 mg/kg bw/day in offspring.
Two-generation reproductive dietary toxicity	Parental NOAEL = 300 mg/kg bw/day in ♂/♀, the highest dose tested Parental LOAEL – not established Reproductive NOAEL = 300 mg/kg bw/day in ♂/♀, the highest dose tested

Study type/Animal/PMRA#	Study results
Crl:CD(SD) Rats	Reproductive LOAEL – not established Offspring NOAEL = 300 mg/kg bw/day in ♂/♀, the highest dose tested Offspring LOAEL – not established There were no treatment-related adverse findings in this study Toxicokinetics in blood and milk. Parental generations: Florpyrauxifen-benzyl was only found in the high dose in blood samples; however, it was found at the mid-dose and above in the milk in the F0 generation and in all treated groups in the milk in the F1 generation. Milk concentrations were apparently linear and much higher than dam blood concentrations. The acid metabolite, X11438848, was found in all treated groups in dams and milk. Levels were sublinear at approximately 300 mg/kg bw/day. Concentrations in the blood of dams were twice those in the milk. Offspring: Florpyrauxifen-benzyl was not found in males or females of either generation. In F1 generation, the acid metabolite, X11438848, had sublinear kinetics in males at approximately 300 mg/kg bw/day and linear kinetics in females. In F2 generation, levels were sublinear in males and females at approximately 300 mg/kg bw/day. Blood concentrations of the metabolite were an order of magnitude lower in pups than in dams and much lower than milk concentrations.
Rat developmental toxicity (dietary) Crl:CD(SD) rats	Supplemental – Range-finding study Maternal toxicity – No treatment-related findings. Developmental toxicity: Not assessed Florpyrauxifen-benzyl was not found in either the dams or fetuses. The acid metabolite, X11438848, was found in both dams and fetuses indicating systemic exposure through the placenta, although the levels were lower in fetuses than the dams and dose-proportionality was apparently sublinear at the high dose.

Study type/Animal/PMRA#	Study results
Rat developmental toxicity (dietary) Crl:CD(SD) Rats	Maternal NOAEL = 975 mg/kg bw/day Maternal LOAEL – not established Developmental NOAEL = 975 mg/kg bw/day Developmental LOAEL – not established There were no treatment-related adverse findings in this study Toxicokinetics performed; No florpyrauxifen-benzyl was found in the blood samples. The acid metabolite, X11438848, was found in both dams and fetuses; however, it was found in dams at 1.75-fold the levels as fetuses
7 -14 day dietary New Zealand White Rabbits	Supplemental - Palatability study 13 500 ppm: inconsistent bw loss and gain, overall bw loss at end of study 27 000 ppm: consistent bw loss, ↓ fc compared to 13 500 ppm animals, ↓ feces Limitations: No control group
Rabbit developmental toxicity study (dietary) New Zealand White rabbits	Supplemental – Range-finding study Maternal toxicity: ↓ bwg during gestation Developmental toxicity: Not assessed Florpyrauxifen-benzyl was not found in either the dams or fetuses. The acid metabolite, X11438848, was found in both dams and fetuses indicating systemic exposure through the placenta, although the levels were lower in fetuses than the dams. Dose-proportionality was approximately sublinear at the high dose in dams and apparently linear in fetuses.
Rabbit developmental toxicity study (dietary) New Zealand White Rabbits	Maternal NOAEL = 1042 mg/kg bw/day Maternal LOAEL – not established Developmental NOAEL = 1042 mg/kg bw/day Developmental LOAEL – not established There were no treatment-related adverse findings in this study Toxicokinetics performed; No florpyrauxifen-benzyl was found in the blood samples. The acid metabolite, X11438848, was found in dams at 10-fold the levels as in the fetuses.

Study type/Animal/PMRA#	Study results
Genotoxicity studies	
Bacterial reverse mutation assay Salmonella typhimurium (TA1537, TA1535, TA98, TA100 and TA102)	Negative ± S9 Tested up to the limit dose
Bacterial reverse mutation assay Salmonella typhimurium (TA1537, TA1535, TA98, TA100 and TA102)	Negative ± S9 Tested up to the limit dose
In vitro forward mutation assay in mammalian cells CHO/HGPRT	Negative ± S9 Tested up to the limit of solubility
In vitro forward mutation assay in mammalian cells CHO/HGPRT	Negative ± S9 Tested up to the limit of solubility
In vitro chromosomal aberration assay Rat lymphocytes	Negative ± S9 Tested up to the limit of solubility
In vitro chromosomal aberration assay Rat lymphocytes	Negative ± S9 Tested up to the limit of solubility
Special studies	
Photoxicity assay BALB/c 3T3 cells	Negative Tested up to the limit of solubility
Neurotoxicity studies	
Acute neurotoxicity study	Waiver request was accepted based on the following: • Chemical family does not have neurotoxic properties • Low acute toxicity • No neurotoxicity in 90-d rat study with extended FOB and histology • No neurotoxicity in reproductive toxicity studies in pups • No neurotoxicity findings in the rest of the database Waiver request was considered acceptable.

Table 6 Toxicology reference values for use in health risk assessment for Florpyrauxifen-benzyl

Exposure scenario	Study	Point of departure and endpoint	CAF[1] or target MOE
Acute dietary	Establishment of an acute reference dose is not required, as an endpoint of concern attributable to a single exposure was not identified in the oral toxicity studies.		
Repeated dietary	18-month dietary oncogenicity study in mice	NOAEL = 200 mg/kg bw/day ↓ bw, bwg	100
-	ADI = 2 mg/kg bw/day		
Short- and intermediate-term dermal	28-day dermal study in rats	NOAEL = 1000 mg/kg bw/day (HDT) No treatment-related effects	100
Short- and intermediate-term inhalation[2]	Co-critical studies 90-day dietary study in mice Dietary reproductive toxicity study in rats	NOAEL = 300 mg/kg bw/day Mice: ↓ bw, bwg Reproductive toxicity: no effects observed at HDT	100
Short-term non-dietary (incidental oral)	Co-critical studies 90-day dietary study in mice Dietary reproductive toxicity study in rats	NOAEL = 300 mg/kg bw/day Mice: ↓ bw, bwg Reproductive toxicity: no effects observed at HDT	100
Short- and intermediate-term aggregate Incidental oral and inhalation	Incidental oral: 90-day mouse dietary toxicity study Inhalation: 90-day mouse dietary toxicity study	Common endpoint: bw effects Incidental oral: NOAEL = 300 mg/kg bw/day Inhalation: NOAEL = 300 mg/kg bw/day	100
Cancer	There was no evidence of tumourigenicity and therefore, a cancer risk assessment is not necessary.		

[1] CAF (composite assessment factor) refers to a total of uncertainty and PCPA factors for dietary assessments; MOE (margin of exposure) refers to a target MOE for occupational and residential assessments.
[2] Since an oral NOAEL was selected, an inhalation absorption factor of 100% (default value) was used in route-to-route extrapolation

Table 7 AHETF/PHED Unit exposure values for mixer/loaders and applicators handling GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide (µg/kg a.i. handled)

Exposure scenario and PPE		Dermal	Inhalation[1]
PPE: Single layer and chemical-resistant gloves			
Mixer/loader AHETF estimates			
A	Open Mix/Load Dry Flowable	84.14	21.8
B	Open Mix/Load Liquids	58.5	0.63
Applicator AHETF/PHED estimates			
C	Open Cab Groundboom Application	25.4	1.68
D	Closed Cockpit Aerial Liquid Application	2.67	0.00969
E	PHED Scenario 18: Right-of-way Sprayer	872.54	5
Mixer/loader + applicator AHETF/PHED estimates			
F	PHED Scenario 21a: Liquid/Open Pour/Manually Pressurized Handwand[2] M/L/A	943.37	45.2
G	PHED Scenario 23a: Liquid/Open Pour/Backpack M/L/A	5445.85	62.1
H	PHED Scenario 24a: Liquid/Open Pour/Mechanically Pressurized Handgun[2] M/L/A	5585.49	151
A+C	AHETF: Open M/L DF + Open Cab Groundboom A	109.54	23.48
B+C	AHETF: Open M/L Liquid + Open Cab Groundboom A	83.9	2.31
A+E	AHETF/PHED: Open M/L DF + Right-of-way Sprayer A	956.68	26.8
B+E	AHETF/PHED: Open M/L Liquid + Right-of-way Sprayer A	931.04	5.63
A+F	AHETF/PHED: Open M/L DF + Liquid/Open Pour/ Manually Pressurized Handwand M/L/A[4]	1027.51	67
A+G	AHETF/PHED: Open M/L DF + Liquid/Open Pour/Backpack M/L/A[3]	5529.99	83.9
A+H	AHETF/PHED: Open M/L DF + Liquid/Open Pour/ Mechanically Pressurized Handgun M/L/A[3]	5669.63	172.8

M = mixer, L = loader, A = applicator

[1] Light inhalation rate (except for backpack – moderate inhalation rate)

[2] It is noted that in the PHED Tables, manually pressurized handwand is referred to as "low pressure handwand" and mechanically pressurized handgun is referred to as "high pressure handwand".

[3] Since the exposure from mixing, loading and applying a dry flowable by backpack, manually pressurized handwand, and mechanically pressurized handgun is not available from the PHED tables, the unit exposure values used in this assessment were estimated from the MLA of a liquid by backpack, manually pressurized handwand or mechanically pressurized handgun AND the ML of a dry flowable. As such, it is an overestimation of exposure.

Table 8 AHETF/PHED/ORETF unit exposure values for mixer/loaders and applicators handling GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide (µg/kg a.i. handled)

Exposure scenario and PPE		Dermal	Inhalation[1]
PPE: Single layer and chemical-resistant gloves			
Mixer/loader AHETF estimates			
A	Open Mix/Load Liquids	58.5	0.63
Applicator AHETF estimates			
B	Open Cab Groundboom Application[2]	25.4	1.68
Mixer/loader + applicator AHETF/PHED/ORETF estimates			
A+B	AHETF: Open M/L + Open Cab Groundboom A	83.9	2.31
C	PHED Scenario 21a: Liquid/Open Pour/Low Pressure Handwand M/L/A	943.37	45.2
D	PHED Scenario 23a: Liquid/Open Pour/Backpack M/L/A	5445.85	62.1
E	ORETF: Low pressure nozzle gun sprayer - liquid flowable M/L/A (OMA002)[3]	785	4

M = mixer, L = loader, A = applicator
[1] Light inhalation rate
[2] Surrogate for boom-type application
[3] Surrogate for handgun application

Table 9 Mixer/Loader/Applicator risk assessment for GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide

Exposure scenario		Route of exposure	Unit exposure values[1] (µg/kg a.i. handled)	ATPD or VTPD[2]	Rate (kg a.i./ha)[3]	Daily exposure[4] (mg/kg bw/day)	MOE[5]
PPE: Single layer and chemical-resistant gloves							
M/L/A Risk assessment for Milestone NXT Herbicide (wettable granule formulation)							
A+C	AHETF: Open M/L DF + Open Cab Groundboom A	Dermal	109.54	360 ha/day	0.012	5.92E-03	169 000
		Inhalation	23.48			1.27E-03	237 000
A	AHETF: Open M/L DF (for aerial application)	Dermal	84.14	400 ha/day	0.012	5.05E-03	198 000
		Inhalation	21.8			1.31E-03	229 000

Exposure scenario		Route of exposure	Unit exposure values[1] (µg/kg a.i. handled)	ATPD or VTPD[2]	Rate (kg a.i./ha)[3]	Daily exposure[4] (mg/kg bw/day)	MOE[5]
D	AHETF: Closed Cockpit Aerial A	Dermal	2.67	400 ha/day	0.012	1.60E-04	6 240 000
		Inhalation	0.00969			5.81E-07	516 000 000
A+E	AHETF: Open M/L DF + Right-of-way Sprayer A	Dermal	956.68	3800 L/day	0.012	5.45E-03	183 000
		Inhalation	26.8			1.53E-04	1 960 000
A+F	AHETF/PHED: Open M/L DF + Liquid/Open Pour/Manually Pressurized Handwand M/L/A	Dermal	1027.51	150 L/day	0.012	2.31E-04	4 330 000
		Inhalation	67.00			1.51E-05	19 900 000
A+G	AHETF/PHED: Open M/L DF + Liquid/Open Pour/Backpack M/L/A	Dermal	5529.99	150 L/day	0.012	1.24E-03	804 000
		Inhalation	83.9			1.89E-05	19 900 000
A+H	AHETF/PHED: Open M/L DF + Liquid/Open Pour/Mechanically Pressurized Handgun M/L/A	Dermal	5669.63	3800 L/day	0.012	3.23E-02	30 900
		Inhalation	172.8			9.85E-04	305 000
M/L/A Risk Assessment for GF-3206 Herbicide (Solution Formulation) (See NOTE below)							
B+C	AHETF: Open M/L Liquid + Open Cab Groundboom A	Dermal	83.9	360 ha/day	0.06	2.27E-02	44 144
		Inhalation	2.31			6.24E-04	481 000
B	AHETF: Open M/L Liquid (for aerial application)	Dermal	58.5	400 ha/day	0.06	1.76E-02	57 000
		Inhalation	0.63			1.89E-04	1 590 000
D	AHETF: Closed Cockpit Aerial A	Dermal	2.67	400 ha/day	0.06	8.01E-04	1 250 000
		Inhalation	0.00969			2.91E-06	103 000 000
B+E	AHETF/PHED: Open M/L Liquid + Right-of-way Sprayer A	Dermal	931.04	3800 L/day	0.06	2.65E-02	37 700
		Inhalation	5.63			1.60E-04	1 870 000
F	PHED Scenario 21a: Liquid/Open Pour/Manually Pressurized Handwand M/L/A	Dermal	943.37	150 L/day	0.06	1.06E-03	942 000
		Inhalation	45.2			5.09E-05	5 900 000
G	PHED Scenario 23a: Liquid/Open Pour/Backpack M/L/A	Dermal	5445.85	150 L/day	0.06	6.13E-03	163 000
		Inhalation	62.1			6.99E-05	4 290 000
H		Dermal	5585.49	3800 L/day	0.06	1.59E-01	6280

Exposure scenario		Route of exposure	Unit exposure values[1] (µg/kg a.i. handled)	ATPD or VTPD[2]	Rate (kg a.i./ha)[3]	Daily exposure[4] (mg/kg bw/day)	MOE[5]
	PHED Scenario 24a: Liquid/Open Pour/Mechanically Pressurized Handgun M/L/A	Inhalation	151			4.30E-03	69 700

NOTE: The risk assessment for GF-3206 Herbicide (solution formulation) is sufficient to cover the M/L/A risk for Restore NXT Herbicide (solution concentrate), which has a maximum application rate of 0.012 kg a.i./ha.
ATPD = Area treated per day; VTPD = Volume treated per day; MOE = Margin of exposure
[1] Dermal or inhalation unit exposure values based on AHETF/PHED from Appendix I, Table 1
[2] Default Area Treated per Day table (2021-09-14)
[3] Rates of 0.012 kg a.i./ha and 0.06 kg a.i./ha are equivalent to 0.00954 kg a.e./ha and 0.0479 kg a.e./ha, respectively.
[4] Exposure from groundboom and aerial application = (Unit exposure values × ATPD × Rate) / (80 kg bw × 1000 µg/mg)
Exposure from handheld methods = (Unit exposure values × VTPD ÷ Min. Water Volume × Rate) / (80 kg bw × 1000 µg/mg)
where minimum water volume is 100 L/ha
5 For dermal MOEs: based on NOAEL = 1000 mg/kg bw/day; Target MOE = 100
For inhalation MOEs; based on NOAEL = 300 mg/kg bw/day; Target MOE = 100

Table 10 Mixer/Loader/Applicator risk assessment for GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

Exposure scenario		Route of exposure	Unit exposure values[1] (µg/kg a.i. handled)	ATPD or VTPD[2]	Rate[3] (kg a.i./ha m or kg a.i./ha)	Daily exposure[4] (mg/kg bw/day)	MOE[5]
PPE: Single layer and chemical-resistant gloves							
In-water application							
A	Open Mix/Load Liquids	Dermal	58.5	20 ha/day	0.5	0.0293	34 200
		Inhalation	0.63			0.0003	952 000
A+B	Open M/L + Open Cab Groundboom A	Dermal	83.9	20 ha/day	0.5	0.0429	23 800
		Inhalation	2.31			0.0012	260 000
Foliar application							
A+B	Open M/L + Open Cab Groundboom Application	Dermal	83.9	10 ha/day	0.06	0.0006	1 590 000
		Inhalation	2.31			0.000017	17 300 000

Exposure scenario		Route of exposure	Unit exposure values[1] (µg/kg a.i. handled)	ATPD or VTPD[2]	Rate[3] (kg a.i./ha m or kg a.i./ha)	Daily exposure[4] (mg/kg bw/day)	MOE[5]
C	Liquid/Open Pour/ Manually Pressurized Handwand M/L/A	Dermal	943.37	150 L/ day	0.06	0.0005	1 880 000
		Inhalation	45.2			0.000025	11 800 000
D	Liquid/Open Pour/Backpack M/L/A	Dermal	5445.85	150 L/day	0.06	0.0031	326 000
		Inhalation	62.1			0.000035	8 590 000
E	Low pressure nozzle gun sprayer - liquid flowable M/L/A	Dermal	785	2 ha/day	0.06	0.0012	849 000
		Inhalation	4			0.000006	50 000 000

M/L = mixer/loader; M/L/A = mixer/loader/applicator; MOE = Margin of exposure
[1] Dermal and inhalation unit exposure values based on AHETF/PHED/ORETF from Appendix I, Table 2
[2] Area Treated Per Day (ATPD) from DACO 5.2 (PMRA# 3168301)
Volume Treated per Day (VTPD) from Default ATPD table (2021-09-14)
[3] Rates of 0.5 kg a.i./ha m and 0.06 kg a.i./ha are equivalent to 0.397 kg a.e./ha m and 0.048 kg a.e./ha
[4] For in-water application: Exposure = (Unit exposure values × ATPD × max depth of 4 m × Rate) / (80 kg bw × 1000 µg/mg)
For foliar application: (Unit exposure values × ATPD × Rate) / (80 kg bw × 1000 µg/mg) or
(Unit exposure values × VTPD ÷ Min water volume of 200 L/ha × Rate) / (80 kg bw × 1000 µg/mg)
[5] For dermal MOEs: based on NOAEL = 1000 mg/kg bw/day; Target MOE = 100
For inhalation MOEs; based on NOAEL = 300 mg/kg bw/day; Target MOE = 100

Table 11 Postapplication worker exposure and risk estimate for Florpyrauxifen-benzyl on Day 0 after the last application of GF-3206 Herbicide, Milestone NXT Herbicide and Restore NXT Herbicide

Postapplication activity	Peak DFR[1] (µg/cm²)	TC[2] (cm²/hr)	Dermal exposure[3] (mg/kg bw/day)	MOE[4]	REI[5]
Scouting pasture, rangeland, and non-crop areas	0.15	1100	0.0165	60600	12 hours for pasture and rangeland; until sprays have dried for non-crop areas

DFR = Dislodgeable foliar residue; TC = Transfer Coefficient; MOE = Margin of exposure; REI = Restricted-entry interval
[1] Calculated using the default 25% dislodgeable on the day of application and 10% dissipation per day
[2] Transfer coefficient obtained from PMRA Agricultural TCs Table (2021-09-27)
[3] Exposure = (Peak DFR [µg/cm²] × TC [cm²/hr] × 8 hours) / (80 kg bw × 1000 µg/mg)
[4] Based on a NOAEL of 1000 mg/kg bw/day, Target MOE = 100
[5] Minimum REI is 12 hours, or until sprays have dried, to allow residues to dry, suspended particles to settle and vapours to dissipate.

Table 12 Postapplication worker exposure and risk estimate for Florpyrauxifen-benzyl after the last application of GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide from removing dead debris

Postapplication activity	Peak DFR[1] (µg/cm²)	TC[2] (cm²/hr)	Dermal exposure[3] (mg/kg bw/day)	MOE[4]
Manually removing dead debris (treated aquatic vegetation) by cutter or rake	0.1518	1100	0.0167	60 000

DFR = Dislodgeable foliar residue; TC = Transfer Coefficient; MOE = Margin of exposure
[1] Calculated using the default 25% dislodgeable on the day of application and 10% dissipation per day
[2] Surrogate transfer coefficient obtained from PMRA Agricultural TCs Table (2021-09-27); based on hand harvesting cranberries by raking.
[3] Exposure = (Peak DFR [µg/cm²] × TC [cm²/hr] × 8 hours) / (80 kg bw × 1000 µg/mg)
[4] Based on a NOAEL of 1000 mg/kg bw/day, Target MOE = 100

Table 13 Postapplication worker exposure and risk estimate for Florpyrauxifen-benzyl from irrigating crops with water at residue levels of 2 ppb a.e. (2.5 ppb a.i.)

Postapplication activity	Irrigation rate[1] (L/ha/day)	App rate to crop[2] (µg/cm²/day)	Peak DFR[3] (µg/cm²)	TC[4] (cm²/hr)	Dermal exposure[5] (mg/kg bw/day)	MOE[6]
Hand detasseling seed corn, hand harvesting sweet corn	75000	0.001875	0.0080	8800	0.0070	143 000
Hand set irrigation in pop corn and field corn				1750	0.0014	717 000
Scouting barley, oats, rice and wheat				1100	0.0009	1 140 000
Girdling and turning in table/raisin grapes	60000	0.0015	0.0064	19 300	0.0123	81 300
Tying/training, hand harvesting, leaf pulling by hand of grapes (all types)				8500	0.0054	185 000
Hand harvesting, disbudding, hand pruning greenhouse cut flowers	162983	0.004075	0.0173	4000	0.0069	144 000

DFR = Dislodgeable foliar residue; TC = Transfer Coefficient; MOE = Margin of exposure

[1] For cereals: based on 7-8 mm/day of irrigation (75 000 L/ha/day) during July and August (2 months of highest usage of irrigation) from applicant-provided use information (PMRA# 3168834)

For grapes: based on a maximum irrigation rate of 6 mm/day (60 000 L/ha/day) from Government of Ontario and British Columbia use information (PMRA# 3342054, 3342055, and 3342056)

For greenhouse cut flowers: based on the peak use rate of 0.3–0.4 gallons/sq ft (122 237 – 162 863 L/ha/day) from use information according to the Centre for Agriculture, Food and the Environment of University of Massachusetts Amherst (PMRA# 3340007)

[2] App rate to crop (µg/cm²/day) = FPB concentration of irrigation water (2.5 µg a.i./L) × Irrigation rate (L/ha/day) × 1 ha / 10^8 cm^2

[3] Calculated using the default 25% dislodgeable on the day of application and 10% dissipation per day (outdoor scenario) or 2% dissipation per day (greenhouse scenario);

based on 2 months of sustained irrigation for outdoor crops and 4 months of sustained irrigation for greenhouse crops

[4] Transfer coefficients obtained from PMRA Agricultural TCs Table (2021-09-27)

[5] Exposure = (Peak DFR [µg/cm²] × TC [cm²/hr] × 8 hours) / (80 kg bw × 1000 µg/mg)

[6] Based on a NOAEL of 1000 mg/kg bw/day, Target MOE = 100

.

Table 14 Postapplication worker exposure and risk estimates for Florpyrauxifen-benzyl from irrigating turf using water immediately after treatment

Postapplication activity	Concentration of irrigation water[1] (µg a.i./L)	Irrigation rate[2] (L/ha/day)	App Rate to turf[3] (µg/cm²/day)	Peak TTR[4] (µg/cm²)	TC[5] (cm²/hr)	Dermal exposure[6] (mg/kg bw/day)	MOE[7]
Sod Farms							
Slab harvesting and transplanting/planting	190	70 000	0.133	0.0226	6700	0.0151	66 000
Mowing, watering and irrigation repair					3500	0.0079	126 000
Aerating, fertilizing, hand pruning, mechanical weeding, scouting and seeding					1000	0.0023	442 000
Golf Courses							
Transplanting/planting, mowing, watering, cup changing, irrigation repair and miscellaneous grooming	190	70000	0.133	0.0226	3500	0.0079	126 000
Maintenance – greens, tees, approaches					2500	0.0057	177 000
Aerating, fertilizing, hand pruning, mechanical weeding, scouting and seeding					1000	0.0023	442 000

TTR = Turf Transferrable Residue; TC = Transfer Coefficient; MOE = Margin of Exposure

[1] The peak Level 1 EEC for open water, for 3 in-water injection applications at 42-day RTI = 151 µg a.e./L = 190 µg a.i./L

[2] Based on golf course use information from Spain (7 mm/day = 70,000 L/ha/day) (PMRA# 3339998), which is consistent with use information about sod farms (up to 610 mm per season) from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) (PMRA# 3342058) and about golf courses in Ontario (an average of 1.7 million L/ha/season for a 208-day golfing season in Central Ontario, the region with the most golf courses and a shorter season length) (PMRA# 3342057).

[3] App rate to turf (µg/cm²/day) = FPB concentration of irrigation water × Irrigation rate (L/ha/day) × 1 ha / 10^8 cm²

[4] Calculated using the default values of 1% of the application rate and 10% dissipation per day, based on 2 months of sustained irrigation

[5] Transfer coefficients obtained from PMRA Agricultural TCs Table (2021-09-27)

[6] Exposure = (Peak TTR [µg/cm²] × TC [cm²/hr] × 8 hours) / (80 kg bw × 1000 µg/mg)

[7] Based on a NOAEL of 1000 mg/kg bw/day; Target MOE = 100

Table 15 Dermal exposure and risk estimates to the general public from golf courses irrigated with water treated with Florpyrauxifen-benzyl

Life Stage	Peak TTR[1] (µg/cm²)	TC[2] (cm²/hr)	Exposure Duration (hr/day)	Dermal Exposure[3] (mg/kg bw/day)	MOE[4]	REI
Adult (16+ yrs)	0.0226	5300	4	0.0060	170000	Not required
Youth (11 to <16 yrs)		4400	4	0.0070	140000	
Children (6 to <11 yrs)		2900	4	0.0082	120000	

TTR = Turf Transferrable Residues; TC = Transfer Coefficient; MOE = Margin of Exposure; REI = Restricted-Entry Interval
[1] Peak TTR from Table 8
[2] A single TC is representative of all activities on golf courses. TCs were obtained from the 2012 USEPA SOP for Residential Pesticide Exposure Assessment.
[3] Dermal Exposure (mg/kg bw/day) = (Peak TTR [µg/cm²] × TC [cm²/hr] × Exposure duration [hours/day]) / (Body weight [80 kg for adults; 57 kg for youth; 32 kg for children] × 1000 µg/mg)
[4] Based on a NOAEL of 1000 mg/kg bw/day; Target MOE of 100

Table 16 Risk assessment for homeowners irrigating turf with treated water

Exposure scenario	Route of exposure	Unit exposure values[1] (mg/kg a.i. handled)	ATPD[2] (m²)	Irrigation per day[3] (m)	Water conc.[4] (µg a.i/L)	Daily exposure[5] (mg/kg bw/day)	MOE[6]
Clothing scenario: Short-sleeved shirt and short pants							
Hose-end sprayer	Dermal	13.8	2000	0.0254	190	1.66E-03	6.01E+05
	Inhalation	0.075				9.05E-06	3.32E+07

[1] Residential applicator unit exposure values from the USEPA Res SOP (2012) (scenario: lawns/turf, ready-to-use, hose-end sprayer);

[2] Area Treated per Day (ATPD) from the USEPA Res SOP (2012) (scenario: lawns/turf, ready-to-use, hose-end sprayer): ½ an acre (2000 m^2) for broadcast applications. This value was further supported by data from the Outdoor Residential Pesticide Use and Usage Survey and National Gardening Association Survey (Johnson, et al., 1999), which showed that 73% of the people surveyed had lawns smaller than ½ acre. This is a more conservative value than the average Canadian lawn size of 400 m^2 (PMRA# 3342992).
[3] Amount of irrigation recommended by Health Canada (PMRA# 3340006): 2.54 cm once per week; as such, 2.54 cm of irrigation would occur in a single day.
[4] The peak Level 1 EEC from the aquatic use of 151 µg a.e./L (190 µg a.i./L)
[5] Exposure = $\frac{\text{Unit exposure value [mg/kg a.i. handled]} \times \text{ATPD } [m^2/\text{day}] \times \text{Irrigation/day [m]} \times \text{Rate [µg a.i./L]} \times 1000\ L/m^3}{(80 \text{ kg bw} \times 10^9 \text{ µg a.i./kg a.i.})}$
[6] Based on the dermal NOAEL of 1000 mg/kg bw/day, target MOE = 100; and the inhalation NOAEL of 300 mg/kg bw/day, target MOE = 100

Table 17 Postapplication dermal exposure and risk estimates to residents from turf irrigated with water treated with Florpyrauxifen-benzyl

Life Stage	Activity	Peak TTR[1] (µg/cm^2)	TC[2] (cm^2/hr)	Exposure Duration[2] (hr/day)	Dermal Exposure[3] (mg/kg bw/day)	MOE[4]
Adult (16+ yrs)	High Contact	0.00924	180000	1.5	0.031	32000
	Mowing		5500	1	0.00064	1600000
Youth (11 to <16 yrs)	Mowing		4500	1	0.00073	1400000
Children (1 to <2 yrs)	High Contact		49000	1.5	0.062	16000

TTR = Turf Transferrable Residues; TC = Transfer Coefficient; MOE = Margin of Exposure
[1] Calculated based on the application rate of 4.83×10^{-6} kg a .i./m^2 (based on the irrigation rate of 254,000 L/ha/week every 7 days for 2 months and the peak Level 1 EEC of 151 µg a.e./L (190 µg a.i./L)) and default TTR values (1% of the application rate on the day of application, and 10% daily dissipation)
[2] TCs and exposure durations were obtained from the 2012 USEPA SOP for Residential Pesticide Exposure Assessment.
[3] Dermal Exposure (mg/kg bw/day) = (Peak TTR [µg/cm^2] × TC [cm^2/hr] × Exposure duration [hours/day]) / (Body weight [80 kg for adults; 57 kg for youth; 11 kg for children] × 1000 µg/mg)
[4] Based on a NOAEL of 1000 mg/kg bw/day; Target MOE of 100

Table 18 Incidental oral exposure and risk estimates for children from lawns irrigated with water treated with Florpyrauxifen-benzyl

Activity	Pesticide residue	Surface area mouthed/Event	Exposure duration (hr/day)	N_Replen (intervals/hr)	SEF	Events per hour	Incidental oral exposure (mg/kg bw/day)[1]	MOE[2]
HtM	0.01358 mg/hr	13%	1.5	140	0.48	14	2.16E-04	14 00 000
OtM	0.00924 µg/cm²	10 cm²				9	3.88E-05	7 728 000
Soil Ingestion	0.323 µg/g	Ingestion rate = 50 mg/day					1.47E-06	200 000 000

HtM = Hand-to-Mouth; OtM = Object-to-Mouth; N_Replen = Replenishment Interval per Hour; SEF = Saliva Extraction Factor; MOE = Margin of Exposure

[1] Refer to the 2012 USEPA SOP for Residential Pesticide Exposure Assessment for the exact algorithm for each scenario.

[2] Based on a NOAEL of 300 mg/kg bw/day; Target MOE of 100.

Table 19 Postapplication dermal exposure and risk estimates to residents from gardens irrigated with water treated with Florpyrauxifen-benzyl

Life stage	Peak TTR[1] (µg/cm²)	TC[2] (cm²/hr)	Exposure duration[2] (hr/day)	Dermal exposure (mg/kg bw/day)[3]	MOE[4]
Adult (16+ yrs)	0.00304	8400	2.2	7.02E-04	1 420 000
Children (6 to <11 yrs)		4600	1.1	4.81E-04	2 080 000

TTR = Turf Transferrable Residues; TC = Transfer Coefficient; MOE = Margin of Exposure

[1] Calculated based on the application rate of 6.35×10^{-8} kg a .i./m² (based on the irrigation rate of 254,000 L/ha/week every 7 days for 2 months and the FPB concentration of 2.5 ppb a.i. in treated water) and default DFR values (25% of the application rate on the day of application, and 10% daily dissipation)

[2] TCs and exposure durations were obtained from the 2012 USEPA SOP for Residential Pesticide Exposure Assessment.

[3] Dermal Exposure (mg/kg bw/day) = (Peak DFR [µg/cm²] × TC [cm²/hr] × Exposure duration [hours/day]) / (Body weight [80 kg for adults; 32 kg for children] × 1000 µg/mg)

[4] Based on a NOAEL of 1000 mg/kg bw/day; Target MOE of 100

Table 20 Postapplication exposure and risk for swimmers in water treated with Florpyrauxifen-benzyl

Incidental oral exposure						
Subpopulation	**Water concentration (mg/L)[1]**	**Ingestion rate (L/hr)[2]**	**Exposure time (hr/day)[2]**	**Body weight (kg)[3]**	**Exposure (mg/kg bw/day)[4]**	**MOE[6]**
Adult	0.190	0.025	1	80	5.94×10^{-5}	5.05×10^{6}
Child 11 to <16	0.190	0.05	1	57	1.67×10^{-5}	1.80×10^{6}
Child 6 to <11	0.190	0.05	1	32	2.97×10^{-4}	1.01×10^{6}
Dermal Exposure						
Subpopulation	**Water Concentration (mg/L)[1]**	**Surface Area (cm^2)[3]**	**Exposure Time (hr/day)[2]**	**Body Weight (kg)[3]**	**Exposure (mg/kg bw/day)[5]**	**MOE[7]**
Adult	0.190	195 00	1	80	1.48×10^{-3}	6.74×10^{5}
Child 11 to <16	0.190	15 900	1	57	1.70×10^{-3}	5.89×10^{5}
Child 6 to <11	0.190	10 800	1	32	2.05×10^{-3}	4.87×10^{5}

[1] The peak Level 1 EEC from the aquatic use of 151 µg a.e./L (190 µg a.i./L)
[2] From the SWIMODEL (USEPA, 2003).
[3] From SPN2014-01.
[4] Incidental Oral Exposure (mg/kg bw/day) = $\frac{\text{Water concentration (mg/L)} \times \text{Ingestion Rate (L/hr)} \times \text{Exposure Time (hr/day)}}{\text{Body weight (kg)}}$
[5] Dermal Exposure (mg/kg bw/day)
$= \frac{\text{Water concentration (mg/L)} \times \text{Permeability Constant (cm/hr)} \times \text{Surface Area (cm}^2\text{)} \times \text{Exposure Time (hr/day)} \times 0.001\ \text{L/cm}^3}{\text{Body weight (kg)}}$
Where the permeability constant for florpyrauxifen-benzyl is 3.20×10^{-2} cm/hr
[6] Based on a NOAEL of 300 mg/kg bw/day; Target MOE of 100
[7] Based on a NOAEL of 1000 mg/kg bw/day; Target MOE of 100

Table 21 Aggregate exposure and risk estimates for residents and swimmers from Florpyrauxifen-benzyl

Life stage	Exposure (mg/kg bw/day)				Aggregate MOE[5]
	Inhalation[1]	Incidental oral[2]	Chronic dietary[3]	Aggregate[4]	
Adults (16+ yrs)	9.05E-06	5.94E-05	1.04E-02	1.05E-02	28 500
Youth (11 to <16 yrs)	Not applicable	1.67E-04	8.82E-03	8.99E-03	33 400
Children (6 to <11 yrs)	Not applicable	2.97E-04	1.19E-02	1.22E-02	24 600
Children (1 to <2 yrs)	Not applicable	2.16E-04	1.79E-02	1.81E-02	16 600

MOE = Margin of Exposure

[1] Inhalation exposure estimate from homeowners irrigating residential areas (Appendix I, Table 10)

[2] For adults, youth and children (6 to <11 yrs): incidental oral exposure from swimming risk assessment (Appendix I, Table 14). For children (1 to <2 yrs): incidental oral exposure (hand-to-mouth) from residential turf risk assessment (Appendix I, Table 12).

[3] Chronic dietary (food + drinking water) exposure estimates from DEEM-FCID

[4] Aggregate exposure = Inhalation Exposure + Incidental Oral Exposure + Chronic Dietary Exposure

[5] Aggregate MOE = 300 mg/kg bw/day, target MOE = 100

Table 22 Integrated food residue chemistry summary

Nature of the residue in laying hen	**PMRA# 3067614**
Species and numbers	Two groups of laying hens (Hy-Line Browns), 10 birds per group.
Radiolabel position	[PH ^{14}C]-florpyrauxifen-benzyl (specific activity: 14.9 mCi/mmol) and [PY ^{14}C]-florpyrauxifen-benzyl (specific activity: 20.1 mCi/mmol).
Average dose	Based on food consumption during the acclimatization period, the average dose level of [PH ^{14}C]-florpyrauxifen-benzyl was 12 ppm (mg a.i./kg feed) per day in the diet and [PY ^{14}C]-florpyrauxifen-benzyl was 11 ppm per day in the diet.
Treatment regimen	Orally via gelatin capsule, once daily.
Study period	14 consecutive days
Collection time	Eggs: collected twice daily (morning and evening) and the evening egg was pooled with the next morning egg to give a single sample per day. Excreta: collected twice daily (am and pm) and pooled within each group. Cage wash: once after necropsy.
Tissues collected	Liver, muscle (breast and leg), fat, and skin with subcutaneous fat.
Interval from last dose to sacrifice	9 hours
Plateau of residues in eggs	Within 8–12 days after the initiation of dosing for ^{14}C-PH-label. The ^{14}C-PY-label total radioactive residue (TRR) levels were extremely low in all egg samples, thus a plateau could not be determined.

Extraction solvents	TRR levels in eggs and the edible tissues were very low for both labels ranging from 0.001–0.005 ppm in liver, <0.001 ppm in muscle, ≤0.004 ppm or less in fat, and 0.003–0.007 ppm in skin with fat. Due to the low residue levels in the egg and tissues, residue characterization work was done only with selected excreta samples.

Matrices	**[PH ^{14}C]-florpyrauxifen-benzyl**		**[PY ^{14}C]-florpyrauxifen-benzyl**	
	TRRs (ppm)	**% of Administered Dose**	**TRRs (ppm)**	**% of Administered Dose**
Excreta (Day 1–14)	-	89.238	-	90.920
Cage Wash	1.287	0.418	1.426	0.347
Pooled Whole Eggs (Day 1–14)	-	0.001	-	0.00
Liver	0.005	0.001	**0.0010**	0.003
Fat	0.004	0.001	**0.0006**	**0.0001**
Skin with Fat	0.007	0.004	0.003	0.002
Leg Muscle	**0.0008**	**0.001**	ND	ND
Breast Muscle	ND	ND	ND	ND

Bolded values are below LOQ of 0.0017 ppm, but above the LOD of 0.00045 ppm

Summary of major identified metabolites in hen matrices	
Radiolabel position	**[^{14}C-PH], [^{14}C-PY]-florpyrauxifen-benzyl**
Metabolites identified	**Major metabolites**
Excreta	Florpyrauxifen-benzyl Florpyrauxifen acid (X11438848) Florpyrauxifen hydroxyl acid (X11966341)

Nature of the residue in lactating goat	**PMRA# 3157485**
Species and Numbers	One goat per radiolabel
Radiolabel position	[PH ^{14}C]-florpyrauxifen-benzyl (specific activity: 45.4 mCi/mmol), [PY ^{14}C]-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol) and [BE ^{14}C]-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol).
Average dose	Based on food consumption during the acclimatization period, the average dose level of [PH ^{14}C]-florpyrauxifen-benzyl was 11.3 ppm (mg a.i./kg feed) per day in the diet and [PY ^{14}C]-florpyrauxifen-benzyl and [BE ^{14}C]-florpyrauxifen-benzyl were each 10.7 ppm per day in the diet (equivalent to ~0.5× the calculated dietary burden for dairy cattle).
Treatment Regimen	Orally via gelatin capsule, once daily.
Study period	7 consecutive days
Collection time	Milk and urine: collected twice daily (morning and evening). Feces: collected once daily. Cage wash: once after necropsy.

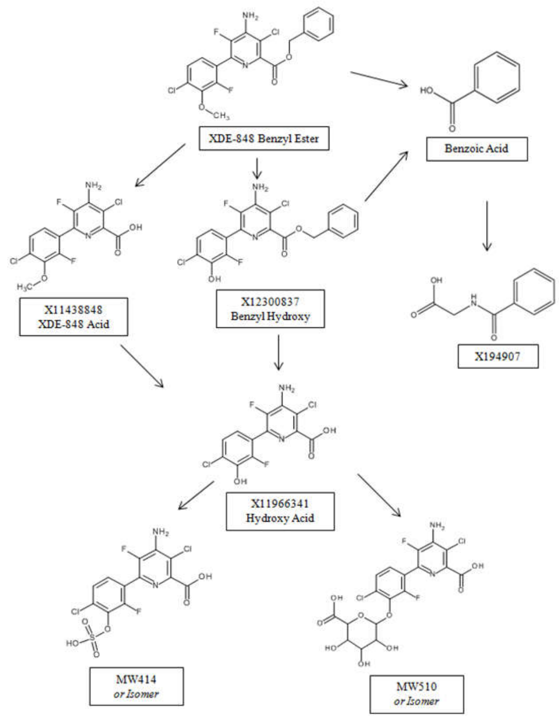
Tissues collected	Liver, muscle (loin and flank), fat (renal, omental and subcutaneous), and kidney.	
Interval from last dose to sacrifice	6–8.5 hours	
Plateau of residues in milk	During dosing, the residue levels in milk appeared to stay consistent and remained low at the end of dosing with no obvious plateau achieved with any label.	
Extraction solvents	Urine	Aliquots of urine sample were analysed directly for radioactivity by LSC and HPLC with no additional work-up.
	Feces	Methanol:water (80:20, v/v) (2×).
	Liver	Hexane followed by methanol:water (80:20, v/v) (3×)
	Kidney	Methanol:water (80:20, v/v) (3×)
	Due to the low TRR levels in the milk, muscle and fat samples, no further analyses were conducted on these commodities.	

Matrices	**[^{14}C-PH]**		**[^{14}C-PY]**		**[^{14}C-BE]**	
	TRRs (ppm)	**% of Administered dose**	**TRRs (ppm)**	**% of Administered dose**	**TRRs (ppm)**	**% of Administered dose**
Urine (total)	4.067	4.471	11.350	4.852	2.591	8.282
Feces (total)	17.80	67.83	16.13	63.48	16.99	64.25
Cage Wash	0.0406	0.0784	0.1388	0.3360	0.0608	0.0876
Muscle, flank	0.0001	0.0001	0.0003	0.0002	0.0006	0.0005
Muscle, loin	0.0001	0.0001	0.0001	0.0000	0.0004	0.0002
Fat, omental	0.0005	0.0001	0.0012	0.0001	0.0009	0.0008
Fat, subcutaneous	0.0004	0.0000	0.0010	0.0000	0.0005	0.0001
Fat, perirenal	0.0007	0.0001	0.0017	0.0001	0.0007	0.0002
Kidney	0.0135	0.0025	0.0220	0.0029	0.0205	0.0031
Liver	0.0076	0.0063	0.0164	0.0117	0.0215	0.0160
Milk (total)	0.0046	0.0035	0.0057	0.0044	0.0462	0.0447

Summary of major identified metabolites in goat matrices	
Radiolabel position	[^{14}C-PH], [^{14}C-PY], [^{14}C-BE]
Metabolites identified	Major metabolites
Excreta	Florpyauxifen-benzyl
Liver	Florpyrauxifen hydroxyl acid (X11966341)* X194907 (glycine conjugate of benzoic acid)*
Kidney	Florpyrauxifen acid (X11438848)* Florpyrauxifen hydroxyl acid (X11966341)* X194907 (glycine conjugate of benzoic acid)
*Absolute residue levels in ppm were all ≤0.01	

Proposed metabolic scheme in livestock

The metabolism of florpyrauxifen-benzyl in livestock involves cleavage of the benzyl ester to give the florpyrauxifen acid (X11438848) metabolite and benzoic acid, as well as demethylation of florpyrauxifen-benzyl ester resulting in the benzyl hydroxyl metabolite (X12300837). Either demethylation of florpyrauxifen acid or cleavage of the benzyl ester results in the hydroxyl acid metabolite (X11966341), which can subsequently undergo conjugation. No metabolites were observed that would suggest cleavage of the bond between the phenyl and pyridine rings.



Nature of the residue in sungill fish	**PMRA# 3067562**
Species and numbers	Bluegill sunfish (*Lepomis macrochirus*) - mix of juvenile males and females Number of fish per date and per sample: 12 Number of fish per replicate exposure tank: 120
Radiolabel position	[PY ^{14}C]-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol).

Average dose	The fish were continuously exposed at low- and high-dose concentrations of 2.59 µg/L (ppb) and 23.2 µg/L (ppb), respectively (equivalent to ~0.02× and 0.2× the Level I EEC of 118 ppb parent equivalents, respectively), for 16 days
Treatment regimen	The bioconcentration and depuration of [^{14}C]florpyrauxifen-benzyl ester in bluegill sunfish were investigated in a continuous flow-through system.
Study period	30 days, consisting of a 16-day uptake phase followed by a 14-day depuration phase
Collection time	During the uptake phase, water and fish were sampled at 0, 0.17, 0.33, 1, 3, 7, 9, 11, 14, and 16 days. Following the collection of all water and fish tissue samples on day 16 of the uptake phase, the depuration phase was initiated by transferring remaining fish to the appropriate depuration test chamber consisting of flowing untreated water to depurate for 14 days. During the depuration phase, water and fish were sampled at 0, 0.17, 1, 3, 7, and 14 days.
Tissues collected	The fish were dissected into fillets (edible tissue: body muscle, skin, most of the bones minus the skull) and viscera (non-edible tissue: head, internal organs, fins).
Interval from last dose to sacrifice	As the fish were continually exposed, there is no interval from last dose to sacrifice.
Plateau of residues in fish tissues – uptake phase	Concentrations in fish reached a plateau after 1–16 days of exposure (low treatment edible tissues, high treatment non-edible tissues, and whole fish) and after 3–16 days (low treatment non-edible tissues and whole fish and high treatment edible tissues).
Extraction solvents	Samples were blended and extracted with acetonitrile.

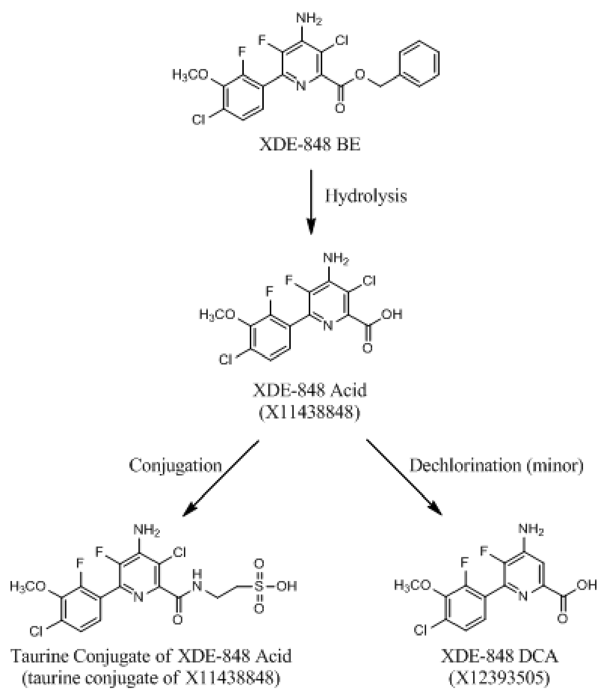
Dose (ppm)	**[^{14}C-PY]**		
	Uptake phase study day	**Mean TRRs – Fillet (ppm)**	**Mean TRRs - Viscera (ppm)**
3	0.17	48.5	452
	0.33	52.4	667
	1	115	1220
	3	63.3	1910
	7	154	1920
	9	127	1720
	11	398	1570
	14	75.5	1780
	16	63.2	1770
30	0.17	377	3920
	0.33	401	4560
	1	660	11 600

	3	1,430	12 800
	7	975	15 800
	9	1,230	13 200
	11	1,230	10 900
	14	817	12 600
	16	1,040	8600

Summary of major identified metabolites in fish matrices	
Radiolabel position	[^{14}C-PY]
Metabolites identified	Major metabolites
Fillets	Florpyauxifen-benzyl Florpyrauxifen acid (X11438848)
Viscera	Florpyrauxifen acid (X11438848)

Proposed metabolic scheme in bluegill fish

Metabolism of florpyrauxifen-benzyl (XDE-848 BE) proceeds via cleavage of the benzyl ester to give the X11438848 (florpyrauxifen acid; XDE-848 acid) metabolite, which subsequently undergoes conjugation with taurine or undergoes a minor pathway of dechlorination of the pyridinyl moiety, yielding X12393505 or XDE-848 DCA.



Freezer storage stability in animal matrices		PMRA# 3168743 and 3168745
Analyte	**Tested matrices**	**Tested intervals (days)**
Flopyrauxifen-benzyl	Milk	0, 27 and 71
	Muscle	0, 28 and 66
	Liver	0, 27 and 65
	Eggs	0, 26 and 70
	Kidney	0, 28, 29, 57 and 93
	Fat	0, 28, 57 and 93
Florpyrauxifen acid (X11438848)	Milk	0, 27 and 71
	Muscle	0, 28 and 66
	Liver	0, 27 and 65
	Eggs	0, 26 and 70

	Kidney	0, 28, 29, 57 and 93
	Fat	0, 28, 57 and 93
Florpyrauxifen Hydroxyl Acid (X11966341)	Milk	0, 27 and 71
	Muscle	0, 28 and 66
	Liver	0, 27 and 65
	Eggs	0, 26 and 70
	Kidney	0, 28, 29, 57 and 93
	Fat	0, 28, 57 and 93

Livestock feeding – Dairy cattle	**PMRA# 3168756**
Species and numbers	Four treatment groups of four dairy cows (Friesian/Holstein)
Actual dose levels	Florpyrauxifen-benzyl at 50, 250, 500 and 2250 in mg/day, equivalent to 0.071, 0.378, 0.645 and 3.119 mg/kg bodyweight, respectively or 2.58 (0.12×, dietary burden), 13.11 (0.6× dietary burden), 23.87 (~1× dietary burden) and 110.77 mg/kg (ppm) (~5× dietary burden) feed (dietary burden for dairy cattle = 21.13 ppm).
Treatment regimen	Twice per day with the test substance dissolved in acetone and mixed in the feed to yield the targeted concentration per dose group.
Study period	28–30 consecutive days
Milk collection time	Samples of whole milk were taken from each cow at each milking (PM and AM) on Days -1, 2, 6, 8, 10, 14, 18, 20, 22, 26, 28, 29, 30, 31, 33, 35, 38, 40, 42, 45, 48 and 49. For each cow, the PM and AM samples were combined for a composite sample. A portion of the Day 22 and 26 milk sample from the combined evening and morning milk yield was processed into cream and skim milk for analysis.
Interval from last dose to sacrifice	Less than 6 hours.
Tissues collected	Liver, kidney, fat (composite of omental, renal and subcutaneous), and muscle (hind leg or flank, loin and diaphragm muscle) were collected.
Depuration study	Sixteen of the cows in the highest dose group were used to generate depuration data. Depuration of residues in tissues was evaluated at 3, 7, 14 and 21 days after administration of final dose.
Analytical method	
Residues of florpyrauxifen-benzyl, florpyrauxifen acid (X11438848) and florpyrauxifen hydroxyl acid (X11966341) in liver, kidney, fat (omental, renal, and subcutaneous) and muscle (hind leg or flank, loin and diaphragm) were analysed using analytical method CAM-0137/001, which has been deemed acceptable for data-gathering and enforcement purposes.	
Storage stability	
Tissue and milk samples were stored frozen at ≤-20°C for a maximum of 91 days (3 months) from collection to analysis.	

Summary of florpyrauxifen-benzyl residue levels in the dairy cattle feeding study							
Matrices/Day	**Actual feeding level (ppm)**	**Florpyrauxifen-benzyl**		**Florpyrauxifen acid (X11438848)**		**Hydroxyl acid (X11966341)**	
		ppm		**ppm parent equivalent**		**ppm parent equivalent**	
		Max	**Mean**	**Max**	**Mean**	**Max**	**Mean**
Whole Milk/28–30	2.5	ND	ND	ND	ND	ND	ND
	12.5	ND	ND	ND	ND	ND	ND
	25.0	ND	ND	ND	ND	ND	ND
	112.5	ND	ND	**0.004**	ND	ND	ND
Muscle/28–30	2.5	ND	ND	ND	ND	ND	ND
	12.5	ND	ND	ND	ND	ND	ND
	25.0	ND	ND	ND	ND	ND	ND
	112.5	**0.006**	ND	**0.004**	ND	ND	ND
Liver/28–30	2.5	ND	ND	ND	ND	**0.005**	**0.004**
	12.5	ND	ND	ND	ND	0.032	0.025
	25.0	ND	ND	**0.003**	ND	0.068	0.048
	112.5	ND	ND	0.068	0.040	0.294	0.242
Kidney/28–30	2.5	ND	ND	**0.006**	**0.005**	**0.009**	**0.005**
	12.5	ND	ND	0.019	0.016	0.025	0.020
	25.0	ND	ND	0.051	0.036	0.055	0.046
	112.5	**0.003**	ND	0.398	0.278	0.183	0.144
Subcutaneous fat/28–30	2.5	ND	ND	ND	ND	ND	ND
	12.5	**0.003**	ND	ND	ND	ND	ND
	25.0	**0.007**	**0.005**	ND	ND	**0.003**	ND
	112.5	0.055	0.031	0.013	**0.006**	0.011	**0.005**
Perirenal fat/28–30	2.5	ND	ND	ND	ND	ND	ND
	12.5	**0.004**	ND	ND	ND	**0.009**	ND
	25.0	**0.009**	**0.005**	**0.003**	ND	**0.006**	ND
	112.5	0.050	0.036	0.020	**0.008**	0.014	**0.006**
Mesenteric fat/28–30	2.5	ND	ND	ND	ND	ND	ND
	12.5	**0.003**	ND	**0.004**	ND	**0.004**	ND
	25.0	**0.008**	**0.004**	**0.008**	ND	**0.007**	ND
	112.5	0.050	0.035	0.067	0.031	0.046	0.026
Bolded values are <LOQ but >LOD. ND = not detected; less than the LOD of 0.003 ppm							

Anticipated residues in animal matrices			
Matrices	**Residue definition**	**Dietary burden (ppm)**	**Anticipated residues of florpyrauxifen-benzyl and florpyrauxifen acid (X11438848) as parent equivalents (ppm)**
Dairy cattle			

Whole milk	Florpyrauxifen-benzyl and florpyrauxifen acid (X11438848) as parent equivalents	23	0.02
Fat			0.02
Liver			0.02
Kidney			0.06
Muscle			0.02

Nature of the residue in rice	**PMRA# 3168733**
Radiolabel position	[^{14}C]-PH-florpyrauxifen-benzyl (specific activity: 45.4 mCi/mmol) [^{14}C]-PY-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol) [^{14}C]-BE-florpyrauxifen-benzyl (specific activity: 26.9 mCi/mmol)
Treatment	
Test site	For the water-injected and foliar-flooded treatment regimes, rice (*Koshihikari variety*) was planted initially in a greenhouse and later transplanted to outdoor plots in boxes double-lined with plastic containing sandy loam soil and grown to maturity. For the dry-seeded treatment regime, the rice was directly seeded in outdoor plots and grown to maturity.
Treatment	Three typical rice planting/application scenarios were studied: • Water-injected scenario (W) - [^{14}C]-florpyrauxifen-benzyl was applied directly to the rice paddy water to simulate a rapid-release granular application; • Foliar-flooded scenario (F); and, • Dry-seeded scenario (D). For the scenarios F and D, [^{14}C]-florpyrauxifen-benzyl was foliarly applied to the rice plants. For the scenario F, the first application was performed at BBCH 11-13 to one box per radiolabel. The second application was made at BBCH 45. For the scenario D, the first application was performed at BBCH 14 and the second application was made at BBCH 45.
Total rate	Two applications of each label separately at 60–200 g a.i./ha for totals of 120 (foliar) and 400 (water-injected) g a.i./ha.
Formulation	Emulsifiable concentrate
Harvest	The immature plants for the PH-, PY- and BE-labels were harvested at BBCH 55–59, 13 days after treatment, and mature plants were harvested at BBCH 99. Due to severe phytotoxicity, the immature rice samples for the treated foliar-flooded (BE-label original plot) were harvested at BBCH 45 after only one application. Mature white rice, hulls and straw were harvested 59–70 days after the second application (BBCH 99).

Extraction solvents	Each milled sample was subjected to six sequential Accelerated Solvent Extraction (ASE) extractions, twice with 90:10 (v/v) acetonitrile:water at 50°C, twice with 50:50 (v/v) acetonitrile:water at 50°C, and twice with 10:90 (v/v) acetonitrile:water at 50°C, followed by an acidic water/acetonitrile extraction.

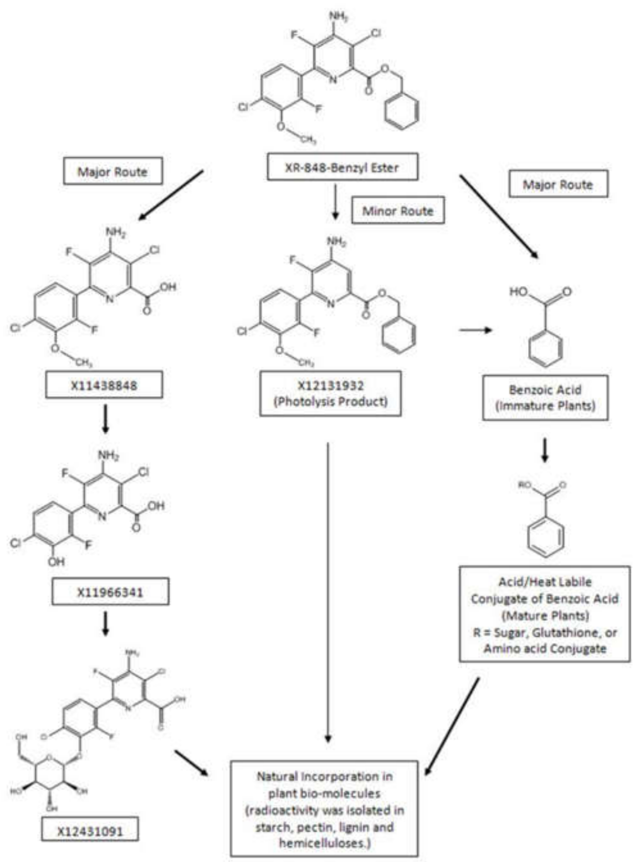
Treatment scenario	**Matrices**	**PHI (days)**	**[^{14}C-PH]**	**[^{14}C-PY]**	**[^{14}C-BE]**
			TRR (ppm)	**TRR (ppm)**	**TRR (ppm)**
Water-injected	Immature rice	13 DAT	0.046	0.052	0.054
	Straw	59–70 DAT	0.112	0.070	0.106
	Hulls		0.035	0.015	0.047
	Grain		0.015	0.019	0.061
Foliar-flooded	Immature rice	13 DAT	0.322	0.287	0.801
	Straw	59–70 DAT	1.005	1.043	2.013
	Hulls		0.392	0.312	0.084
	Grain		0.032	0.024	0.007
Dry-seeded planting	Immature rice	13 DAT	0.392	0.334	0.153
	Straw	59–70 DAT	1.101	1.699	0.480
	Hulls		0.127	0.178	0.078
	Grain		0.009	0.015	0.011

Summary of major identified metabolites in rice matrices		
Application Scenario	Radiolabel Position:	[^{14}C-PH], [^{14}C-PY], [^{14}C-BE]
	Metabolites Identified:	Major Metabolites
Water-injected	Immature rice	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Florpyrauxifen acid (X11438848)
	Mature rice straw	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Florpyrauxifen acid (X11438848)
	Mature rice hulls	Florpyrauxifen acid (X11438848)
	Mature rice grain	-
Foliar-flooded	Immature rice	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Florpyrauxifen hydroxyl acid (X11966341) Benzoic acid
	Mature rice straw	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Florpyrauxifen hydroxyl acid (X11966341) Benzoic acid conjugate
	Mature rice hulls	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Benzoic acid conjugate
	Mature rice grain	-
Foliar-dry seeded	Immature rice	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Florpyrauxifen hydroxyl acid (X11966341) Benzoic acid conjugate
	Mature rice straw	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Florpyrauxifen hydroxyl acid (X11966341)

		Benzoic acid conjugate
	Mature rice hulls	Florpyrauxifen-benzyl (XR-848 Benzyl Ester) Benzoic acid conjugate
	Mature rice grain	-

Proposed Metabolic Scheme in Rice

The metabolism florpyrauxifen-benzyl proceeds through cleavage of the benzyl ester yielding the acid X11438848 and benzoic acid. X11438848 is then metabolized to hydroxyl acid X11966341, and X11966341 is conjugated with glucose to form X12431091. In rice, benzoic acid is further conjugated into an acid/heat labile conjugate of benzoic acid. The photolysis product, X12131932, was observed in the foliar applied scenarios (foliar-flooded and dry-seeded). Metabolism proceeds further through natural incorporation of the radiolabelled carbon into natural plant constituents, such as starch, pectin, lignin, or hemicellulose.



Nature of the residue in apple	**PMRA# 3168739**
Radiolabel position	[^{14}C]-PH-florpyrauxifen-benzyl (specific activity: 36.8 mCi/mmol) [^{14}C]-PY-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol) [^{14}C]- BE-florpyrauxifen-benzyl (specific activity: 26.4 mCi/mmol)
Treatment	
Test site	The in-life and analytical phases of the study were conducted by Charles River Laboratories in Tranent, Scotland using apple trees grown outdoors.

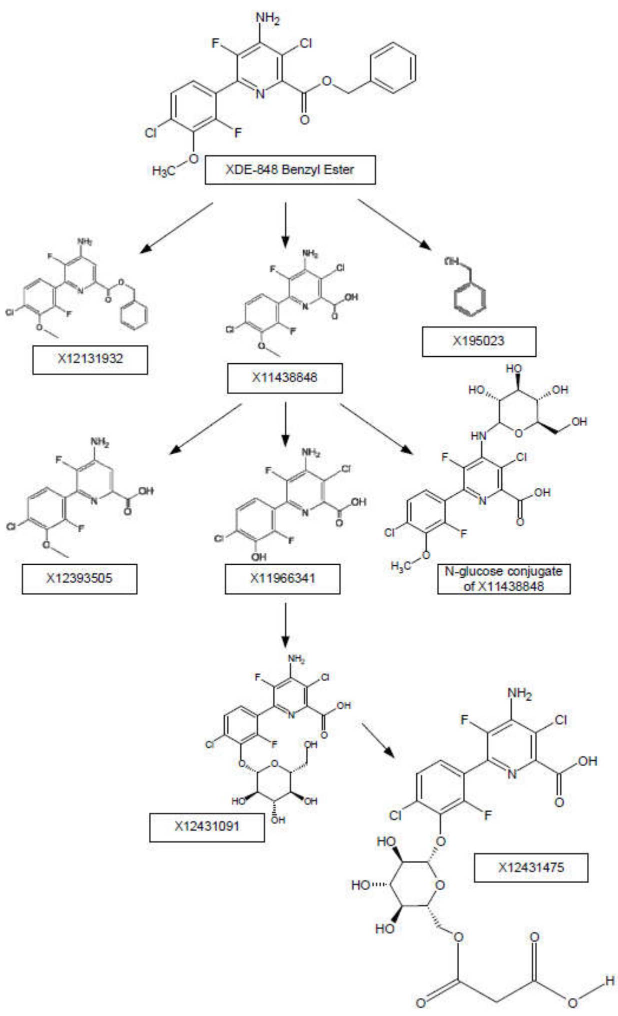
Treatment	Two applications directed to soil around the base of apple trees. The first application was made at BBCH 74 (small fruit on tree), and the second application was made at BBCH 82 (beginning of ripening) at a retreatment interval (RTI) of 30 days.
Total rate	Two applications at 39.9–42.3 g a.i./ha/application for rates totaling 81.1–83.8 g a.i./ha.
Formulation	Emulsifiable concentrate
Harvest	Samples of foliage were harvested at a 15-day PHI, and samples of foliage and fruit were harvested at maturity at a 60-day PHI.
Extraction solvents	TRR, determined by combustion/LSC, were below or near the limit of detection (<0.0003–0.001 ppm) in foliage for all labels at both PHIs and were non-detectable (<0.0003 ppm) in all samples of apple fruit from each label. As such, no extraction or identification and characterization procedures were conducted, and the metabolism of florpyrauxifen-benzyl in apple was not further investigated.
Nature of the residue in rapeseed	**PMRA# 3168738**
Radiolabel position	[^{14}C]-PH-florpyrauxifen-benzyl (specific activity: 36.8 mCi/mmol) [^{14}C]-PY-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol) [^{14}C]-BE-florpyrauxifen-benzyl (specific activity: 26.4 mCi/mmol)
Treatment	
Test site	The in-life and analytical phases of the study were conducted by Charles River Laboratories in Tranent, Scotland. Rapeseed plants were grown outdoors in plastic crates.
Treatment	A single foliar application using a handheld sprayer to rapeseed plants at the flowering stage, 64 days after planting.
Total rate	20.7–21.0 g a.i./ha
Formulation	Emulsifiable concentrate
Harvest	Samples of forage were harvested at a 21-day PHI, and samples of trash (straw including seed pods) and seed were harvested at an interim PHI of 60 days and at maturity at a 90-day PHI.
Extraction solvents	Seed samples were not subjected to extraction and analysis procedures due to low TRR levels. Samples of forage and straw were extracted 3× with ACN:water (90:10, 50:50, and 10:90, v/v).

Matrix	**PHI (days)**	**[^{14}C-PH]**	**[^{14}C-PY]**	**[^{14}C-BE]**
		TRR (ppm)	**TRR (ppm)**	**TRR (ppm)**
Forage	21	0.188	0.185	0.223
Straw	60	0.078	0.100	0.101
Seed		0.002	0.002	0.001
Straw	90	0.099	0.131	0.062
Seed		0.004	0.002	0.004

Summary of Metabolites Identified in Rapeseed.	
Matrix	**Major Metabolites (>10% of the TRR)**
	[^{14}C-PH], [^{14}C-PY], [^{14}C-BE]
Forage	N-glucose conjugate of florpyrauxifen acid (X11438848) X12431091 (glucose conjugate of the hydroxyl acid) X195023 (benzyl alcohol)
Straw (60-day PHI)	N-glucose conjugate of florpyrauxifen acid (X11438848) X12431091 (glucose conjugate of the hydroxyl acid) X12431475 (malonyl-glucose conjugate of the hydroxyl acid) X195023 (benzyl alcohol)
Straw (90-day PHI)	X12431091 (glucose conjugate of the hydroxyl acid)

Proposed metabolic scheme in rapeseed

Metabolism of florpyrauxifen-benzyl proceeds by loss of the benzyl ester to yield benzyl alcohol (X195023) and florpyrauxifen acid (X11438848) which may then be conjugated with glucose through the free amine to give the N-glucose conjugate. Significant amounts of the florpyrauxifen acid also undergo demethylation of the methoxy group to give the corresponding hydroxylated acid (11966341), which in turn forms O-glucose and O-malonyl-glucose conjugates (X12431091 and X12431475). Low levels of florpyrauxifen-benzyl and the florpyrauxifen acid in which the chlorine on the pyridine ring had been lost were also observed (metabolites X12131932 and X12393505, respectively), and arose presumably due to photolysis of the parent and acid on the plant surface. In addition, florpyrauxifen acid was further metabolized to give residues that were incorporated at low levels into natural plant constituents such as lignin and cellulose.

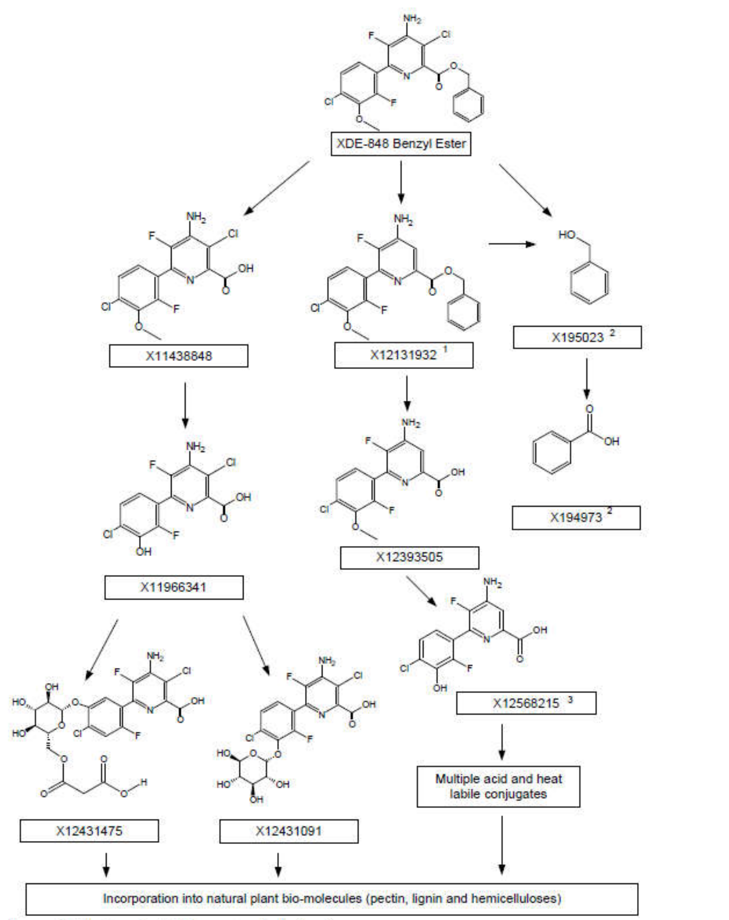


Nature of the residue in wheat	PMRA# 3168740
Radiolabel position	[^{14}C]-PH-florpyrauxifen-benzyl (specific activity: 36.8 mCi/mmol) [^{14}C]-PY-florpyrauxifen-benzyl (specific activity: 30.6 mCi/mmol) [^{14}C]-BE-florpyrauxifen-benzyl (specific activity: 26.4 mCi/mmol)

Treatment				
Test site	The in-life and analytical phases of the study were conducted by Charles River Laboratories in Tranent, Scotland. Spring wheat plants were grown outdoors in plastic crates.			
Treatment	A single foliar application to wheat plants grown outdoors at the BBCH 37 growth stage (flag leaf just visible), 58 days after planting.			
Total rate	19.8–19.9 g a.i./ha.			
Formulation	Emulsifiable concentrate			
Harvest	Samples of forage were harvested at a 1-day PHI, hay was harvested at a 15-day PHI, and samples of straw and grain were harvested at an interim PHI of 60 days and at maturity, at an 84-day PHI.			
Extraction solvents	Grain samples were not subjected to extraction and analysis procedures due to low TRR levels. Samples of forage, hay and straw were extracted 3× with ACN:water (90:10, 50:50, and 10:90, v/v); 84-day PHI straw was soaked in ACN:water (90:10, v/v) for 30 min prior to extraction.			
Matrix	**PHI (days)**	**[^{14}C-PH]**	**[^{14}C-PY]**	**[^{14}C-BE]**
		TRR (ppm)	**TRR (ppm)**	**TRR (ppm)**
Forage	1	0.493	0.492	0.564
Hay	15	0.369	0.455	0.339
Straw	60	0.258	0.266	0.261
Grain		0.003	0.004	0.002
Straw	84	0.313	0.370	0.178
Grain		0.003	0.004	0.002

Summary of metabolites identified in wheat	
Matrix	**Major metabolites (>10% of the TRR)**
	[^{14}C-PH], [^{14}C-PY], [^{14}C-BE]
Forage	Florpyrauxifen-benzyl
Hay	Florpyrauxifen-benzyl X12431091 (glucose conjugate of the hydroxyl acid)
Straw (60- and 84-day PHI)	None

Proposed metabolic scheme in wheat
Based on the results of the wheat metabolism study, following a single foliar application to wheat plants, the metabolism of florpyrauxifen-benzyl begins on the leaf surface, with the loss of the chlorine atom from the pyridine ring as a result of photolysis to yield deschloro florpyrauxifen-benzyl (X12131932). Following absorption of both the parent ester and the deschloro ester into the plants, both undergo parallel metabolism which begins with cleavage of the benzyl ester to give the florpyrauxifen acid (X11438848) and the deschloro florpyrauxifen acid (X12393505). Both of these acids then undergo demethylation of the methoxy group on the phenyl ring to give the corresponding hydroxylated acids (major metabolites X11966341 and X12568215). Both of these hydroxylated acids are then further metabolized to give acid- and heat-labile conjugates, with two of the larger X11966341 conjugates being identified as the O-glucose and O-malonyl glucose conjugates (X12431091 and X12431475). In addition, following the initial cleavage of the benzyl ester portion of the molecule, the resulting benzyl alcohol (X195023) was metabolized to give acid and/or heat labile conjugates of benzoic acid (X194973) and the benzyl alcohol. Following the initial changes described above, more extensive metabolism of the parent molecule occurs that results in the incorporation of the radiolabelled carbon into monomeric units of natural plant constituents such as lignin and cellulose.



[1] X12131932 is a known photolysis product which occurs on the leaf surface
[2] Both benzyl alcohol and benzoic acid were observed as acid and heat labile conjugates only in the BE labelled samples.
[3] X12568215 observed in minor amounts in extractable residue; major hydrolysis product formed after incubation in 1M HCl at 80°C for 1 hour.

Freezer storage stability in plant matrices			PMRA# 3168744, 3168742, 3311077	
Tested matrices	**Analytes**	**Tested intervals**	**Temperature (°C)**	**Category**
Spinach	Florpyrauxifen-benzyl and florpyrauxifen acid [X11438848] and florpyrauxifen hydroxyl acid [X11966341]	0 day and 1, 2 and 6 months	-20°C	High-water
Lettuce		0 day and 3, 6, 12, 18, 27 and 36 months	<-18°C	
Soybean seed, dried bean		0 day and 1, 2 and 6 months	-20°C	High-protein
Dried navy beans		0 day and 3, 6, 12, 18, 27 and 36 months	<-18°C	
Carrots, wheat grain		0 day and 1, 2 and 6 months	-20°C	High-starch
Rice grain		0 day and 1, 3, 6 and 12 months	-20°C	
Wheat grain, carrots		0 day and 3, 6, 12, 18, 27 and 36 months	<-18°C	
Soybean seed		0 day and 1, 2 and 6 months	-20°C	High-oil
Oilseed rape seed		0 day and 3, 6, 12, 18, 27 and 36 months	<-18°C	
Orange		0 day and 1, 2 and 6 months	-20°C	High-acid
Lemon		0 day and 3, 6, 12, 18, 27 and 36 months	<-18°C	
Rice straw		0 day and 1, 3, 6 and 12 months	-20°C	Dry commodities
Hulls, bran and flour		0 day and 1 (29 days), 3 (92 days), 6 (189 days) and 12 (365 days) months	-20°C	Processed rice commodities
Tomato juice, puree and		0 day, and 3, 6 and 12 months	<-18°C	Processed tomato, oil seed rape and wheat

paste; oil seed rape oil and meal; wheat bran, middlings, flour and shorts				commodities

Crop field trials and residue decline on grass	**PMRA# 3200049**
Crop field trials were conducted in 2016 in the United States including growing regions representative of Canada. Trials were conducted in North American growing regions 1 (1 trial), 3 (1 trial), 5 (3 trials), 6 (1 trial), 8 (1 trial), 10 (1 trial), 11 (2 trials) and 12 (2 trials) for a total of 12 trials. The treated plots received either a single foliar application of GF-3649 (suspension concentrate formulation containing florpyrauxifen-benzyl at 5.429 g a.i./L) at rates of 9.3–9.8 g a.i./ha (7.4–7.8 g a.e./ha; ~0.2× GAP) or 18.5–19.6 g a.i./ha (14.8–15.7 g a.e./ha; ~0.3× GAP). Samples were collected as follows: • Grass forage samples were collected at 0 and 6/7 days after application. • Grass hay samples were generated by cutting samples at the boot stage (BBCH 41-47), allowing them to dry in the field and collected at 6- or 7-day PHIs • At two trials, samples of grass forage were collected at additional intervals (PHIs of 0, 3, 7, 14, 21, and 27–28 days) to monitor residue decline. • Grass forage for silage production was cut at 7 days and was allowed to wilt to approximately 55–65% moisture. The number and geographic distribution of trials were generally in accordance with Health Canada's DIR2010-05. Independence of trials was assessed. Residue decline data from grass forage show that residues of florpyrauxifen-benzyl, florpyrauxifen acid and florpyrauxifen hydroxyl acid decreased with longer PHIs. Adequate storage stability data are available on diverse crop types to support the storage intervals of the grass field trials. Samples were analyzed using a validated analytical method. Given that the application rates used in the grass trials were lower than the maximum proposed rate on pasture and rangeland, and that this was the only difference in the use parameters between the GAP used in the trials and that proposed, residues from the grass trials were scaled as per the June 2015 Memo, Application of Proportionality to Crop Field Trial Residue Data as follows:	

Crop matrix	**Analyte**	**Total application rate (g a.e./ha)**	**PHI (days)**	**Residue levels (ppm)[1]**					
				n[2]	**LAFT[3]**	**HAFT[3]**	**Median[3] (STMdR)**	**Mean[3] (STMR)**	**SDEV[3]**
Forage	Florpyrauxif	48	0	12	1.46	9.03	3.51	4.22	2.2

	en-benzyl								
	Florpyrauxifen-acid			12	0.477	1.893	1.001	1.230	0.63
	Florpyrauxifen-hydroxyl acid			12	<0.03	0.0438	0.03	0.03	0.004
Hay	Florpyrauxifen-benzyl	48	6/7	12	1.359	10.665	3.18	3.813	2.7
	Florpyrauxifen-acid			12	0.456	2.70	1.352	1.357	0.58
	Florpyrauxifen-hydroxyl acid			12	0.03	1.173	0.422	0.485	0.366
Silage	Florpyrauxifen-benzyl	48	7	2	1.914	2.466	-	2.19	-
	Florpyrauxifen-acid			2	0.609	1.725	-	1.167	-
	Florpyrauxifen-hydroxyl acid			2	0.1881	0.222	-	0.205	-

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation.
[1] Expressed as parent equivalents.
[2] The application rates have been converted from g a.i./ha in the study to g a.e./ha in order to compare directly with the supported/proposed application rates using the following equation:

$$\text{Application Rate (g a. e./ha)} = \text{Application Rate (g a. i./ha)} \times \frac{\text{MW flopyrauxifen acid (g/mol)}}{\text{MW florpyrauxifen} - \text{benzyl (g/mol)}}$$

with a MW conversion factor (MWCF) from parent to acid of 0.8. The rates from the highest application rate used in the trials were then proportionality scaled to the proposed maximum application rate of 48 g a.e./ha as shown in this table. All values have been subsequently proportionately scaled.
[3] Values based on per-trial averages.

Residue data on filberts (Hazelnuts)	PMRA# 3168739

No field trials conducted on filberts according to the proposed use pattern were submitted for review. In lieu, the apple metabolism study was used to support the requested use on filberts.

In the apple metabolism study, florpyrauxifen-benzyl radiolabelled as [^{14}C]-PH-florpyrauxifen-benzyl, [^{14}C]-PY-florpyrauxifen-benzyl and [^{14}C]-BE-florpyrauxifen-benzyl was applied to apple trees grown outdoors in Scotland as two bare-soil directed treatments around the base of the trees which is the same use scenario as requested for filberts, another orchard crop. The first application was made at BBCH 74 (small fruit on tree), and the second application was made at BBCH 82 (beginning of ripening) at a retreatment interval (RTI) of 30 days. The application rates were 39.9–42.3 g a.i./ha/application totaling 81.1–83.8 g a.i./ha (equivalent to ~8.4× the supported single rate for filberts). TRRs of florpyrauxifen-benzyl and all derived metabolites, determined by combustion/LSC, were below or near the limit of detection (<0.0003–0.001 ppm) in foliage for all labels at both PHIs and were non-detectable (<0.0003 ppm) in all samples of apple fruit from each label. As such, no extraction or identification and characterization procedures were conducted, and the metabolism of florpyrauxifen-benzyl in apple was not further investigated. The results from this study demonstrated that there is very little uptake of radioactive residues from the soil and no subsequent translocation of residues in orchard trees to the edible commodity.

Based on these data, no quantifiable residues of florpyrauxifen-benzyl and/or metabolites are anticipated in the nutmeats of filberts following a single application to the soil surrounding the base of the tree when treated according to the proposed GAP. As such, the use on filberts can be supported and an MRL at the combined LOQ for florpyrauxifen-benzyl and florpyrauxifen acid (residue definition for enforcement) will be recommended.

Crop field trials and residue decline on rice	**PMRA# 3168754, 3168755, 3168746, 3168748, 3168750, 3168749, 3168747, 3168751**

The following eight rice field trial studies were submitted to support the requested aquatic use in/on water bodies which may subsequently be used to irrigate crops:

American study No. 1

Twelve trials were conducted in 2013 in growing regions 4 (7 trials), 5 (1 trial), 6 (2 trials) and 10 (2 trials). One treated plot received two foliar applications of GF-3162 (SN formulation) at 43.7–52.4 g a.i./ha for a total of 94.5–102.8 g a.i./ha (75.6–82.2 g a.e./ha) (~7× rate using water for irrigation treated at GAP). The second treated plot received two foliar applications of GF-3187 (WG formulation) at a rate of 193–219 g a.i./ha for a total of 400–435 g a.i./ha (320–348 g a.e./ha) (~33× rate using water for irrigation treated at GAP). At all trials, grain and straw samples were collected at early to peak maturity (BBCH 85–89), 59–63 days after the last application (DALA). At two decline trials, grain and straw samples were also collected at 51–53, 67–68 and 72–73 DALA at BBCH 87–89.

Crop matrix	**Analytes**	**Total application rate g a.e./ha (Product)**	**PHI (days)**	**Residue levels (ppm)[1]**					
				n[2]	**LAFT[3]**	**HAFT[3]**	**Median[3] (STMdR)**	**Mean[3] (STMR)**	**SDEV[3]**
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	75.6–82.2 (GF-3162)	59–63	24	<0.023	<0.023	<0.023	<0.023	0
		320–348 (GF-3187)		24	<0.023	0.0195	<0.023	0.0032	0.006
Straw		75.6–82.2 (GF-3162)		24	<0.023	0.538	0.0173	0.0713	0.148
		320–348 (GF-3187)		24	<0.023	0.864	0.0604	0.2179	0.333

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDev. = standard deviation.
LOQ = <0.023 ppm for combined florpyrauxifen-benzyl + florpyrauxifen acid residues expressed as parent equivalents. For computation of the LAFT, HAFT, median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.
[1]Residues of florpyrauxifen acid were converted to parent equivalents using MWCF of 1.26, based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol.

[2] Values based on total number of samples.
[3] Values based on per-trial averages.

American study No. 2
Twelve trials were conducted in 2014 in growing regions 4 (7 trials), 5 (1 trial), 6 (2 trials) and 10 (2 trials). At each test location, three treated plots were established: TRT2 received two foliar applications of GF-3206 (EC formulation) at a nominal rate of 40 g a.i./ha per application for a total rate of 80 g a.i./ha (64 g a.e./ha; 5× rate using treated water for irrigation at GAP). TRT3 consisted of two granular broadcast foliar applications of GF-3187 (WG formulation) at a rate of 75 g a.i./ha per application, for a total of 150 g a.i./ha (120 g a.e./ha; 10× rate using water for irrigation treated at GAP); and TRT4 was comprised of two foliar applications of GF-3301 (SC formulation) at a target rate of 40 g a.i./ha for a total rate of 80 g a.i./ha (64 g a.e./ha; 5× rate using water for irrigation treated at GAP). The first applications of GF-3206 (EC) and GF-3301 (SC) were made to drained crops, except at the CA trials which were water-seeded. All other applications, including those made with the WG formulation, were made to a flooded crop. At all trials, grain and straw samples were collected at 58–64 DALA at crop maturity (BBCH 87–89). At the two decline trials, samples were collected at 53, 67–68 and 74 DALA, at BBCH89.

Crop matrix	Analytes	Total application rate g a.e./ha (Product)	PHI (days)	Residue levels (ppm)[1]					
				n[2]	LAFT[3]	HAFT[3]	Median[3] (STMdR)	Mean[3] (STMR)	SDEV[3]
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	64 (GF-3206)	58–64	24	<0.023	0.0764	<0.023	0.03	0.02
		120 (GF-3187)		24	<0.023	0.266	<0.023	0.023	0.001
		64 (GF-3301)[4]		24	<0.023	0.278	<0.023	0.06	0.08
Straw		64 (GF-3206)		24	<0.023	0.9016	0.051	0.150	0.252
		120 (GF-3187)		24	<0.023	0.162	0.0407	0.057	0.042
		64 (GF-3301)[4]		24	<0.023	1.74	0.275	0.421	0.63

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation. LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol.
For computation of the LAFT, HAFT, median, mean, and standard deviation, values <LOQ are assumed to be at the LOQ.
[1] Expressed as parent equivalents.
[2] Values based on total number of samples.

[3] Values based on per-trial averages.
[4] A methylated seed oil was included in all spray applications for this trial.

Australian study
Three trials were conducted in 2013/2014 in southern New South Wales, Australia, in Strathmerton, Jerilderie and Tantona. Each site consisted of one untreated and three treated plots. One treated plot received two foliar applications of GF-3206 (EC formulation) at a target rate of 30 g a.i./ha (24 g a.e./ha) for a total rate of 60 g a.i./ha (48 g a.e./ha; 4× rate using water for irrigation treated at GAP). The second treated plot received two foliar applications of GF-3206 at a target rate of 60 g a.i./ha (48 g a.e./ha; 4× rate using water for irrigation treated at GAP) for a total rate of 120 g a.i/ha (96 g a.e./ha; 8× rate using water for irrigation treated at GAP). The third treated plot received two foliar applications of GF-3262 (EC formulation) at a target rate of 2 L/ha, equivalent to 30 g a.i./ha (24 g a.e./ha) for a total rate of 60 g a.i./ha (48 g a.e./ha). No adjuvant was added to the spray mixtures at the first and second treated plots, while a methylated seed oil was included in the spray mixtures at the third treated plot. The second application was made at a retreatment interval of 42–45 days. At all 3 trials, forage samples were harvested at PHIs of 0, 3/4, 7, 14/15 and 28 days, while straw and whole grain were harvested at 111–112 day PHIs.

Crop matrix	Analytes	Total application rate g a.e./ha (Product)	PHI (days)	Residue levels (ppm)					
				n[1]	Min.[1,2]	Max.[1,2]	Median[1] (STMdR)	Mean[1] (STMR)	SDEV[1]
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	48 (GF-3206)	111–112	3	<0.023	<0.023	<0.023	0.023	0
		96 (GF-3206)	111–112	3	<0.023	<0.023	<0.023	0.023	0
		48 (GF-3262)[3]	111–112	3	<0.023	<0.023	<0.023	<0.013	0
Straw		48 (GF-3206)	111–112	3	<0.023	0.035	0.035	0.023	0.02
		96 (GF-3206)	111–112	3	<0.023	0.102	0.068	0.057	0.05
		48 (GF-3262)[3]	111–112	3	0.075	0.189	0.135	0.133	0.06
Forage		48 (GF-3206)	0	3	4.46	7.08	5.07	5.54	1.4
			3/4	3	1.5	1.95	1.70	1.72	0.23
			7	3	0.63	0.99	0.66	0.76	0.20
			14	3	0.193	1.42	0.28	0.63	0.68

			28	3	0.086	1.32	0.086	0.497	0.71
		96 (GF-3206)	0	3	8.981	9.419	9.23	9.21	0.22
			3/4	3	2.22	3.28	3.06	2.85	0.56
			7	3	1.096	1.56	1.13	1.26	0.26
			14	3	0.199	1.4	0.51	0.70	0.62
			28	3	0.086	1.32	0.24	0.55	0.69
		48 (GF-3262)[3]	0	3	4.013	6.634	5.71	5.45	1.33
			3/4	3	1.934	3.07	2.7	2.57	0.58
			7	3	1.20	1.91	1.34	1.49	0.38
			14	3	0.559	1.55	0.572	0.894	0.568
			28	3	0.236	1.46	0.316	0.67	0.68

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation. LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol. For computation of the median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.
[1]Values based on total number of samples
[2]Only one sample was harvested per trial plot; therefore, values shown are minimum and maximum instead of HAFT and LAFT.
[3]A methylated seed oil was included in all spray applications for this trial.

Southern Europe study

Four trials were conducted during the 2014 growing season in southern Europe with 2 trials in Italy (Vento and Emiglia Romagna), 1 trial in Greece and 1 trial in Spain. At each test location, one treated plot received two foliar applications of GF-3206 (EC formulation) at a target rate of 30 g a.i./ha for a total rate of 60 g a.i./ha (equivalent to 48 g a.e./ha; ~4× rate using water for irrigation treated at GAP). The second treated plot received one application of GF-3206 at a target rate of 25 g a.i./ha (equivalent to 20 g a.e./ha; ~1.7× rate using water for irrigation treated at GAP). No adjuvant was added to any spray mixtures. Rice was harvested at PHIs of 53–62 days. Two decline trials (Greece and Emilia Romagna) were established in which rice grain, hulls and straw were harvested at multiple PHIs of 53, 61/62, 67, and 72/74 days.

Commodity	Analytes	Total applic. rate, g a.e./ha (Product)	PHI (days)	Residue levels (ppm)[1]					
				n	LAFT[2]	HAFT[2]	Median (STMdR)	Mean (STMR)	SDEV
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	48 (GF-3206)	54–62	4	<0.023	0.021	0.0045	0.0075	0.010
		20 (GF-3206)		4	<0.023	0.024	0.0050	0.0086	0.011
Dehulled grain		48 (GF-3206)		4	<0.023	<0.023	<0.023	0.023	0
		20 (GF-3206)		4	<0.023	<0.023	<0.023	0.023	0
Straw		48 (GF-3206)		4	<0.023	0.126	0.069	0.070	0.059
		20 (GF-3206)		4	<0.023	0.059	0.033	0.032	0.028

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation. LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues expressed in parent equivalents. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol. For computation of the median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.

[1]Values based on total number of samples.
[2]Only one sample was harvested per trial plot; therefore, values shown are minimum and maximum instead of HAFT and LAFT, and the mean, median and standard deviations are based on the total number of samples rather than per trial averages.

Argentinian study

Two trials were conducted during the 2014 growing season in Argentina in the provinces of Entre Rios and Corrientes. At each test location, one treated plot received two foliar applications of GF-3206 (EC formulation) at a target rate of 60 g a.i./ha per application for a total rate of 120 g a.i./ha (equivalent to 96 g a.e./ha; ~8× rate using water for irrigation treated at GAP). No adjuvant was added to any of the spray mixtures. Samples of grain with hulls and without hulls, and straw were harvested at PHIs of 58–60 days.

Commodity	Analytes	Total applic. rate (g a.e./ha)	PHI (days)	Residue levels (ppm) [1]					
				n[2]	LAFT[2]	HAFT[2]	Median[2] (STMdR)	Mean[2] (STMR)	SDEV [2]
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	96	58–60	2	<0.023	<0.023	NA	NA	NA
Dehulled grain				2	<0.023	<0.023	NA	NA	NA
Straw				2	<0.023	<0.023	NA	NA	NA

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation, NA = not applicable. LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues expressed in parent equivalents. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol. For computation of the median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.
[1]Values based on total number of samples.
[2]Only one sample was harvested per trial plot; therefore, values shown are minimum and maximum instead of HAFT and LAFT; the mean, median and standard deviations could not be determined that only 2 samples (1 per trial) were collected and analyzed.

Brazilian study

Four trials were conducted during the 2014/2015 growing seasons in Brazil in Restinga Seca, Santa Cruz do Sul, Santa Maria and Rolândia. At each test location, one treated plot received two foliar applications of GF-3206 (EC formulation) at a retreatment interval of 15–18 days equivalent to 60 g a.i./ha for a total targeted rate of 120 g a.i./ha (equivalent to 96 g a.e./ha; ~8× rate using water for irrigation treated at GAP). No adjuvant was added to any spray mixtures. Samples of grain with and without hulls and straw were collected at multiple PHIs of 50, 55/56, 60, 65 and 70 days postapplication at 3 of the 4 sites. At the fourth site in Santa Maria, samples of whole and dehulled grain and straw were collected at a 60-day PHI.

Commodity	Analytes	Total applic. rate, g a.e./ha (Product)	PHI (days)	Residue levels (ppm) [1]					
				n	LAFT [2]	HAFT [2]	Median[2] (STMdR)	Mean[2] (STMR)	SDEV [2]
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	96 (GF-3206)	50–70	4	<0.023	0.0262	<0.023	<0.023	0.002
Dehulled grain		96 (GF-3206)		4	<0.023	<0.023	<0.023	<0.023	0
Straw		96 (GF-3206)		4	<0.023	0.1033	0.0037	0.017	0.030

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation.

LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues expressed in parent equivalents. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol. For computation of the median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.
[1]Values based on total number of samples.
[2]Only one sample was harvested per trial plot; therefore, values shown are minimum and maximum instead of HAFT and LAFT and the mean, median and standard deviations are based on the number of samples and not per trial averages.

Chinese study

Three field trials and 3 decline trials were conducted during the 2014 growing season in China in the Hainan, Tianjing, Hunan, Heilongjiang, Guangdong and Zhejiang regions. At each test location, one treated plot received two foliar applications of GF-3206 (EC formulation) at a target rate of 40 g a.i./ha per application for a total rate of 80 g a.i./ha (equivalent to 64 g a.e./ha; ~5.3× rate using water for irrigation treated at GAP) and the second treated plot received 2 applications at a target rate of 60 g a.i./ha per application for a total of 120 g a.i./ha (equivalent to 96 g a.e./ha; ~8× rate using water for irrigation treated at GAP). Spray volumes ranged from 100 to 500 L/ha, with no adjuvant added. Samples of grain and straw at the field trials were harvested at PHIs of 53, 59 and 60 days. At the three decline trials, samples were collected at PHIs of 55, 57/59/60, 66/67 and 73/74 days.

Commodity	Analytes	Total applic. rate, g a.e./ha (Product)	PHI (days)	Residue levels (ppm) [1]					
				n	LAFT [2]	HAFT [2]	Median (STMdR)	Mean (STMR)	SDEV
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	64 (GF-3206)	59–60	6	<0.023	0.0915	<0.023	0.039	0.029
		96 (GF-3206)		6	<0.023	0.112	<0.023	0.051	0.045
Dehulled grain		64 (GF-3206)		6	<0.023	<0.02	<0.02	0.02	0
		96 (GF-3206)		6	<0.023	<0.02	<0.02	0.02	0
Straw		64 (GF-3206)		6	<0.023	0.162	0.046	0.076	0.068
		96 (GF-3206)		6	<0.023	0.188	0.107	0.113	0.067

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation.
LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues expressed in parent equivalents. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol. For computation of the median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.
[1]Values based on total number of samples since only one sample per trial was collected.
[2]Values shown are minimum and maximum instead of HAFT and LAFT.

Japanese study

Two trials were conducted encompassing Japanese rice growing regions (1 trial each in Furukawa and Okayama provinces) during the 2014 growing season. At each test location, one treated plot received 30 days after transplanting one application of DAH-1401, a granular formulation at a target rate of 150 g a.i./ha (equivalent to 120 g a.e./ha, 10× rate applied using treated irrigated water). Later, two foliar applications of GF-2978 (a soluble concentrate formulation) at 50 g a.i./ha were made for a total rate of 250 g a.i./ha (equivalent to 200 g a.e./ha; ~17× rate applied using treated irrigated water). No adjuvant was added to any spray application mixtures.

Commodity	Analytes	Total appl. rate, (g a.e./ha)	PHI (days)	Residue levels (ppm) [1]					
				n	LAFT[2]	HAFT[2]	Median[2] (STMR)	Mean[2] (STMR)	SDEV[2]
Whole grain	Sum of Florpyrauxifen-benzyl and florpyrauxifen-acid	200	60	2	<0.023	<0.023	NA	NA	NA
Dehulled grain				2	<0.023	<0.023	NA	NA	NA
Straw				2	0.71	1.76	NA	NA	NA

n = number of independent field trials, LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation, NA = not applicable. LOQ = <0.023 ppm for combined FPB + florpyrauxifen acid residues expressed in parent equivalents. Residues of florpyrauxifen acid were converted to the parent using MWCF of 1.26 based on the following molecular weights: florpyrauxifen-benzyl = 439.24 g/mol; florpyrauxifen acid = 349.11 g/mol. For computation of the median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ.

[1]Values based on total number of samples.

[2]Only one sample was harvested per trial plot; therefore, values shown are minimum and maximum instead of HAFT and LAFT. The mean, median and standard deviations could not be determined since only 2 samples (1 sample per trial) was harvested.

Overall summary – Rice field trials

The rice field trials adequately depict the behavior of florpyrauxifen-benzyl when applied foliarly to a representative large field crop and cereal grain. As such, the rice field trials are an acceptable representation of using treated water to irrigate large field crops such as cereals, legumes and oilseeds. All studies reflect data from rice grown in major production zones from several different countries. As such, the number of trials and their locations are acceptable. Adequate storage stability data are available on diverse crop types to support the storage conditions of the treated samples from all rice field trials. Samples in all studies were analyzed using a validated analytical method.

Use of treated water to irrigate crops

The aquatic product labels propose to use water treated according to the directions for use to irrigate greenhouse and field crops grown for food and feed.

Acceptable studies are available showing the metabolism of florpyrauxifen-benzyl applied foliarly to wheat and rice (cereals/grass) and to oilseed rape (oilseed/pulses), and the magnitude of residues in representative grasses and rice treated with foliar applications of florpyrauxifen-benzyl.

The application rates used in the rice and grass field trial studies were exaggerated compared to the anticipated rate when using water treated according to the label directions to irrigate crops. These data, in addition to the wheat, rice and oilseed rape metabolism studies, demonstrate that when applied foliarly, very little translocation of residues occurs during plant growth and maturation, with the majority of residues observed in the foliage (forage, hay, straw) and negligible residues observed in the edible commodity (grain, seed), which are protected from direct contact with residues by the grain/seed hull/shell. Furthermore, based on the confined and field accumulation studies as well as the apple metabolism study, very little uptake of residues from the soil was observed. Therefore, based on the metabolism and field trial studies, the irrigation of the large field crops of cereal grains (Crop Group 15–21), legumes (Crop Group 6–21), oilseeds (Crop Group 20), grass forages (Crop Group 17), and non-grass feeds

(Crop Group 18) using water treated according to the label directions can be supported. Additional field crops in which treated irrigation water would not directly contact and/or translocate to the edible portion of the crop include root and tuber vegetables of Crop Group 1. Therefore, the use of treated water to irrigate root and tuber vegetables (Crop Group 1) can also be supported. Data depicting foliar applications to greenhouse-grown food crops to demonstrate the behavior of residues in this environment and to field crops where the consumable portion of the crop may be present during irrigation were not provided and as per current guidelines, are required to support the irrigation of these crops. As such, the irrigation of greenhouse-grown and other field-grown food crops cannot be supported.		
Processed food and feed – Rice		**PMRA# 3168754**
Processing studies were conducted in growing region 4 using GF-3206 (EC formulation) at a total rate of 400.5 g a.i./ha (320.4 g a.e./ha) (27× the rate applied to crops when irrigated with water treated according to GAP) in/on rice. Adequate storage stability data are available on diverse crop types to support the storage intervals of the processed food and feed. Samples were analyzed using a validated analytical method. Florpyrauxifen-benzyl residues were all <LOQ (<0.01 ppm) in rice grain and all processed commodities. Processing factors could not be calculated for florpyrauxifen-benzyl in rice processed fractions. However, due to the highly exaggerated rate, it can be concluded that there is no expectation of residues in processed cereal crops irrigated with treated water, or other irrigated large field crops where grains, seeds, roots and tubers are the human food commodities such as legume vegetables, oilseeds and root and tuber vegetables.		
Confined accumulation in rotational crops – Lettuce/mustard, radish and wheat		**PMRA# 3200050**
Radiolabel position	[^{14}C]-PH-florpyrauxifen-benzyl ester (specific activity: 45.4 mCi/mmol/36.8 mCi/mmol) [^{14}C]-PY-florpyrauxifen-benzyl ester (specific activity: 30.6 mCi/mmol) [^{14}C]-BE-florpyrauxifen-benzyl ester (specific activity: 26.9 mCi/mmol/26.4 mCi/mmol)	
Treatment		
Test site	Confined plots in crop boxes at a single site in California were used to conduct this study.	
Soil type	Sandy loam (81% sand, 15% silt and 4% clay)	
Treatment	A single bare soil application was made at 117-125 g a.i./ha (equivalent to ~97 g a.e./ha, or ~8× the rate determined when irrigating field crops with water treated according to GAP). The rotational crops (lettuce [leafy crop], radish [root crop] and wheat [cereal grain]) were each sown at 30, 90 and 271 days after application. Lettuce did not germinate at 30- or 90-day PBIs, and was replaced with mustard at the 271-day PBI, from which both immature and mature mustard were harvested. The 30-day PBI radishes germinated, but did not survive to maturity. Radish tops and roots were harvested from the 90- and 271-day PBIs. Wheat forage, hay and mature grain and straw, were harvested at each of the PBIs.	

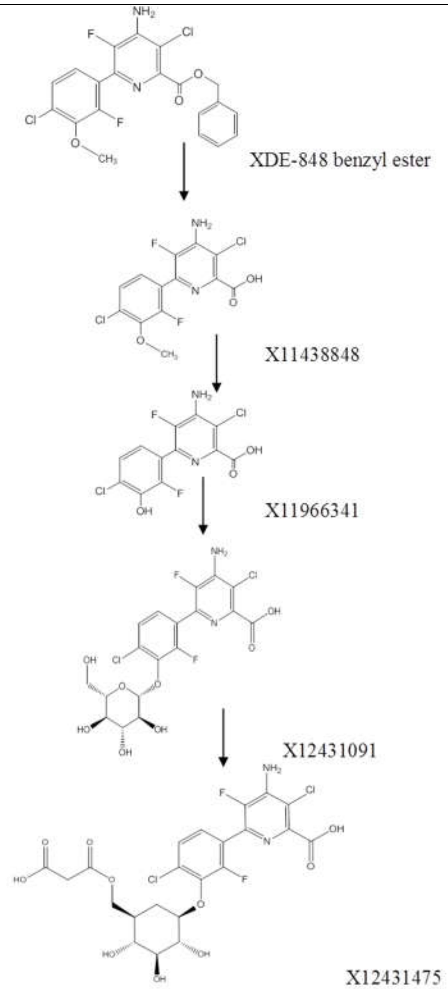
Formulation	GF-3175 is an EC formulation blank of GF-3162 prepared such that 2.3 g of florpyrauxifen-benzyl ester added to 97.7 g of the GF-3175 equals GF-3162.			
Extraction solvents	TRR in crops at all PBIs ranged from 0.001 to 0.046 ppm florpyrauxifen-benzyl equivalents. Lettuce did not grow when planted 30 or 90 days after application. At all PBIs, wheat hay and straw were the only samples with residues exceeding 0.010 ppm. As such, these were the only matrices that were further investigated. Wheat hay and straw were subjected to six sequential accelerated solvent (ASE) extractions, twice with 90/10 acetonitrile/water at 50°C, twice with 50/50 acetonitrile/water at 50°C, and twice with 10/90 acetonitrile/water at 50°C.			
Matrices	**PBI (days)**	**[^{14}C-PH]**	**[^{14}C-PY]**	**[^{14}C-BE]**
		TRR (ppm)	**TRR (ppm)**	**TRR (ppm)**
Immature lettuce	30	No sample available		
	90			
Mature lettuce	30			
	90			
Immature mustard	271	<LOQ*	<LOQ	<LOQ
Mature mustard	271	<LOQ	<LOQ	<LOQ
Radish tops	30	No sample available		
	90	0.004	0.005	<LOQ
	271	<LOQ	<LOQ	<LOQ
Radish roots	30	No sample available		
	90	0.003	0.006	0.004
	271	<LOQ	<LOQ	<LOQ
Wheat forage	30	0.004	0.006	0.003
	90	0.003	0.004	0.002
	271	<LOQ	0.008	<LOQ
Wheat hay	30	0.017	0.013	0.007
	90	0.013	0.028	0.005
	271	0.005	0.026	<LOQ
Wheat straw	30	0.025	0.033	0.006
	90	0.034	0.046	0.005
	271	0.006	0.033	<LOQ
Wheat grain	30	0.002	0.002	0.005
	90	0.003	<LOQ	0.002
	271	<LOQ	<LOQ	<LOQ
*LOQ = 0.0028 ppm				

Summary of major identified metabolites in rotated crops			
Plantback intervals (PBI)	1st Rotation (30 day PBI)	2nd Rotation (90 day PBI)	3rd Rotation (271 day PBI)
Radiolabel position	[^{14}C-PH], [^{14}C-PY], [^{14}C-BE]		

Metabolites identified	Major Metabolites		
Lettuce (Immature and mature)	TRR were either <0.01 ppm or there was no sample due to poor growth.		
Mustard (Immature and mature)			
Radish (Tops and roots)			
Wheat forage and grain			
Wheat hay	Florpyrauxifen hydroxyl acid (X11966341) X12431091	Florpyrauxifen hydroxyl acid (X11966341) X12431091	Florpyrauxifen hydroxyl acid (X11966341) Florpyrauxifen acid (X11438848)
Wheat straw	Florpyrauxifen hydroxyl acid (X11966341) X12431091	Florpyrauxifen hydroxyl acid (X11966341) X12431091	Florpyrauxifen hydroxyl acid (X11966341)

Proposed metabolic scheme in rotational crops

The proposed metabolic pathway for florpyrauxifen-benzyl (XDE-848 benzyl ester) proceeds through loss of the benzyl ester to form florpyrauxifen acid (X11438848), which is likely generated in the soil and taken up by the plant, followed by loss of the methyl to form the hydroxy acid X11966341. Florpyrauxifen hydroxy acid, X11966341, either remains free or is conjugated to glucose (X12431091) or to glucose and malonic acid (X12431475).



Residue data in rotational crops								**PMRA# 3200051**
Two trials (two each for radish, turnip, kale, mustard greens, sorghum, wheat [spring or winter] and soybean) were conducted during the 2015 growing season in North American growing regions 6 and 10. One broadcast application was made to bare soil with an EC formulation at a rate of 59.4–78.5 g a.i./ha (47.5–62.8 g a.e./ha; equivalent to ~5× the rate determined for field crops irrigated with water treated according to GAP). Adequate storage stability data are available on diverse commodity categories to support the storage intervals of the rotational crop field trials. Samples were analyzed using a validated analytical method.								
Commodity	**Total application rate (g ae/ha)**	**PBI (days)**	**Residue levels (ppm)**					
			n	**LAFT**	**HAFT**	**Median**	**Mean**	**SDEV**
Florpyrauxifen-benzyl								
Turnip roots	47.5–60.1	74–78	2	<0.01	<0.01	0.01	0.01	NA
Turnip top	47.5–60.1	74–78	2	<0.01	<0.01	0.01	0.01	NA
Kale	59.2–61	20–21	2	<0.01	<0.01	0.01	0.01	NA
Soybean forage	60.1	40	1	<0.01	<0.01	0.01	0.01	NA
Soybean hay	60.1	40	1	<0.01	<0.01	0.01	0.01	NA
Soybean	48.4–62.8	81–97	2	<0.01	<0.01	0.01	0.01	NA

seed								
Wheat forage	59.2–61.8	20–21	2	<0.01	<0.01	0.01	0.01	NA
Wheat hay	60.1–61.8	20	1	<0.01	<0.01	0.01	0.01	NA
Wheat grain	59.2–61.8	20–21	2	<0.01	<0.01	0.01	0.01	NA
Wheat straw	59.2–61.8	20–21	2	<0.01	<0.01	0.01	0.01	NA
Florpyrauxifen acid (X11438848)								
Turnip roots	47.5–60.1	74–78	2	<0.013	<0.013	0.013	0.013	NA
Turnip top	47.5–60.1	74–78	2	<0.013	<0.013	0.013	0.013	NA
Kale	59.2–61	20–21	2	<0.013	<0.013	0.013	0.013	NA
Soybean forage	60.1	40	1	<0.013	<0.013	0.013	0.013	NA
Soybean hay	60.1	40	1	<0.013	<0.013	0.013	0.013	NA
Soybean seed	48.4–62.8	81–97	2	<0.013	<0.013	0.013	0.013	NA
Wheat forage	59.2–61.8	20–21	2	<0.013	<0.013	0.013	0.013	NA
Wheat hay	60.1–61.8	20	1	<0.013	<0.013	0.013	0.013	NA
Wheat grain	59.2–61.8	20–21	2	<0.013	<0.013	0.013	0.013	NA
Wheat straw	59.2–61.8	20–21	2	<0.013	<0.013	0.013	0.013	NA
Florpyrauxifen hydroxyl acid (X11966341)								
Turnip roots	47.5–60.1	74–78	2	<0.013	<0.013	0.013	0.013	NA
Turnip top	47.5–60.1	74–78	2	<0.013	<0.013	0.013	0.013	NA
Kale	59.2–61	20–21	2	<0.013	<0.013	0.013	0.013	NA
Soybean forage	60.1	40	1	<0.013	<0.013	0.013	0.013	NA
Soybean hay	60.1	40	1	<0.013	<0.013	0.013	0.013	NA
Soybean seed	48.4–62.8	81–97	2	<0.013	<0.013	0.013	0.013	NA
Wheat forage	59.2–61.8	20–21	2	<0.013	<0.013	0.013	0.013	NA
Wheat hay	60.1–61.8	20	1	<0.013	<0.013	0.013	0.013	NA
Wheat grain	59.2–61.8	20–21	2	<0.013	<0.013	0.013	0.013	NA
Wheat straw	59.2–61.8	20–21	2	<0.013	<0.013	0.013	0.013	NA

[1] Only data for the lowest PBI for each crop type (root vegetable, *Brassica* leafy vegetable, oil seed, and cereal grain) for which two trials were completed are included in this table. Residues were <LOQ in all samples of rotational crop commodities from the subsequent PBIs.
[2] n = number of independent field trials.
[3] Values based on residues in individual samples.
[4] Values based on per-trial averages. LAFT = lowest average field trial, HAFT = highest average field trial, SDEV = standard deviation. For computation of the LAFT, HAFT, median, mean, and standard deviation, values < LOQ are assumed to be at the LOQ (0.01 ppm for parent; 0.013 ppm for X11438848 and X11966341; and 0.023 ppm for combined florpyrauxifen-benzyl and X11438848). NA = Not applicable.
Note: combined residues of florpyrauxifen-benzyl and the acid are reported in florpyrauxifen-benzyl equivalents.

Based on the results of the field accumulation study, no plantback interval is required for the supported crops that may be irrigated with treated water as long as the limit of <2 ppb a.e. for total florpyrauxifen-benzyl residues prior to irrigation is followed. As pasture and rangeland and filberts are not rotated, these data are not relevant to these uses.

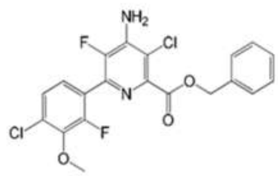
Table 23 Food residue chemistry overview of metabolism studies and risk assessment

Plant studies		
Residue definition for enforcement **Primary crops (wheat, oilseed rape seed and rice)** **Rotational crops**		Florpyrauxifen-benzyl including the metabolite florpyrauxifen acid (free and conjugated) expressed as parent equivalents.
Residue definition for risk assessment **Primary crops (wheat, oilseed rape seed and rice)** **Rotational crops**		**For human food commodities:** Florpyrauxifen-benzyl including the metabolite florpyrauxifen acid (free and conjugated) expressed as parent equivalents.
		For livestock feed items: Florpyrauxifen-benzyl including the metabolites florpyrauxifen acid (free and conjugated) and florpyrauxifen hydroxyl acid (free and conjugated), expressed as parent equivalents.
Metabolic profile in diverse crops		Similar in rice and wheat (cereals/grasses) and oilseed rape (oilseeds/pulses). Metabolic profile could not be determined in apple as there was no uptake of residue from the soil.
Animal studies		
Animals		**Ruminant, Poultry and Fish**
Residue definition for enforcement		Florpyrauxifen-benzyl including the metabolite florpyrauxifen acid (free and conjugated) expressed as parent equivalents.
Residue definition for risk assessment		
Metabolic profile in animals (goat, hen, rat, bluegill fish)		The metabolic profile was similar in animals investigated.
Fat soluble residue		Yes
Dietary risk from food and drinking water		
Basic chronic dietary exposure analysis	**Population**	**Estimated risk % of acceptable daily intake (ADI)**

		Food alone	Food and drinking water
ADI = 2 mg/kg bw/day **Estimated chronic drinking water concentration = 0.098 ppm acid equivalents**	All infants <1 year	0	0.5
	Children 1–2 years	0.1	0.3
	Children 3–5 years	0.1	0.2
	Children 6–12 years	0.1	0.2
	Youth 13–19 years	0	0.1
	Adults 20–49 years	0	0.2
	Adults 50+ years	0	0.2
	Females 13–49 years	0	0.2
	Total population	0	0.2

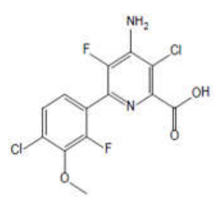
Table 24 Summary of the environmental transformation and dissipation studies

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
Parent				
Common name: Florpyrauxifen-benzyl (X11959130) **IUPAC Chemical Name:** Benzyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropyridine-2-carboxylate **Molecular Weight:** 439.2 g/mol **Structure:**	Hydrolysis (3070805)	Buffer, 10°C, pH 4	100 (0–30)	100 (30)
		Buffer, 10°C, pH 7	100 (0–14)	98.4 (30)
		Buffer, 10°C, pH 9	100 (0)	24.1 (30)
		Buffer, 25°C, pH 4	100 (0–6)	98.2 (30)
		Buffer, 25°C, pH 7	100 (0–1)	85.4 (30)
		Buffer, 25°C, pH 9	100 (0)	3.5 (30)
		Buffer, 35°C, pH 4	100 (0–1)	94.9 (30)
		Buffer, 35°C, pH 7	100 (0)	59.2 (30)
		Buffer, 35°C, pH 9	100 (0)	0.6 (30)
	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	106.2 (0)	70.9 (17)
		Loam soil, dark, 20°C, pH 7.2	106.2 (0)	102.8 (17)
	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	108.6 (0)	0.2 (18)
		Natural water, irradiated, 25°C, pH 7.8	105.3 (0)	<LOD (16)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		Aqueous buffer solution, dark, 25°C, pH 4	103.5 (0–0.02)	96.7 (18)
		Natural water, dark, 25°C, pH 7.8	102.1 (0.04)	12.4 (16)
	Aerobic soil (3070811)	Yolo, CA, loam soil, 20°C, pH 7.2	98.5 (0)	41.4 (120)
		Germany, loam soil, 20°C, pH 6.2	98.75 (0)	23 (120)
		United Kingdom, silt loam soil, 20°C, pH 5.9	100.48 (0)	13.4 (120)
		United Kingdom, loamy sand soil, 20°C, pH 7.4	103.5 (0)	6.32 (120)
	Aerobic soil (3070820)	Italy, flooded paddy soil (loam), 20°C, pH 4.9	90.8 (0)	13.6 (156)
		Italy, flooded paddy soil (sandy loam), 20°C, pH 4.5	95.8 (0)	3.2 (156)
	Anaerobic soil (3070812) (after 6 days of aerobic incubation)	Yolo, CA, clay loam soil, 20°C, pH 7.3	58.1 (0)	8.1 (120)
		RefSol 03-G, Germany, loam, 20°C, pH 6.0	42.4 (0)	3.4 (120)
		Site E1, United Kingdom, silt loam, 20°C, pH 5.5	64.2 (0)	4.9 (120)
		Site I2, United Kingdom, sandy loam, 20°C, pH 7.5	19.1 (0)	2.9 (120)
	Aerobic aquatic (3070813)	France, water:loam sediment, 20°C, pH 7.8/7.1	99.8 (0)	1.8 (105)
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	98.9 (0)	3.0 (105)
	Aerobic aquatic	Pond water – high	99.4 (0)	1.3 (60)

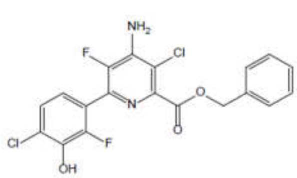
Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	(3070806)	dose, 20°C, pH 8.49		
		Pond water – low dose, 20°C, pH 8.49	101.9 (0)	<LOD (60)
	Anaerobic aquatic (3070814)	river water:loamy sand sediment, 20°C, pH 8.14/7.35	105.7 (0)	<LOD (105)
		pond water:silt loam sediment, 20°C, pH 7.42/7.15	105.3 (0)	<LOD (105)
	Aquatic field study (3070817)	XDE-848 BE EC (20 g a.i./L), California, water-seeded rice, Centerville clay loam soil, pH 7.8	70.0% of applied (0 DA1A)	0.1% of applied (181 DA2A)
		XDE-848 BE G (1.2% a.i.), California, water-seeded rice, Centerville clay loam soil, pH 7.8	202.5% of applied (0 DA1A)	4.8% of applied (181 DA2A)
		XDE-848 BE EC (20 g a.i./L), Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	61.8% of applied (0 DA1A)	<LOD (184 DA2A)
	Aquatic field study (3070822)	Florida, 50 ppb a.i., pond water:sand, pH 7.06-8.64	103.3% of applied (0.25)	<LOQ (282)
		North Carolina, 50 ppb a.i., pond water:sandy loam, pH 6.77–9.88	64.9% of applied (0.5)	<LOD (246)
	Aquatic field study (3070821)	North Carolina, 150 ppb a.i., pond water:sandy loam, pH 6.77–9.88	52.8% of applied (0.04)	<LOQ (246)
	Terrestrial field study (3070818)	NY bare soil plot: 2 × 40 g a.i./ha	91% of applied (0	2.7% of applied

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		(target, 30-d interval)	DA1A)	(359 DA2A)
		IA bare soil plot: 2 × 20 g a.i./ha (target, 33-d interval)	68.3% of applied (0 DA1A)	3.8% of applied (262 DA2A)
		IA cropped plot, grass samples: 2 × 20 g a.i./ha (33-d interval)	5.35 % of applied (0 DA1A)	0.1% of applied (60 DA2A)
		IA cropped plot, soil samples: 2 × 20 g a.i./ha (33-d interval)	31.7% of applied (3 DA1A)	3.8% of applied (268 DA2A)
		TX cropped plot, grass samples: 2 × 20 g a.i./ha (30-d interval)	32.5% of applied (0 DA1A)	0.3% of applied (60 DA2A)
		TX cropped plot, soil samples: 2 × 20 g a.i./ha (30-d interval)	84.2% of applied (0 DA1A)	3.8% of applied (278 DA2A)

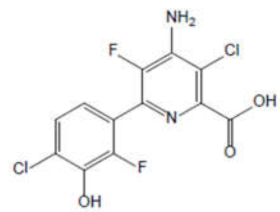
Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
Acid				
Common name: Florpyrauxifen acid (X11438848) **IUPAC Chemical Name:** 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropyridine-2-carboxylic acid **Molecular Weight:** 349.12 g/mol **Structure:** 	Hydrolysis (3070805) * TP was test item in the 50°C tests	Buffer, 10°C, pH 7	1.7 (30)	1.7 (30)
		Buffer, 10°C, pH 9	89.6 (30)	89.6 (30)
		Buffer, 25°C, pH 4	2.9 (30)	2.9 (30)
		Buffer, 25°C, pH 7	16.6 (30)	16.6 (30)
		Buffer, 25°C, pH 9	98.5 (21)	97.8 (30)
		Buffer, 35°C, pH 4	5.9 (22)	5.7 (30)
		Buffer, 35°C, pH 7	41.1 (30)	41.1 (30)
		Buffer, 35°C, pH 9	99.5 (30)	99.5 (30)
		Buffer, 50°C, pH 4	98.9 (5)	98.9 (5)
		Buffer, 50°C, pH 7	100 (5)	100 (5)
		Buffer, 50°C, pH 9	99.7 (5)	99.7 (5)
	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	7 (10)	6.7 (17)
		Loam soil, dark, 20°C, pH 7.2	2.1 (10–17)	2.1 (17)
	Aqueous phototransformation (3070809)	Natural water, irradiated, 25°C, pH 7.8	8.9 (0.17)	0.8 (16)
		Natural water, dark, 25°C, pH 7.8	96.7 (16)	96.7 (16)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	Aerobic soil (3070811)	Yolo, CA, loam soil, 20°C, pH 7.2	39.7 (30)	19.7 (120)
		Germany, loam soil, 20°C, pH 6.2	33 (9)	8.08 (120)
		United Kingdom, silt loam soil, 20°C, pH 5.9	37.7 (15)	23.5 (120)
		United Kingdom, loamy sand soil, 20°C, pH 7.4	62.4 (7)	7.33 (120)
	Aerobic soil (3070820)	Italy, flooded paddy soil (loam), 20°C, pH 4.9	8.1 (6)	0.4 (156)
		Italy, flooded paddy soil (sandy loam), 20°C, pH 4.5	33.1 (20)	0.7 (156)
	Anaerobic soil (3070812) (after 6 days of aerobic incubation)	Yolo, CA, clay loam soil, 20°C, pH 7.3	61.3 (20)	22.2 (120)
		RefSol 03-G, Germany, loam, 20°C, pH 6.0	39.2 (12)	3.1 (120)
		Site E1, United Kingdom, silt loam, 20°C, pH 5.5	25.2 (12)	1.1 (100)
		Site I2, United Kingdom, sandy loam, 20°C, pH 7.5	73.5 (20)	16.8 (120)
	Aerobic aquatic (3070813)	France, water:loam sediment, 20°C, pH 7.8/7.1	30.6 (3)	1.6 (105)
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	45.2 (21)	1.2 (105)
	Aerobic aquatic (3070806)	Pond water – high dose, 20°C, pH 8.49	100.4 (60)	100.4 (60)
		Pond water – low dose, 20°C, pH 8.49	108.5 (33)	103.8 (60)

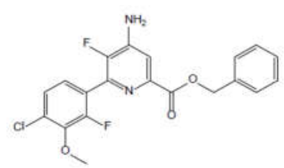
Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	27.9 (7)	<LOD (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	46.9 (3)	<LOD (105)
	Aquatic field study (3070817)	XDE-848 BE EC (20 g a.i./L), California, water-seeded rice, Centerville clay loam soil, pH 7.8	25.5% parent eq. (3 DA1A)	0.9% parent eq. (181 DA2A)
		XDE-848 BE G (1.2% a.i.), California, water-seeded rice, Centerville clay loam soil, pH 7.8	13.7% parent eq. (1 DA1A)	0.5% parent eq. (181 DA2A)
		XDE-848 BE EC (20 g a.i./L), Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	12.3% parent eq. (7 DA1A)	<LOD (184 DA2A)
	Aquatic field study (3070822)	Florida, 50 ppb a.i., pond water:sand, pH 7.06–8.64	22.4% parent eq. (14)	<LOD (282)
		North Carolina, 50 ppb a.i., pond water:sandy loam, pH 6.77–9.88	41.5% parent eq. (14)	<LOD (246)
	Aquatic field study (3070821)	North Carolina, 150 ppb a.i., pond water:sandy loam, pH 6.77–9.88	44.3% parent eq. (22)	<LOD (246)
	Terrestrial field study (3070818)	NY bare soil plot: 2 × 40 g a.i./ha (target, 30-d interval)	3.3% parent eq. (3 DA2A)	<LOD (449 DA2A)
		IA bare soil plot: 2 × 20 g a.i./ha (target, 33-d	4.6% parent eq. (7 DA2A)	<LOD (268 DA2A)

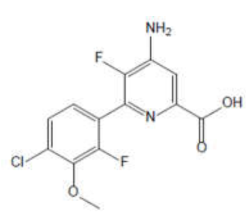
Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		interval)		
		IA cropped plot, grass samples: 2 × 20 g a.i./ha (33-d interval)	0.07% parent eq. (0 DA2A)	<LOD (60 DA2A)
		IA cropped plot, soil samples: 2 × 20 g a.i./ha (33-d interval)	6.3% parent eq. (7 DA2A)	<LOD (268 DA2A)
		TX cropped plot, grass samples: 2 × 20 g a.i./ha (30-d interval)	0.25% parent eq. (7 DA2A)	0.029% parent eq. (60 DA2A)
		TX cropped plot, soil samples: 2 × 20 g a.i./ha (30-d interval)	5.6% parent eq. (7 DA2A)	<LOD (278 DA2A)
Major (>10%) Transformation Products				
Common name: hydroxy benzyl ester (X12300837) **IUPAC Chemical Name:** benzyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-hydroxyphenyl)-5-fluoropyridine-2-carboxylate **Molecular Weight:** 425.21 g/mol **Structure:** 	Aerobic soil (3070811)	Yolo, CA, loam soil, 20°C, pH 7.2	2.45 (0)	1.11 (120)
		Germany, loam soil, 20°C, pH 6.2	2.49 (0)	0.74 (120)
		United Kingdom, silt loam soil, 20°C, pH 5.9	2.5 (0)	0.59 (120)
		United Kingdom, loamy sand soil, 20°C, pH 7.4	2.44 (0)	<LOD (120)
	Aerobic soil (3070820)	Italy, flooded paddy soil (loam), 20°C, pH 4.9	15.9 (30)	6.8 (156)
		Italy, flooded paddy soil (sandy loam), 20°C, pH 4.5	6.5 (20)	0.6 (156)
	Aerobic aquatic (3070813)	France, water:loam sediment, 20°C, pH 7.8/7.1	22.8 (7)	0.2 (105)
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	13.2 (14)	0.1 (105)

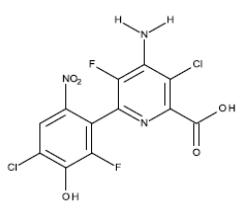
Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	21.5 (10)	<LOD (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	43.1 (10)	<LOD (105)
	Aquatic field study (3070817)	XDE-848 BE EC (20 g a.i./L), California, water-seeded rice, Centerville clay loam soil, pH 7.8	0.5% parent eq. (3 DA1A)	<LOD (181 DA2A)
		XDE-848 BE G (1.2% a.i.), California, water-seeded rice, Centerville clay loam soil, pH 7.8	10.0% parent eq. (14 DA2A)	1.5% parent eq. (181 DA2A)
		XDE-848 BE EC (20 g a.i./L), Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	0.1% parent eq. (1 DA2A)	<LOD (184 DA2A)
	Aquatic field study (3070822)	Florida, 50 ppb a.i., pond water:sand, pH 7.06–8.64	1.6% parent eq. (14)	<LOD (282)
		North Carolina, 50 ppb a.i., pond water:sandy loam, pH 6.77–9.88	0.3% parent eq. (7)	<LOD (246)
	Aquatic field study (3070821)	North Carolina, 150 ppb a.i., pond water:sandy loam, pH 6.77–9.88	0.997% parent eq. (22)	<LOD (246)
Common name: hydroxy acid (X11966341) **IUPAC Chemical Name:** 4-Amino-3-chloro-6-(4-chloro-2-fluoro-3-	Aerobic soil (3070811)	Yolo, CA, loam soil, 20°C, pH 7.2	3.3 (59)	3.11 (120)

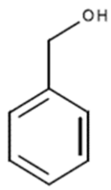
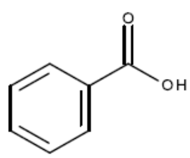
Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
hydroxyphenyl)-5-fluoropyridine-2-carboxylic acid **Molecular Weight:** 335.09 g/mol **Structure:** 				
		Germany, loam soil, 20°C, pH 6.2	7.8 (30)	1.41 (120)
		United Kingdom, silt loam soil, 20°C, pH 5.9	6.38 (30)	1.48 (120)
		United Kingdom, loamy sand soil, 20°C, pH 7.4	4.1 (45)	1 (120)
	Aerobic soil (3070820)	Italy, flooded paddy soil (loam), 20°C, pH 4.9	26.3 (58)	16.4 (156)
		Italy, flooded paddy soil (sandy loam), 20°C, pH 4.5	64.2 (72)	57.8 (156)
	Anaerobic soil (3070812) (after 6 days of aerobic incubation)	Yolo, CA, clay loam soil, 20°C, pH 7.3	58.3 (120)	58.3 (120)
		RefSol 03-G, Germany, loam, 20°C, pH 6.0	64.4 (100)	63.0 (120)
		Site E1, United Kingdom, silt loam, 20°C, pH 5.5	61.5 (100)	61.4 (120)
		Site I2, United Kingdom, sandy loam, 20°C, pH 7.5	68.9 (120)	68.9 (120)
	Aerobic aquatic (3070813)	France, water:loam sediment, 20°C, pH 7.8/7.1	75.2 (31)	47.2 (105)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	78.3 (59)	44.8 (105)
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	104.4 (80)	97.4 (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	100 (13)	94.3 (105)
	Aquatic field study (3070817)	XDE-848 BE EC (20 g a.i./L), California, water-seeded rice, Centerville clay loam soil, pH 7.8	34.7% parent eq. (3 DA1A)	0.8% parent eq. (181 DA2A)
		XDE-848 BE G (1.2% a.i.), California, water-seeded rice, Centerville clay loam soil, pH 7.8	12.2% parent eq. (3 DA2A)	1.0% parent eq. (181 DA2A)
		XDE-848 BE EC (20 g a.i./L), Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	13.4% parent eq. (28 DA2A)	<LOD (184 DA2A)
	Aquatic field study (3070822)	Florida, 50 ppb a.i., pond water:sand, pH 7.06–8.64	8.9% parent eq. (14)	<LOD (282)
		North Carolina, 50 ppb a.i., pond water:sandy loam, pH 6.77–9.88	3.6% parent eq. (22)	<LOD (246)
	Aquatic field study (3070821)	North Carolina, 150 ppb a.i., pond water:sandy loam, pH 6.77–9.88	6.21% parent eq. (22)	0.508 (246)
	Terrestrial field study (3070818)	NY bare soil plot: 2 × 40 g a.i./ha (target, 30-d	3.6% parent eq. (14	<LOD (28 DA2A)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		interval)	DA2A)	
		IA cropped plot, grass samples: 2 × 20 g a.i./ha (33-d interval)	0.03% parent eq. (7 DA2A)	<LOD (60 DA2A)
		TX cropped plot, grass samples: 2 × 20 g a.i./ha (30-d interval)	0.03% parent eq. (7 DA2A)	<LOD (60 DA2A)
Common name: dechlorinated benzyl ester (X12131932) **IUPAC Chemical Name:** 4-Benzyl 4-amino-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropyridine-2-carboxylate **Molecular Weight:** 404.79 g/mol **Structure:** 	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	3.4 (1)	2.9 (17)
		Loam soil, dark, 20°C, pH 7.2	1.6 (3)	0.7 (17)
	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	30.8 (0.17)	<LOD (18)
		Natural water, irradiated, 25°C, pH 7.8	28.4 (0.17)	<LOD (16)
		Aqueous buffer solution, dark, 25°C, pH 4	2.1 (0.02)	1.9 (18)
	Aquatic field study (3070817)	XDE-848 BE EC (20 g a.i./L), California, water-seeded rice, Centerville clay loam soil, pH 7.8	0.1% parent eq. (0 DA1A)	<LOD (60 DA2A)
		XDE-848 BE G (1.2% a.i.), California, water-seeded rice, Centerville clay loam soil, pH 7.8	<LOD	<LOD (60 DA2A)
		XDE-848 BE EC (20 g a.i./L), Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	0.1% parent eq. (0 DA2A)	<LOD (60 DA2A)
	Aquatic field	Florida, 50 ppb a.i.,	0.23%	<LOD

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	study (3070822)	pond water:sand, pH 7.06–8.64	parent eq. (0.04)	(282)
		North Carolina, 50 ppb a.i., pond water:sandy loam, pH 6.77–9.88	0.3% parent eq. (125)	<LOD (246)
	Aquatic field study (3070821)	North Carolina, 150 ppb a.i., pond water:sandy loam, pH 6.77–9.88	0.19% parent eq. (2)	<LOD (246)
Common name: dechlorinated acid (X12393505) **IUPAC Chemical Name:** 4-amino-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoropyridine-2-carboxylic acid **Molecular Weight:** 314.67 g/mol **Structure:** 	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	2.8 (7)	2.1 (17)
	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	10.4 (0.99)	<LOD (18)
		Natural water, irradiated, 25°C, pH 7.8	8.4 (1)	2.4 (16)
	Aerobic aquatic (3070806)	Pond water – high dose, 20°C, pH 8.49	1.4 (7)	0.3 (60)
	Aquatic field study (3070817)	XDE-848 BE EC (20 g a.i./L), California, water-seeded rice, Centerville clay loam soil, pH 7.8	0.2% parent eq. (3 DA1A)	<LOD (60 DA2A)
		XDE-848 BE G (1.2% a.i.), California, water-seeded rice, Centerville clay loam soil, pH 7.8	0.4% parent eq. (1 DA1A)	<LOD (60 DA2A)
		XDE-848 BE EC (20 g a.i./L), Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	0.1% parent eq. (1-7 DA2A)	<LOD (60 DA2A)
	Aquatic field study	Florida, 50 ppb a.i., pond water:sand,	0.28% parent eq.	<LOD (282)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	(3070822)	pH 7.06-8.64	(8)	
		North Carolina, 50 ppb a.i., pond water:sandy loam, pH 6.77–9.88	0.3% parent eq. (3)	<LOD (246)
	Aquatic field study (3070821)	North Carolina, 150 ppb a.i., pond water:sandy loam, pH 6.77–9.88	0.296% parent eq. (14)	<LOD (246)
Common name: nitro hydroxy acid (X12483137) **IUPAC Chemical Name:** 4-amino-6-(4-chloro-2-fluoro-3-  methoxyphenyl)-5-fluoropyridine-2-carboxylic acid **Molecular Weight:** 380.09 g/mol **Structure:**	Aerobic soil (3070811)	Yolo, CA, loam soil, 20°C, pH 7.2	8.26 (120)	8.26 (120)
		Germany, loam soil, 20°C, pH 6.2	8.33 (120)	8.33(120)
		United Kingdom, silt loam soil, 20°C, pH 5.9	11.1 (80)	10.2 (120)
	Aerobic soil (3132959) *TP was the test item	United Kingdom, silt loam soil, 20°C, pH 5.6	98.3% of applied (0)	75.1 (121)
		United Kingdom, loamy sand soil, 20°C, pH 7.9	105.1% of applied (7)	78.5 (121)
		Germany, loam soil, 20°C, pH 6.1	101% of applied (0)	77.3 (121)
		Hanford, CA, loam soil, 20°C, pH 7	99.5% of applied (0)	60.2 (121)
	Terrestrial field study (3070818)	NY bare soil plot: 30–45 cm (single detect)	2.5% parent eq. (0 DA2A)	<LOD (449 DA2A)
Common name: benzyl alcohol (X195023) **IUPAC Chemical Name:** benzyl alcohol **Molecular Weight:** 108.14 g/mol **Structure:**	Hydrolysis (3070805)	Buffer, 10°C, pH 7	2.7 (30)	2.7 (30)
		Buffer, 10°C, pH 9	90.7 (30)	90.7 (30)
		Buffer, 25°C, pH 4	1.9 (30)	1.9 (30)
		Buffer, 25°C, pH 7	20.1 (30)	20.1 (30)
		Buffer, 25°C, pH 9	100 (30)	100 (30)
		Buffer, 35°C, pH 4	5.3 (30)	5.3 (30)
		Buffer, 35°C, pH 7	51.5 (30)	51.5 (30)
		Buffer, 35°C, pH 9	100 (14–30)	100 (30)
	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	67.5 (7)	59.7 (18)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		Natural water, irradiated, 25°C, pH 7.8	81.5 (6.9)	75.7 (16)
		Natural water, dark, 25°C, pH 7.8	79.7 (16)	79.7 (16)
	Aerobic aquatic (3070806)	Pond water – high dose, 20°C, pH 8.49	18.7 (2)	2.2 (14)
		Pond water – low dose, 20°C, pH 8.49	6.1 (3)	<LOD (7)
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	8.2 (7)	<LOD (105)
Common name: benzoic acid (X194973) **IUPAC Chemical Name:** benzoic acid **Molecular Weight:** 122.12 g/mol **Structure:** 	Aerobic aquatic (3070813)	France, water:loam sediment, 20°C, pH 7.8/7.1	21.3 (10)	<LOD (105)
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	10.7 (14)	<LOD (105)
	Aerobic aquatic (3070806)	Pond water – high dose, 20°C, pH 8.49	5.1 (14)	5.1 (14)
		Pond water – low dose, 20°C, pH 8.49	14.6 (3)	<LOD (7)
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	7.4 (7)	<LOD (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	20.2 (10)	<LOD (105)
Carbon dioxide (CO_2)	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	13.2 (17)	13.2 (17)
		Loam soil, dark, 20°C, pH 7.2	<0.1 (1-17)	<0.1 (17)
	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	44 (18)	44 (18)
		Natural water,	37.5 (16)	37.5 (16)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		irradiated, 25°C, pH 7.8		
	Aerobic soil (3070811)	Yolo, CA, loam soil, 20°C, pH 7.2	46.58 (120)	46.58 (120)
		Germany, loam soil, 20°C, pH 6.2	59.13 (120)	59.13 (120)
		United Kingdom, silt loam soil, 20°C, pH 5.9	64.06 (120)	64.06 (120)
		United Kingdom, loamy sand soil, 20°C, pH 7.4	64.25 (120)	64.25 (120)
	Aerobic soil (3070820)	Italy, flooded paddy soil (loam), 20°C, pH 4.9	37.6 (156)	37.6 (156)
		Italy, flooded paddy soil (sandy loam), 20°C, pH 4.5	71.5 (156)	71.5 (156)
	Anaerobic soil (3070812) (after 6 days of aerobic incubation)	Yolo, CA, clay loam soil, 20°C, pH 7.3	47.2 (100)	14.5 (120)
		RefSol 03-G, Germany, loam, 20°C, pH 6.0	41 (120)	41 (120)
		Site E1, United Kingdom, silt loam, 20°C, pH 5.5	45.8 (120)	45.8 (120)
		Site I2, United Kingdom, sandy loam, 20°C, pH 7.5	45 (100)	44.4 (120)
	Aerobic aquatic (3070813)	France, water:loam sediment, 20°C, pH 7.8/7.1	67.34 (105)	67.34 (105)
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	80.67 (91)	75.61 (105)
	Aerobic aquatic (3070806)	Pond water – high dose, 20°C, pH 8.49	77.6 (60)	77.6 (60)
		Pond water – low	84.7 (60)	84.7 (60)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
		dose, 20°C, pH 8.49		
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	49.1 (105)	49.1 (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	55.1 (82)	52.5 (105)
M10	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	4.3 (65)	<LOD (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	12.9 (10)	1.5 (105)
Polar peak	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	38.6 (18)	38.6 (18)
		Natural water, irradiated, 25°C, pH 7.8	51.6 (16)	51.6 (16)
Be-Deg#1	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	12.7 (4)	8.8 (18)
		Natural water, irradiated, 25°C, pH 7.8	7.8 (1.94)	4.3 (16)
Be-Deg#2	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	13 (1.08–2.01)	8 (18)
Minor (<10%) Transformation Products				
benzyl 4-amino-5-fluoro-6-(2-fluoro-3,4-dihydroxyphenyl)pyridine-2-carboxylate (X12421263)	Aqueous phototransformation (3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	6.1 (0.17)	<LOD (18)
M4	Aerobic aquatic (3070806)	Pond water – high dose, 20°C, pH 8.49	5.5 (14)	5.5 (14)
		Pond water – low dose, 20°C, pH 8.49	2.8 (2)	<LOD (7)
M7	Aerobic aquatic	Pond water – high	0.5 (14)	0.5 (14)

Chemical name	Study type (PMRA#)	Test conditions	Max % AR (d)	% AR at study end (d)
	(3070806)	dose, 20°C, pH 8.49		
	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	9.6 (0.33)	<LOD (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	4.2 (21)	<LOD (105)
M11	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	4 (17)	4 (17)
M12	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	6.1 (3)	4.6 (17)
M13	Soil phototransformation (3070807)	Loam soil, irradiated, 20°C, pH 7.2	5.7 (10)	<LOD (17)
M14	Anaerobic aquatic (3070814)	River water:loamy sand sediment, 20°C, pH 8.14/7.35	3.7 (42)	<LOD (105)
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	5.1 (83)	5 (105)
Degradate #1	Aqueous phototransformation 3070809)	Aqueous buffer solution, irradiated, 25°C, pH 4	6.8 (0.08)	<LOD (18)

Table 25 Environmental fate parameters for florpyrauxifen-benzyl and its transformation products

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
Abiotic transformation							
Hydrolysis	Florpyrauxifen-benzyl	10°C, pH 4	Stable	None	None	Hydrolysis is an important route of dissipation under alkaline conditions, but less so under acid and neutral conditions.	3070805
		10°C, pH 7	Stable	None	X11438848, X195023		
		10°C, pH 9	$t_{1/2}$ = 9.23 d (SFO)	X11438848, X195023	None		
		25°C, pH 4	Stable	None	X11438848, X195023		
		25°C, pH 7	$t_{1/2}$ = 111 d (SFO)	X11438848, X195023	None		
		25°C, pH 9	$t_{1/2}$ = 1.23 d (SFO)	X11438848, X195023	None		
		35°C, pH 4	$t_{1/2}$ = 375 d (SFO)	None	X11438848, X195023		
		35°C, pH 7	$t_{1/2}$ = 34.6 d (SFO)	X11438848, X195023	None		
		35°C, pH 9	$t_{1/2}$ = 0.406 d (SFO)	X11438848, X195023	None		
	Florpyrauxifen acid (X11438848)	50°C, pH 4	Stable	None	None	Hydrolysis is not an important route of dissipation.	
		50°C, pH 7	Stable	None	None		
		50°C, pH 9	Stable	None	None		
Soil Phototransformation	Florpyrauxifen-benzyl	Loam soil, irradiated, 20°C, pH 7.2	$t_{1/2}$ = 26.1 d (SFO) phototransformation $t_{1/2}$ = 27.5 d $t_{1/2}$ equivalent under natural sunlight (30–50°N) = 52.0 d	Unextracted residues, CO_2	X12393505, X12131932, X11438848	Phototransformation on soil is not expected to be an important route of dissipation in the environment.	3070807
		Loam soil, dark, 20°C, pH 7.2	$t_{1/2}$ = 545 d (SFO)	None	X11438848, X12131932		
Aqueous Phototransformation	Florpyrauxifen-benzyl	Aqueous buffer solution, irradiated, 25°C, pH 4	$t_{1/2}$ = 0.0393 d (SFO) phototransformation $t_{1/2}$ = 0.0394 d $t_{1/2}$ equivalent under natural sunlight (40°N) = 0.0788 d	X12131932, X12393505, X195023, unidentified TPs (polar peak, Be-Deg #1 and #2), CO_2	X12421263, unidentified TP (Degradate #1)	Phototransformation in water is expected to be an important route of dissipation.	3070809

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		Natural water, irradiated, 25°C, pH 7.8	$t_{1/2}$ = 0.0977 d (SFO) phototransformation $t_{1/2}$ = 0.0994 d $t_{1/2}$ equivalent under natural sunlight (40°N) = 0.161 d	X12131932, X195023, unidentified TPs (polar peak), CO_2	X11438848, X12393505, unidentified TP (Be-Deg #1)		
		Aqueous buffer solution, dark, 25°C, pH 4	$t_{1/2}$ = 644 d (SFO)	None	X12131932		
		Natural water, dark, 25°C, pH 7.8	$t_{1/2}$ = 5.87 d (SFO)	X11438848, X195023	None		
Phototransformation in Air	Florpyrauxifen-benzyl	EPISuite v4.0, AOPWin v1.92, 25°C	$t_{1/2}$ = 1.124 d (modelled in EPISuite)	NA	NA	Non-persistent in air	3070810
Biotransformation							
Aerobic soil	Florpyrauxifen-benzyl	Yolo, CA, loam soil, 20°C, pH 7.2	t_R = 348 d (DFOP) DT_{50} = 33 d	X11438848 (t_R = 67.4 d (IORE), DT_{50} = 19 d), NER, CO_2	X12300837, X11966341, X12483137	Slightly persistent	3070811
		RefSol 03-G, Germany, loam soil, 20°C, pH 6.2	t_R = 129 d (DFOP) DT_{50} = 11 d	X11438848 ($t_{1/2}$ = 57 d (SFO)), NER, CO_2	X12300837, X11966341 ($t_{1/2}$ = 31.5 d (SFO)), X12483137	Non-persistent	
		Site E1, United Kingdom, silt loam soil, 20°C, pH 5.9	t_R = 34 d (IORE) DT_{50} = 10 d	X11438848 (t_R = 1830 d (IORE), DT_{50} = 29 d), X12483137, NER, CO_2	X12300837, X11966341 ($t_{1/2}$ = 40.5 d (SFO))	Non-persistent	
		Site I2, United Kingdom, loamy sand soil, 20°C, pH 7.4	t_R = 8.91 d (IORE) DT_{50} = 2.5 d	X11438848 ($t_{1/2}$ = 40 d (SFO)), NER, CO_2	X12300837, X11966341 ($t_{1/2}$ = 36.9 d (SFO))	Non-persistent	

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		San Pietro, Italy, flooded paddy soil (loam), 20°C, pH 4.9	t_R = 31.3 d (IORE) DT_{50} = 8 d	X12300837 ($t_{1/2}$ = 86.9 d (SFO)), X11966341 ($t_{1/2}$ = 127 d (SFO)), unextracted residues, CO_2	X11438848 (t_R = 23.4 d (IORE), DT_{50} = 11.3 d)	Non-persistent	3070820
		Casalino, Italy, flooded paddy soil (sandy loam), 20°C, pH 4.5	t_R = 11.6 d (IORE) DT_{50} = 9.7 d	X11438848 ($t_{1/2}$ = 14 d (SFO)), X11966341 ($t_{1/2}$ = 729 d (SFO)), unextracted residues, CO_2	X12300837 ($t_{1/2}$ = 14 d (SFO)		
Aerobic soil	Nitro hydroxy acid (X12483137)	Site E1, United Kingdom, silt loam soil, 20°C, pH 5.6	Stable	NA	NA	Persistent	3132959
		Site I2, United Kingdom, loamy sand soil, 20°C, pH 7.9	Stable	NA	NA		
		RefSol 03-G, Germany, loam soil, 20°C, pH 6.1	Stable	NA	NA		
		Hanford, CA, loam soil, 20°C, pH 7	Stable	NA	NA		
Anaerobic soil	Florpyrauxifen-benzyl	Yolo, CA, clay loam soil, 20°C, pH 7.3	t_R = 37.6 d (IORE) DT_{50} = 14.9 d	X11438848 ($t_{1/2}$ = 67.2 d (SFO)), X11966341, NER, CO_2	None	Non-persistent	3070812
		RefSol 03-G, Germany, loam soil, 20°C, pH 6	t_R = 14.8 d (IORE) DT_{50} = 8.1 d	X11438848 ($t_{1/2}$ = 32.9 d (SFO)), X11966341, NER, CO_2	None		

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		Site E1, United Kingdom, silt loam soil, 20°C, pH 5.5	t_R = 16.9 d (IORE) DT_{50} = 8.5 d	X11438848 ($t_{1/2}$ = 19.9 d (SFO)), X11966341, NER, CO_2	None		
		Site I2, United Kingdom, sandy loam soil, 20°C, pH 2.9	t_R = 46.7 d (IORE) DT_{50} = 7.4 d	X11438848 ($t_{1/2}$ = 62.7 d (SFO)), X11966341, NER, CO_2	None		
Aerobic aquatic	Florpyrauxifen-benzyl	Pond water – high dose, 20°C, pH 8.49	$t_{1/2}$ = 3.6 d (SFO) corrected biotransformation $t_{1/2}$ = 4.2 d	X11438848, X195023, CO_2	X12393505, X194973, unidentified TPs (M4, M7)	Non-persistent; aerobic mineralisation study (water only)	3070806
		Pond water – low dose, 20°C, pH 8.49	$t_{1/2}$ = 2.6 d (SFO)	X11438848, CO_2	X195023, X194973, unidentified TP (M4)		
		France, water:loam sediment, 20°C, pH 7.8/7.1	$t_{1/2}$ = 3.76 d (SFO)	X11438848 ($t_{1/2}$ = 6.33 d (SFO)), X12300837 ($t_{1/2}$ = 5.6 d (SFO)), X11966341 ($t_{1/2}$ = 121 d (SFO)), X194973 ($t_{1/2}$ = 2.6 d (SFO)), Unextracted residues, CO_2	None	Non-persistent	3070813
		England, water:loamy sand sediment, 20°C, pH 6.6/6.2	$t_{1/2}$ = 6.09 d (SFO)	X11438848 ($t_{1/2}$ = 19.8 d (SFO)), X12300837 ($t_{1/2}$ = 13.9 d (SFO)), X11966341 ($t_{1/2}$ = 52.5 d (SFO)), X194973 ($t_{1/2}$ = 2.3 d (SFO)), Unextracted residues, CO_2	None		

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
Anaerobic aquatic	Florpyrauxifen-benzyl	River water:loamy sand sediment, 20°C, pH 8.14/7.35	$t_{1/2}$ = 2.6 d (SFO)	X11438848 ($t_{1/2}$ = 3.13 d (SFO)), X12300837, X11966341 ($t_{1/2}$ = 279 d (SFO), sediment only), NER, CO_2	X195023, X194973, unidentified TPs (M7, M10, M14)	Non-persistent	3070814
		Pond water:silt loam sediment, 20°C, pH 7.42/7.15	$t_{1/2}$ = 1.74 d (SFO)	X11438848 ($t_{1/2}$ = 4.60 d (SFO)), X12300837 ($t_{1/2}$ = 7.37 d (SFO)), X11966341 ($t_{1/2}$ = 111 d (SFO), sediment only), X194973, unidentified TP (M10), NER, CO_2	Unidentified TPs (M7, M14)		
Field dissipation							
Terrestrial field dissipation	XDE-848 BE SC (320 g a.i./L)	New York, bare soil, silt loam, pH 4.8	t_R = 14.5 d (IORE) DT_{50} = 3.6 d, soil, app 1	None	X11438848, X11966341	Non-persistent Parent not detected below 15 cm, TPs not detected below 7.5 cm	3070818
			$t_{1/2}$ = 13.3 d (SFO), soil, app 2	None	X11438848, X11966341, X12483137	Non-persistent Parent not detected below 15 cm X11438848 and X11966341 not detected below 7.5 cm Single detection of X12483137 at 30–45 cm	

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		Iowa, bare soil, sandy loam, pH 5.7	$t_{1/2}$ = 19.4 d (SFO), soil, app 1	None	X11438848	Slightly persistent Parent not detected below 15 cm; TPs not detected below 7.5 cm.	
			t_R = 110 d (IORE) DT_{50} = 7.5 d, soil, app 2	None	X11438848	Non-persistent Parent not detected below 15 cm, TPs not detected below 7.5 cm	
		Iowa, pasture, sandy loam, pH 6.4	$t_{1/2}$ = 4.9 d (SFO), grass, app 1	None	X11438848	Non-persistent	
			$t_{1/2}$ = 2.5 d (SFO), grass, app 2	None	X11438848, X11966341	Non-persistent	
			$t_{1/2}$ = 19.7 d (SFO), soil, app 1	None	X11438848	Slightly persistent Parent and TPs not detected below 7.5 cm	
			t_R = 77 d (IORE) DT_{50} = 11.1 d, soil, app 2	None	X11438848	Non-persistent Parent and TPs not detected below 7.5 cm	
		Texas, pasture, clay, pH 6.9	$t_{1/2}$ = 4.4 d (SFO), grass app 1	None	X11438848	Non-persistent	
			$t_{1/2}$ = 4.4 d (SFO), grass, app 2	None	X11438848, X11966341	Non-persistent	
			t_R = 12.9 d (DFOP) DT_{50} = 6.7 d, soil, app 1	None	X11438848	Non-persistent Parent and TPs not detected below 7.5 cm	
			t_R = 31.1 d (IORE) DT_{50} = 4.6 d, soil, app 2	None	X11438848	Non-persistent Parent and TPs not detected below 7.5 cm	
Aquatic field dissipation	XDE-848 BE EC (20 g a.i./L)	California, water-seeded rice, Centerville clay	$t_{1/2}$ = 0.159 d (SFO), water, app 1	X11438848, X11966341	X12300837, X12131932, X12393505	Non-persistent; Major route of dissipation: transformation to	3070817

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		loam soil, pH 7.8	$t_{1/2}$ = 0.199 d (SFO), water, app 2	X11438848, X11966341	X12300837, X12131932, X12393505	X11438848 and X11966341 Use site (rice) and formulation applied are not relevant to the proposed uses	
			$t_{1/2}$ = 1.45 d (SFO), soil, app 1	X11438848 ($t_{1/2}$ = 1.49 d (SFO)), X11966341 ($t_{1/2}$ = 11.5 d (SFO))	X12300837, X12131932, X12393505		
			t_R = 22.6 d (IORE) DT_{50} = 0.000663 d, soil, app 2	X11438848, X11966341	X12300837, X12131932, X12393505		
	XDE-848 BE G (1.2% a.i.)	California, water-seeded rice, Centerville clay loam soil, pH 7.8	$t_{1/2}$ = 0.343 d (SFO), water, app 1	X11438848 ($t_{1/2}$ = 0.274 d (SFO)), X12300837, X11966341	None	Non-persistent; Major route of dissipation: transformation to X12300837 and X11966341 Use site (rice) and formulation applied are not relevant to the proposed uses	
			$t_{1/2}$ = 0.15 d (SFO), water, app 2	X11438848, X12300837, X11966341	None		
			t_R = 24.2 d (DFOP) DT_{50} = 0.154 d, soil, app 1	X11438848, X12300837 ($t_{1/2}$ = 43.4 d (SFO)), X11966341 ($t_{1/2}$ = 65.6 d (SFO))	None		
			t_R = 17 d (DFOP) DT_{50} = 5.21 d, soil, app 2	X11438848, X12300837, X11966341	None		
	XDE-848 BE EC (20 g a.i./L)	Texas, dry-seeded rice, Bernard/Edna sandy loam soil, pH 6.7	$t_{1/2}$ = 0.791 d (SFO), water, app 2	X11438848 ($t_{1/2}$ = 3.51 d (SFO)), X11966341	X12300837, X12131932, X12393505	Non-persistent; Major route of dissipation: transformation to X11438848 and X11966341 Use site (rice) and formulation applied are not relevant to the proposed uses	
			$t_{1/2}$ = 8.11 d (SFO), soil, app 1	X11438848, X11966341 ($t_{1/2}$ = 34 d (SFO), soil, app 2)	X12300837, X12131932, X12393505		

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
	GF-3301 (27.2% a.i.)	North Carolina, pond water:sandy loam sediment, pH 6.77-9.88	$t_{1/2}$ = 6.39 d (SFO), water only	X11438848 ($t_{1/2}$ = 19.4 d (SFO))	X12300837, X11966341 ($t_{1/2}$ = 13.9 d (SFO)), X12131932 ($t_{1/2}$ = 6.9 d (SFO)), X12393505 ($t_{1/2}$ = 12.1 d (SFO))	Non-persistent; Major route of dissipation: transformation to X11438848	3070821
		Florida, pond water:sand sediment, pH 7.06-8.64	$t_{1/2}$ = 1.37 d (SFO), water only	X11438848 ($t_{1/2}$ = 8.4 d (SFO))	X12300837 ($t_{1/2}$ = 6.1 d (SFO)), X11966341 ($t_{1/2}$ = 7.7 d (SFO)), X12131932 ($t_{1/2}$ = 1.4 d (SFO)), X12393505	Non-persistent; Major route of dissipation: transformation to X11438848	3070822
		North Carolina, pond water:sandy loam sediment, pH 6.77-9.88	$t_{1/2}$ = 2.26 d (SFO), water only	X11438848 ($t_{1/2}$ = 15 d (SFO))	X12300837 ($t_{1/2}$ = 7.7 d (SFO)), X11966341 ($t_{1/2}$ = 14.4 d (SFO)), X12131932 ($t_{1/2}$ = 0.9 d (SFO)), X12393505 ($t_{1/2}$ = 10.1 d (SFO))	Non-persistent; Major route of dissipation: transformation to X11438848	
Mobility							
Adsorption/ desorption	Florpyrauxifen-benzyl	Yolo, CA, clay loam soil	K_{oc} = 31120 L/kg	NA	NA	Immobile	3132960

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
in soil		RefSol 03-G, Germany, loam soil	K_{oc} = 24931 L/kg	NA	NA		
		Site E1, United Kingdom, silt loam soil	K_{oc} = 30876 L/kg	NA	NA		
		Site I2, United Kingdom, loamy sand soil	K_{oc} = 21777 L/kg	NA	NA		
		Casalino, Italy, sandy loam soil	K_{oc} = 44278 L/kg	NA	NA		
	Florpyrauxifen acid (X11438848)	Yolo, CA, clay loam soil	K_{oc} = 47.6 L/kg	NA	NA	Very high mobility	3070815
		RefSol 03-G, Germany, loam soil	K_{oc} = 28.1 L/kg	NA	NA	Very high mobility	
		Site E1, United Kingdom, silt loam soil	K_{oc} = 35.4 L/kg	NA	NA	Very high mobility	
		RefSol 01-A, Germany, loamy sand soil	K_{oc} = 64.5 L/kg	NA	NA	High mobility	
		Site K, United Kingdom, loam soil	K_{oc} = 49.7 L/kg	NA	NA	Very high mobility	
		San Pietro, Italy, loam soil	K_{oc} = 136 L/kg	NA	NA	High mobility	
		Casalino, Italy, sandy loam soil	K_{oc} = 174 L/kg	NA	NA	Medium mobility	
		Site I2, United Kingdom, loamy sand soil	K_{oc} = 24.9 L/kg	NA	NA	Very high mobility	
		Centerville, CA, clay loam soil	K_{oc} = 41.3 L/kg	NA	NA	Very high mobility	
		Bernard-Edna, TX, sandy clay soil	K_{oc} = 89.4 L/kg	NA	NA	High mobility	

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		Site Fr3, France, sandy loam soil	K_{oc} = 45.3 L/kg	NA	NA	Very high mobility	
		Site Sp4, Spain, silty clay soil	K_{oc} = 68.3 L/kg	NA	NA	High mobility	
	Hydroxy benzyl ester (X12300837)	Yolo, CA, clay loam soil	K_{oc} = 1268 L/kg	NA	NA	Low mobility	
		RefSol 03-G, Germany, loam soil	K_{oc} = 6748 L/kg	NA	NA	Immobile	
		Site E1, United Kingdom, silt loam soil	K_{oc} = 6196 L/kg	NA	NA	Immobile	
		RefSol 01-A, Germany, loamy sand soil	K_{oc} = 6581 L/kg	NA	NA	Immobile	
		Site K, United Kingdom, loam soil	K_{oc} = 803 L/kg	NA	NA	Low mobility	
		San Pietro, Italy, loam soil	K_{oc} = 23024 L/kg	NA	NA	Immobile	
		Casalino, Italy, sandy loam soil	K_{oc} = 14221 L/kg	NA	NA	Immobile	
		Site I2, United Kingdom, loamy sand soil	K_{oc} = 1525 L/kg	NA	NA	Low mobility	
		Centerville, CA, clay loam soil	K_{oc} = 770 L/kg	NA	NA	Low mobility	
		Bernard-Edna, TX, sandy clay soil	K_{oc} = 2538 L/kg	NA	NA	Slight mobility	
		Site Fr3, France, sandy loam soil	K_{oc} = 1031 L/kg	NA	NA	Low mobility	
		Site Sp4, Spain, silty clay soil	K_{oc} = 1505 L/kg	NA	NA	Low mobility	
	Hydroxy acid (X11966341)	Yolo, CA, clay loam soil	K_{oc} = 18.0 L/kg	NA	NA	Very high mobility	

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		RefSol 03-G, Germany, loam soil	K_{oc} = 28.7 L/kg	NA	NA	Very high mobility	
		Site E1, United Kingdom, silt loam soil	K_{oc} = 50.3 L/kg	NA	NA	High mobility	
		RefSol 01-A, Germany, loamy sand soil	K_{oc} = 109 L/kg	NA	NA	High mobility	
		Site K, United Kingdom, loam soil	K_{oc} = 14.3 L/kg	NA	NA	Very high mobility	
		San Pietro, Italy, loam soil	K_{oc} = 255 L/kg	NA	NA	Medium mobility	
		Casalino, Italy, sandy loam soil	K_{oc} = 270 L/kg	NA	NA	Medium mobility	
		Site I2, United Kingdom, loamy sand soil	K_{oc} = 20.8 L/kg	NA	NA	Very high mobility	
		Centerville, CA, clay loam soil	K_{oc} = 29.9 L/kg	NA	NA	Very high mobility	
		Bernard-Edna, TX, sandy clay soil	K_{oc} = 116 L/kg	NA	NA	High mobility	
		Site Fr3, France, sandy loam soil	K_{oc} = 164 L/kg	NA	NA	Medium mobility	
		Site Sp4, Spain, silty clay soil	K_{oc} = 70.9 L/kg	NA	NA	High mobility	
	Nitro hydroxy acid (X12483137)	Site E1, United Kingdom, silt loam soil	K_{oc} = 11.6 L/kg	NA	NA	Very high mobility	3132961
		RefSol 03-G, Germany, loam soil	K_{oc} = 6.58 L/kg	NA	NA		
		Site I2, United Kingdom, loamy sand soil	K_{oc} = 6.93 L/kg	NA	NA		

Study	Test substance	Medium/ Test conditions	Value	Major TPs[a]	Minor TPs[a]	Comments	PMRA#
		Hanford, CA, loam soil	K_{oc} = 9.78 L/kg	NA	NA		
Volatilization	Florpyrauxifen-benzyl	Glass, 22°C	R_v <1%	NA	NA	Non-volatile	3070816
		Deionized water, 22°C	R_v <1%	NA	NA		
		LUFA Speyer 2.3, Germany, sandy loam soil, 22°C, pH 6.6	R_v <1%	NA	NA		
Bioaccumulation							
Fish bioconcentration	Florpyrauxifen-benzyl	Edible tissue, 3 µg/L	BCF_{SS} = 55 L/kg BCF_k = 52.2 L/kg	NA	NA	Florpyrauxifen-benzyl does not readily bioconcentrate in fish tissue under the conditions of the study.	3067562
		Non-edible tissue, 3 µg/L	BCF_{SS} = 686 L/kg BCF_k = 673 L/kg	NA	NA		
		Whole fish, 3 µg/L	BCF_{SS} = 356 L/kg BCF_k = 348 L/kg depuration $t_{1/2}$ = 0.39 d	NA	NA		
		Edible tissue, 30 µg/L	BCF_{SS} = 48 L/kg BCF_k = 46.4 L/kg	X11438848	taurine conjugate of X11438848, X12393505		
		Non-edible tissue, 30 µg/L	BCF_{SS} = 528 L/kg BCF_k = 575 L/kg	X11438848	taurine conjugate of X11438848, X12393505		
		Whole fish, 30 µg/L	BCF_{SS} = 279 L/kg BCF_k = 276 L/kg depuration $t_{1/2}$ = 0.2 d	NA	NA		

NA: not applicable; NER: non-extractable residues; R_v: volatility value; BCF_{SS}: steady-state BCF; BCF_k: kinetic BCF

[a] X11438848: Florpyrauxifen acid; X12300837: hydroxy benzyl ester; X11966341: hydroxy acid; X12131932: dechlorinated benzyl ester; X12393505: dechlorinated acid; X12483137: nitro hydroxy acid; X195023: benzyl alcohol; X194973: benzoic acid

Table 26 Aquatic toxicity endpoints

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
Freshwater invertebrates					
Florpyrauxifen-benzyl	Amphipod (*Gammarus pseudolimnaeus*)	96-h acute	LC_{50} >0.042 mg a.i./L	practically non-toxic up to limit of solubility	3133006
	Great pond snail (*Lymnaea stagnalis*)	96-h acute	LC_{50} >0.0482 mg a.i./L	practically non-toxic up to limit of solubility	3133005
	Midge (*Chironomus riparius*)	48-h acute	EC_{50} (immobilization) >0.0563 mg a.i./L	practically non-toxic up to limit of solubility	3067531
		28-d spiked water	NOEC (emergence, time to emergence, development rate, survival, male:female ratio) ≥0.014 mg a.i./L overlying water; ≥0.00042 mg a.i./L pore water *no significant effects up to highest treatment	-	3067532
	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >0.0626 mg a.i./L	practically non-toxic up to limit of solubility	3067527
		21-d chronic	NOEC (parent mortality, days to 1st brood release, young per adult, adult body length) ≥0.0385 mg a.i./L *no significant effects up to highest treatment	-	3067530
	Midge (*Chironomus dilutus*)	10-d spiked sediment	NOEC (dry weight, ash-free dry weight) = 0.00169 mg a.i./L overlying water; 0.0133 mg a.i./L pore water	-	3067546
			LOEC (dry weight, ash-free dry weight) = 0.00252 mg a.i./L overlying water; 0.0346 mg a.i./L pore water		

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
GF-3301[b]	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >22.2 mg a.i./L	practically non-toxic up to highest concentration tested	3067528
GF-3206[b]	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) = 1.32 mg a.i./L	moderately toxic	3133004
Florpyrauxifen acid	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >91.8 mg/L	practically non-toxic up to highest concentration tested	3132999
		21-d chronic	NOEC (young per adult) = 25.9 mg/L LOEC (young per adult) = 52.9 mg/L	-	3067529
Hydroxy benzyl ester	Midge (*Chironomus riparius*)	28-d spiked sediment	NOEC (emergence, time to emergence, development rate, survival) ≥ 0.181 mg/L overlying water; 0.555 mg/L pore water *no significant effects up to highest treatment	-	3133007
Hydroxy acid	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >100 mg/L	practically non-toxic	3133000
	Midge (*Chironomus riparius*)	28-d spiked sediment	NOEC (male emergence time) = 58 mg/L overlying water; 375 mg/L pore water LOEC (male emergence time) = 109 mg/L overlying water; 885 mg/L pore water	-	3133008
Dechlorinated benzyl ester	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >0.98 mg/L	practically non-toxic up to limit of solubility	3133002
Dechlorinated acid	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >110 mg/L	practically non-toxic	3133001

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
Nitro hydroxy acid	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) >10 mg/L	practically non-toxic up to highest concentration tested	3133003
Benzyl alcohol	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (immobilization) = 230 mg/L	practically non-toxic	3339990
		21-d chronic	NOEC (reproduction) = 51 mg/L *LOEC not reported	-	
Benzoic acid	Water flea (*Daphnia magna*)	48-h acute	EC_{50} (NR) >100 mg/L	practically non-toxic	3339988, 3339993
		21-d chronic	NOEC (mortality, reproduction) ≥25 mg/L *no significant effects up to highest treatment	-	
Freshwater fish					
Florpyrauxifen-benzyl	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >0.0414 mg a.i./L	practically non-toxic up to limit of solubility	3067559
	Fathead minnow (*Pimephales promelas*)	96-h acute	LC_{50} >0.0518 mg a.i./L	practically non-toxic up to limit of solubility	3067558
		33-d early life stage	NOEC (hatching success, time to hatch, post-hatch survival, length, and blotted wet weight) ≥0.0373 mg a.i./L *no significant effects up to highest treatment	-	3133013
	Rainbow trout (*Oncorhynchus mykiss*)	96-h acute	LC_{50} >0.049 mg a.i./L	practically non-toxic up to limit of solubility	3067551
GF-3301	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >0.526 mg a.i./L	practically non-toxic up to highest concentration tested	3067560

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
GF-3206	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >3.2 mg a.i./L	practically non-toxic up to highest concentration tested	3133012
Florpyrauxifen acid	Rainbow trout (*Oncorhynchus mykiss*)	96-h acute	LC_{50} >99.4 mg/L	practically non-toxic up to highest concentration tested	3067550
	Fathead minnow (*Pimephales promelas*)	33-d early life stage	NOEC (hatching success, time to hatch, post-hatch survival, length, and blotted wet weight) ≥29.8 mg/L *no significant effects up to highest treatment	-	3133014
Hydroxy acid	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >120 mg/L	practically non-toxic up to highest concentration tested	3067555
Dechlorinated benzyl ester	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >1 mg/L	practically non-toxic up to limit of solubility	3067556
Dechlorinated acid	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >90 mg/L	practically non-toxic up to limit of solubility	3133011
Nitro hydroxy acid	Common carp (*Cyprinus carpio*)	96-h acute	LC_{50} >9.6 mg/L	practically non-toxic up to highest concentration tested	3067557
Benzyl alcohol	Fathead minnow (*Pimephales promelas*)	96-h acute	LC_{50} = 460 mg/L	practically non-toxic	3339990

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
	Medaka (*Oryzias latipes*)	96-h acute	LC_{50} >100 mg/L	practically non-toxic	
Benzoic acid	Bluegill sunfish (*Lepomis macrochirus*)	96-h acute	LC_{50} = 44.6 mg/L	slightly toxic	3339988, 3339993
	Rainbow trout (*Oncorhynchus mykiss*)	96-h acute	LC_{50} = 47.3 mg/L	slightly toxic	
		28-d chronic	NOEC (mortality, growth) ≥120 mg/L *no significant effects up to highest treatment	-	
Amphibians					
Florpyrauxifen-benzyl	African clawed frog (*Xenopus laevis*)	96-h acute	LC_{50} >0.0676 mg a.i./L	practically non-toxic up to limit of solubility	3133023
Freshwater algae					
Florpyrauxifen-benzyl	Cyanobacteria (*Anabaena flos-aquae*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >0.0513 mg a.i./L	practically non-toxic up to limit of solubility	3067576
	Freshwater diatom (*Navicula pelliculosa*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >0.0565 mg a.i./L	practically non-toxic up to limit of solubility	3067577
	Green alga (*Raphidocelis subcapitata*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >0.0612 mg a.i./L	practically non-toxic up to limit of solubility	3067575
GF-3301	Green alga (*Raphidocelis subcapitata*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >0.568 mg a.i./L	practically non-toxic up to highest concentration tested	3133019
GF-3206	Green alga (*Raphidocelis subcapitata*)	96-h growth inhibition	EC_{50} (yield) = 0.126 mg a.i./L	highly toxic	3133017

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
Florpyrauxifen acid	Green alga (*Raphidocelis subcapitata*)	96-h growth inhibition	EC_{50} (growth rate) = 75.1 mg/L	slightly toxic	3067570
Hydroxy acid	Freshwater diatom (*Navicula pelliculosa*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >11 mg/L	practically non-toxic up to highest concentration tested	3067571
Dechlorinated benzyl ester	Freshwater diatom (*Navicula pelliculosa*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >1.3 mg/L	practically non-toxic up to limit of solubility	3067572
Dechlorinated acid	Freshwater diatom (*Navicula pelliculosa*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >9.9 mg/L	practically non-toxic up to highest concentration tested	3067573
Nitro hydroxy acid	Freshwater diatom (*Navicula pelliculosa*)	96-h growth inhibition	EC_{50} (yield) = 5.619 mg/L	moderately toxic	3067574
Benzyl alcohol	Green alga (*Raphidocelis subcapitata*)	72-h growth inhibition	EC_{50} (AUC) = 500 mg/L	practically non-toxic	3339990
Benzoic acid	Green alga (*Raphidocelis subcapitata*)	72-h growth inhibition	EC_{50} >33.1 mg/L	practically non-toxic up to highest concentration tested	3339988
Freshwater vascular plants					
Florpyrauxifen-benzyl	Duckweed (*Lemna gibba*)	7-d growth inhibition	EC_{50} (frond number yield, frond number growth rate, biomass yield, biomass growth rate) >46.1 µg a.i./L	-	3067545

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
	Common hornwort (*Ceratophyllum demersum*)	14-d growth inhibition	EC_{50} (fresh weight yield) = 1.52 µg a.i./L	-	3067535
GF-3301	Duckweed (*Lemna gibba*)	7-d growth inhibition	EC_{50} (frond number yield, frond number growth rate, biomass yield, biomass growth rate) >558 µg a.i./L	-	3133021
	Elodea (*Elodea canadensis*)	14-d growth inhibition	EC_{50} (shoot length yield) = 2.8 µg a.i./L[b]	-	3070863
	Megalodonta (*Bidens beckii*)	14-d growth inhibition	EC_{50} (shoot length yield) = 3.0 µg a.i./L[b]	-	3070863
		28-d mesocosm	EC_{50} (dry weight yield) = 4.7 µg a.i./L	-	
	American waterwillow (*Justicia americana*)	28-d mesocosm	EC_{50} (shoot length) = 1.4 µg a.i./L[b]	-	3070865
GF-3206	Duckweed (*Lemna gibba*)	7-d growth inhibition	EC_{50} (frond number yield) = 520 µg a.i./L	-	3133020
Florpyrauxifen acid	Common hornwort (*Ceratophyllum demersum*)	14-d growth inhibition	EC_{50} (fresh weight yield) = 33.2 µg/L	-	3067537
	Elodea (*Elodea canadensis*)	14-d growth inhibition	EC_{50} (shoot length yield) = 6.8 µg/L	-	3070863
	Megalodonta (*Bidens beckii*)	14-d growth inhibition	EC_{50} (shoot length yield) = 6.0 µg/L	-	3070863
	American waterwillow (*Justicia americana*)	28-d mesocosm	EC_{50} (fresh weight) = 59.1 µg/L[b]	-	3070865

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
Freshwater vascular plants (non-native species)					
Florpyrauxifen-benzyl	Carolina fanwort (*Cabomba caroliniana*)[c]	21-d growth inhibition	EC_{50} (shoot length yield) = 0.595 µg a.i./L	-	3067536
	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 0.00719 µg a.i./L	-	3067533
GF-3301	Alligatorweed (*Alternanthera philoxeroides*)[c]	28-d mesocosm	EC_{50} (dry weight) = 0.96 µg a.i./L[b]	-	3070865
	Carolina waterhyssop (*Bacopa monnieri*)[c]	28-d mesocosm	EC_{50} (shoot length) = 3.2 µg a.i./L[b]	-	3070865
	Carolina fanwort (*Cabomba caroliniana*)[c]	28-d mesocosm	EC_{50} (shoot length, fresh weight, dry weight) >81 µg a.i./L[b]	-	3070865
	Hydrilla (*Hydrilla verticillata*)[d]	14-d growth inhibition	EC_{50} (shoot length yield, fresh weight yield) = 1.1 µg a.i./L	-	3070863
		28-d mesocosm	EC_{50} (dry weight) = 0.71 µg a.i./L[b]	-	3070865
	Crested floating heart (*Nymphoides cristata*)[d]	14-d growth inhibition	EC_{50} (fresh weight yield) = 4.9 µg a.i./L	-	3070863
	Parrotfeather (*Myriophyllum aquaticum*)[d]	28-d mesocosm	EC_{50} (fresh weigh, dry weight) <0.3 µg a.i./L[b]	-	3070865

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
	Variable watermilfoil *(Myriophyllum heterophyllum)*[d]	28-d mesocosm	EC_{50} (shoot length, fresh weight, dry weight) <0.3 µg a.i./L[b]	-	3070865
	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 0.0043 µg a.i./L	-	3133022 / 3266189
		28-d mesocosm	EC_{50} (dry weight yield) = 0.09 µg a.i./L	-	3070863
GF-3206	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 0.0018 µg a.i./L	-	3133018
Florpyrauxifen acid	Carolina fanwort (*Cabomba caroliniana*)[c]	21-d growth inhibition	EC_{50} (fresh weight yield) = 113 µg/L	-	3067538
		28-d mesocosm	EC_{50} (shoot length, fresh weight, dry weight) >81 µg/L[b]	-	3070865
	Alligatorweed (*Alternanthera philoxeroides*)[c]	28-d mesocosm	EC_{50} (dry weight) = 9.7 µg/L[b]	-	3070865
	Carolina waterhyssop (*Bacopa monnieri*)[c]	28-d mesocosm	EC_{50} (shoot length) = 2.5 µg/L[b]	-	3070865
	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (fresh weight yield, dry weight yield) = 0.17 µg a.i./L	-	3070863
		28-d mesocosm	EC_{50} (dry weight yield) = 0.38 µg/L	-	
	Hydrilla (*Hydrilla verticillata*)[d]	14-d growth inhibition	EC_{50} (shoot length yield, dry weight yield) = 1.8 µg/L	-	3070863
		28-d mesocosm	EC_{50} (shoot length) = 1.2 µg/L[b]	-	3070865

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
	Crested floating heart (*Nymphoides cristata*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 17.6 µg/L	-	3070863
	Parrotfeather (*Myriophyllum aquaticum*)[d]	28-d mesocosm	EC_{50} (fresh weigh) = 6.0 µg/L[b]	-	3070865
	Variable watermilfoil *(Myriophyllum heterophyllum*)[d]	28-d mesocosm	EC_{50} (shoot length) = 21.3 µg/L[b]	-	3070865
Hydroxy benzyl ester	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 10.3 µg/L	-	3067541
Hydroxy acid	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 63.3 µg/L	-	3067542
Dechlorinated benzyl ester	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (fresh weight yield) = 110 µg/L	-	3067539
Dechlorinated acid	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 1190 µg/L	-	3067540
Nitro hydroxy acid	Eurasian milfoil (*Myriophyllum spicatum*)[d]	14-d growth inhibition	EC_{50} (shoot length yield) = 3071 µg/L	-	3067543

Test substance	Test species	Exposure	Endpoint value	Degree of toxicity[a]	PMRA#
Estuarine/marine invertebrates					
Florpyrauxifen-benzyl	Eastern oyster (*Crassostrea virginica*)	96-h acute	EC_{50} (mortality, shell growth) >0.0251 mg a.i./L	practically non-toxic up to limit of solubility	3133010/ 3241111
	Mysid shrimp (*Americamysis bahia*)	96-h acute	LC_{50} >0.026 mg a.i./L	practically non-toxic up to limit of solubility	3133009
		28-d chronic	NOEC (female length[e]) <0.0011 mg a.i./L	-	3067547
			LOEC (female length[e]) ≤0.0011 mg a.i./L		
			NOEC (offspring per female) = 0.0035 mg a.i./L		
			LOEC (offspring per female) = 0.0078 mg a.i./L		
GF-3301	Eastern oyster (*Crassostrea virginica*)	96-h acute	EC_{50} (mortality, shell growth) >0.27 mg a.i./L	practically non-toxic up to highest concentration tested	3067549
	Mysid shrimp (*Americamysis bahia*)	96-h acute	LC_{50} >0.37 mg a.i./L	practically non-toxic up to highest concentration tested	3067548
Estuarine/marine fish					
Florpyrauxifen-benzyl	Sheepshead minnow (*Cyprinodon variegatus*)	96-h acute	LC_{50} >0.0403 mg a.i./L	practically non-toxic up to limit of solubility	3067561
Estuarine/marine algae					
Florpyrauxifen-benzyl	Diatom (*Skeletonema costatum*)	96-h growth inhibition	EC_{50} (yield, growth rate, AUC) >0.0389 mg a.i./L	practically non-toxic up to limit of solubility	3067578

[a] USEPA classification, where applicable

[b] Endpoints not considered quantitatively in the risk assessment due to reported issues maintaining test concentrations during the study and the absence of recovery data.

[c] Alligatorweed (*Alternanthera philoxeroides*), Carolina waterhyssop (*Bacopa monnieri*) and

Carolina fanwort (*Cabomba caroliniana*) are not native to Canada.
[d] Eurasian milfoil (*Myriophyllum spicatum*), hydrilla (*Hydrilla verticillata*), parrotfeather (*Myriophyllum aquaticum*), variable watermilfoil (*Myriophyllum heterophyllum*) and crested floating heart (*Nymphoides cristata*) are invasive species and target pests of the aquatic end-use products, GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide.
[e] NOECs based on female body length and offspring per female were considered in the risk assessment since the level of effect observed on length at all treatments compared to controls (3–5%) was not considered biologically relevant.

Table 27 Terrestrial toxicity endpoints

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
Terrestrial Invertebrates					
Florpyrauxifen-benzyl	Earthworm (*Eisenia fetida*)	14-d acute	LC_{50} >1928 mg a.i./kg soil	-	3067520
		56-d chronic	NOEC (number of juveniles) = 130.1 mg a.i./kg soil	-	3067521
			LOEC (number of juveniles) = 260.3 mg a.i./kg soil		
	Honeybee (*Apis mellifera*)	Acute oral (48-h)	LD_{50} >105.4 µg a.i./bee	practically non-toxic	3067522
		Acute contact (48-h)	LD_{50} >100 µg a.i./bee	practically non-toxic	
GF-3301	Predatory mite (*Typhlodromus pyri*)	7-d glass plate	ER_{50} (mortality, reproduction) >150.6 g a.i./ha	-	3067523
	Parasitic wasp (*Aphidius rhopalosiphi*)	48-h glass plate	ER_{50} (mortality, reproduction) >150.6 g a.i./ha	-	3067525
GF-3206	Earthworm (*Eisenia fetida*)	56-d chronic	NOEC (number of juveniles) ≥8.1 mg a.i./kg soil *no significant effects up to highest treatment	-	3132979
	Predatory soil mite (*Hypoaspis aculeifer*)	14-d chronic	NOEC (mortality, number of juveniles) ≥8.1 mg a.i./kg soil *no significant effects up to highest treatment	-	3132991

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
	Springtail (*Folsomia candida*)	28-d chronic	NOEC (mortality, number of juveniles) = 8.1 mg a.i./kg soil	-	3132998
			LOEC (mortality, number of juveniles) = 14.58 mg a.i./kg soil		
	Predatory mite (*Typhlodromus pyri*)	7-d glass plate	LR_{50} = 24.3 g a.i./ha	-	3067524
		14-d extended laboratory	ER_{50} (mortality (assessed at 7-d), reproduction) >150 g a.i./ha	-	3132989
	Parasitic wasp (*Aphidius rhopalosiphi*)	48-h glass plate	LR_{50} = 33.6 g a.i./ha	-	3067526
	Lacewing (*Chrysoperla carnea*)	27-d extended laboratory	LR_{50} >55 g a.i./ha	-	3132990
	Honeybee (*Apis mellifera*)	Acute oral (48-h)	LD_{50} >5.77 µg a.i./bee	practically non-toxic up to highest dose tested	3132984
		Acute contact (48-h)	LD_{50} >5.4 µg a.i./bee		
		10-d chronic	NOEL (mortality) = 4.33 µg a.i./bee/d	-	3132988
			LOEL (mortality) = 6.84 µg a.i./bee/d		
		Repeated larval exposure (22-d)	NOEL (emergence) = 1.2 µg a.i./bee/d LOEL (emergence) = 2.41 µg a.i./bee/d	-	3132986

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
Florpyrauxifen acid	Earthworm (*Eisenia fetida*)	56-d chronic	NOEC (number of juveniles) ≥213 mg/kg soil *no significant effects up to highest treatment	-	3132980
	Predatory soil mite (*Hypoaspis aculeifer*)	14-d chronic	NOEC (number of juveniles) = 25 mg/kg soil LOEC (number of juveniles) = 50 mg/kg soil	-	3132992
	Springtail (*Folsomia candida*)	28-d chronic	NOEC (number of juveniles) = 25 mg/kg soil LOEC (number of juveniles) = 50 mg/kg soil	-	3132995
	Honeybee (*Apis mellifera*)	Single larval exposure (72-h)	LD_{50} >30 µg/larvae	-	3132985
Hydroxy acid	Earthworm (*Eisenia fetida*)	56-d chronic	NOEC (number of juveniles) ≥10 mg/kg soil *no significant effects up to highest treatment	-	3132981
	Predatory soil mite (*Hypoaspis aculeifer*)	14-d chronic	NOEC (mortality, number of juveniles) ≥10 mg/kg soil *no significant effects up to highest treatment	-	3132993
	Springtail (*Folsomia candida*)	28-d chronic	NOEC (mortality, number of juveniles) ≥10 mg/kg soil *no significant effects up to highest treatment	-	3132996

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
Nitro hydroxy acid	Earthworm (*Eisenia fetida*)	56-d chronic	NOEC (number of juveniles) ≥10 mg/kg soil *no significant effects up to highest treatment	-	3132983
	Predatory soil mite (*Hypoaspis aculeifer*)	14-d chronic	NOEC (mortality, number of juveniles) ≥10 mg/kg soil *no significant effects up to highest treatment	-	3132994
	Springtail (*Folsomia candida*)	28-d chronic	NOEC (mortality, number of juveniles) ≥10 mg/kg soil *no significant effects up to highest treatment	-	3132997
Birds					
Florpyrauxifen-benzyl	Northern bobwhite (*Colinus virginianus*)	Acute oral (14 d)	LD_{50} >2250 mg a.i./kg bw	practically non-toxic	3067563
		5-d dietary (3d)	LD_{50} >1485 mg a.i./kg bw/d	practically non-toxic	3067566
		21-wk reproduction	NOEL (mortality, body weight, reproduction) ≥88.1 mg a.i./kg bw/d *no significant effects up to highest treatment	-	3067568
	Mallard (*Anas platyrhynchos*)	Acute oral (14 d)	LD_{50} >2250 mg a.i./kg bw	practically non-toxic	3067564
		5-d dietary (3 d)	LD_{50} >2524 mg a.i./kg bw/d	practically non-toxic	3067567

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
		21-wk reproduction	NOEL (mortality, body weight, reproduction) ≥138.3 mg a.i./kg bw/d *no significant effects up to highest treatment	-	3067569
	Zebra finch (*Poephila guttata*)	Acute oral (14 d)	LD_{50} >2250 mg a.i./kg bw	practically non-toxic	3067565
GF-3301	Northern bobwhite (*Colinus virginianus*)	Acute oral (14 d)	LD_{50} >546 mg a.i./kg bw	practically non-toxic up to highest dose tested	3133015
GF-3206	Mallard (*Anas platyrhynchos*)	Acute oral (14 d)	LD_{50} >60.75 mg a.i./kg bw	practically non-toxic up to highest dose tested	3133016
Mammals					
Florpyrauxifen-benzyl	Rat	Acute oral (14 d)	LD_{50} >4725 mg a.i./kg bw	practically non-toxic	3067462
		2-gen reproduction	NOEL ≥285 mg a.i./kg bw/d *no significant effects up to highest treatment	-	3067486, 3094026
GF-3301	Rat	Acute oral (14 d)	LD_{50} >1405 mg a.i./kg bw	practically non-toxic up to highest dose tested	3070905
GF-3206	Rat	Acute oral (14 d)	LD_{50} >134 mg a.i./kg bw	practically non-toxic up to highest dose tested	3067784

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
Terrestrial plants					
GF-3301	Dicot - Carrot (*Daucus carota*)	21-d seedling emergence	ER_{25} (shoot weight) = 1.3 g a.i./ha	-	3067586
	Monocot - Onion (*Allium cepa*)	21-d seedling emergence	ER_{25} (shoot weight) = 5.7 g a.i./ha	-	
	Dicot - Soybean (*Glycine max*)	21-d vegetative vigour	ER_{25} (shoot length) = 0.019 g a.i./ha	-	3067580
	Monocot - Onion (*Allium cepa*)	21-d vegetative vigour	ER_{25} (shoot weight) = 0.23 g a.i./ha	-	
GF-3206	Dicot - Carrot (*Daucus carota*)	21-d seedling emergence	ER_{25} (shoot weight) = 0.97 g a.i./ha	-	3067585
	Monocot - Onion (*Allium cepa*)	21-d seedling emergence	ER_{25} (shoot weight) = 5.4 g a.i./ha	-	
	Dicot - Soybean (*Glycine max*)	21-d vegetative vigour	ER_{25} (shoot length) = 0.059 g a.i./ha	-	3067579
	Monocot - Onion (*Allium cepa*)	21-d vegetative vigour	ER_{25} (shoot weight) = 4.9 g a.i./ha	-	
Florpyrauxifen acid	Dicot - Carrot (*Daucus carota*)	21-d seedling emergence	ER_{25} (shoot weight) = 0.6 g/ha	-	3067583
	Monocot - Onion (*Allium cepa*)	21-d seedling emergence	ER_{25} (shoot weight) = 6.5 g/ha	-	
	Dicot - Soybean (*Glycine max*)	21-d vegetative vigour	ER_{25} (shoot length) = 0.45 g/ha	-	3067581
	Monocot - Onion (*Allium cepa*)	21-d vegetative vigour	ER_{25} (shoot weight) = 35 g/ha	-	
Hydroxy benzyl ester	Soybean (*Glycine max*), Sunflower (*Helianthus*	21-d seedling emergence	ER_{25} (emergence, survival, shoot length, shoot weight) >100 g/ha	-	3067584

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
	annuus), Carrot (*Daucus carota*), Cotton (*Gossypium hirsutum*), Cucumber (*Cucumis sativus*)	21-d vegetative vigour	ER_{25} (survival, shoot length, shoot weight) >100 g/ha	-	3067582
Hydroxy acid	Carrot (*Daucus carota*)	21-d seedling emergence	ER_{25} (shoot weight) = 57.66 g/ha	-	3067584
	Soybean (*Glycine max*)	21-d vegetative vigour	ER_{25} (shoot weight) = 65.59 g/ha	-	3067582
Dechlorinated benzyl ester	Soybean (*Glycine max*), Sunflower (*Helianthus annuus*), Carrot (*Daucus carota*), Cotton (*Gossypium hirsutum*), Cucumber (*Cucumis sativus*)	21-d seedling emergence	ER_{25} (emergence, survival, shoot length, shoot weight) >64 g/ha	-	3067584
		21-d vegetative vigour	ER_{25} (survival, shoot length, shoot weight) >64 g/ha	-	3067582
Dechlorinated acid	Soybean (*Glycine max*), Sunflower (*Helianthus annuus*), Carrot (*Daucus carota*), Cotton (*Gossypium hirsutum*), Cucumber (*Cucumis sativus*)	21-d seedling emergence	ER_{25} (emergence, survival, shoot length, shoot weight) >54 g/ha	-	3067584
		21-d vegetative vigour	ER_{25} (survival, shoot length, shoot weight) >54 g/ha	-	3067582

Test substance	Test species	Exposure (observation)	Endpoint value	Degree of toxicity[a]	PMRA#
Nitro hydroxy acid	Soybean (*Glycine max*), Sunflower (*Helianthus annuus*), Carrot (*Daucus carota*), Cotton (*Gossypium hirsutum*), Cucumber (*Cucumis sativus*)	21-d seedling emergence	ER_{25} (emergence, survival, shoot length, shoot weight) >100 g/ha	-	3067584
		21-d vegetative vigour	ER_{25} (survival, shoot length, shoot weight) >100 g/ha	-	3067582

[a] USEPA classification, where applicable

Table 28 Estimation of screening-level application rates for irrigation

Irrigation use	Irrigation water volume (frequency)[a]	Treated water EEC (µg a.e./L)	Derivation of EEC[b]	Resulting application rate (g a.e./ha)[c]
Turf – sod farms and golf courses	70 000 L/ha (applied daily)	119.2	Irrigation water can be applied immediately following water treatment. Screening-level EEC for florpyrauxifen acid for the direct in-water application is calculated for 3 × 50 ppb a.i., assuming 100% conversion from parent and no degradation between applications.	501 (630 g a.i./ha)
Turf – residential	254 000 L/ha (applied once per week)	119.2	Irrigation water can be applied immediately following water treatment. Screening-level EEC for florpyrauxifen acid for the direct in-water application is calculated for 3 × 50 ppb a.i., assuming 100% conversion from parent and no degradation between applications.	260 (327 g a.i./ha)
Greenhouse and nursery	162983 L/ha (applied daily)	2	2 ppb a.e. (florpyrauxifen-benzyl + florpyrauxifen acid), based on the maximum residue allowed on the proposed label following analytical verification by HPLC.	19.6 (25 g a.i./ha)

Irrigation use	Irrigation water volume (frequency)[a]	Treated water EEC (µg a.e./L)	Derivation of EEC[b]	Resulting application rate (g a.e./ha)[c]
Landscape vegetation or other non-food vegetation	134592 L/ha (applied three times per week)	2	2 ppb a.e. (florpyrauxifen-benzyl + florpyrauxifen acid), based on the maximum residue allowed on the proposed label following analytical verification by HPLC or a specified waiting period based on percent are treated and application rate.	6.9 (8.7 g a.i./ha)
Field grown crops – cereal crops	75000 L/ha (applied daily)	2	2 ppb a.e. (florpyrauxifen-benzyl + florpyrauxifen acid), based on the maximum residue allowed on the proposed label following analytical verification by HPLC.	9.0 (11 g a.i./ha)
Field grown crops – all crops	233434 L/ha (applied three times per week)	2	2 ppb a.e. (florpyrauxifen-benzyl + florpyrauxifen acid), based on the maximum residue allowed on the proposed label following analytical verification by HPLC.	12 (15 g a.i./ha)

[a] Information on irrigation rates for turf (sod farms and golf courses), turf (residential), greenhouse and nurseries, and cereal crops were obtained from PMRA# 3339998, 3340006, 3340007, and 3168834, respectively. Irrigation rates for other crops and landscape vegetation or other non-food vegetation were calculated based on information from PMRA# 3070883.
[b] Based on proposed product labels and correspondence with the applicant.
[c] Resulting irrigation rate calculated as the irrigation volume applied over a 2-month (60-day) period multiplied by the treated water EEC.

Table 29 Fate input parameters for screening-level modelling

Compound	Identity	Input parameter			
		Aquatic half-life (d)[a]	Soil half-life (d)[b]	Foliar half-life (d)[c]	Molar conversion factor[d]
Florpyrauxifen-benzyl	Active Ingredient/Parent	6.09	173	10	-
Florpyrauxifen acid	Acid	-	-	-	0.795
Hydroxy benzyl ester	Major TP	-	-	-	0.968
Hydroxy acid	Major TP	-	-	-	0.763
Dechlorinated benzyl ester	Major TP	-	-	-	0.922

Compound	Identity	Input parameter			
		Aquatic half-life (d)[a]	Soil half-life (d)[b]	Foliar half-life (d)[c]	Molar conversion factor[d]
Dechlorinated acid	Major TP	-	-	-	0.716
Nitro hydroxy acid	Major TP	-	-	-	0.865
Benzyl alcohol	Major TP	-	-	-	0.246
Benzoic acid	Major TP	-	-	-	0.278

[a] Longest of two aerobic aquatic half-lives calculated from PMRA# 3070813
[b] 90 percent upper confidence bound on the mean of aerobic soil representative half-life values from PMRA# 3070811 and 3070820
[c] Default value
[d] Molecular weight ratio of the acid or transformation product: active ingredient

Table 30 Endpoints used in the screening-level assessment of aquatic end-use products

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Soil-dwelling invertebrates	Florpyrauxifen-benzyl	Earthworm (*Eisenia fetida*)	Acute 14-d Soil surface application	LC_{50}	>1928 mg a.i./kg soil	2
			Chronic 56-d Soil surface application	NOEC	130.1 mg a.i./kg soil	1
	Florpyrauxifen acid	Predatory soil mite (*Hypoaspis aculeifer*); Springtail (*Folsomia candida*)	Chronic 14 to 28-d Soil surface application	NOEC	25 mg/kg soil	1
	Hydroxy acid	Earthworm (*Eisenia fetida*); Predatory soil mite (*Hypoaspis aculeifer*); Springtail (*Folsomia candida*)	Chronic 14 to 56-d Soil surface application	NOEC	≥10 mg/kg soil	1
	Nitro hydroxy acid	Earthworm (*Eisenia fetida*); Predatory soil mite (*Hypoaspis aculeifer*); Springtail (*Folsomia candida*)	Chronic 14 to 56-d Soil surface application	NOEC	≥10 mg/kg soil	1
Leaf-dwelling invertebrates	GF-3301	Predatory mite (*Typhlodromus pyri*)	Acute 7-d Glass plate	LR_{50}	>150.6 g a.i./ha	1
		Parasitic wasp (*Aphidius rhopalosiphi*)	Acute 48-h Glass plate	LR_{50}	>150.6 g a.i./ha	1
Bees	Florpyrauxifen-benzyl	Honeybee (*Apis mellifera*)	Acute oral adult	LD_{50}	>105.4 µg a.i./bee	1
			Acute contact adult	LD_{50}	>100 µg a.i./bee	1
	GF-3206	Honeybee (*Apis mellifera*)	Acute oral adult	LD_{50}	>5.77 µg a.i./bee	1
			Acute contact adult	LD_{50}	>5.4 µg a.i./bee	1
			Chronic 10-d adult	NOEL	4.33 µg a.i./bee/d	1
			Repeated exposure larvae	NOEL	1.2 µg a.i./bee/d	1
	Florpyrauxifen acid	Honeybee (*Apis mellifera*)	Single exposure larvae	LD_{50}	>30 µg/larvae	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Terrestrial plants	GF-3301	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	1.3 g a.i./ha	1
Terrestrial plants	GF-3301	Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.019 g a.i./ha	1
Terrestrial plants	Florpyrauxifen acid	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	0.6 g/ha	1
Terrestrial plants	Florpyrauxifen acid	Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.45 g/ha	1
Terrestrial plants	Hydroxy benzyl ester	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>100 g/ha	1
Terrestrial plants	Hydroxy benzyl ester	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>100 g/ha	1
Terrestrial plants	Hydroxy acid	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	57.66 g/ha	1
Terrestrial plants	Hydroxy acid	Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	65.59 g/ha	1
Terrestrial plants	Dechlorinated benzyl ester	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>64 g/ha	1
Terrestrial plants	Dechlorinated benzyl ester	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>64 g/ha	1
Terrestrial plants	Dechlorinated acid	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>54 g/ha	1
Terrestrial plants	Dechlorinated acid	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>54 g/ha	1
Terrestrial plants	Nitro hydroxy acid	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>100 g/ha	1
Terrestrial plants	Nitro hydroxy acid	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>100 g/ha	1
Birds	Florpyrauxifen-benzyl	Mallard (*Anas platyrhynchos*)	Acute oral	LD_{50}	>2250 mg a.i./kg bw/d	10
Birds	Florpyrauxifen-benzyl	Mallard (*Anas platyrhynchos*)	Acute dietary 5-d	LD_{50}	>2524 mg a.i./kg bw/d	10
Birds	Florpyrauxifen-benzyl	Mallard (*Anas platyrhynchos*)	Chronic reproduction 21-wk	NOEL	≥138.3 mg a.i./kg bw/d	1
Birds	GF-3301	Northern bobwhite (*Colinus virginianus*)	Acute oral	LD_{50}	>546 mg a.i./kg bw/d	10

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Mammals	Florpyrauxifen-benzyl	Rat	Acute oral	LD_{50}	>4725 mg a.i./kg bw/d	10
			Chronic reproduction 2-gen	NOEL	≥285 mg a.i./kg bw/d	1
	GF-3301	Rat	Acute oral	LD_{50}	>1405 mg a.i./kg bw/d	10
Freshwater pelagic invertebrates	Florpyrauxifen-benzyl	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>0.0626 mg a.i./L	2
			Chronic 21-d	NOEC	≥0.0385 mg a.i./L	1
	GF-3301	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>22.2 mg a.i./L	2
	Florpyrauxifen acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>91.8 mg/L	2
			Chronic 21-d	NOEC	25.9 mg/L	1
	Hydroxy acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>100 mg/L	2
	Dechlorinated benzyl ester	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>0.98 mg/L	2
	Dechlorinated acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>110 mg/L	2
	Nitro hydroxy acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>10 mg/L	2
	Benzyl alcohol	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	230 mg/L	2
			Chronic 21-d	NOEC	51 mg/L	1
	Benzoic acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>100 mg/L	2
			Chronic 21-d	NOEC	≥25 mg/L	1
Freshwater benthic invertebrates	Florpyrauxifen-benzyl	Midge (*Chironomus dilutus*)	Acute spiked sediments 10-d	NOEC	0.00169 mg a.i./L overlying water	1
		Midge (*Chironomus riparius*)	Chronic spiked water 28-d	NOEC	≥0.014 mg a.i./L overlying water	1
	Hydroxy benzyl ester	Midge (*Chironomus riparius*)	Chronic spiked water 28-d	NOEC	≥0.181 mg/L overlying water	1
	Hydroxy acid	Midge (*Chironomus riparius*)	Chronic spiked sediments 28-d	NOEC	58 mg/L overlying water	1
Freshwater fish	Florpyrauxifen-benzyl	Fathead minnow (*Pimephales promelas*)	Acute 96-h	LC_{50}	>0.0518 mg a.i./L	10
			Chronic 33-d	NOEC	≥0.0373 mg a.i./L	1
	GF-3301	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>0.526 mg a.i./L	10

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Florpyrauxifen acid	Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h	LC_{50}	>99.4 mg/L	10
		Fathead minnow (*Pimephales promelas*)	Chronic 33-d	NOEC	≥29.8 mg/L	1
	Hydroxy acid	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>120 mg/L	10
	Dechlorinated benzyl ester	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>1 mg/L	10
	Dechlorinated acid	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>90 mg/L	10
	Nitro hydroxy acid	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>9.6 mg/L	10
	Benzyl alcohol	Fathead minnow (*Pimephales promelas*)	Acute 96-h	LC_{50}	460 mg/L	10
	Benzoic acid	Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h	LC_{50}	44.6 mg/L	10
		Rainbow trout (*Oncorhynchus mykiss*)	Chronic 28-d	NOEC	≥120 mg/L	1
Freshwater algae	Florpyrauxifen-benzyl	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 96-h	EC_{50}	>0.0612 mg a.i./L	2
	GF-3301	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 96-h	EC_{50}	>0.568 mg a.i./L	2
	Florpyrauxifen acid	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 96-h	EC_{50}	75.1 mg/L	2
	Hydroxy acid	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	>11 mg/L	2
	Dechlorinated benzyl ester	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	>1.3 mg/L	2
	Dechlorinated acid	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	>9.9 mg/L	2
	Nitro hydroxy acid	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	5.619 mg/L	2
	Benzyl alcohol	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 72-h	EC_{50}	500 mg/L	2
	Benzoic acid	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 72-h	EC_{50}	>33.1 mg/L	2
Freshwater vascular plant	Florpyrauxifen-benzyl	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.00719 µg a.i./L	2
	GF-3301	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.0043 µg a.i./L	2

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Florpyrauxifen acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.17 µg/L	2
	Hydroxy benzyl ester	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	10.3 µg/L	2
	Hydroxy acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	63.3 µg/L	2
	Dechlorinated benzyl ester	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	110 µg/L	2
	Dechlorinated acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	1190 µg/L	2
	Nitro hydroxy acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	3071 µg/L	2
Amphibians	Florpyrauxifen-benzyl	African clawed frog (*Xenopus laevis*)	Acute 96-h	LC_{50}	>0.0676 mg a.i./L	10

Table 31 Screening-level risk assessment results for aquatic organisms exposed to aquatic end-use products

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
Freshwater pelagic invertebrates	Florpyrauxifen-benzyl	Acute 48-h	$EC_{50}/2$ > 0.0313 mg a.i./L	0.05 mg a.i./L	**< 1.6**	**1**	**Yes**
		Chronic 21-d	NOEL/1 = 0.0385 mg a.i./L	0.05 mg a.i./L	**1.3**	**1**	**Yes**
	GF-3301	Acute 48-h	$EC_{50}/2$ > 11.1 mg a.i./L	0.05 mg a.i./L	< 0.01	1	No
	Florpyrauxifen acid	Acute 48-h	$EC_{50}/2$ > 45.9 mg/L	0.119 mg/L	< 0.01	1	No
		Chronic 21-d	NOEL/1 = 25.9 mg/L	0.119 mg/L	< 0.01	1	No
	Hydroxy acid	Acute 48-h	$EC_{50}/2$ > 50 mg/L	0.114 mg/L	< 0.01	1	No
	Dechlorinated benzyl ester	Acute 48-h	$EC_{50}/2$ > 0.49 mg/L	0.138 mg/L	< 0.28	1	No
	Dechlorinated acid	Acute 48-h	$EC_{50}/2$ > 55 mg/L	0.107 mg/L	< 0.01	1	No
	Nitro hydroxy acid	Acute 48-h	$EC_{50}/2$ > 5 mg/L	0.130 mg/L	< 0.03	1	No
	Benzyl alcohol	Acute 48-h	$EC_{50}/2$ = 115 mg/L	0.0369 mg/L	< 0.01	1	No
		Chronic 21-d	NOEL/1 = 51 mg/L	0.0369 mg/L	< 0.01	1	No
	Benzoic acid	Acute 48-h	$EC_{50}/2$ > 50 mg/L	0.0417 mg/L	< 0.01	1	No
		Chronic 21-d	NOEL/1 ≥ 25 mg/L	0.0417 mg/L	< 0.01	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
Freshwater benthic invertebrates	Florpyrauxifen-benzyl	Acute 10-d spiked sediments	NOEL/1 = 0.00169 mg a.i./L overlying water	0.05 mg a.i./L	**30**	**1**	**Yes**
		Chronic 28-d spiked water	NOEL/1 > 0.014 mg a.i./L overlying water	0.05 mg a.i./L	**< 3.6**	**1**	**Yes**
	Hydroxy benzyl ester	Chronic 28-d spiked sediments	NOEL/1 ≥ 0.181 mg/L pore water	0.145 mg/L	< 0.08	1	No
	Hydroxy acid	Chronic 28-d spiked sediments	NOEL/1 = 58 mg/L pore water	0.114 mg/L	< 0.01	1	No
Freshwater fish	Florpyrauxifen-benzyl	Acute 96-h	$LC_{50}/10$ > 0.00518 mg a.i./L	0.05 mg a.i./L	**< 9.7**	**1**	**Yes**
		Chronic 33-d	NOEL/1 ≥ 0.0373 mg a.i./L	0.05 mg a.i./L	**< 1.4**	**1**	**Yes**
	GF-3301	Acute 96-h	$LC_{50}/10$ > 0.0526 mg a.i./L	0.05 mg a.i./L	<0.96	1	No
	Florpyrauxifen acid	Acute 96-h	$LC_{50}/10$ > 9.94 mg/L	0.119 mg/L	< 0.01	1	No
		Chronic 33-d	NOEL/1 ≥ 29.8 mg/L	0.119 mg/L	< 0.01	1	No
	Hydroxy acid	Acute 96-h	$LC_{50}/10$ > 12 mg/L	0.114 mg/L	< 0.01	1	No
	Dechlorinated benzyl ester	Acute 96-h	$LC_{50}/10$ > 0.1 mg/L	0.138 mg/L	**< 1.4**	**1**	**Yes**
	Dechlorinated acid	Acute 96-h	$LC_{50}/10$ > 9 mg/L	0.107 mg/L	< 0.01	1	No
	Nitro hydroxy acid	Acute 96-h	$LC_{50}/10$ > 0.96 mg/L	0.130 mg/L	< 0.14	1	No
	Benzyl alcohol	Acute 96-h	$LC_{50}/10$ = 46 mg/L	0.0369 mg/L	< 0.01	1	No
	Benzoic acid	Acute 96-h	$LC_{50}/10$ = 4.46 mg/L	0.0417 mg/L	< 0.01	1	No
		Chronic 28-d	NOEL/1 ≥ 120 mg/L	0.0417 mg/L	< 0.01	1	No
Freshwater algae	Florpyrauxifen-benzyl	Acute 96-h	$EC_{50}/2$ > 0.0306 mg a.i./L	0.05 mg a.i./L	**< 1.6**	**1**	**Yes**
	GF-3301	Acute 96-h	$EC_{50}/2$ > 0.284 mg a.i./L	0.05 mg a.i./L	< 0.18	1	No
	Florpyrauxifen acid	Acute 96-h	$EC_{50}/2$ = 37.55 mg/L	0.119 mg/L	< 0.01	1	No
	Hydroxy acid	Acute 96-h	$EC_{50}/2$ > 5.5 mg/L	0.114 mg/L	< 0.02	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
	Dechlorinated benzyl ester	Acute 96-h	EC_{50}/2 > 0.65 mg/L	0.138 mg/L	< 0.21	1	No
	Dechlorinated acid	Acute 96-h	EC_{50}/2 > 4.95 mg/L	0.107 mg/L	< 0.02	1	No
	Nitro hydroxy acid	Acute 96-h	EC_{50}/2 = 2.81 mg/L	0.130 mg/L	0.05	1	No
	Benzyl alcohol	Acute 72-h	EC_{50}/2 = 250 mg/L	0.0369 mg/L	< 0.01	1	No
	Benzoic acid	Acute 72-h	EC_{50}/2 > 16.55 mg/L	0.0417 mg/L	< 0.01	1	No
Freshwater vascular plants	Florpyrauxifen-benzyl	Acute 14-d	EC_{50}/2 = 0.000003595 mg a.i./L	0.05 mg a.i./L	**14000**	**1**	**Yes**
	GF-3301	Acute 14-d	EC_{50}/2 = 0.00000215 mg a.i./L	0.05 mg a.i./L	**23000**	**1**	**Yes**
	Florpyrauxifen acid	Acute 14-d	EC_{50}/2 = 0.000085 mg/L	0.119 mg/L	**1400**	**1**	**Yes**
	Hydroxy benzyl ester	Acute 14-d	EC_{50}/2 = 0.00515 mg/L	0.145 mg/L	**28**	**1**	**Yes**
	Hydroxy acid	Acute 14-d	EC_{50}/2 = 0.03165 mg/L	0.114 mg/L	**3.6**	**1**	**Yes**
	Dechlorinated benzyl ester	Acute 14-d	EC_{50}/2 = 0.055 mg/L	0.138 mg/L	**2.5**	**1**	**Yes**
	Dechlorinated acid	Acute 14-d	EC_{50}/2 = 0.595 mg/L	0.107 mg/L	0.18	1	No
	Nitro hydroxy acid	Acute 14-d	EC_{50}/2 = 1.54 mg/L	0.130 mg/L	0.08	1	No
Amphibians	Florpyrauxifen-benzyl	Acute 96-h	LC_{50}/10 > 0.00676 mg a.i./L	0.05 mg a.i./L	**< 7.5**	**1**	**Yes**

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient; LOC: level of concern

Table 32 Screening-level risk assessment results for terrestrial organisms other than birds and mammals exposed to aquatic end-use products

Use	Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
Foliar application	Soil-dwelling invertebrates	Florpyrauxifen-benzyl	Acute 14-d Soil surface application	LC_{50}/2 > 964 mg a.i./kg soil	0.0492 mg a.i./kg soil	< 0.01	1	No
			Chronic 56-d Soil surface application	NOEC/1 = 130.1 mg a.i./kg soil	0.0492 mg a.i./kg soil	< 0.01	1	No
		Florpyrauxifen acid	Chronic 14 to 28-d Soil surface application	NOEC/1 = 25 mg/kg soil	0.0424 mg/kg soil	< 0.01	1	No
		Hydroxy acid	Chronic 14 to 56-d Soil surface application	NOEC/1 ≥ 10 mg/kg soil	0.0407 mg/kg soil	< 0.01	1	No
		Nitro hydroxy acid	Chronic 14 to 56-d Soil surface application	NOEC/1 ≥ 10 mg/kg soil	0.0462 mg/kg soil	< 0.01	1	No
	Leaf-dwelling invertebrates	GF-3301	Acute 48-h and 7-d Glass plate	ER_{50}/1 > 150.6 g a.i./ha	63.3 g a.i./ha	< 0.42	2	No
	Bees	Florpyrauxifen-benzyl	Acute adult oral	LD_{50}/1 >105.4 µg a.i./bee	1.71 µg a.i./bee	< 0.016	0.4	No
			Acute adult contact	LD_{50}/1 >100 µg a.i./bee	0.144 µg a.i./bee	< 0.01	0.4	No
		GF-3206[a]	Acute adult oral	LD_{50}/1 >5.77 µg a.i./bee	1.71 µg a.i./bee	< 0.30	0.4	No
			Acute adult contact	LD_{50}/1 >5.4 µg a.i./bee	0.144 µg a.i./bee	< 0.027	0.4	No
			Chronic 10-d adult	NOEL/1 = 4.33 µg a.i./bee/d	1.71 µg a.i./bee	0.40	1	No
			Chronic larvae, repeated exposure	NOEL/1 = 1.2 µg a.i./bee/d	0.73 µg a.i./bee	0.61	1	No
		Florpyrauxifen acid	Acute larvae, single exposure	LD_{50}/1 >30 µg a.i./bee/d	0.58 µg a.i./bee	< 0.019	1	No
	Terrestrial plants	GF-3301	Acute 21-d Seedling emergence	ER_{25}/1 = 1.3 g a.i./ha	111 g a.i./ha	**85**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 = 0.019 g a.i./ha	63.3 g a.i./ha	**3330**	**1**	**Yes**
		Florpyrauxifen acid	Acute 21-d Seedling emergence	ER_{25}/1 = 0.6 g/ha	95.4 g/ha	**159**	**1**	**Yes**

Use	Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
			Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.45 g/ha	95.4 g/ha	**212**	**1**	**Yes**
		Hydroxy benzyl ester	Acute 21-d Seedling emergence	$ER_{25}/1$ > 100 g/ha	116 g/ha	**< 1.2**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1$ > 100 g/ha	116 g/ha	**< 1.2**	**1**	**Yes**
		Hydroxy acid	Acute 21-d Seedling emergence	$ER_{25}/1$ = 57.66 g/ha	91.5 g/ha	**1.6**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1$ = 65.59 g/ha	91.5 g/ha	**1.4**	**1**	**Yes**
		Dechlorinated benzyl ester	Acute 21-d Seedling emergence	$ER_{25}/1$ > 64 g/ha	111 g/ha	**< 1.7**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1$ > 64 g/ha	111 g/ha	**< 1.7**	**1**	**Yes**
		Dechlorinated acid	Acute 21-d Seedling emergence	$ER_{25}/1$ > 54 g/ha	86.0 g/ha	**< 1.6**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1$ > 54 g/ha	86.0 g/ha	**< 1.6**	**1**	**Yes**
		Nitro hydroxy acid	Acute 21-d Seedling emergence	$ER_{25}/1$ > 100 g/ha	104 g/ha	**< 1.04**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1$ > 100 g/ha	104 g/ha	**< 1.04**	**1**	**Yes**
Turf irrigation	Soil-dwelling invertebrates	Florpyrauxifen-benzyl	Acute 14-d Soil surface application	$LC_{50}/2$ > 964 mg a.i./kg soil	0.280 mg a.i./kg soil	< 0.01	1	No
			Chronic 56-d Soil surface application	NOEC/1 = 130.1 mg a.i./kg soil	0.280 mg a.i./kg soil	< 0.01	1	No
		Florpyrauxifen acid	Chronic 14 to 28-d Soil surface application	NOEC/1 = 25 mg/kg soil	0.223 mg/kg soil	< 0.01	1	No
		Hydroxy acid	Chronic 14 to 56-d Soil surface application	NOEC/1 ≥ 10 mg/kg soil	0.214 mg/kg soil	≤ 0.02	1	No
		Nitro hydroxy acid	Chronic 14 to 56-d Soil surface application	NOEC/1 ≥ 10 mg/kg soil	0.242 mg/kg soil	≤ 0.02	1	No
	Leaf-dwelling invertebrates	GF-3301	Acute 48-h and 7-d Glass plate	$ER_{50}/1$ > 150.6 g a.i./ha	630 g a.i./ha	**< 4.2**	**2**	**Yes**
	Bees	Florpyrauxifen-benzyl	Acute adult oral	$LD_{50}/1$ >105.4 µg a.i./bee	18 µg a.i./bee	< 0.17	0.4	No

Use	Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
			Acute adult contact	LD_{50}/1 >100 µg a.i./bee	1.51 µg a.i./bee	< 0.015	0.4	No
		GF-3206[a]	Acute adult oral	LD_{50}/1 >5.77 µg a.i./bee	18 µg a.i./bee	**< 3.1**	**0.4**	**Yes**
			Acute adult contact	LD_{50}/1 >5.4 µg a.i./bee	1.51 µg a.i./bee	< 0.28	0.4	No
			Chronic 10-d adult	NOEL/1 = 4.33 µg a.i./bee/d	18 µg a.i./bee	**4.2**	**1**	**Yes**
			Chronic larvae, repeated exposure	NOEL/1 = 1.2 µg a.i./bee/d	7.6 µg a.i./bee	**6.4**	**1**	**Yes**
		Florpyrauxifen acid	Acute larvae, single exposure	LD_{50}/1 >30 µg a.i./bee/d	6.1 µg a.i./bee	< 0.20	0.4	No
	Terrestrial plants	GF-3301	Acute 21-d Seedling emergence	ER_{25}/1 = 1.3 g a.i./ha	630 g a.i./ha	**485**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 = 0.019 g a.i./ha	630 g a.i./ha	**33200**	**1**	**Yes**
		Florpyrauxifen acid	Acute 21-d Seedling emergence	ER_{25}/1 = 0.6 g/ha	501 g/ha	**835**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 = 0.45 g/ha	501 g/ha	**1110**	**1**	**Yes**
		Hydroxy benzyl ester	Acute 21-d Seedling emergence	ER_{25}/1 > 100 g/ha	610 g/ha	**< 6.1**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 > 100 g/ha	610 g/ha	**< 6.1**	**1**	**Yes**
		Hydroxy acid	Acute 21-d Seedling emergence	ER_{25}/1 = 57.66 g/ha	481 g/ha	**8.3**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 = 65.59 g/ha	481 g/ha	**7.3**	**1**	**Yes**
		Dechlorinated benzyl ester	Acute 21-d Seedling emergence	ER_{25}/1 > 64 g/ha	581 g/ha	**< 9.1**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 > 64 g/ha	581 g/ha	**< 9.1**	**1**	**Yes**
		Dechlorinated acid	Acute 21-d Seedling emergence	ER_{25}/1 > 54 g/ha	451 g/ha	**< 8.4**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 > 54 g/ha	451 g/ha	**< 8.4**	**1**	**Yes**

Use	Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
		Nitro hydroxy acid	Acute 21-d Seedling emergence	ER_{25}/1 > 100 g/ha	545 g/ha	**< 5.5**	**1**	**Yes**
			Acute 21-d Vegetative vigour	ER_{25}/1 > 100 g/ha	545 g/ha	**< 5.5**	**1**	**Yes**

Effect metric = toxicity endpoint/uncertainty factor

EEC: estimated environmental concentration. ; RQ: risk quotient; LOC: level of concern

[a] GF-3206 Herbicide is a surrogate for GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

Table 33 Screening-level risk assessment results for birds and mammals exposed to aquatic end-use products

Use	Taxon	Test substance	Exposure	Effect metric (mg a.i./kg bw/d)	Organism size and feeding guild	EDE (mg a.i./kg bw/day)	RQs	LOC	LOC exceeded?
Foliar application	Birds	Florpyrauxifen-benzyl	Acute oral	LD_{50}/10 > 225	Small insectivore Medium insectivore Large herbivore	5.13 4.03 2.6	< 0.02 < 0.02 < 0.01	1	No
		GF-3301	Acute oral	LD_{50}/10 > 54.6	Small insectivore Medium insectivore Large herbivore	5.13 4.03 2.6	< 0.09 < 0.07 < 0.05	1	No
		Florpyrauxifen-benzyl	Acute dietary	LD_{50}/10 > 252.4	Small insectivore Medium insectivore Large herbivore	5.13 4.03 2.6	< 0.02 < 0.02 < 0.01	1	No
		Florpyrauxifen-benzyl	Reproduction	NOEL/1 ≥ 138.3	Small insectivore Medium insectivore Large herbivore	5.13 4.03 2.6	≤ 0.04 ≤ 0.03 ≤ 0.02	1	No
	Mammals	Florpyrauxifen-benzyl	Acute oral	LD_{50}/10 > 472.5	Small insectivore Medium herbivore Large herbivore	2.93 5.58 3.07	< 0.01 < 0.01 < 0.01	1	No
		GF-3301	Acute oral	LD_{50}/10 > 140.5	Small insectivore Medium herbivore Large herbivore	2.93 5.58 3.07	< 0.02 < 0.04 < 0.02	1	No
		Florpyrauxifen-benzyl	Reproduction	NOEL/1 ≥ 285	Small insectivore Medium herbivore Large herbivore	2.93 5.58 3.07	< 0.01 ≤ 0.02 < 0.01	1	No

Use	Taxon	Test substance	Exposure	Effect metric (mg a.i./kg bw/d)	Organism size and feeding guild	EDE (mg a.i./kg bw/day)	RQs	LOC	LOC exceeded?
Turf irrigation	Birds	Florpyrauxifen-benzyl	Acute oral	LD_{50}/10 > 225	Small insectivore Medium insectivore Large herbivore	51.1 40.1 25.9	< 0.23 < 0.18 < 0.11	1	No
		GF-3301	Acute oral	LD_{50}/10 > 54.6	Small insectivore Medium insectivore Large herbivore	51.1 40.1 25.9	< 0.94 < 0.73 < 0.47	1	No
		Florpyrauxifen-benzyl	Acute dietary	LD_{50}/10 > 252.4	Small insectivore Medium insectivore Large herbivore	51.1 40.1 25.9	< 0.20 < 0.16 < 0.10	1	No
		Florpyrauxifen-benzyl	Reproduction	NOEL/1 > 138.3	Small insectivore Medium insectivore Large herbivore	51.1 40.1 25.9	≤ 0.37 ≤ 0.29 ≤ 0.19	1	No
	Mammals	Florpyrauxifen-benzyl	Acute oral	LD_{50}/10 ≥ 472.5	Small insectivore Medium herbivore Large herbivore	29.2 55.5 30.6	< 0.06 < 0.12 < 0.06	1	No
		GF-3301	Acute oral	LD_{50}/10 > 140.5	Small insectivore Medium herbivore Large herbivore	29.2 55.5 30.6	< 0.21 < 0.40 < 0.22	1	No
		Florpyrauxifen-benzyl	Reproduction	NOEL/1 ≥ 285	Small insectivore Medium herbivore Large herbivore	29.2 55.5 30.6	< 0.10 ≤ 0.19 ≤ 0.11	1	No

Effect metric = toxicity endpoint/uncertainty factor
EDE: estimated daily exposure; RQ: risk quotient; LOC: level of concern

Table 34 Endpoints used in the refined assessment of aquatic end-use products

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Leaf-dwelling invertebrates	GF-3301	Predatory mite (*Typhlodromus pyri*)	Acute 7-d Glass plate	LR_{50}	>150.6 g a.i./ha	1
		Parasitic wasp (*Aphidius rhopalosiphi*)	Acute 48-h Glass plate	LR_{50}	>150.6 g a.i./ha	1
Bees	GF-3206	Honey bee (*Apis mellifera*)	Acute 48-h oral adult	LD_{50}	>5.77 µg a.i./bee	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
			Chronic 10-d adult	NOEL	4.33 µg a.i./bee/d	1
			Chronic 22-d larvae	NOEL	1.2 µg a.i./bee/d	1
Terrestrial plants	GF-3301	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	1.3 g a.i./ha	1
		Onion (*Allium cepa*)	Acute 21-d Seedling emergence	ER_{25}	5.7 g a.i./ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.019 g a.i./ha	1
		Onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}	0.23 g a.i./ha	1
	Florpyrauxifen acid	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	0.6 g/ha	1
		Onion (*Allium cepa*)	Acute 21-d Seedling emergence	ER_{25}	6.5 g/ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.45 g/ha	1
		Onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}	35 g/ha	1
Freshwater benthic invertebrates	Florpyrauxifen-benzyl	Midge (*Chironomus dilutus*)	Acute spiked sediments 10-d	NOEC	0.0133 mg a.i./L pore water	1
		Midge (*Chironomus riparius*)	Chronic spiked water 28-d	NOEC	≥0.014 mg a.i./L overlying water	1
Freshwater vascular plants (native species)	Florpyrauxifen-benzyl	Duckweed (*Lemna gibba*)	Acute 7-d	EC_{50}	>46.1 µg a.i./L	2
		Common hornwort (*Ceratophyllum demersum*)	Acute 14-d	EC_{50}	1.52 µg a.i./L	2
	GF-3301	Duckweed (*Lemna gibba*)	Acute 7-d	EC_{50}	>558 µg a.i./L	2
		Megalodonta (*Bidens beckii*)	28-d mesocosm	EC_{50}	4.7 µg a.i./L	2

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Florpyrauxifen acid	Common hornwort (*Ceratophyllum demersum*)	Acute 14-d	EC_{50}	33.2 µg/L	2
		Elodea (*Elodea canadensis*)	Acute 14-d	EC_{50}	6.8 µg/L	2
		Megalodonta (*Bidens beckii*)	Acute 14-d	EC_{50}	6.0 µg/L	2
Freshwater vascular plants (non-native species)[a]	Florpyrauxifen-benzyl	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.00719 µg a.i./L	2
		Carolina fanwort (*Cabomba caroliniana*)	Acute 21-d	EC_{50}	0.595 µg a.i./L	2
	GF-3301	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.0043 µg a.i./L	2
	Florpyrauxifen acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.17 µg/L	2
		Carolina fanwort (*Cabomba caroliniana*)	21-d growth inhibition	EC_{50}	113 µg/L	2

[a] Eurasian milfoil (*Myriophyllum spicatum*) is an invasive species in Canada, and a target of the aquatic products containing florpyrauxifen-benzyl. This species is being considered as a surrogate for the the most sensitive native aquatic macrophyte species, as the results of available field and mesocosm studies indicate that native watermilfoil species were the most sensitive to florpyrauxifen-benzyl in comparison to other common native aquatic plant species, and have similar sensitivity to the invasive milfoil species controlled by florpyrauxifen-benzyl. Carolina fanwort (*Cabomba caroliniana*) is not native to Canada.

Table 35 Ecological water model input parameters for modelling florpyrauxifen-benzyl for in-water applications

Parameter	Florpyrauxifen-benzyl
Aquatic photolysis at 40°N latitude (days)	0.12
Hydrolysis at pH 7 at 20°C (days)	181.2
Aerobic aquatic half-life at 20°C (days)	6.12[1]
Anaerobic aquatic half-life at 20°C (days)	2.57[1]
Aerobic soil half-life at 20°C (days)[2]	NA
K_{oc} (L/kg)	24300[3]

Based on the use of the parent-daughter approach, some inputs may differ from the values presented in Appendix I, Table 2.
[1] Longer of 2 half-lives, as this produced the most conservative EECs for florpyrauxifen-benzyl.
[2] Terrestrial degradation not considered for in-water application
[3] 20^{th} percentile of 5 values

Table 36 Ecological water model input parameters for modelling florpyrauxifen acid for in-water applications

Parameter	Florpyrauxifen-benzyl	Florpyrauxifen acid
Aquatic photolysis at 40°N latitude (days)	0.12	2.32 (0.086[1])
Hydrolysis at pH 7 at 20°C (days)	181.2	Stable (0.988)
Aerobic aquatic half-life at 20°C (days)	3.78[2]	9.27[3] (0.874[3])
Anaerobic aquatic half-life 20°C (days)	1.74[2]	3.79[3] (0.646[3])
Aerobic soil half-life at 20°C (days)[4]	NA	NA
K_{oc} (L/kg)	24 300[5]	36.6[6]

Based on the use of the parent-daughter approach, some inputs may differ from the values presented in Appendix I, Table 2.
[1] Transformation fractions in parenthesis
[2] Shorter of 2 half-lives, as this produced the most conservative EECs for florpyrauxifen acid.
[3] Longer of 2 half-lives and higher of 2 fractions, as this produced the most conservative EECs for florpyrauxifen acid.
[4] Terrestrial transformation and degradation not considered for in-water application
[5] 20^{th} percentile of 5 values
[6] 20^{th} percentile of 12 values

Table 37 EECs (in µg/L) of florpyrauxifen-benzyl and florpyrauxifen acid for in-water applications

Use (Application method)	Chemical	Water column					Pore water	
		Peak	24-hour	96-hour	21-day	60-day	Peak	21-day
In-water (sub-surface injection)	Florpyrauxifen-benzyl	47	24	7.9	1.6	1.1	0.41	0.17
	Florpyrauxifen acid	3.9	3.8	3.8	3.3	2.6	72	50

Table 38 Refined risk assessment results for aquatic organisms based on modelling

Taxon	Test substance	Species / Exposure	Effect metric	EEC (µg/L)	RQ	LOC	LOC exceeded?
Freshwater benthic invertebrates	Florpyrauxifen-benzyl	Midge / 10-d spiked sediments	NOEC/1 = 13.3 µg a.i./L (pore water)	Peak pore water: 0.41	0.03	1	No
		Midge / 28-d spiked water	NOEC/1 > 14 µg a.i./L overlying water	21-day: 1.6	<0.11	1	No
Freshwater vascular plants (native species)	Florpyrauxifen-benzyl	Duckweed / 7-d	EC_{50}/2 > 23.1 µg a.i./L	4-day: 7.9	<0.34	1	No
		Common hornwort / 14-d	EC_{50}/2 = 0.76 µg a.i./L	4-day: 7.9	**10**	**1**	**Yes**
	GF-3301	Duckweed / 7-d	EC_{50}/2 > 279 µg a.i./L	4-day: 7.9	<0.028	1	No
		Megalodonta / 28-d mesocosm	EC_{50}/2 = 2.4 µg a.i./L	21-day: 1.6	0.67	1	No
	Florpyrauxifen acid	Common hornwort / 14-d	EC_{50}/2 = 16.6 µg/L	4-day: 3.8	0.23	1	No
		Elodea / 14-d	EC_{50}/2 = 3.4 µg/L	4-day: 3.8	**1.1**	**1**	**Yes**
		Megalodonta / 14-d	EC_{50}/2 = 3.0 µg/L	4-day: 3.8	**1.3**	**1**	**Yes**
Freshwater vascular plants (non-native)	Florpyrauxifen-benzyl	Eurasian milfoil / 14-d	EC_{50}/2 = 0.003595 µg a.i./L	4-day: 7.9	**2200**	**1**	**Yes**
		Carolina fanwort / 21-d	EC_{50}/2= 0.298 µg a.i./L	21-day: 1.6	**5.4**	**1**	**Yes**
	GF-3301	Eurasian milfoil / 14-d	EC_{50}/2 = 0.00215 µg a.i./L	4-day: 7.9	**3700**	**1**	**Yes**
	Florpyrauxifen acid	Eurasian milfoil / 14-d	EC_{50}/2 = 0.085 µg/L	4-day: 3.8	**45**	**1**	**Yes**
		Carolina fanwort / 21-d	EC_{50}/2 = 56.5 µg/L	21-day: 3.3	0.06	1	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient; LOC: level of concern

Table 39 Refined risk assessment results for aquatic vascular plants exposed to florpyrauxifen-benzyl based on field exposure data

Exposure scenario[a]		Risk quotients based on different effect metrics						
		Native species				Non-native species[b]		
		Duckweed		Common hornwort	Megalodonta	Carolina fanwort	Eurasian milfoil	
		FPB	GF-3301	FPB	GF-3301	FPB	FPB	GF-3301
		7-d EC_{50}/2 >23.1 µg a.i./L	7-d EC_{50}/2 >279 µg a.i./L	14-d EC_{50}/2 = 0.76 µg a.i./L	28-d EC_{50}/2 = 2.4 µg a.i./L	21-d EC_{50}/2= 0.298 µg a.i./L	14-d EC_{50}/2 = 0.003595 µg a.i./L	14-d EC_{50}/2 = 0.00215 µg a.i./L
Field monitoring								
Pond, Ontario, 4 ppb a.i. applied to whole pond (0.85 ha)	Peak (6-hr) = 4.3 ppb	<0.19	<0.02	5.6	1.8	14	1200	2000
	21-d <1 ppb	NA	NA	NA	<0.42	<3.4	NA	NA
Lake basin 1, Ontario, 10 ppb a.i. applied to 1.22 ha area	Peak (6-hr) = 10.4	<0.45	<0.04	14	4.3	35	2890	4840
	7-d <1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Lake basin 2, Ontario, 50 ppb a.i. applied to 0.093 ha area	Peak (6-hr) <1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Lake, Florida, 48.3 ppb a.i. applied to 20 ha area of 81 ha water body	Peak (6-hr) = 18.8 ppb	<0.81	<0.07	25	7.8	63	5230	8740
	7-d <1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Bay, New York, 3.9–5.8 ppb a.i. appliedto 91 ha area	Peak (24-hr) = 3 ppb	<0.13	<0.01	3.9	1.3	10	834	1400
	3-d <1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Lake, Florida, 38.6 ppb a.i. applied to 174 ha area of >7284 ha water body	Peak (24-hr) = 5 ppb	<0.22	<0.02	6.6	2.1	17	1390	2330
	20-d <1 ppb	NA	NA	NA	<0.42	<3.4	NA	NA

Exposure scenario[a]		Risk quotients based on different effect metrics						
		Native species				Non-native species[b]		
		Duckweed		Common hornwort	Megalodonta	Carolina fanwort	Eurasian milfoil	
		FPB	GF-3301	FPB	GF-3301	FPB	FPB	GF-3301
		7-d EC_{50}/2 >23.1 µg a.i./L	7-d EC_{50}/2 >279 µg a.i./L	14-d EC_{50}/2 = 0.76 µg a.i./L	28-d EC_{50}/2 = 2.4 µg a.i./L	21-d EC_{50}/2= 0.298 µg a.i./L	14-d EC_{50}/2 = 0.003595 µg a.i./L	14-d EC_{50}/2 = 0.00215 µg a.i./L
Lake Florida, 38.6 ppb a.i. applied to 174 ha area of >7284 ha water body (outside management area)	Peak (entire study period) <1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Lake, New York, 3.86 to 5.79 ppb a.i. applied to 83.7 ha area of 466 ha water body	Peak (24-hr) = 2.3 ppb	<0.099	<0.008	3	0.96	7.7	640	1070
	7-d <1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Canal system, British Columbia, 50 g a.i./ha (5 ppb a.i.) applied to 4 ha	Peak (6-hr) = 1.4 ppb	<0.06	<0.005	1.8	0.58	4.7	289	651
	24-hr < 1 ppb	<0.04	<0.003	<1.3	<0.42	<3.4	<278	<465
Field dissipation								
Florida, natural pond (0.084 ha), 50 ppb a.i. applied to whole pond	Peak avg (6-hr) = 52 ppb	<2.3	<0.19	68	22	174	14 500	24 200
	Avg 8-d = 2.0 ppb	<0.09	<0.007	2.6	0.83	6.7	556	930
	Avg 14-d = 0.38 ppb	NA	NA	0.5	0.16	1.3	106	177
	Avg 21-d = 0.19 ppb	NA	NA	NA	NA	0.64	NA	NA
North Carolina, constructed pond (0.043 ha), 50 ppb	Peak avg (12-hr) = 32 ppb	<1.4	<0.11	42	13	107	8900	14 900

<table>
<tr><th rowspan="4" colspan="2">Exposure scenario[a]</th><th colspan="7">Risk quotients based on different effect metrics</th></tr>
<tr><th colspan="4">Native species</th><th colspan="3">Non-native species[b]</th></tr>
<tr><th colspan="2">Duckweed</th><th>Common hornwort</th><th>Megalodonta</th><th>Carolina fanwort</th><th colspan="2">Eurasian milfoil</th></tr>
<tr><th>FPB</th><th>GF-3301</th><th>FPB</th><th>GF-3301</th><th>FPB</th><th>FPB</th><th>GF-3301</th></tr>
<tr><th colspan="2"></th><th>7-d EC_{50}/2 >23.1 µg a.i./L</th><th>7-d EC_{50}/2 >279 µg a.i./L</th><th>14-d EC_{50}/2 = 0.76 µg a.i./L</th><th>28-d EC_{50}/2 = 2.4 µg a.i./L</th><th>21-d EC_{50}/2= 0.298 µg a.i./L</th><th>14-d EC_{50}/2 = 0.003595 µg a.i./L</th><th>14-d EC_{50}/2 = 0.00215 µg a.i./L</th></tr>
<tr><td rowspan="3">a.i. applied to whole pond</td><td>Avg 7-d = 1.2 ppb</td><td><0.052</td><td><0.004</td><td>1.6</td><td>0.5</td><td>4</td><td>334</td><td>558</td></tr>
<tr><td>Avg 14-d = 0.29 ppb</td><td>NA</td><td>NA</td><td>0.38</td><td>0.12</td><td>0.97</td><td>81</td><td>135</td></tr>
<tr><td>Avg 22-d = 0.05 ppb</td><td>NA</td><td>NA</td><td>NA</td><td>0.020</td><td>0.17</td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="4">North Carolina, constructed pond (0.043 ha), 150 ppb a.i. applied to whole pond</td><td>Peak avg (1-hr) = 79 ppb</td><td><3.4</td><td><0.28</td><td>104</td><td>33</td><td>265</td><td>22 000</td><td>36 700</td></tr>
<tr><td>Avg 7-d = 29 ppb</td><td><1.3</td><td><0.10</td><td>38</td><td>12</td><td>97</td><td>8070</td><td>13 500</td></tr>
<tr><td>Avg 14-d = 21 ppb</td><td>NA</td><td>NA</td><td>28</td><td>8.8</td><td>70.5</td><td>5840</td><td>9770</td></tr>
<tr><td>Avg 22-d = 7.6 ppb</td><td>NA</td><td>NA</td><td>NA</td><td>3.2</td><td>26</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="9">Field efficacy</td></tr>
<tr><td rowspan="3">Hopkinton-Everett Flood Control Area, New Hampshire, 10 ppb a.i. applied to 0.4-ha area in a 10-ha water body</td><td>Peak avg (6-hr) = 2.3 ppb</td><td><0.01</td><td><0.008</td><td>3.0</td><td>0.96</td><td>7.7</td><td>640</td><td>1070</td></tr>
<tr><td>24-hour = 0.7 ppb</td><td><0.03</td><td><0.003</td><td>0.92</td><td>0.29</td><td>2.3</td><td>195</td><td>326</td></tr>
<tr><td>96-hr = 0.08 ppb</td><td><0.003</td><td><0.0003</td><td>0.11</td><td>0.03</td><td>0.27</td><td>22</td><td>37</td></tr>
<tr><td>Lake Pend, Northern Idaho, 10 ppb a.i.</td><td>Peak avg (1-hr) = 3.5 ppb</td><td><0.15</td><td><0.013</td><td>4.6</td><td>1.5</td><td>12</td><td>974</td><td>1630</td></tr>
</table>

Exposure scenario[a]		Risk quotients based on different effect metrics						
		Native species				Non-native species[b]		
		Duckweed		Common hornwort	Megalodonta	Carolina fanwort	Eurasian milfoil	
		FPB	GF-3301	FPB	GF-3301	FPB	FPB	GF-3301
		7-d EC_{50}/2 >23.1 µg a.i./L	7-d EC_{50}/2 >279 µg a.i./L	14-d EC_{50}/2 = 0.76 µg a.i./L	28-d EC_{50}/2 = 2.4 µg a.i./L	21-d EC_{50}/2= 0.298 µg a.i./L	14-d EC_{50}/2 = 0.003595 µg a.i./L	14-d EC_{50}/2 = 0.00215 µg a.i./L
applied to 1.42-ha area	24-hour <1 ppb	<0.04	<0.004	<1.3	<0.42	<3.4	<278	<465

Effect metric = toxicity endpoint/uncertainty factor

NA: not applicable, an RQ was not calculated because the timeframe of the measured concentration in the field monitoring, dissipation and efficacy studies is longer than the timeframe for the effect metrics.

[a] All measurements were taken inside the management area unless otherwise noted.

[b] Eurasian milfoil (*Myriophyllum spicatum*) is an invasive species in Canada, and a target of the aquatic products containing florpyrauxifen-benzyl. This species is being considered as a surrogate for the the most sensitive native aquatic macrophyte species, as the results of available field and mesocosm studies indicate that native watermilfoil species were the most sensitive to florpyrauxifen-benzyl in comparison to other common native aquatic plant species, and have similar sensitivity to the invasive milfoil species controlled by florpyrauxifen-benzyl. Carolina fanwort (*Cabomba caroliniana*) is not native to Canada.

Table 40 Refined risk assessment results for aquatic vascular plants exposed to florpyrauxifen acid based on field exposure data

Exposure scenario[a]		Risk quotients based on various effect metrics				
		Florpyrauxifen acid				
		Native species			Non-native species[b]	
		Common hornwort	Elodea	Megalodonta	Carolina fanwort	Eurasian milfoil
		14-d EC_{50}/2 = 16.6 µg/L	14-d EC_{50}/2 = 3.4 µg/L	14-d EC_{50}/2 = 3.0 µg/L	21-d EC_{50}/2 = 56.5 µg/L	14-d EC_{50}/2 = 0.085 µg/L
Field monitoring						
Pond, Ontario, 4 ppb a.i. applied to whole pond (0.85 ha)	Peak (6-hr) = 7.2 ppb	0.43	2.1	2.4	0.13	85
	21-d <1 ppb	<0.06	<0.29	<0.33	<0.018	<12

Exposure scenario[a]		Risk quotients based on various effect metrics				
		Florpyrauxifen acid				
		Native species			Non-native species[b]	
		Common hornwort	Elodea	Megalodonta	Carolina fanwort	Eurasian milfoil
		14-d $EC_{50}/2$ = 16.6 µg/L	14-d $EC_{50}/2$ = 3.4 µg/L	14-d $EC_{50}/2$ = 3.0 µg/L	21-d $EC_{50}/2$ = 56.5 µg/L	14-d $EC_{50}/2$ = 0.085 µg/L
Lake basin 1, Ontario, 10 ppb a.i. applied to 1.22 ha area	Peak (24-hr) = 3.3 ppb	0.2	0.97	1.1	0.058	39
	7-d <1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Lake basin 2, Ontario, 50 ppb a.i. applied to 0.093 ha area	Peak (6-hr) <1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Lake, Florida, 48.3 ppb a.i. applied to 20 ha area of 81 ha water body	Peak (69-hr) = 7 ppb	0.42	2.1	2.3	0.12	82
	7-d <1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Bay, New York, 3.9–5.8 ppb a.i. appliedto 91 ha area	Peak (24-hr) = 1.7 ppb	0.1	0.5	0.57	0.03	20
	3-d = 1.4 ppb	0.08	0.41	0.47	0.025	16
Lake, Florida, 38.6 ppb a.i. applied to 174 ha area of >7284 ha water body	Peak (4-d) = 13 ppb	0.78	3.8	4.3	0.23	153
	30-d = 2 ppb	0.12	0.59	0.67	0.035	24
Lake, Florida, 38.6 ppb a.i. applied to	Peak (10-d) = 8 ppb	0.48	2.4	2.7	0.14	94
	20-d = 6 ppb	0.36	1.8	2	0.11	71

Exposure scenario[a]		Risk quotients based on various effect metrics				
		Florpyrauxifen acid				
		Native species			Non-native species[b]	
		Common hornwort	Elodea	Megalodonta	Carolina fanwort	Eurasian milfoil
		14-d $EC_{50}/2$ = 16.6 µg/L	14-d $EC_{50}/2$ = 3.4 µg/L	14-d $EC_{50}/2$ = 3.0 µg/L	21-d $EC_{50}/2$ = 56.5 µg/L	14-d $EC_{50}/2$ = 0.085 µg/L
174 ha area of >7284 ha water body (outside management area)	30-d <1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Lake, New York, 3.86 to 5.79 ppb a.i. applied to 83.7 ha area of 466 ha water body	Peak (24-hr) <1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Canal system, British Columbia, 50 g a.i./ha (5 ppb a.i.) applied to 4 ha	Peak (6-hr) < 1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Field dissipation						
Florida, natural pond (0.084 ha), 50 ppb a.i. applied to whole pond	Peak avg (14-d) = 8.7 ppb	0.52	2.6	2.9	0.15	102
	Avg 21-d = 4.1 ppb	NA	NA	1.4	0.072	NA
North Carolina, constructed pond (0.043 ha), GF-3301 (27% a.i.) applied at 50 ppb a.i. to whole pond	Peak avg (14-d) =16 ppb	0.96	4.7	5.7	0.28	188
	Avg 22-d = 13 ppb	NA	NA	4.3	0.23	NA

Exposure scenario[a]		Risk quotients based on various effect metrics				
		Florpyrauxifen acid				
		Native species			Non-native species[b]	
		Common hornwort	Elodea	Megalodonta	Carolina fanwort	Eurasian milfoil
		14-d $EC_{50}/2$ = 16.6 µg/L	14-d $EC_{50}/2$ = 3.4 µg/L	14-d $EC_{50}/2$ = 3.0 µg/L	21-d $EC_{50}/2$ = 56.5 µg/L	14-d $EC_{50}/2$ = 0.085 µg/L
North Carolina, constructed pond (0.043 ha), 150 ppb a.i. applied to whole pond	Peak avg (22-d) = 53 ppb	3.2	16	18	0.94	624
	Avg 14-d = 44 ppb	2.7	13	15	0.78	518
Field efficacy						
Hopkinton-Everett Flood Control Area, New Hampshire, 10 ppb a.i. applied to 0.4-ha area in a 10-ha water body	Avg over entire study period: < 1 ppb	<0.06	<0.29	<0.33	<0.018	<12
Lake Pend, Northern Idaho, 10 ppb a.i. applied to 1.42-ha area						

Effect metric = toxicity endpoint/uncertainty factor

NA: not applicable, an RQ was not calculated because the timeframe of the measured concentration in the field monitoring, dissipation and efficacy studies is longer than the timeframe for the effect metrics.

[a] All measurements were taken inside the management area unless otherwise noted.

[b] Eurasian milfoil (*Myriophyllum spicatum*) is an invasive species in Canada, and a target of the aquatic products containing florpyrauxifen-benzyl. This species is being considered as a surrogate for the the most sensitive native aquatic macrophyte species, as the results of available field and mesocosm studies indicate that native watermilfoil species were the most sensitive to florpyrauxifen-benzyl in comparison to other common native aquatic plant species, and have similar sensitivity to the invasive milfoil species controlled by florpyrauxifen-benzyl. Carolina fanwort (*Cabomba caroliniana*) is not native to Canada.

Table 41 Relative sensitivity of common native aquatic plant species to florpyrauxifen-benzyl based on mesocosm and field study data

Common name	Species name	Concentrations applied (µg a.i./L)	Adverse effect concentration (µg a.i./L)[a]	References	Relative Sensitivity[b]
Northern watermilfoil	*Myriophyllum sibiricum*	5.7–9.7	9.7[c]	3070862, 3070825	High
Other watermilfoils	*Myriophyllum* spp.	1.5–12	1.5	3070869	High
Watershield	*Brasenia scherberi*	5.7–15	10	3070862, 3070824, 3070886	Moderate - High
American lotus	*Nelumbo lutea*	9.7–48	10	3070858, 3070857, 3070886	Moderate - High
White water lily	*Nymphae odorata*	3–48	9	3070862, 3070824, 3070858, 3070857, 3070886	Moderate
Yellow pond lily	*Nuphar* spp.	5–48	5	3070857, 3070824, 3070886	Low - Moderate
Stargrass	*Heteranthera dubia*	3–27	9	3070876, 3070858	Low - Moderate
Pickerelweed	*Pontedaria cordata*	10–48	12	3070871, 3070824, 3070857	Low - Moderate
Coontail	*Ceratophyllum demersum*	2–9.7	>9.7	3070870, 3070862, 3070825, 3070858	Low - Moderate

Common name	Species name	Concentrations applied (µg a.i./L)	Adverse effect concentration (µg a.i./L)[a]	References	Relative Sensitivity[b]
Sago pondweed	*Stuckenia pectinata*	5.7–9.7	9.7	3070862, 3070825, 3070858	Low
Arrowhead	*Sagittaria* spp.	5.7–48	>48	3070871, 3070862, 3070857	Low
Elodea	*Elodea* spp.	2–27	>27[d]	3070876, 3070870, 3070862, 3070858	Low
Water marigold	*Bidens beckii* (or *Megalodonta beckii*)	0.1–81	4.7[e]	3070863	Low
Naiads	*Najas* spp.	5.7–10	>10	3070862, 3070824, 3070858	Low
Pondweeds	*Potamogeton* spp.	2–27	5.7–>27[f]	3070876, 3070870, 3070862, 3070825, 3070858, 3070824	Low
Bladderworts	*Utricularia* spp.	9.7–10	>10	3070825, 3070824, 3070858	Low
Vallisneria (tape grass)	*Vallisneria americana*	3–48	>48	3070876, 3070862, 3070858, 3070857	Low
Bulrush	*Schoenoplectus* spp.	3–48	>48	3070857, 3070886	Low

Common name	Species name	Concentrations applied (µg a.i./L)	Adverse effect concentration (µg a.i./L)[a]	References	Relative Sensitivity[b]
Cattail	*Typha* spp.	5–48	>48	3070857, 3070886	Low
Native grasses	*Panicum* spp.	30–48	>48	3070857, 3070886	Low

Source: PMRA# 3070866

[a] Concentration at which significant adverse effects were reported in mesocosm and field studies.

[b] Relative sensitivity to typical rates for selective control of invasive watermilfoils (4–12 PDU/ha-m or 4–12 µg a.i./L), as defined by the applicant.

Low: little or no response to standard rates for invasive watermilfoil control typically followed by expansion following milfoil control; in many cases, no symptoms will be observed, but in some cases, light herbicide symptoms such as unusual growth or light chlorosis may be observed but they will be temporary and result in no control/reductions in the plant

Moderate: Initial symptoms will be more obvious within 1–2 weeks after treatment. Symptoms may be stronger with longer exposures in large-partial or full-site treatments. There may be some reductions in standing biomass immediately following treatment but generally strong recovery. Competition with other more tolerant native plants may delay recovery of stressed sensitive plants under some conditions.

High: sensitivity less but close to invasive watermilfoil with intense symptoms. Notable reductions in density and coverage of the plant in question will often be observed.

[c] In PMRA# 3070862, the frequency of occurrence for *Myriophyllum sibiricum* was 3, 0, and 2 on 14 June (pre-treatment), 5 July (post-treatment), and 31 July (post-treatment), respectively. The report only noted significant differences between the 14 June and 31 July time points. Therefore it is uncertain whether the reduction observed on 5 July represents a significant reduction following the treatment of 5.7 µg a.i./L.

[d] A significant reduction in frequency of occurrence was observed for *Elodea canadensis* at 5.7 µg a.i./L in PMRA# 3070862, but no significant reductions in frequency or biomass were observed in any other study.

[e] Most sensitive EC_{50} from mesocosm study.

[f] Pondweeds displayed a range of sensitivity to florpyrauxifen-benzyl. Significant effects to *P. crispus* were observed at concentrations of 5.7 to 9.7 µg a.i./L (PMRA# 3070862, 3070858), and to *P. foliosus, P. pusillus, P. friesii* and *P. natans* at 9.7 µg a.i./L (PMRA# 3070825, 3070858). In contrast, no significant adverse effects to *P. amplifolius, P. epihydrus, P. filiformis, P. gramineus, P. illinoensis, P. nodosus, P. praelongus, P. richardsonii, P. robbinsii,* or *P. zosteriformis*, were observed in any study (PMRA# 3070876, 3070862, 3070825, 3070858, 3070824)

Table 42 Refined risk assessment results for non-target terrestrial plants exposed to spray drift from foliar applications

Use	Test substance	Sub-taxon	Exposure	Effect metric (g/ha)	Drift EEC (g/ha)	RQ	LOC	LOC exceeded?
Foliar application	GF-3301	Dicot	Acute 21-d Seedling emergence	$ER_{25}/1 = 1.3$	3.32	**2.6**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1 = 0.019$	1.90	**100**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	$ER_{25}/1 = 5.7$	3.32	0.58	1	No
			Acute 21-d Vegetative vigour	$ER_{25}/1 = 0.23$	1.90	**8.3**	**1**	**Yes**
	Florpyrauxifen acid	Dicot	Acute 21-d Seedling emergence	$ER_{25}/1 = 0.6$	2.86	**4.8**	**1**	**Yes**
			Acute 21-d Vegetative vigour	$ER_{25}/1 = 0.45$	2.86	**6.4**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	$ER_{25}/1 = 6.5$	2.86	0.44	1	No
			Acute 21-d Vegetative vigour	$ER_{25}/1 = 35$	2.86	0.08	1	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration. EECs are in units of g a.i./ha for GF-3301; RQ: risk quotient; LOC: level of concern

Table 43 Estimation of refined application rates for irrigation uses

Irrigation use	Irrigation water volume (frequency)[a]	Chemical	Peak EEC (µg/L)[b]	Single application rate[c]	60-d EEC (µg/L)[b]	Seasonal application rate (2 months/season)[d]
Turf – sod farms and golf courses	70 000 L/ha (daily)	Florpyrauxifen-benzyl	47	3.3 g a.i./ha	1.1	4.6 g a.i./ha
		Florpyrauxifen acid	3.9	0.27 g a.e./ha	2.6	**11 g a.e./ha**
Turf – residential	254 000 L/ha (once per week)	Florpyrauxifen-benzyl	47	**12 g a.i./ha**	1.1	2.4 g a.i./ha
		Florpyrauxifen acid	3.9	0.99 g a.e./ha	2.6	5.7 g a.e./ha

Bolded values represent highest application rates for florpyrauxifen-benzyl and florpyrauxifen acid.
[a] Information on irrigation rates for turf (sod farms and golf courses) and turf (residential), were obtained from PMRA# 3339998 and 3340006, respectively.
[b] Peak and 60-d modelled EECs for in-water application to a water body. The peak and 60-d EECs represent the 90th percentile of maximum peak and 60-day rolling averages values calculated over the entirety of each simulation year.
[c] Single application rate calculated as the irrigation water volume multiplied by the peak EEC.
[d] Seasonal application rate calculated as the irrigation water volume for a 2-month (60-day) period multiplied by the 60-d EEC.

Table 44 Refined risk assessment results for leaf-dwelling invertebrates, bees and non-target terrestrial plants exposed via direct application of treated waters for irrigation

Use	Taxon	Sub-taxon	Exposure	Test substance	Effect metric (g/ha, unless otherwise stated)	EEC (g/ha, unless otherwise stated)	RQ	LOC	LOC exceeded?
Turf irrigation	Leaf-dwelling invertebrates	-	Acute 48-h and 7-d Glass plate	GF-3301	ER_{50}/1 > 150.6	12	< 0.08	2	No
	Bees	-	Acute oral adult	GF-3206	LD_{50}/1 > 5.77 µg a.i./bee	0.34 µg a.i./bee	<0.06	0.4	No
			Chronic 10-d adult	GF-3206	NOEL/1 = 4.33 µg a.i./bee/d	0.34 µg a.i./bee	0.079	1	No

Use	Taxon	Sub-taxon	Exposure	Test substance	Effect metric (g/ha, unless otherwise stated)	EEC (g/ha, unless otherwise stated)	RQ	LOC	LOC exceeded?
			Chronic larvae, repeated exposure	GF-3206	NOEL/1 = 1.2 µg a.i./bee/d	0.15 µg a.i./bee	0.121	1	No
	Terrestrial plants	Dicot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 1.3	12	**9.2**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.019	12	**632**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 5.7	12	**2.1**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.23	12	**52**	**1**	**Yes**
		Dicot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 0.6	11.0	**18.3**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 0.45	11.0	**24.4**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 6.5	11.0	**1.7**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 35	11.0	0.31	1	No
Greenhouse and nursery	Leaf-dwelling invertebrates	-	Acute 48-h and 7-d Glass plate	GF-3301	ER_{50}/1 > 150.6	25.0	<0.17	2	No
	Bees	-	Acute oral adult	GF-3206	LD_{50}/1 > 5.77 µg a.i./bee	0.72 µg a.i./bee	<0.124	0.4	No
			Chronic 10-d adult	GF-3206	NOEL/1 = 4.33 µg a.i./bee/d	0.72 µg a.i./bee	0.165	1	No
			Chronic larvae, repeated exposure	GF-3206	NOEL/1 = 1.2 µg a.i./bee/d	0.30 µg a.i./bee	0.252	1	No
	Terrestrial plants	Dicot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 1.3	25.0	**19.2**	**1**	**Yes**

Use	Taxon	Sub-taxon	Exposure	Test substance	Effect metric (g/ha, unless otherwise stated)	EEC (g/ha, unless otherwise stated)	RQ	LOC	LOC exceeded?
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.019	25.0	**1316**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 5.7	25.0	**4.4**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.23	25.0	**109**	**1**	**Yes**
		Dicot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 0.6	19.9	**33.1**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 0.45	19.9	**44.2**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 6.5	19.9	**3.1**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 35	19.9	0.57	1	No
Landscape vegetation and other non-food vegetation	Leaf-dwelling invertebrates	-	Acute 48-h and 7-d Glass plate	GF-3301	ER_{50}/1 > 150.6	8.7	< 0.06	1	No
	Bees	-	Acute oral adult	GF-3206	LD_{50}/1 > 5.77 µg a.i./bee	0.25 µg a.i./bee	<0.043	0.4	No
			Chronic 10-d adult	GF-3206	NOEL/1 = 4.33 µg a.i./bee/d	0.25 µg a.i./bee	0.058	0.4	No
			Chronic larvae, repeated exposure	GF-3206	NOEL/1 = 1.2 µg a.i./bee/d	0.105 µg a.i./bee	0.088	1	No
	Terrestrial plants	Dicot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 1.3	8.7	**6.7**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.019	8.7	**458**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 5.7	8.7	**1.5**	**1**	**Yes**

Use	Taxon	Sub-taxon	Exposure	Test substance	Effect metric (g/ha, unless otherwise stated)	EEC (g/ha, unless otherwise stated)	RQ	LOC	LOC exceeded?
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.23	8.7	**37.8**	**1**	**Yes**
		Dicot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 0.6	6.9	**11.5**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 0.45	6.9	**15.4**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 6.5	6.9	**1.1**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 35	6.9	0.2	1	No
Field grown crop–cereal crops	Leaf-dwelling invertebrates	-	Acute 48-h and 7-d Glass plate	GF-3301	ER_{50}/1 > 150.6	11.0	< 0.07	2	No
	Bees	-	Acute oral adult	GF-3301	LD_{50}/1 > 5.77 µg a.i./bee	0.31 µg a.i./bee	<0.055	0.4	No
			Chronic 10-d adult	Florpyrauxifen acid	NOEL/1 = 4.33 µg a.i./bee/d	0.31 µg a.i./bee	0.073	1	No
			Chronic larvae, repeated exposure	Florpyrauxifen acid	NOEL/1 = 1.2 µg a.i./bee/d	0.13 µg a.i./bee	0.11	1	No
	Terrestrial plants	Dicot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 1.3	11.0	**8.5**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen-benzyl	ER_{25}/1 = 0.019	11.0	**579**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 5.7	11.0	**1.9**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3206	ER_{25}/1 = 0.23	11.0	**47.8**	**1**	**Yes**
		Dicot	Acute 21-d Seedling emergence	GF-3206	ER_{25}/1 = 0.6	8.7	**14.6**	**1**	**Yes**

Use	Taxon	Sub-taxon	Exposure	Test substance	Effect metric (g/ha, unless otherwise stated)	EEC (g/ha, unless otherwise stated)	RQ	LOC	LOC exceeded?
			Acute 21-d Vegetative vigour	GF-3206	ER_{25}/1 = 0.45	8.7	**19.4**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	GF-3206	ER_{25}/1 = 6.5	8.7	**1.3**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 35	8.7	0.25	1	No
Field grown crop – all crops	Leaf-dwelling invertebrates	-	Acute 48-h and 7-d Glass plate	GF-3301	ER_{50}/1 > 150.6	15.0	< 0.1	2	No
	Bees	-	Acute oral adult	GF-3206	LD_{50}/1 > 5.77 µg a.i./bee	0.43 µg a.i./bee	<0.074	0.4	No
			Chronic 10-d adult	GF-3206	NOEL/1 = 4.33 µg a.i./bee/d	0.43 µg a.i./bee	0.099	1	No
			Chronic larvae, repeated exposure	GF-3206	NOEL/1 = 1.2 µg a.i./bee/d	0.18 µg a.i./bee	0.151	1	No
	Terrestrial plants	Dicot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 1.3	15.0	**11.5**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.019	15.0	**789**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	GF-3301	ER_{25}/1 = 5.7	15.0	**2.6**	**1**	**Yes**
			Acute 21-d Vegetative vigour	GF-3301	ER_{25}/1 = 0.23	15.0	**65**	**1**	**Yes**
		Dicot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 0.6	11.9	**19.9**	**1**	**Yes**
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 0.45	11.9	**26.5**	**1**	**Yes**
		Monocot	Acute 21-d Seedling emergence	Florpyrauxifen acid	ER_{25}/1 = 6.5	11.9	**1.8**	**1**	**Yes**

Use	Taxon	Sub-taxon	Exposure	Test substance	Effect metric (g/ha, unless otherwise stated)	EEC (g/ha, unless otherwise stated)	RQ	LOC	LOC exceeded?
			Acute 21-d Vegetative vigour	Florpyrauxifen acid	ER_{25}/1 = 35	11.9	0.34	1	No

Effect metrics = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration. EECs are in units of g a.i./ha for GF-3301 and GF-3206.
RQ: risk quotient; LOC: level of concern

Table 45 Endpoints used in the screening-level assessment of terrestrial end-use products

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Soil-dwelling invertebrates	Florpyrauxifen-benzyl	Earthworm (*Eisenia fetida*)	Acute 14-d Soil surface application	LC_{50}	>1928 mg a.i./kg soil	2
			Chronic 56-d Soil surface application	NOEC	130.1 mg a.i./kg soil	1
	GF-3206	Springtail (*Folsomia candida*)	Chronic 28-d Soil surface application	NOEC	8.1 mg a.i./kg soil	1
	Florpyrauxifen acid	Predatory soil mite (*Hypoaspis aculeifer*); Springtail (*Folsomia candida*)	Chronic 14-d - 28-d Soil surface application	NOEC	25 mg/kg soil	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Hydroxy acid	Earthworm (*Eisenia fetida*); Predatory soil mite (*Hypoaspis aculeifer*); Springtail (*Folsomia candida*)	Chronic 14-d - 56-d Soil surface application	NOEC	≥10 mg/kg soil	1
	Nitro hydroxy acid	Earthworm (*Eisenia fetida*); Predatory soil mite (*Hypoaspis aculeifer*); Springtail (*Folsomia candida*)	Chronic 14-d - 56-d Soil surface application	NOEC	≥10 mg/kg soil	1
Leaf-dwelling invertebrates	GF-3206	Predatory mite (*Typhlodromus pyri*)	Acute 7-d Glass plate	LR_{50}	24.3 g a.i./ha	1
		Predatory mite (*Typhlodromus pyri*)	Acute 7-d Leaf surface application	LR_{50}	>150 g a.i./ha	1
		Predatory mite (*Typhlodromus pyri*)	Acute 14-d Leaf surface application	ER_{50}	>150 g a.i./ha	1
		Lacewing (*Chrysoperla carnea*)	Chronic 27-d Leaf surface application	LR_{50}	>55 g a.i./ha	1
Bees	Florpyrauxifen-benzyl	Honeybee (*Apis mellifera*)	Acute oral adult	LD_{50}	>105.4 µg a.i./bee	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
			Acute contact adult	LD_{50}	>100 µg a.i./bee	1
	GF-3206	Honeybee (*Apis mellifera*)	Acute oral adult	LD_{50}	>5.77 µg a.i./bee	1
			Acute contact adult	LD_{50}	>5.4 µg a.i./bee	1
			Chronic 10-d adult	NOEL	4.33 µg a.i./bee/d	1
			Chronic larvae, repeated exposure	NOEL	1.2 µg a.i./bee/d	1
	Florpyrauxifen acid	Honeybee (*Apis mellifera*)	Acute larvae, single exposure	LD_{50}	>30 µg/larvae	1
Terrestrial plants	GF-3206	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	0.97 g a.i./ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.059 g a.i./ha	1
	Florpyrauxifen acid	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	0.6 g/ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.45 g/ha	1
	Hydroxy benzyl ester	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>100 g/ha	1
		All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>100 g/ha	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Hydroxy acid	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	57.66 g/ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	65.59 g/ha	1
	Dechlorinated benzyl ester	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>64 g/ha	1
		All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>64 g/ha	1
	Dechlorinated acid	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>54 g/ha	1
		All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>54 g/ha	1
	Nitro hydroxy acid	All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Seedling emergence	ER_{25}	>100 g/ha	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
		All species (soybean, sunflower, carrot, cotton, cucumber)	Acute 21-d Vegetative vigour	ER_{25}	>100 g/ha	1
Birds	Florpyrauxifen-benzyl	Mallard (*Anas platyrhynchos*)	Acute oral	LD_{50}	>2250 mg a.i./kg bw/d	10
			Acute dietary 5-d	LD_{50}	>2524 mg a.i./kg bw/d	10
			Chronic reproduction 21-wk	NOEL	≥138.3 mg a.i./kg bw/d	1
	GF-3206	Northern bobwhite (*Colinus virginianus*)	Acute oral	LD_{50}	>60.75 mg a.i./kg bw/d	10
Mammals	Florpyrauxifen-benzyl	Rat	Acute oral	LD_{50}	>4725 mg a.i./kg bw/d	10
			Chronic reproduction 2-gen	NOEL	≥285 mg a.i./kg bw/d	1
	GF-3206	Rat	Acute oral	LD_{50}	>134 mg a.i./kg bw/d	10
Freshwater pelagic invertebrates	Florpyrauxifen-benzyl	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>0.0626 mg a.i./L	2
			Chronic 21-d	NOEC	≥0.0385 mg a.i./L	1
	GF-3206	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	1.32 mg a.i./L	2
		Water flea	Acute 48-h	EC_{50}	>91.8 mg/L	2

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Florpyrauxifen acid	(*Daphnia magna*)	Chronic 21-d	NOEC	25.9 mg/L	1
	Hydroxy acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>100 mg/L	2
	Dechlorinated benzyl ester	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>0.98 mg/L	2
	Dechlorinated acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>110 mg/L	2
	Nitro hydroxy acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>10 mg/L	2
	Benzyl alcohol	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	230 mg/L	2
			Chronic 21-d	NOEC	51 mg/L	1
	Benzoic acid	Water flea (*Daphnia magna*)	Acute 48-h	EC_{50}	>100 mg/L	2
			Chronic 21-d	NOEC	≥25 mg/L	1
Freshwater benthic invertebrates	Florpyrauxifen -benzyl	Midge (*Chironomus dilutus*)	Acute spiked sediments 10-d	NOEC	0.00169 mg a.i./L overlying water	1
		Midge (*Chironomus riparius*)	Chronic spiked water 28-d	NOEC	≥0.014 mg a.i./L overlying water	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Hydroxy benzyl ester	Midge (*Chironomus riparius*)	Chronic spiked water 28-d	NOEC	≥0.181 mg/L overlying water	1
	Hydroxy acid	Midge (*Chironomus riparius*)	Chronic spiked sediments 28-d	NOEC	58 mg/L overlying water	1
Freshwater fish	Florpyrauxifen -benzyl	Fathead minnow (*Pimephales promelas*)	Acute 96-h	LC_{50}	>0.0518 mg a.i./L	10
			Chronic 33-d	NOEC	≥0.0373 mg a.i./L	1
	GF-3206	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>3.2 mg a.i./L	10
	Florpyrauxifen acid	Rainbow trout (*Oncorhynchus mykiss*)	Acute 96-h	LC_{50}	>99.4 mg/L	10
		Fathead minnow (*Pimephales promelas*)	Chronic 33-d	NOEC	≥29.8 mg/L	1
	Hydroxy acid	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>120 mg/L	10
	Dechlorinated benzyl ester	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>1 mg/L	10
	Dechlorinated acid	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>90 mg/L	10

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Nitro hydroxy acid	Common carp (*Cyprinus carpio*)	Acute 96-h	LC_{50}	>9.6 mg/L	10
	Benzyl alcohol	Fathead minnow (*Pimephales promelas*)	Acute 96-h	LC_{50}	460 mg/L	10
	Benzoic acid	Bluegill sunfish (*Lepomis macrochirus*)	Acute 96-h	LC_{50}	44.6 mg/L	10
		Rainbow trout (*Oncorhynchus mykiss*)	Chronic 28-d	NOEC	≥120 mg/L	1
Freshwater algae	Florpyrauxifen-benzyl	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 96-h	EC_{50}	>0.0612 mg a.i./L	2
	GF-3206	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 96-h	EC_{50}	0.126 mg a.i./L	2
	Florpyrauxifen acid	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 96-h	EC_{50}	75.1 mg/L	2

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Hydroxy acid	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	>11 mg/L	2
	Dechlorinated benzyl ester	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	>1.3 mg/L	2
	Dechlorinated acid	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	>9.9 mg/L	2
	Nitro hydroxy acid	Freshwater diatom (*Navicula pelliculosa*)	Acute 96-h	EC_{50}	5.619 mg/L	2
	Benzyl alcohol	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 72-h	EC_{50}	500 mg/L	2
	Benzoic acid	Green alga (*Raphidocelis subcapitata*, reported as *Pseudokirchneriella subcapitata*)	Acute 72-h	EC_{50}	>33.1 mg/L	2
Freshwater vascular plant	Florpyrauxifen-benzyl	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.00719 µg a.i./L	2
	GF-3206	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.0018 µg a.i./L	2

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
	Florpyrauxifen acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.17 µg/L	2
	Hydroxy benzyl ester	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	10.3 µg/L	2
	Hydroxy acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	63.3 µg/L	2
	Dechlorinated benzyl ester	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	110 µg/L	2
	Dechlorinated acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	1190 µg/L	2
	Nitro hydroxy acid	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	3071 µg/L	2
Amphibians	Florpyrauxifen-benzyl	African clawed frog (*Xenopus laevis*)	Acute 96-h	LC_{50}	>0.0676 mg a.i./L	10
Marine invertebrates	Florpyrauxifen-benzyl	Eastern oyster (*Crassostrea virginica*)	Acute 96-h	EC_{50}	>0.0251 mg a.i./L	2
		Mysid shrimp (*Americamysis bahia*)	Acute 96-h	LC_{50}	>0.026 mg a.i./L	2
			Chronic 28-d	NOEC	<0.0011 mg a.i./L	10

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Marine fish	Florpyrauxifen -benzyl	Sheepshead Minnow (*Cyprinodon variegatus*)	Acute 96-h	LC_{50}	>0.0403 mg a.i./L	10
Marine algae	Florpyrauxifen -benzyl	Diatom (*Skeletonema costatum*)	Acute 96-h	EC_{50}	>0.0389 mg a.i./L	2

Table 46 Screening-level risk assessment results for aquatic organisms exposed to terrestrial end-use products

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
Freshwater pelagic invertebrates	Florpyrauxifen-benzyl	Acute 48-h	$EC_{50}/2 > 0.0313$ mg a.i./L	0.00750 mg a.i./L	< 0.24	1	No
		Chronic 21-d	$NOEC/1 \geq 0.0385$ mg a.i./L	0.00750 mg a.i./L	≤ 0.19	1	No
	GF-3206	Acute 48-h	$EC_{50}/2 = 0.66$ mg a.i./L	0.00750 mg a.i./L	0.01	1	No
	Florpyrauxifen acid	Acute 48-h	$EC_{50}/2 > 45.9$ mg/L	0.00596 mg/L	< 0.01	1	No
	Florpyrauxifen acid	Chronic 21-d	$NOEC/1 = 25.9$ mg/L	0.00596 mg/L	< 0.01	1	No
	Hydroxy acid	Acute 48-h	$EC_{50}/2 > 50$ mg/L	0.00572 mg/L	< 0.01	1	No
	Dechlorinated benzyl ester	Acute 48-h	$EC_{50}/2 > 0.49$ mg/L	0.00691 mg/L	< 0.01	1	No
	Dechlorinated acid	Acute 48-h	$EC_{50}/2 > 55$ mg/L	0.00537 mg/L	< 0.01	1	No
	Nitro hydroxy acid	Acute 48-h	$EC_{50}/2 > 5$ mg/L	0.00649 mg/L	< 0.01	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
	Benzyl alcohol	Acute 48-h	$EC_{50}/2$ = 115 mg/L	0.00185 mg/L	< 0.01	1	No
		Chronic 21-d	NOEC/1 = 51 mg/L	0.00185 mg/L	< 0.01	1	No
	Benzoic acid	Acute 48-h	$EC_{50}/2$ > 50 mg/L	0.00209 mg/L	< 0.01	1	No
		Chronic 21-d	NOEC/1 ≥ 25 mg/L	0.00209 mg/L	< 0.01	1	No
Freshwater benthic invertebrates	Florpyrauxifen-benzyl	Acute 10-d spiked sediments	NOEC/1 = 0.00169 mg a.i./L overlying water	0.00750 mg a.i./L	**4.4**	**1**	**Yes**
		Chronic 28-d spiked water	NOEC/1 ≥ 0.014 mg a.i./L overlying water	0.00750 mg a.i./L	≤ 0.54	1	No
	Hydroxy benzyl ester	Chronic 28-d spiked sediments	NOEC/1 ≥0.181 mg/L overlying water	0.00726 mg/L	≤ 0.04	1	No
	Hydroxy acid	Chronic 28-d spiked sediments	NOEC/1 = 58 mg/L overlying water	0.00572 mg/L	< 0.01	1	No
Freshwater fish	Florpyrauxifen-benzyl	Acute 96-h	$LC_{50}/10$ > 0.00518 mg a.i./L	0.00750 mg a.i./L	**< 1.4**	1	**Yes**
		Chronic 33-d	NOEC/1 ≥ 0.0373 mg a.i./L	0.00750 mg a.i./L	≤ 0.2	1	No
	GF-3206	Acute 96-h	$LC_{50}/10$ > 0.32 mg a.i./L	0.00750 mg a.i./L	< 0.02	1	No
	Florpyrauxifen acid	Acute 96-h	$LC_{50}/10$ > 9.94 mg/L	0.00596 mg/L	< 0.01	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
		Chronic 33-d	NOEC/1 ≥ 29.8 mg/L	0.00596 mg/L	< 0.01	1	No
	Hydroxy acid	Acute 96-h	LC_{50}/10 > 12 mg/L	0.00572 mg/L	< 0.01	1	No
	Dechlorinated benzyl ester	Acute 96-h	LC_{50}/10 > 0.1 mg/L	0.00691 mg/L	< 0.07	1	No
	Dechlorinated acid	Acute 96-h	LC_{50}/10 > 9 mg/L	0.00537 mg/L	< 0.01	1	No
	Nitro hydroxy acid	Acute 96-h	LC_{50}/10 > 0.96 mg/L	0.00649 mg/L	< 0.01	1	No
	Benzyl alcohol	Acute 96-h	LC_{50}/10 = 46 mg/L	0.00185 mg/L	< 0.01	1	No
	Benzoic acid	Acute 96-h	LC_{50}/10 = 4.46 mg/L	0.00209 mg/L	< 0.01	1	No
		Chronic 28-d	NOEC/1 ≥ 120 mg/L	0.00209 mg/L	< 0.01	1	No
Freshwater algae	Florpyrauxifen-benzyl	Acute 96-h	EC_{50}/2 > 0.0306 mg a.i./L	0.00750 mg a.i./L	< 0.25	1	No
	GF-3206	Acute 96-h	EC_{50}/2 = 0.063 mg a.i./L	0.00750 mg a.i./L	0.12	1	No
	Florpyrauxifen acid	Acute 96-h	EC_{50}/2 = 37.55 mg/L	0.00596 mg/L	< 0.01	1	No
	Hydroxy acid	Acute 96-h	EC_{50}/2 > 5.5 mg/L	0.00572 mg/L	< 0.01	1	No
	Dechlorinated benzyl ester	Acute 96-h	EC_{50}/2 > 0.65 mg/L	0.00691 mg/L	< 0.01	1	No
	Dechlorinated acid	Acute 96-h	EC_{50}/2 > 4.95 mg/L	0.00537 mg/L	< 0.01	1	No
	Nitro hydroxy acid	Acute 96-h	EC_{50}/2 = 2.81 mg/L	0.00649 mg/L	< 0.01	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
	Benzyl alcohol	Acute 72-h	$EC_{50}/2$ = 250 mg/L	0.00185 mg/L	< 0.01	1	No
	Benzoic acid	Acute 72-h	$EC_{50}/2$ > 16.55 mg/L	0.00209 mg/L	< 0.01	1	No
Freshwater vascular plants	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.000003595 mg a.i./L	0.00750 mg a.i./L	**2090**	1	**Yes**
	GF-3206	Acute 14-d	$EC_{50}/2$ = 0.0000009 mg a.i./L	0.00750 mg a.i./L	**8330**	1	**Yes**
	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 0.000085 mg/L	0.00596 mg/L	**70**	1	**Yes**
	Hydroxy benzyl ester	Acute 14-d	$EC_{50}/2$ = 0.00515 mg/L	0.00726 mg/L	**1.4**	1	**Yes**
	Hydroxy acid	Acute 14-d	$EC_{50}/2$ = 0.03165 mg/L	0.00572 mg/L	0.18	1	No
	Dechlorinated benzyl ester	Acute 14-d	$EC_{50}/2$ = 0.055 mg/L	0.00691 mg/L	0.13	1	No
	Dechlorinated acid	Acute 14-d	$EC_{50}/2$ = 0.595 mg/L	0.00537 mg/L	< 0.01	1	No
	Nitro hydroxy acid	Acute 14-d	$EC_{50}/2$ = 1.54 mg/L	0.00649 mg/L	< 0.01	1	No
Amphibians	Florpyrauxifen-benzyl	Acute 96-h	$LC_{50}/10$ > 0.00676 mg a.i./L	0.0400 mg a.i./L	**< 5.9**	1	**Yes**
Marine invertebrates	Florpyrauxifen-benzyl	Acute 96-h	$EC_{50}/2$ > 0.01255 mg a.i./L	0.00750 mg a.i./L	< 0.6	1	No
		Chronic 28-d	NOEC/1 <0.0011 mg a.i./L	0.00750 mg a.i./L	**> 6.8**	1	**Yes**

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
Marine fish	Florpyrauxifen-benzyl	Acute 96-h	LC_{50}/10 > 0.00403 mg a.i./L	0.00750 mg a.i./L	**< 1.9**	1	**Yes**
Marine algae	Florpyrauxifen-benzyl	Acute 96-h	EC_{50}/2 > 0.01945 mg a.i./L	0.00750 mg a.i./L	< 0.39	1	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient; LOC: level of concern

Table 47 Screening-level risk assessment results for terrestrial organisms other than birds and mammals exposed to terrestrial end-use products

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
Soil-dwelling invertebrates	Florpyrauxifen-benzyl	Acute 14-d Soil surface application	LC_{50}/2 > 964 mg a.i./kg soil	0.0267 mg a.i./kg soil	< 0.01	1	No
		Chronic 56-d Soil surface application	NOEL/1 = 130.1 mg a.i./kg soil	0.0267 mg a.i./kg soil	< 0.01	1	No
	GF-3206	Chronic 28-d Soil surface application	NOEL/1 = 8.1 mg a.i./kg soil	0.0267 mg a.i./kg soil	< 0.01	1	No
	Florpyrauxifen acid	Chronic 14 to 28-d Soil surface application	NOEL/1 = 25 mg/kg soil	0.0212 mg/kg soil	< 0.01	1	No
	Hydroxy acid	Chronic 14 to 56-d Soil surface application	NOEL/1 ≥ 10 mg/kg soil	0.0203 mg/kg soil	< 0.01	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
	Nitro hydroxy acid	Chronic 14 to 56-d Soil surface application	NOEL/1 ≥ 10 mg/kg soil	0.0231 mg/kg soil	< 0.01	1	No
Leaf-dwelling invertebrates	GF-3206	Acute 7-d Glass plate	LR_{50}/1 = 24.3 g a.i./ha	60.0 g a.i./ha	**2.5**	**2**	**Yes**
		Acute 7-d Leaf surface application	LR_{50}/1 > 150 g a.i./ha	60.0 g a.i./ha	< 0.4	1	No
		Acute 14-d Leaf surface application	ER_{50}/1 > 150 g a.i./ha	60.0 g a.i./ha	< 0.4	1	No
		Chronic 27-d Leaf surface application	LR_{50}/1 > 55 g a.i./ha	60.0 g a.i./ha	< 1.1	1	No[a]
Bees	Florpyrauxifen-benzyl	Acute adult oral	LD_{50}/1 >105.4 µg a.i./bee	1.71 µg a.i./bee	<0.016	0.4	No
		Acute adult contact	LD_{50}/1 >100 µg a.i./bee	0.144 µg a.i./bee	<0.001	0.4	No
	GF-3206	Acute adult oral	LD_{50}/1 >5.77 µg a.i./bee	1.71 µg a.i./bee	<0.30	0.4	No
		Acute adult contact	LD_{50}/1 >5.4 µg a.i./bee	0.144 µg a.i./bee	<0.027	0.4	No
		Chronic 10-d adult	NOEL/1 = 4.33 µg a.i./bee/d	1.71 µg a.i./bee	0.4	1	No
		Chronic larvae, repeated exposure	NOEL/1 = 1.2 µg a.i./bee/d	0.727 µg a.i./bee	0.6	1	No
	Florpyrauxifen acid	Acute larvae,	LD_{50}/1 >30 µg	0.578 µg	<0.019	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
		single exposure	a.i./bee/d	a.e./bee			
Terrestrial plants	GF-3206	Acute 21-d Seedling emergence	ER_{25}/1 = 0.97 g a.i./ha	60.0 g a.i./ha	**62**	**1**	**Yes**
		Acute 21-d Vegetative vigour	ER_{25}/1 = 0.059 g a.i./ha	60.0 g a.i./ha	**1020**	**1**	**Yes**
	Florpyrauxifen acid	Acute 21-d Seedling emergence	ER_{25}/1 = 0.6 g/ha	47.7 g/ha	**79**	**1**	**Yes**
		Acute 21-d Vegetative vigour	ER_{25}/1 = 0.45 g/ha	47.7 g/ha	**106**	**1**	**Yes**
	Hydroxy benzyl ester	Acute 21-d Seedling emergence	ER_{25}/1 > 100 g/ha	58.1 g/ha	< 0.58	1	No
		Acute 21-d Vegetative vigour	ER_{25}/1 > 100 g/ha	58.1 g/ha	< 0.58	1	No
	Hydroxy acid	Acute 21-d Seedling emergence	ER_{25}/1 = 57.66 g/ha	45.8 g/ha	0.79	1	No
		Acute 21-d Vegetative vigour	ER_{25}/1 = 65.59 g/ha	45.8 g/ha	0.7	1	No
	Dechlorinated benzyl ester	Acute 21- Seedling emergence	ER_{25}/1 > 64 g/ha	55.3 g/ha	< 0.86	1	No
		Acute 21-d	ER_{25}/1 > 64	55.3	< 0.86	1	No

Taxon	Test substance	Exposure	Effect metric	EEC	RQ	LOC	LOC exceeded?
		Vegetative vigour	g/ha	g/ha			
	Dechlorinated acid	Acute 21-d Seedling emergence	ER_{25}/1 > 54 g/ha	43.0 g/ha	< 0.8	1	No
		Acute 21-d Vegetative vigour	ER_{25}/1 > 54 g/ha	43.0 g/ha	< 0.8	1	No
	Nitro hydroxy acid	Acute 21-d Seedling emergence	ER25/1 > 100 g/ha	51.9 g/ha	< 0.52	1	No
		Acute 21-d Vegetative vigour	ER25/1 > 100 g/ha	51.9 g/ha	< 0.52	1	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient; LOC: level of concern
[a] Although risk quotient is slightly above the LOC, it is a non-definitive value. No effects to *Chrysoperla carnea* were observed up to the highest treatment, chronic risks are considered to be negligible.

Table 48 Screening-level risk assessment results for birds and mammals exposed to terrestrial end-use products

Taxon	Exposure	Test substance	Effect metric (mg a.i./kg bw/day)	Organism size and feeding guild	EDE (mg a.i./kg bw/d)	RQs	LOC	LOC Exceeded?
Birds	Acute oral	Florpyrauxifen-benzyl	LD_{50}/10 > 225	Small insectivore Medium insectivore Large herbivore	4.86 3.82 2.46	< 0.02 < 0.02 < 0.01	1	N

Taxon	Exposure	Test substance	Effect metric (mg a.i./kg bw/day)	Organism size and feeding guild	EDE (mg a.i./kg bw/d)	RQs	LOC	LOC Exceeded?
	Acute oral	GF-3206	LD_{50}/10 > 6.075	Small insectivore Medium insectivore Large herbivore	4.86 3.82 2.46	< 0.8 < 0.63 < 0.41	1	N
	Acute dietary	Florpyrauxifen-benzyl	LD_{50}/10 > 252.4	Small insectivore Medium insectivore Large herbivore	4.86 3.82 2.46	< 0.02 < 0.02 < 0.01	1	N
	Reproduction	Florpyrauxifen-benzyl	NOEL/1 ≥ 138.3	Small insectivore Medium insectivore Large herbivore	4.86 3.82 2.46	≤ 0.04 ≤ 0.03 ≤ 0.02	1	N
Mammals	Acute oral	Florpyrauxifen-benzyl	LD_{50}/10 > 472.5	Small insectivore Medium herbivore Large herbivore	2.78 5.29 2.91	< 0.01 < 0.01 < 0.01	1	N
	Acute oral	GF-3206	LD_{50}/10 > 13.4	Small insectivore Medium herbivore Large herbivore	2.78 5.29 2.91	< 0.21 < 0.39 < 0.22	1	N

Taxon	Exposure	Test substance	Effect metric (mg a.i./kg bw/day)	Organism size and feeding guild	EDE (mg a.i./kg bw/d)	RQs	LOC	LOC Exceeded?
	Reproduction	Florpyrauxifen-benzyl	NOEL/1 ≥ 285	Small insectivore Medium herbivore Large herbivore	2.78 5.29 2.91	< 0.01 ≤ 0.02 < 0.01	1	N

Effect metric = toxicity endpoint/uncertainty factor
EDE: estimated daily exposure; RQ: risk quotient; LOC: level of concern

Table 49 Endpoints used in refined assessment of terrestrial end-use products

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Terrestrial plants	GF-3206	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	0.97 g a.i./ha	1
		Onion (*Allium cepa*)	Acute 21-d Seedling emergence	ER_{25}	5.4 g a.i./ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.059 g a.i./ha	1
		Onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}	4.9 g a.i./ha	1
	Florpyrauxifen acid	Carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}	0.6 g/ha	1
		Onion (*Allium cepa*)	Acute 21-d Seedling emergence	ER_{25}	6.5 g/ha	1
		Soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}	0.45 g/ha	1
		Onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}	35 g/ha	1

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Freshwater vascular plants (native species)	Florpyrauxifen-benzyl	Duckweed (*Lemna gibba*)	Acute 7-d	EC_{50}	>46.1 µg a.i./L	2
		Common hornwort (*Ceratophyllum demersum*)	Acute 14-d	EC_{50}	1.52 µg a.i./L	2
	GF-3206	Duckweed (*Lemna gibba*)	Acute 7-d	EC_{50}	520 µg a.i./L	2
	Florpyrauxifen acid	Common hornwort (*Ceratophyllum demersum*)	Acute 14-d	EC_{50}	33.2 µg/L	2
		Elodea (*Elodea canadensis*)	Acute 14-d	EC_{50}	6.8 µg/L	2
		Megalodonta (*Bidens beckii*)	Acute 14-d	EC_{50}	6.0 µg/L	2
Freshwater vascular plants (non-native species)[a]	Florpyrauxifen-benzyl	Carolina fanwort (*Cabomba caroliniana*)	Acute 21-d	EC_{50}	0.595 µg a.i./L	2
		Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.00719 µg a.i./L	2
	GF-3206	Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.0018 µg a.i./L	2
	Florpyrauxifen acid	Carolina fanwort (*Cabomba caroliniana*)	Acute 14-d	EC_{50}	113 µg/L	2
		Eurasian milfoil (*Myriophyllum spicatum*)	Acute 14-d	EC_{50}	0.17 µg/L	2

Taxon	Test substance	Test organism	Exposure	Endpoint	Value	Uncertainty factor
Marine invertebrates	Florpyrauxifen-benzyl	Mysid shrimp (*Americamysis bahia*)	Chronic 28-d	NOEL	0.0035 mg a.i./L[b]	1

[a] Eurasian milfoil (*Myriophyllum spicatum*) is an invasive species in Canada and a target of the aquatic products containing florpyrauxifen-benzyl. This species is a surrogate for native watermilfoil species, which have similar sensitivity to florpyrauxifen-benzyl. Carolina fanwort (*Cabomba caroliniana*) is not native to Canada.

[b] Although the NOEC based on female body length was lower than that for offspring per female, the level of effect observed on length at all treatments compared to controls (3–5%) was not considered biologically relevant and was therefore not considered in the refined assessment.

Table 50 Refined risk assessment results for aquatic organisms exposed to spray drift from terrestrial end-use products

Use	Application method	Taxon	Organism	Test substance	Exposure	Effect metric (µg/L)	Drift EEC (µg/L)	RQ	LOC exceeded?[a]
GF-3206 Herbicide									
Rangeland, permanent pasture, industrial and other non-crop areas	Aerial	Freshwater vascular plants (native)	Common hornwort (*Ceratophyllum demersum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.76	**4.50**	**5.9**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 16.6	3.58	0.22	No
			Duckweed (*Lemna gibba*)	Florpyrauxifen-benzyl	Acute 7-d	$EC_{50}/2$ > 23.05	4.50	< 0.2	No
				GF-3206	Acute 7-d	$EC_{50}/2$ = 260	4.50	0.02	No
			Elodea (*Elodea canadensis*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3.4	**3.58**	**1.1**	**Yes**

Use	Application method	Taxon	Organism	Test substance	Exposure	Effect metric (µg/L)	Drift EEC (µg/L)	RQ	LOC exceeded?[a]
			Megalodonta (*Bidens beckii*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2 = 3$	**3.58**	**1.2**	**Yes**
		Freshwater vascular plants (non-native)	Carolina fanwort (*Cabomba caroliniana*)	Florpyrauxifen-benzyl	Acute 21-d	$EC_{50}/2 = 0.2975$	**4.50**	**15**	**Yes**
				Florpyrauxifen acid	Acute 21-d	$EC_{50}/2 = 56.5$	3.58	0.06	No
			Eurasian milfoil (*Myriophyllum spicatum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2 = 0.003595$	**4.50**	**1250**	**Yes**
				GF-3206	Acute 14-d	$EC_{50}/2 = 0.0009$	**4.50**	**5000**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2 = 0.085$	**3.58**	**42**	**Yes**
	Ground	Freshwater vascular plants (native)	Common hornwort (*Ceratophyllum demersum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2 = 0.76$	0.225	0.3	No
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2 = 16.6$	0.179	0.01	No
			Duckweed (*Lemna gibba*)	Florpyrauxifen-benzyl	Acute 7-d	$EC_{50}/2 > 23.05$	0.225	< 0.01	No
				GF-3206	Acute 7-d	$EC_{50}/2 = 260$	0.225	< 0.01	No
			Elodea (*Elodea canadensis*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2 = 3.4$	0.179	0.05	No
			Megalodonta (*Bidens beckii*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2 = 3$	0.179	0.06	No

Use	Application method	Taxon	Organism	Test substance	Exposure	Effect metric (µg/L)	Drift EEC (µg/L)	RQ	LOC exceeded?[a]
		Freshwater vascular plants (non-native)	Carolina fanwort (*Cabomba caroliniana*)	Florpyrauxifen-benzyl	Acute 21-d	$EC_{50}/2$ = 0.2975	0.225	0.76	No
				Florpyrauxifen acid	Acute 21-d	$EC_{50}/2$ = 56.5	0.179	< 0.01	No
			Eurasian milfoil (*Myriophyllum spicatum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.003595	**0.225**	**63**	**Yes**
				GF-3206	Acute 14-d	$EC_{50}/2$ = 0.0009	**0.225**	**250**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 0.085	**0.179**	**2.1**	**Yes**
Filbert	Ground	Freshwater vascular plants (native)	Common hornwort (*Ceratophyllum demersum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.76	0.0375	0.05	No
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 16.6	0.0298	< 0.01	No
			Duckweed (*Lemna gibba*)	Florpyrauxifen-benzyl	Acute 7-d	$EC_{50}/2$ > 23.05	0.0375	< 0.01	No
				GF-3206	Acute 7-d	$EC_{50}/2$ = 260	0.0375	< 0.01	No
			Elodea (*Elodea canadensis*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3.4	0.0298	< 0.01	No
			Megalodonta (*Bidens beckii*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3	0.0298	< 0.01	No
		Freshwater vascular plants	Carolina fanwort (*Cabomba caroliniana*)	Florpyrauxifen-benzyl	Acute 21-d	$EC_{50}/2$ = 0.2975	0.0375	0.13	No
				Florpyrauxifen acid	Acute 21-d	$EC_{50}/2$ = 56.5	0.0298	< 0.01	No

Use	Application method	Taxon	Organism	Test substance	Exposure	Effect metric (µg/L)	Drift EEC (µg/L)	RQ	LOC exceeded?[a]
		(non-native)	Eurasian milfoil (*Myriophyllum spicatum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.003595	**0.0375**	**10**	**Yes**
				GF-3206	Acute 14-d	$EC_{50}/2$ = 0.0009	**0.0375**	**42**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 0.085	0.0298	0.35	No
Milestone NXT Herbicide/Restore NXT Herbicide									
Rangeland, permanent pasture, rights-of-way, industrial and other non-crop areas of Canada	Aerial	Freshwater vascular plants (native)	Common hornwort (*Ceratophyllum demersum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.76	**0.900**	**1.2**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 16.6	0.715	0.04	No
			Duckweed (*Lemna gibba*)	Florpyrauxifen-benzyl	Acute 7-d	$EC_{50}/2$ > 23.05	0.900	< 0.04	No
				GF-3206	Acute 7-d	$EC_{50}/2$ = 260	0.900	< 0.01	No
			Elodea (*Elodea canadensis*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3.4	0.715	0.21	No
			Megalodonta (*Bidens beckii*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3	0.715	0.24	No
		Freshwater vascular plants (non-native)	Carolina fanwort (*Cabomba caroliniana*)	Florpyrauxifen-benzyl	Acute 21-d	$EC_{50}/2$ = 0.2975	**0.900**	**3**	**Yes**
				Florpyrauxifen acid	Acute 21-d	$EC_{50}/2$ = 56.5	0.715	0.01	No
			Eurasian milfoil	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.003595	**0.900**	**250**	**Yes**

Use	Application method	Taxon	Organism	Test substance	Exposure	Effect metric (µg/L)	Drift EEC (µg/L)	RQ	LOC exceeded?[a]
			(*Myriophyllum spicatum*)	GF-3206	Acute 14-d	$EC_{50}/2$ = 0.0009	**0.900**	**1000**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 0.085	**0.715**	**8.4**	**Yes**
	Ground	Freshwater vascular plants (native)	Common hornwort (*Ceratophyllum demersum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.76	0.0450	0.06	No
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 16.6	0.0358	< 0.01	No
			Duckweed (*Lemna gibba*)	Florpyrauxifen-benzyl	Acute 7-d	$EC_{50}/2$ > 23.05	0.0450	< 0.01	No
				GF-3206	Acute 7-d	$EC_{50}/2$ = 260	0.0450	< 0.01	No
			Elodea (*Elodea canadensis*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3.4	0.0358	0.01	No
			Megalodonta (*Bidens beckii*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3	0.0358	0.01	No
		Freshwater vascular plants (non-native)	Carolina fanwort (*Cabomba caroliniana*)	Florpyrauxifen-benzyl	Acute 21-d	$EC_{50}/2$ = 0.2975	0.0450	0.15	No
				Florpyrauxifen acid	Acute 21-d	$EC_{50}/2$ = 56.5	0.0358	< 0.01	No
			Eurasian milfoil (*Myriophyllum spicatum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.003595	**0.0450**	**13**	**Yes**
				GF-3206	Acute 14-d	$EC_{50}/2$ = 0.0009	**0.0450**	**50**	**Yes**
				Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 0.085	0.0358	0.42	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient
[a] LOC: level of concern. The LOC is 1 for freshwater benthic invertebrates, freshwater vascular plants and marine invertebrates.

Table 51 Refined risk assessment results for non-target terrestrial plants exposed to spray drift from terrestrial end-use products

Use	Application method	Test substance	Test species	Exposure	Effect metric (g a.i./ha)	Drift EEC (g a.i./ha)	RQ	LOC	LOC exceeded?
GF-3206 Herbicide									
Rangeland, permanent pasture, industrial and other non-crop areas	Aerial	GF-3206	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.97	36.0	**37.1**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 5.4	36.0	**6.7**	**1**	**Yes**
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.059	36.0	**610**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 4.9	36.0	**7.3**	**1**	**Yes**
		Florpyrauxifen acid	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.6	28.6	**47.7**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 6.5	28.6	**4.4**	**1**	**Yes**
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.45	28.6	**64.0**	**1**	**Yes**

Use	Application method	Test substance	Test species	Exposure	Effect metric (g a.i./ha)	Drift EEC (g a.i./ha)	RQ	LOC	LOC exceeded?
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}/1 = 35	28.6	0.82	1	No
	Ground	GF-3206	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}/1 = 0.97	1.80	**1.90**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	ER_{25}/1 = 5.4	1.80	0.33	1	No
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}/1 = 0.059	1.80	**30.5**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}/1 = 4.9	1.80	0.37	1	No
		Florpyrauxifen acid	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	ER_{25}/1 = 0.6	1.43	**2.40**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	ER_{25}/1 = 6.5	1.43	0.22	1	No
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	ER_{25}/1 = 0.45	1.43	**3.20**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	ER_{25}/1 = 35	1.43	0.04	1	No

Use	Application method	Test substance	Test species	Exposure	Effect metric (g a.i./ha)	Drift EEC (g a.i./ha)	RQ	LOC	LOC exceeded?
Filbert	Ground	GF-3206	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.97	0.300	0.310	1	No
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 5.4	0.300	0.06	1	No
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.059	0.300	**5.10**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 4.9	0.300	0.06	1	No
		Florpyrauxifen acid	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.6	0.238	0.400	1	No
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 6.5	0.238	0.04	1	No
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.45	0.238	0.530	1	No
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 35	0.238	< 0.01	1	No
Milestone NXT Herbicide/Restore NXT Herbicide									
Rangeland, permanent pasture, rights-	Aerial	GF-3206	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.97	7.20	**7.40**	**1**	**Yes**

Use	Application method	Test substance	Test species	Exposure	Effect metric (g a.i./ha)	Drift EEC (g a.i./ha)	RQ	LOC	LOC exceeded?
of-way, industrial and other non-crop areas of Canada			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 5.4	7.20	**1.3**	**1**	**Yes**
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.059	7.20	**122**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 4.9	7.20	**1.5**	**1**	**Yes**
		Florpyrauxifen acid	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.6	5.72	**9.50**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 6.5	5.72	0.88	1	No
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.45	5.72	**12.7**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 35	5.72	0.16	1	No
	Ground	GF-3206	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.97	0.360	0.370	1	No
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 5.4	0.360	0.07	1	No

Use	Application method	Test substance	Test species	Exposure	Effect metric (g a.i./ha)	Drift EEC (g a.i./ha)	RQ	LOC	LOC exceeded?
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.059	0.360	**6.10**	**1**	**Yes**
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 4.9	0.360	0.07	1	No
		Florpyrauxifen acid	carrot (*Daucus carota*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 0.6	0.286	0.480	1	No
			onion (*Allium cepa*)	Acute 21-d Seedling emergence	$ER_{25}/1$ = 6.5	0.286	0.04	1	No
			soybean (*Glycine max*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 0.45	0.286	0.640	1	No
			onion (*Allium cepa*)	Acute 21-d Vegetative vigour	$ER_{25}/1$ = 35	0.286	< 0.01	1	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient; LOC: level of concern

Table 52 Ecological water model input parameters for modelling florpyrauxifen-benzyl for runoff

Parameter	Florpyrauxifen-benzyl
Aquatic photolysis at 40°N latitude (days)	0.12
Hydrolysis at pH 7 at 20°C (days)	181.2
Aerobic aquatic half-life at 20°C (days)	6.12[1]
Anaerobic aquatic half-life at 20°C (days)	2.57[1]
Aerobic soil half-life at 20°C (days)[2]	426[2]
K_{oc} (L/kg)	24300[3]

Based on the use of the parent-daughter approach, some inputs may differ from the values presented in Appendix I, Table 2.
[1] Longer of 2 half-lives, as this produced the most conservative EECs for florpyrauxifen-benzyl.
[2] Terrestrial degradation not considered for in-water application
[3] 20th percentile of 5 values

Table 53 Ecological water model input parameters for modelling florpyrauxifen acid for runoff

Parameter	Florpyrauxifen-benzyl	Florpyrauxifen acid
Aquatic photolysis at 40°N latitude (days)	0.12	2.32 (0.086[1])
Hydrolysis at pH 7 at 20°C (days)	181.2	Stable (0.988)
Aerobic aquatic half-life at 20°C (days)	3.78[2]	9.27[3] (0.874[3])
Anaerobic aquatic half-life at 20°C	1.74[2]	3.79[3] (0.646[3])
Aerobic soil half-life at 20°C (days)[4]	3.2[4]	51.8[5]
K_{oc} (L/kg)	24300[6]	36.6[6]

Based on the use of the parent-daughter approach, some inputs may differ from the values presented in Appendix I, Table 2.
[1] Transformation fractions in parenthesis
[2] Shorter of 2 half-lives, as this produced the most conservative EECs for florpyrauxifen acid.
[3] Longer of 2 half-lives and higher of 2 fractions, as this produced the most conservative EECs for florpyrauxifen acid.
[4] 90th percentile upper bound on the mean of four slow half-lives from DFOP
[5] 90th percentile upper bound on the mean of four half-lives
[5] 20th percentile of 5 values
[6] 20th percentile of 12 values

Table 54 EECs (in µg/L) of florpyrauxifen-benzyl and florpyrauxifen acid for runoff to 1-ha water body with 80-cm depth

Use (Application Method)[1]	Chemical	Water column				
		Peak	24-hour	96-hour	21-day	60-day
Permanent grass pasture (ground foliar application)	Florpyrauxifen-benzyl	0.64	0.33	0.12	0.033	0.015
	Florpyrauxifen acid	1.1	1.0	0.92	0.57	0.33

Table 55 Refined risk assessment results for aquatic organisms exposed to via runoff from terrestrial end-use products

Use	Taxon	Organism	Test substance	Exposure	Effect metric (µg/L)	Runoff EEC (µg/L)	RQ	LOC exceeded?
Rangeland, permanent pasture, industrial and other non-crop areas	Freshwater vascular plant (native)	Common hornwort (*Ceratophyllum demersum*)	Florpyrauxifen-benzyl	Acute 14-d	$EC_{50}/2$ = 0.76	0.12	0.16	No
			Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 16.6	0.92	0.06	No
		Duckweed (*Lemna gibba*)	Florpyrauxifen-benzyl	Acute 7-d	$EC_{50}/2$ > 23.05	0.12	< 0.01	No
			GF-3206	Acute 7-d	$EC_{50}/2$ = 260	0.12	< 0.01	No
		Elodea (*Elodea canadensis*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3.4	0.92	0.27	No
		Megalodonta (*Bidens beckii*)	Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 3	0.92	0.31	No
	Freshwater vascular plant (non-native)	Carolina fanwort (*Cabomba caroliniana*)	Florpyrauxifen-benzyl	Acute 21-d	$EC_{50}/2$ = 0.2975	0.033	0.11	No
			Florpyrauxifen acid	Acute 21-d	$EC_{50}/2$ = 56.5	0.57	0.01	No
		Eurasian milfoil (*Myriophyllum spicatum*)	Florpyrauxifen-benzyl	Acute 14-d static	$EC_{50}/2$ = 0.003595	**0.12**	**33**	**Yes**
			GF-3206	Acute 14-d static	$EC_{50}/2$ = 0.0009	**0.12**	**133**	**Yes**
			Florpyrauxifen acid	Acute 14-d	$EC_{50}/2$ = 0.085	**0.92**	**11**	**Yes**
	Marine invertebrates	Mysid shrimp (*Americamysis bahia*)	Florpyrauxifen-benzyl	Chronic 28-d	NOEC/1 = 3.5	0.033	< 0.01	No

Effect metric = toxicity endpoint/uncertainty factor
EEC: estimated environmental concentration; RQ: risk quotient; LOC: level of concern.
The LOC is 1 for freshwater benthic invertebrates, freshwater vascular plants and marine invertebrates.

Table 56 Toxic substances management policy considerations-Comparison to TSMP Track 1 criteria

TSMP track 1 criteria	TSMP track 1 criterion value		Active Ingredient endpoints[1]	Transformation products endpoints[2]
CEPA toxic or CEPA toxic equivalent[3]	Yes		Yes	Yes
Predominantly anthropogenic[4]	Yes		Yes	Yes
Persistence[5]:	Soil	Half-life ≥ 182 days	**Laboratory studies**	
			Yes: Representative half-lives of 8.91 to 348 days	Yes: Representative half-lives of 14 days to stable
			Field dissipation studies	
			No: Representative half-lives ranged from 12.9 to 110 days in the terrestrial field dissipation study.	Not available
	Water	Half-life ≥ 182 days	**Laboratory studies**	
			No: Representative half-lives ranged from 1.58 to 4.4 days in the water phase. Total system representative half-lives ranged from 1.74 to 6.09 days in water-sediment systems.	No: Representative half-lives ranged from 5.1 to 88.2 days in the water phase. Total system representative half-lives ranged from 2.3 to 121 days in water-sediment systems.
			Field dissipation studies	
			No: Representative half-lives ranged from 0.15–6.39 days in the water phase from aquatic field dissipation studies.	No: Representative half-lives ranged from 0.274–19.4 days in the water phase from aquatic field dissipation studies.
	Sediment	Half-life	**Laboratory studies**	

TSMP track 1 criteria	TSMP track 1 criterion value		Active Ingredient endpoints[1]	Transformation products endpoints[2]
		≥ 365 days	No: Representative half-lives ranged from 1.45 to 8.9 days in the sediment phase. Total system representative half-lives ranged from 1.74 to 6.09 days in water-sediment systems.	No: Representative half-lives ranged from 5.7 to 279 days in the sediment phase. Total system representative half-lives ranged from 2.3 to 121 days in water-sediment systems.
			Field dissipation studies	
			No: Representative half-lives ranged from 1.45 to 24.2 days in the soil/sediment phase from aquatic field dissipation studies.	No: Representative half-lives ranged from 1.49 to 65.6 days in the soil/sediment phase from aquatic field dissipation studies.
	Air	Half-life ≥ 2 days or evidence of long-range transport	No: AOPWIN (v1.92) predicted half-life of 1.124 days.	Unknown; however unlikely based on properties of parent.
Bioaccumulation[6]	Log $K_{ow} \geq 5$		Yes: 5.4–5.5	No: <1–3.5
	BCF ≥ 5000		No: 276–356 L/kg (whole fish)	Unknown; however unlikely based on BCF of parent
	BAF ≥ 5000		Not available	Not available
Is the chemical a TSMP Track 1 substance (all four criteria must be met)?			No, does not meet TSMP Track 1 criteria.	No, does not meet TSMP Track 1 criteria.

[1] Active ingredient: florpyrauxifen-benzyl

[2] Major transformation products of florpyrauxifen-benzyl, including florpyrauxifen acid, hydroxy benzyl ester, hydroxy acid, dechlorinated benzyl ester, dechlorinated acid, nitro hydroxy acid, benzyl alcohol and benzoic acid.

[3] All pesticides will be considered CEPA-toxic or CEPA toxic equivalent for the purpose of initially assessing a pesticide against the TSMP criteria. Assessment of the CEPA toxicity criteria may be refined if required (in other words, all other TSMP criteria are met).

[4] The policy considers a substance "predominantly anthropogenic" if, based on expert judgement, its concentration in the environment medium is largely due to human activity, rather than to natural sources or releases.

[5] If the pesticide and/or the transformation product(s) meet one persistence criterion identified for one media (soil, water, sediment or air) than the criterion for persistence is considered to be met.

[6] Field data (for example, BAFs) are preferred over laboratory data (for example, BCFs) which, in turn, are preferred over chemical properties (for example, log K_{ow}).

Table 57 List of supported uses for GF-3206 Herbicide

Items	Supported claims for GF-3206 Herbicide
Application rates and weed claims	• 200 ml/ha: Control of Canada fleabane, velvetleaf, common waterhemp • 400 ml/ha: Control of cleavers, common lambsquarters, annual sow thistle, wild chervil, wild caraway, wild parsnip, tall buttercup • 800 ml/ha: Control of dandelion rosette, wild buckwheat, shepherd's purse, kochia • 1200 ml/ha: control of barnyard grass • 1600 ml/ha: control of redroot pigweed • 2400 ml/ha: suppression of tansy
Crops(s)/Use site(s)	Hazelnut (filbert), rangeland, permanent grass pastures, non-cropland areas (such as roadsides, railroad and utility rights-of way), non-irrigation ditch banks, natural areas and grazed areas in and around these use sites
Application method and timing	Post-emergence to weeds by spray boom via ground or aerial application. Directed to weeds under and around hazelnut trees
Adjuvant	Gateway (0.25–0.5% v/v) or non-ionic surfactant (0.25–0.5% v/v) or MSO (0.5–1% v/v)
Spray volume	Minimum 100 L/ha (ground) or minimum 30 L/ha (air)
Number of applications per season	One
Max rate per year	2.4 L/ha (48 g ae/ha florpyrauxifen-benzyl)
Tank mix partners	Arsenal Herbicide or glyphosate (present as isopropylamine salt, diammonium salt, trimethylsulfonium salt, potassium salt or dimethylamine salt, registered for use on non-cropland areas)

Table 58 List of supported uses for Milestone NXT Herbicide

Items	Supported claims for Milestone NXT Herbicide
Application rates and weed claims	• 100 g/ha: control of Canada fleabane, velvetleaf, common waterhemp; suppression of Canada thistle and spotted knapweed • 117 g/ha: control of common ragweed, yellow star thistle, plumeless thistle, musk or nodding thistle, Canada fleabane, horsenettle, perennial sowthistle, oxeye daisy, tall buttercup, Canada thistle, spotted knapweed, common broomweed, bull thistle, tropical soda apple, hairy buttercup, tropic croton; suppression of western ragweed, curly dock, Canada goldenrod, scentless chamomile, sulphur cinquefoil • 150 g/ha: control of cudweed, curly dock, western ragweed, scentless chamomile, bitter sneezeweed, hairy fleabane, tansy ragwort, clover, poison hemlock; suppression of absinth (wormwood) and Canada goldenrod • 200 g/ha: Control of absinth (wormwood), prickly lettuce, Fuller's teasel, tall ironweed, fireweed, purple loosestrife, orange hawkweed, mullein, rush skeletonweed, Scotch thistle, wild caraway, cleavers, common lamb's quarters, annual sowthistle, wild chervil, wild parsnip; suppression of Canada goldenrod, dandelion, common tansy, common yarrow, diffuse knotweed, Russian knapweed, Japanese knotweed
Crops(s)/Use site(s)	Rangeland, permanent pasture, rights-of way, industrial and other non-crop areas of Canada.
Application method and timing	Post-emergence to weeds by spray boom via ground or aerial application.
Adjuvant	Gateway (0.25–0.5% v/v) or non-ionic surfactant (0.25–0.5% v/v) or MSO (0.5–1% v/v)
Spray volume	Minimum 100 L/ha (ground)
Number of applications per season	One
Max rate per year	200 g/ha (120 g ae aminopyralid + 9.54 g ae/ha florpyrauxifen-benzyl)
Tank mix partners	Arsenal Herbicide or glyphosate (present as isopropylamine salt, diammonium salt, trimethylsulfonium salt, potassium salt or dimethylamine salt, registered for use on non-cropland areas), 2,4-D or Garlon XRT

Table 59 List of supported uses for Restore NXT Herbicide

Items	Supported claims for Restore NXT Herbicide
Application rates and weed claims	• 750 ml/ha: control of Canada fleabane, velvetleaf, common waterhemp; suppression of suppression of Canada thistle and spotted knapweed • 870 ml/ha: control of common ragweed, yellow star thistle, plumeless thistle, musk or nodding thistle, Canada fleabane, horsenettle, perennial sowthistle, oxeye daisy, tall buttercup, Canada thistle, spotted knapweed, common broomweed, bull thistle, tropical soda apple, hairy buttercup, tropic croton; suppression of western ragweed, curly dock, Canada goldenrod, scentless chamomile, sulphur cinquefoil • 1120 ml/ha: control of cudweed, curly dock, western ragweed, scentless chamomile, bitter sneezeweed, hairy fleabane, tansy ragwort, clover, poison hemlock; suppression of absinth (wormwood) and Canada goldenrod • 1500 ml/ha: control of absinth (wormwood), prickly lettuce, Fuller's teasel, tall ironweed, fireweed, purple loosestrife, orange hawkweed, mullein, rush skeletonweed, Scotch thistle, wild caraway, cleavers, common lamb's quarters, annual sowthistle, wild chervil, wild parsnip; suppression of Canada goldenrod, dandelion, common tansy, common yarrow, diffuse knotweed, Russian knapweed, Japanese knotweed
Crops(s)/Use site(s)	Rangeland, permanent pasture, rights-of way, industrial and other non-crop areas of Canada.
Application method and timing	Post-emergence to weeds by spray boom via ground or aerial application.
Adjuvant	Gateway (0.25–0.5% v/v) or non-ionic surfactant (0.25–0.5% v/v) or MSO (0.5–1% v/v)
Spray volume	Minimum 100 L/ha (ground)
Number of applications per season	One
Max rate per year	1500 ml/ha (120 g ae/ha aminopyralid + 9.54 g ae/ha florpyrauxifen-benzyl)
Tank mix partners	2,4-D

Table 60 List of supported uses for GF-3301 Aquatic Herbicide and ProcellaCOR FX Herbicide

Items	Supported label claims
In-water application	
Use sites	In still or slow-moving waters of ponds, lakes, reservoirs, streams, rivers, and canals, including shoreline and riparian areas in or adjacent to these sites
Application rates	2-50 PDU*; use higher rates when treating a smaller percentage of the water, when targeting a more difficult to control species, including hydrilla or water chestnut, and for dense infestations of particular species
Efficacy claims	Control of: Yellow floating heart (*Nymphoides peltata*), hydrilla (*Hydrilla verticillata*), parrotfeather (*Myriophyllum aquaticum*), water chestnut (*Trapa natans*), Eurasian watermilfoil (*Myriophyllum spicatum*), hybrid Eurasian watermilfoil variable watermilfoil (*Myriophyllum heterophyllum*) and water soldier (*Stratiotes aloides*)
Application methods	By boat using a trailing hose, sub-surface injection or surface spray
Number of applications/ year	Three applications of 50 PDU max each (max 150 PDU/yr)
Application interval	42 days
Foliar application	
Use sites	In still or slow-moving waters of ponds, lakes, reservoirs, streams, rivers, and canals, including shoreline and riparian areas in or adjacent to these sites
Application rates	3–6 PDU*; use higher rates for mature, dense growth with high surface cover
Efficacy claims	Control of: Yellow floating heart (*Nymphoides peltata*), water soldier (*Stratiotes aloides*), parrotfeather (*Myriophyllum aquaticum*) and large-flower primrose-willow (*Ludwigia hexapetala*)
Adjuvant	Aquasurf Non-ionic Spray Adjuvant 0.5% v/v
Application methods	By boat or ground using a boom-type sprayer, backpack or handgun equipment in 200–1000 L/ha
Number of applications/ year	Two applications of 6 PDU max each (max 12 PDU/yr)

Items	Supported label claims
Application interval	42 days
Treated water used for irrigation (such as shoreline property use including irrigation landscape plants and golf courses in domestic and commercial setups	• Turf Irrigation: Turf may be irrigated immediately after treatment. • Greenhouse and Nursery Irrigation: A diversity of different plant species may be irrigated in greenhouses or nurseries.
Treated water used for agricultural irrigation	• Oats, barley, wheat, corn , rice 24 hours after application

Appendix II Supplemental maximum residue limit information – International situation and trade implications

Florpyrauxifen-benzyl is an active ingredient that is being registered in Canada for use on filberts (hazelnuts), pasture and rangeland, and aquatic non-food sites. MRLs are proposed for florpyrauxifen-benzyl in Canada. In the United States, an exemption from the requirement of a tolerance is established for residues of florpyrauxifen-benzyl, including its metabolites and degradates, in or on all food and feed commodities, when it is applied as an herbicide in accordance with good agricultural practices.

Currently, there are no Codex MRLs[10] listed for florpyrauxifen-benzyl in or on any commodity on the Codex Alimentarius Pesticide Index website.

[10] The Codex Alimentarius Commission is an international organization under the auspices of the United Nations that develops international food standards, including MRLs.

References

A. List of studies/Information submitted by applicant

1.0 Chemistry

PMRA document number	Reference
3067449	2019, Product Identification, DACO: 2.1,2.2,2.3,2.4 CBI
3067450	2015, Analytical Method and Validation for the Determination of Active Ingredient in XDE-848 BE Technical by Liquid Chromatography, DACO: 2.13.1 CBI
3067451	2015, Analytical Method and Validation for the Determination of Active Ingredient and Impurities in XDE-848 BE Technical by [CBI Removed], DACO: 2.13.1 CBI
3067452	2018, Analysis of Product Samples for Active Ingredient and Impurities in Florpyrauxifen-benzyl Technical Grade Active Ingredient, DACO: 2.13.2 CBI
3067453	2015, Batch Analysis Study for XDE-848 BE Technical, DACO: 2.13.3 CBI
3067454	2015, Group B: Physical and Chemical Properties of XDE-848 BE, DACO: 2.14.1,2.14.10,2.14.11,2.14.12,2.14.13,2.14.3,2.14.4,2.14.5,2.14.6,2.14.7,2.14.8,2.14.9 CBI
3067455	2013, Determination of the Stability of XDE-848 BE Technical to Normal and Elevated Temperatures, Metals and Metal Ions, DACO: 2.14.13 CBI
3067456	2017, Florpyrauxifen-benzyl Technical Grade Active Ingredient Accelerated Storage Stability in LLDPE, DACO: 2.14.14 CBI
3067457	2015, Group A-Product Identity and Composition, Description of Materials Used to Produce the Product, Description of Production Process, Discussion of Formation of Impurities, Preliminary Analysis, Certified Limits, and Enforcement Analytical Method for XDE-848 BE, DACO: 2.11.1,2.11.2,2.11.3,2.11.4,2.12.1, 2.13.1,2.13.2,2.7,2.9 CBI
3081999	2020, Identity of the active substance - synonyms, DACO: 2.4 CBI
3084748	2020, DACO 2.4 REVISED Identity of the active substance - synonyms, DACO: 2.4 CBI
3116075	2020, Cover Letter, Rinskor Technical Sub 2019-6962, DACO: 2.11,2.12 CBI
3116076	2020, Certified Limits Rinskor Active, Quality Control Data, DACO: 2.12.1 CBI
3116077	2018, Group A-Product Identity and Composition, Description of Materials Used to Produce the Product, Description of Production Process, Discussion of Formation of Impurities, Preliminary Analysis, Certified Limits, and Enforcement Analytical Method for Florpyrauxifen-benzyl, DACO:2.11.1, 2.11.2, 2.11.3, 2.11.4, 2.12.1, 2.13, 2.13.1, 2.13.2, 2.7, 2.8, 2.9 CBI
3157395	2020, Response to DACO 2.12, 2.13.1, 2.13.3, and 2.13.4, Rinskor Technical Herbicide 2019-6962, DACO: 2.12,2.13.1,2.13.3,2.13.4 CBI
3157396	2015, Analytical Method and Validation for the Determination of [CBI Removed] in XDE-848 BE Technical [CBI Removed] , DACO: 2.13.1 CBI

3067636	2018, Group A-Product Identity and Composition, Description of Materials Used to Produce the Product, Description of Formulation Process, Discussion of Formation of Impurities, Certified Limits, and Enforcement Analytical Method for GF-3886, an End Use Product Containing Aminopyralid potassium salt and Florpyrauxifen-benzyl, DACO: 3.2.1,3.2.2,3.2.3,3.3.1,3.4.1 CBI
3067637	2014, Analytical Method and Validation for the Determination of XDE-848 BE in GF-3206, DACO: 3.4.1 CBI
3067638	2018, Determination of Color, Physical State, Odor, Oxidizing and Reducing Action, pH, Bulk Density and Tap Density of GF-3886, an End Use Product Containing Aminopyralid potassium and Florpyrauxifen-benzyl., DACO: 3.5.1,3.5.11,3.5.13,3.5.15,3.5.2,3.5.3,3.5.4,3.5.5,3.5.6,3.5.7,3.5.8,3.5.9 CBI
3067639	2018, Group B-Physical/Chemical Properties for GF-3886, A Solid End Use Product Containing Aminopyralid potassium and Florpyrauxifen-benzyl - Self Certification, DACO: 3.5.1, 3.5.11, 3.5.13, 3.5.15, 3.5.2, 3.5.3, 3.5.4, 3.5.5, 3.5.6, 3.5.7, 3.5.8, 3.5.9 CBI
3067640	2019, GF-3886 Two-Week Accelerated Storage Stability and Packaging Corrosion Characteristics in HDPE, DACO: 3.5.10,3.5.14 CBI
3067641	2018, Determination of Explosive Properties of GF-3886, DACO: 3.5.12 CBI
3070900	2015, Group A-Product Identity and Composition, Description of Materials Used to Produce the Product, Description of Formulation Process, Discussion of Formation of Impurities, Certified Limits, and Enforcement Analytical Method for GF-3301, an End Use Product Containing XDE-848 BE, DACO: 3.2.1, 3.2.2, 3.2.3, 3.3.1, 3.4.1, 3.4.2 CBI
3070901	2015, Validation of an Analytical Method for the Determination of XDE-848 BE in GF-3301, DACO: 3.4.1 CBI
3070902	2015, Determination of Color, Odor, Physical State, Oxidizing and Reducing Action, Flammability, Explodability, pH, Viscosity, and Density of GF-3301, an End Use Product Containing XDE-848 BE AMENDED REPORT, DACO: 3.5.1, 3.5.11,3.5.12,3.5.13,3.5.15 CBI
3070903	2015, Group B-Physical/Chemical Properties for GF-3301 - Self Certification, DACO: 3.5.1,3.5.11,3.5.12,3.5.13,3.5.15 CBI
3070904	2015, GF-3301 Two Weeks 54°C Accelerated Storage in F-HDPE, HDPE and One Week at 0°C in Glass, DACO: 3.5.10 CBI
3070939	2018, Group A-Product Identity and Composition, Description of Materials Used to Produce the Product, Description of Formulation Process, Discussion of Formation of Impurities, Certified Limits, and Enforcement Analytical Method for GF-3850, an End Use Product Containing Aminopyralid and Florpyrauxifen-benzyl, DACO: 3.2.1,3.2.2,3.2.3,3.3.1,3.4.2 CBI
3070940	2018, Analytical Method and Validation for the Determination of Aminopyralid and Florpyrauxifen-benzyl in GF-3850 Formulation, DACO: 3.4.1 CBI
3070941	2018, Determination of Color, Physical State, Odor, Oxidizing and Reducing Action, pH, Viscosity, and Density of GF-3850, an End Use Product Containing Aminopyralid potassium and Florpyrauxifen-benzyl, DACO: 3.5.1, 3.5.11, 3.5.13, 3.5.15, 3.5.2, 3.5.3, 3.5.5, 3.5.6, 3.5.7, 3.5.8, 3.5.9 CBI

3070942	2018, Group B - Self Certification, GF-3850, DACO: 3.5.1, 3.5.11, 3.5.13, 3.5.15, 3.5.2, 3.5.3, 3.5.5, 3.5.6, 3.5.7, 3.5.8, 3.5.9 CBI
3070943	2019, GF-3850 Two-Week Accelerated Storage Stability and Packaging Corrosion Characteristics in HDPE, DACO: 3.5.10,3.5.14 CBI
3070944	2018, Determination of Explosive Properties of GF-3850, DACO: 3.5.12 CBI
3202305	2018, GF-3850: Physical and Chemical Characteristics: Flammability, DACO: 3.5.11 CBI
3067778	2019, Product Identification, GF-3206 Herbicide, initial registration, DACO: 3.1.1,3.1.2,3.1.3,3.1.4 CBI
3067779	2015, Group A-Product Identity and Composition, Description of Materials Used to Produce the Product, Description of Formulation Process, Discussion of Formation of Impurities, Certified Limits, and Enforcement Analytical Method for GF-3206, an End Use Product Containing XDE-848 BE, DACO: 3.1, 3.2.1, 3.2.2, 3.2.3, 3.3.1, 3.4.1 CBI
3067780	2014, Analytical Method and Validation for the Determination of XDE-848 BE in GF-3206, DACO: 3.4.1 CBI
3067781	2015, Determination of Color, Odor, Physical State, Oxidizing and Reducing Action, Flammability, pH, Viscosity, and Density of GF-3206, an End Use Product Containing XDE-848 BE AMENDED REPORT, DACO: 3.5.1, 3.5.11, 3.5.12, 3.5.13, 3.5.15 CBI
3067782	2015, Group B-Physical/Chemical Properties for GF-3206, A Liquid End Use Product Containing XDE-848 BE, DACO: 3.5.1,3.5.11,3.5.12,3.5.13,3.5.15 CBI
3067783	2015, GF-3206: One-Year Warehouse Ambient Storage Stability of GF-3206 in PET and FHDPE, DACO: 3.5.10,3.5.14 CBI
3070790	2015, Method Validation Study for the Determination of Residues of XDE-848 Benzyl Ester and Three Metabolites (X11438848, X12300837 and X11966341) in Soil and Sediment by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 8.2.2.1,8.2.2.2
3070800	2015, Independent Laboratory Validation of a Dow AgroSciences Method for the Determination of XDE-848 Benzyl Ester and Three Metabolites (X11438848, X12300837 and X11966341) in Soil, DACO: 8.2.2.1
3070801	2015, Independent Laboratory Validation of a Dow AgroSciences Method for the Determination of XDE-848 Benzyl Ester and Five Metabolites (X11438848, X12300837, X11966341, X12131932 and X12393505) in Water, DACO: 8.2.2.3
3070795	2015, Method Validation Study for the Determination of Residues of XDE-848 and Five Metabolites (X11438848, X12300837, X11966341, X12131932 and X12393505) in Ground, Surface, and Drinking Water by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 8.2.2.3
3070792	2015, Method Validation Study for the Determination of Residues of XDE-848 Benzyl Ester and Metabolites in Crayfish, Catfish, and Clams by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 8.2.2.4

2.0 Human and animal health

PMRA document number	Reference
3067462	2019, Acute Oral Toxicity Study of XR-848 Benzyl Ester TGAI in Rats, DACO: 4.2.1
3067463	2012, Acute Dermal Toxicity Study of XR-848 Benzyl Ester TGAI in Rats, DACO: 4.2.2
3067464	2013, XDE-848 Benzyl ester: acute dust aerosol inhalation toxicity study in F344/DuCrl RATS, DACO: 4.2.3
3067465	2012, Acute Dermal Toxicity Study of XR-848 Benzyl Ester TGAI in Rats, DACO: 4.2.4
3067468	2012, Acute Dermal Irritation Study of XR-848 Benzyl Ester TGAI in Rabbits, DACO: 4.2.5
3067469	2011, Skin Sensitization Study of XR-848 Benzyl by Local Lymph Node Assay in Mice, DACO: 4.2.6
3067470	2012, XR-848 Benzyl ester: local lymph node assay in cba/j mice, DACO: 4.2.6
3067471	2015, XDE-848 Benzyl ester: 90-day dietary toxicity study in Cr1:CD1(ICR) mice, DACO: 4.3.1
3067472	2013, XDE-848 Benzyl ester: 90-day dietary toxicity study in F344DuCrl rats, DACO: 4.3.1
3067473	2013, XR-848 Benzyl ester: a 28-day preliminary dietary toxicity study in beagle dogs, DACO: 4.3.2
3067474	2012, XR-848 Benzyl ester: 28 day dietary toxicity study in Crl:CD1(ICR) mice, DACO: 4.3.3
3067475	2015, XDE-848 Benzyl ester: 28-day dermal toxicity study in F344/DuCrl RATS, DACO: 4.3.3
3067476	2012, XDE-848 Benzyl ester: 28-day dermal toxicity study in F344/DuCrl RATS, DACO: 4.3.3
3067477	2014, XDE-848 Benzyl ester: a 90-day dietary toxicity study in beagle dogs, DACO: 4.3.4
3067478	2019, ReCAPP Cancer Waiver Placeholder, DACO: 4.4.1,4.4.3
3067479	2015, XDE-848 Benzyl ester: 18-month dietary oncogenicity study in Crl:CD1(ICR) MICE, DACO: 4.4.3

3067482	2016, XDE-848 Benzyl Ester: Two-Year Dietary Chronic Toxicity/Oncogenicity Study in F344/DuCrl Rats, DACO: 4.4.4
3067485	2015, XDE-848 Benzyl Ester Acute Neurotoxicity Study Waiver, DACO: 4.5
3067486	2016, XDE-848 Benzyl Ester: Dietary Two-Generation Reproduction Toxicity Study In Crl:CD(SD) Rats, DACO: 4.5.1
3067487	2015, XDE-848 Benzyl Ester: Dietary Developmental Toxicity Study In Crl:CD(SD) Rats, DACO: 4.5.2
3067488	2014, XDE-848 Benzyl ester: dietary developmental toxicity study in newzealand white rabbits, DACO: 4.5.3
3067489	2013, XDE-848 Benzyl ester: dietary palatability study in nonpregnant new zealand white rabbits, DACO: 4.5.3
3067490	2015, Bacterial reverse mutation test of xde-848 benzyl ester using Salmonella typhimurium, DACO: 4.5.4
3067491	2012, Bacterial reverse mutation test of xr-848 benzyl ester technical using Salmonella typhimurium, DACO: 4.5.4
3067492	2015, Evaluation of XDE-848 Benzyl Ester in the Chinese Hamster Ovary Cell/Hypoxanthine- Guanine-Phosphoribosyl Transferase (CHO/HGPRT) Forward Mutation Assay, DACO: 4.5.5
3067493	2012, Evaluation of XR-848 benzyl ester in the chinese hamster ovary cell hypoxanthine-guanine-phosphoribosyl transferase (cho/hgprt) forward mutation assay, DACO: 4.5.5
3067494	2015, Evaluation of XDE-848 Benzyl Ester in an In Vitro Chromosomal Aberration Assay Utilizing Rat Lymphocytes, DACO: 4.5.6
3067495	2012, Evaluation of XR-848 Benzyl ester in an in vitro chromosomal aberration assay utilizing rat lymphocytes, DACO: 4.5.6
3067496	2016, XDE-848 BE TGAI: Cytotoxicity assay in vitro with BALB/c 3T3 cells: neutral red (NR) test during simultaneous irradiation with artificial sunlight, DACO: 4.5.8
3067497	2012, XR-848 Benzyl: evaluating the potential for ahr activation by XR-848 benzyl in a mouse hepatoma luciferase reporter cell line, DACO: 4.8
3067498	2015, XDE-848 Benzyl Ester: In Vitro Comparative Metabolism Study, DACO: 4.5.9
3067499	2014, XDE-848 Benzyl ester: pharmacokinetics and metabolism in F344/NTac rats, DACO: 4.5.9
3067501	2014, XDE-848 Benzyl Ester: Tissue Distribution in F344/NTac Rats, DACO: 4.5.9

3067502	2015, Reduced Risk Rationale for Rinskor Active (XDE-848 Benzyl Ester or SX-1552) for Aquatic Weed Control in Ponds, Lakes, Reservoirs, Marshes, Wetlands, Bayous, Drainage Ditches, Canals, and Other Aquatic Use Sites, DACO: 4.8,5.14,9.9
3082000	2019, Basic Short Summary Florpyrauxifen-benzyl Toxicology, DACO: 4.1
3085794	2019, Basic Short Summary Florpyrauxifen-benzyl Toxicology, DACO: 4.1
3091272	2011, XR-848 Benzyl Palatability Probe Study in Rats & Mice, DACO: 4.3.3
3091273	2016, XDE-848 Benzyl Ester Dietary Reproduction-Developmental Screening Test in Rats (Revision), DACO: 4.5.1
3091274	2012, XR-848 Benzyl ester dietary developmental toxicity probe study in rats, DACO: 4.5.2
3091275	2014, XDE-848 Benzyl Ester Dietary Developmental Toxicity Probe Study in NZ WhRabbits, DACO: 4.5.3
3091276	2012, XR-848 Benzyl Ester Probe Study to Determine Absorption, Metabolism & Excretion in Rats, Mice & NZ WhRabbits, DACO: 4.5.9
3266537	2021, Compiled Corteva Response Human Tox Deficiency July 2021, DACO: 4.1
3266538	2021, Position paper - Significance of Mammary Gland Tumors in Male Rats in a 2-Year Study with XDE-848 Benzyl Ester, DACO: 4.1
3266539	2021, Position Paper Support for a KMD Approach, DACO: 4.1
3266540	2016, XDE-848 Benzyl Ester Dietary Reproduction-Developmental Screening Test in Rats (Revision), DACO: 4.5.1
3266541	2021, Position paper to address PMRA questions related to dietary administration on study under DACO 4.5.2 & 4.5.3, DACO: 4.5.2,4.5.3
3266542	2014, A Probe Study of the Disposition of 14C-XR-848 Benzyl Ester in Bile Duct Cannulated Rats, DACO: 4.5.9
3266675	2021, Compiled Corteva Response Human Tox Deficiency July 2021, DACO: 4.1
3266676	2021, Position paper - Significance of Mammary Gland Tumors in Male Rats in a 2-Year Study with XDE-848 Benzyl Ester, DACO: 4.1
3266677	2021, Position Paper Support for a KMD Approach, DACO: 4.1
3266678	2016, XDE-848 Benzyl Ester Dietary Reproduction-Developmental Screening Test in Rats (Revision), DACO: 4.5.1
3266679	2021, Position paper to address PMRA questions related to dietary administration on study under DACO 4.5.2 & 4.5.3, DACO: 4.5.2,4.5.3

3266680	2014, A Probe Study of the Disposition of 14C-XR-848 Benzyl Ester in Bile Duct Cannulated Rats, DACO: 4.5.9
3067642	2014, Acute Oral Toxicity Study of GF-3206 in Rats, DACO: 4.6.1
3067643	2014, Acute Dermal Toxicity Study of GF-3206 in Rats, DACO: 4.6.2
3067644	2014, Acute Inhalation Toxicity Study of GF-3206 in Rats, DACO: 4.6.3
3067645	2016, Acute Eye Irritation Study of GF-3206 in Rabbits, DACO: 4.6.4
3067646	2014, Acute Dermal Irritation Study of GF-3206 in Rabbits (Revision), DACO: 4.6.5
3067647	2014, Skin Sensitization Study of GF-3206 in Guinea Pigs (Buehler Test), DACO: 4.6.6
3266685	2021, 4.6.6 Corteva Response Human Tox Def July 2021 - Milestone NXT, DACO: 4.6.6
3070905	2015, Acute Oral Toxicity Study of GF-3301 in Rats, DACO: 4.6.1
3070906	2015, Acute Dermal Toxicity Study of GF-3301 in Rats, DACO: 4.6.2
3070907	2015, Acute Inhalation Toxicity Study of GF-3301 in Rats, DACO: 4.6.3
3070908	2015, Acute Eye Irritation Toxicity Study of GF-3301 in Rabbits, DACO: 4.6.4
3070909	2015, Acute Dermal Irritation Study of GF-3301 in Rabbits, DACO: 4.6.5
3070910	2015, Skin Sensitization Study of GF-3301 in Guinea Pigs (Buehler Test), DACO: 4.6.6
3070945	2018, Acute oral toxicity study of GF-3850 in rats, DACO: 4.6.1
3070946	2018, Acute dermal toxicity study of GF-3850 in rats, DACO: 4.6.2
3070947	2018, Acute inhalation toxicity study of GF-3850 in rats, DACO: 4.6.3
3070948	2018, Acute eye irritation study of GF-3850 in rabbits, DACO: 4.6.4
3070949	2018, Acute dermal irritation study of GF-3850 in rabbits, DACO: 4.6.5
3070950	2018, Akin sensitisation study of GF-3850 by local lymph node assay in mice, DACO: 4.6.6
3067784	2014, Acute Oral Toxicity Study of GF-3206 in Rats, DACO: 4.6.1
3067785	2014, Acute Dermal Toxicity Study of GF-3206 in Rats, DACO: 4.6.2
3067786	2014, Acute Inhalation Toxicity Study of GF-3206 in Rats, DACO: 4.6.3
3067787	2016, Acute Eye Irritation Study of GF-3206 in Rabbits, DACO: 4.6.4
3067788	2014, Acute Dermal Irritation Study of GF-3206 in Rabbits (Revision), DACO: 4.6.5

3067789	2014, Skin Sensitization Study of GF-3206 in Guinea Pigs (Buehler Test), DACO: 4.6.6
3168301	2020, Rationale & Deficiency Response, GF-3301 19-6965 & ProcellaCOR 19-6969, DACO: 5.2
3168834	2011, Crop Water Use and Requirements. Agdex 100561-1, DACO: 7.4.1,8.6.2
3067614	2015, A Nature of the Residue Study with [14C]-XDE-848 Benzyl Ester in the Laying Hen, DACO: 6.2
3157485	2015, A Nature of the Residue Study in Ruminant with 14C-XDE-848 Benzyl Ester, DACO: 6.2
3067562	2013, 14C-XDE-848 Benzyl Ester: Bioconcentration and Metabolism Study with Bluegill, *Lepomis macrochirus*, DACO: 6.4
3168733, 3067615	2015, A Nature of the Residue Study with [14C]-XR-848-Benzyl Ester Applied to Rice, DACO: 6.3
3168738, 3067616	2015, The Metabolism of [14C]-XDE-848 Benzyl Ester in Oilseed Rape, DACO: 6.3
3168739, 3067617	2015, The Metabolism of [14C]-XDE-848 Benzyl Ester in the Apple, DACO: 6.3
3168740, 3067618	2016, The Metabolism of [14C]-XDE-848 Benzyl Ester in Wheat, DACO: 6.3
3070789	2015, Method Validation of the Determination of Residues of XDE-848 Benzyl Ester and Its Metabolites in Rice Processed Fractions Using Liquid Chromatography with Tandem Mass Spectrometry, DACO: 7.2., 7.2.1
3070791	2015, Method Validation of the Determination of Residues of XDE-848 Benzyl Ester and Its Metabolites in Rice Grain and Straw Using Liquid Chromatography with Tandem Mass Spectrometry, DACO: 7.2, 7.2.1
3070799	2015, Independent Laboratory Validation of a Dow AgroSciences Method for the Determination of XDE-848 Benzyl Ester and Three Metabolites (X11438848, X12300837 and X11966341) in Agricultural Commodities, DACO: 7.2, 7.2.3A
3070793	2015, Validation of an Analytical Method for the Determination of XDE-848 Benzyl Ester, its Acid Metabolite (X11438848) and its Hydroxy Acid Metabolite (X11966341) in Animal Matrices, DACO: 7.2, 7.2.1
3070796	2015, Independent Laboratory Validation (ILV) of the Determination of XDE-848 Benzyl Ester and two Metabolites X11438848 and X11966341 in Animal Matrices, DACO: 7.2, 7.2.3A

3070794	2015, Validation of a Multi-Residue Method following the QuEChERS Sample Preparation Technique for the Determination of XDE-848 BE and XDE-848 in Matrices of Plant and Animal Origin, DACO: 7.2, 7.2.2
3070797	2015, Independent Laboratory Validation of a Multi-residue Method Following the QuEChERS Sample Preparation Technique for the Determination of XDE-848 Benzyl Ester and its Metabolite X11438848 in Matrices of Plant and Animal Origin, DACO: 7.2, 7.2.3A
3070792	2015, Method Validation Study for the Determination of Residues of XDE-848 Benzyl Ester and Metabolites in Crayfish, Catfish, and Clams by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 7.2, 7.2.1
3070798	2015, Radiovalidation of the Extraction Method for XDE-848 BE, XDE-848 Acid, and XDE-848 Taurine Conjugate in Fish, DACO: 7.2.3B
3168742	2016, Frozen Storage Stability of XDE-848 BE and Major Metabolites in Rice Grain, Straw and Processed Fractions-12 Month Final Report, DACO: 7.3
3168743	2015, XDE-848 - Frozen Storage Stability for the Determination of XDE-848 Benzyl Ester and two Metabolites (X11438848, Acid Metabolite and X11966341, Hydroxyl Acid Metabolite) in Animal Matrices, DACO: 7.3
3168744	2016, Storage Stability of XDE-848 Benzyl Ester and its Metabolites XI 1438848 and Xl 1966341 in Plant Matrices 6 Month Interim Report, DACO: 7.3
3168745	2017, XDE-848 - Frozen Storage Stability for the Determination of XDE-848 Benzyl Ester and two Metabolites (X11438848, Acid Metabolite and X11966341, Hydroxyl Acid Metabolite) in Two Animal Matrices, DACO: 7.3
3311077	2021, Frozen Storage Stability of XDE-848 Benzyl Ester and its Metabolites in Crop Matrices, DACO: 7.3
3168746	2014, Residues of XDE-848 in rice Australia 2013, DACO: 7.4, 7.4.1
3168747	2015, Magnitude of XDE-848 BE Residues in Raw and Processed Commodities Following Application of GF-3206 to Rice in China, DACO: 7.4, 7.4.1, 7.4.5
3168748	2015, Determination of Residues of XDE-848 after One and after Two Applications of GF-3206 in rice (outdoor) at 4 sites in Southern Europe, DACO: 7.4, 7.4.1
3168749	2015, Residues of XDE-848 in rice following applications of GF-3206 - Brazil – 2014/2015, DACO: DACO: 7.4, 7.4.1
3168750	2015, Residues of XDE-848 in rice Following Applications of GF-3206 – Argentina – 2014/2016 – INTERIM REPORT, DACO: 7.4, 7.4.1
3168751	2015, Residues of XDE-848 BE in Rice Following Sequential Applications of DAH-1401-1kg GR and DAH-1403SC (GF-2978) – Japan, 2014, DACO: 7.4, 7.4.1

3168754	2015, Magnitude of XDE-848 Residues in Raw Commodities Following Application of GF-3162 or GF-3187 to Rice, DACO: 7.4, 7.4.1
3168755	2015, Magnitude of XDE-848 Residues in Raw and Processed Commodities Following Application of Various Formulations to Rice, DACO: 7.4, 7.4.1, 7.4.2
3200049	2016, Magnitude of Residues of XDE-848 BE + 2,4-D in Grass Forage, Hay and Silage Following Foliar Applications of GF-3649 in the USA – 2016, DACO: 7.4, 7.4.1
3200050	2015, Confined Rotational Study with 14C-XDE-848 Benzyl Ester, PY, PH and BE Labels, DACO: 7.4, 7.4.3
3200051	2017, Field Accumulation in Rotational Crops with XDE-848, DACO: 7.4.4
3168756	2015, XDE-848 Livestock Feeding Study: Magnitude of Residue in Milk, Muscle, Liver, Kidney and Fat of Lactating Dairy Cattle, DACO: 7.5
3200052	2015, GF-3301 – Magnitude of Residues Study in an Outdoor, Static Aquatic System Following OCSPP Guideline 860.1400, DACO: 7.5

3.0 Environment

PMRA document number	Reference
3070790	2015, Method Validation Study for the Determination of Residues of XDE-848 Benzyl Ester and Three Metabolites (X11438848, X12300837 and X11966341) in Soil and Sediment by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 8.2.2.1,8.2.2.2
3070792	2015, Method Validation Study for the Determination of Residues of XDE-848 Benzyl Ester and Metabolites in Crayfish, Catfish, and Clams by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 8.2.2.4
3070793	2015, Validation of an Analytical Method for the Determination of XDE-848 Benzyl Ester, its Acid Metabolite (X11438848) and its Hydroxy Acid Metabolite (X11966341) in Animal Matrices, DACO: 8.2.2.4
3070794	2015, Validation of a Multi-Residue Method following the QuEChERS Sample Preparation Technique for the Determination of XDE-848 BE and XDE-848 in Matrices of Plant and Animal Origin, DACO: 8.2.2.4
3070795	2015, Method Validation Study for the Determination of Residues of XDE-848 and Five Metabolites (X11438848, X12300837, X11966341, X12131932 and X12393505) in Ground, Surface, and Drinking Water by Liquid Chromatography with Tandem Mass Spectrometry, DACO: 8.2.2.3
3070796	2015, Independent Laboratory Validation (ILV) of the Determination of XDE-848 Benzyl Ester and two Metabolites X11438848 and X11966341 in Animal Matrices, DACO: 8.2.2.4

PMRA document number	Reference
3070797	2015, Independent Laboratory Validation of a Multi-residue Method Following the QuEChERS Sample Preparation Technique for the Determination of XDE-848 Benzyl Ester and its Metabolite X11438848 in Matrices of Plant and Animal Origin, DACO: 8.2.2.4
3070798	2015, Radiovalidation of the Extraction Method for XDE-848 BE, XDE-848 Acid, and XDE-848 Taurine Conjugate in Fish, DACO: 8.2.2.4
3070800	2015, Independent Laboratory Validation of a Dow AgroSciences Method for the Determination of XDE-848 Benzyl Ester and Three Metabolites (X11438848, X12300837 and X11966341) in Soil, DACO: 8.2.2.1
3070801	2015, Independent Laboratory Validation of a Dow AgroSciences Method for the Determination of XDE-848 Benzyl Ester and Five Metabolites (X11438848, X12300837, X11966341, X12131932 and X12393505) in Water, DACO: 8.2.2.3
3070805	2017, Hydrolysis of XR-848 Benzyl Ester and X11438848 at pH 4, 7 and 9 AMENDED REPORT, DACO: 8.2.3.2
3070806	2014, [14C] XDE-848 Benzyl Ester - Aerobic Mineralisation in Surface Water - Simulation Biodegradation Test, DACO: 8.2.3.3.1
3070807	2016, [14C] XDE-848 Benzyl Ester - Photodegradation on Soil Surface, AMENDED REPORT, DACO: 8.2.3.3.1
3070808	2015, Use of Different Solvents for Extracting XDE-848 Benzyl Ester Residues from Treated Soils, DACO: 8.2.3.3.1
3070809	2014, Aqueous Photolysis of XR-848 Benzyl Ester in pH4 Buffer and Natural Water under Xenon Light, DACO: 8.2.3.3.2
3070810	2014, Estimation of the Photochemical Oxidation Rate of XDE-848 Benzyl Ester, DACO: 8.2.3.3.3
3070811	2017, Degradation of XR-848 Benzyl Ester in Four Soils under Aerobic Conditions, DACO: 8.2.3.4.2
3070812	2017, Soil Degradation of XDE-848 Benzyl Ester under Anaerobic Conditions AMENDED REPORT, DACO: 8.2.3.4.4
3070813	2015, Aerobic Aquatic Degradation of XR-848 Benzyl Ester in 2 Sediment and Pond Water Systems, DACO: 8.2.3.5.2
3070814	2015, [14C]XDE-848 Benzyl Ester - Degradation/Metabolism in two Aquatic Systems under Anaerobic Conditions, DACO: 8.2.4.2
3070815	2017, Batch Equilibrium Adsorption/Desorption of XDE-848 Benzyl Ester, DACO: 8.2.4.2
3070816	2017, [14C]-XDE-848 Benzyl Ester: Volatility from Glass, Water and Soil, DACO: 8.2.4.5
3070817	2015, Aquatic Field Dissipation of the Herbicide XDE-848 BE Under Field Conditions at Two Rice Production Locations (Texas and California), DACO: 8.3.2.2

PMRA document number	Reference
3070818	2017, Terrestrial Field Dissipation of the Herbicide XDE-848 BE Under Field Conditions at Four Locations (California, New York, Iowa, and Texas), DACO: 8.3.2.2
3070819	2019, Rinskor Terrestrial Field Dissipation Rationale, DACO: 8.3.2.2
3070820	2015, Aerobic Aquatic Degradation of XDE-848 Benzyl Ester in Two Flooded Paddy Soil Systems, DACO: 8.2.3.5.4
3070821	2015, Aquatic Dissipation of XDE-848 Benzyl Ester (SX-1552) in a Pond System Treated at 150 ppb Concentration, DACO: 8.3.3.2
3070822	2015, Aquatic Dissipation of XDE-848 Benzyl Ester (SX-1552) in a Pond Systems (REVISED), DACO: 8.3.3.2
3070823	2019, Rationale for suitability of existing US aquatic field dissipation data for ProcellaCOR® (a.i. florpyrauxifen-benzyl) to support technical review for potential Canadian aquatic use registration, DACO: 8.3.3
3070824	2019, Field evaluation of selective control of variable-leaf watermilfoil in New Hampshire using florpyrauxifen-benzyl, DACO: 8.3.3,9.8.7
3070825	2019, Preliminary report on the 2018 Cooperative Demonstration of Selective Control of Eurasian watermilfoil with ProcellaCOR® Aquatic Herbicide: Morton Slough - Pend Oreille, Idaho, DACO: 8.3.3,9.8.7
3132934	2014, X11438848: Determination of UV/Visible Absorption and Molar Absorptivity, DACO: 8.2.1
3132935	2014, Determination of Vapour Pressure for X11438848, DACO: 8.2.1
3132936	2014, Determination of Water Solubility of XDE-848 Acid (X11438848), DACO: 8.2.1
3132937	2014, Determination of Organic Solvent Solubility of XDE-848 Acid (X11438848), DACO: 8.2.1
3132938	2014, Determination of Octanol/Water Partition Coefficient for XDE-848 Acid (X11438848) by Shake Flask Method, DACO: 8.2.1
3132939	2014, X11966341: Determination of UV/Vis Absorption and Molar Absorptivity, DACO: 8.2.1
3132940	2014, Determination of Octanol/Water Partition Coefficient of X12300837 by HPLC Method, DACO: 8.2.1
3132941	2014, X12300837: Determination of UV/Vis Absorption and Molar Absorptivity, DACO: 8.2.1
3132942	2014, Determination of Vapour Pressure for X12300837, DACO: 8.2.1
3132943	2014, Determination of Octanol/Water Partition Coefficient of X11966341 by HPLC Method, DACO: 8.2.1
3132944	2014, Determination of Vapour Pressure for X11966341, DACO: 8.2.1
3132945	2015, Determination of Vapour Pressure for X12393505, DACO: 8.2.1
3132946	2015, Determination of Water Solubility of X12393505, DACO: 8.2.1
3132947	2015, Determination of Organic Solvent Solubility of X12393505, DACO: 8.2.1

PMRA document number	Reference
3132948	2015, Determination of Octanol/Water Partition Coefficient of X12393505 by HPLC Method, DACO: 8.2.1
3132949	2015, Determination of Vapour Pressure for X12131932, DACO: 8.2.1
3132950	2015, Determination of Water Solubility of X12131932, DACO: 8.2.1
3132951	2015, Determination of Organic Solvent Solubility of X12131932, DACO: 8.2.1
3132952	2015, Determination of Octanol Water Partition Coefficient of X12131932 by HPLC Method, DACO: 8.2.1
3132953	2014, X12393505: Determination of Spectral Characteristics (UV/Vis Absorption and Molar Absorptivity, MS, IR, and NMR), DACO: 8.2.1
3132954	2014, X12131932: Determination of Spectral Characteristics (UV/Vis Absorption and Molar Absorptivity, MS, IR, and NMR), DACO: 8.2.1
3132959	2016, Degradation of XDE-848 Benzyl Ester Metabolite, X12483137, in Four Soils under Aerobic Conditions, DACO: 8.2.3.4.2
3132960	2017, Batch Equilibrium Adsorption/Desorption of XDE-848 Benzyl Ester, DACO: 8.2.4.2
3132961	2017, Batch Equilibrium Adsorption of XDE-848 Benzyl Ester Metabolite, X12483137, DACO: 8.2.4.2
3287315	2021, Analytical Monitoring for BC Parrotfeather Research Application treatment with ProcellaCOR FX, DACO: 8.6.1
3288894	2021, Cazenovia NY ProcellaCOR dissipation example, DACO: 8.6.1
3288895	2021, Dissipation of Research Authorization Treatments of ProcellaCOR FX, DACO: 8.6.1
3288896	2021, Representative operational ProcellaCOR dissipation data for PMRA, DACO: 8.6.1
3070857	Heilman, M., 2018, Demonstration of selective hydrilla control through partial-site application of ProcellaCOR Aquatic Herbicide in a central Florida lake, Aquatics 41(2):23-28, DACO: 10.2.3,8.3.3,9.8.7
3070858	Heilman, M. et al., 2018, 2018 Selective, Spot Management of Hybrid Eurasian Watermilfoil with ProcellaCOR Aquatic Herbicide: Silver Lake - Kenosha County, Wisconsin, Technical Report to the Wisconsin Department of Natural Resources, DACO: 10.2.3,8.3.3,9.8.7
3070881	2017, Simulated irrigation study, DACO: 10.3.2,8.6.2,9.8.7
3070883	2019, University of Florida Irrigation Studies of ProcellaCOR Aquatic Herbicide, DACO: 10.3.2,8.6.2,9.8.7
3070885	2016, HFL17SX1552: Ornamental plant irrigation simulation study protocol for SePRO, 2017, DACO: 10.3.2,8.6.2,9.8.7
3070886	2019, Selective Control of Invasive Aquatic Plants with ProcellaCOR Aquatic Herbicide and Response of Native Aquatic Plants common in Canada., DACO: 10.3.2,8.6.2,9.8.7

PMRA document number	Reference
3067520	2013, X11959130 (XDE-848 Benzyl Ester): Acute Toxicity (14 Days) to the Earthworm *Eisenia fetida* in Artificial Soil with 10% Peat, DACO: 9.2.3.1
3067521	2013, XDE-848 Benzyl Ester: Effects on Reproduction and Growth of Earthworms *Eisenia fetida* in Artificial Soil with 10% Peat, DACO: 9.2.3
3067522	2013, XDE-848 Benzyl Ester: Acute Contact and Oral Effects on Honey Bees (*Apis mellifera* L.) in the Laboratory, DACO: 9.2.4.1,9.2.4.2
3067523	2016, GF-3301: Effects on the Predatory Mite *Typhlodromus pyri* in the Laboratory (Tier I) - Dose Response Test -, DACO: 9.2.5
3067524	2016, GF-3206: Effects on the Predatory Mite *Typhlodromus pyri* in the Laboratory (Tier I) - Dose Response Test -, DACO: 9.2.5
3067525	2016, GF-3301: Effects on the Parasitoid *Aphidius rhopalosiphi* in the Laboratory (Tier I) - Dose Response Test -, DACO: 9.2.6
3067526	2015, GF-3206: Effects on the Parasitoid *Aphidius rhopalosiphi* in the Laboratory (Tier I) - Dose Response Test -, DACO: 9.2.6
3067527	2013, XDE-848 Benzyl Ester: Acute Toxicity to the Cladoceran, *Daphnia magna*, Determined Under Static-Renewal Test Conditions, DACO: 9.3.2
3067528	2015, GF-3301: Acute Toxicity to the Cladoceran, *Daphnia magna*, Determined Under Static- Renewal Test Conditions, DACO: 9.3.2
3067529	2013, X11438848 (XDE-848 acid): Chronic Toxicity Test with the Cladoceran, *Daphnia magna*, Exposed Under Static-Renewal Conditions, DACO: 9.3.3
3067530	2014, XDE-848 Benzyl Ester: Chronic Toxicity Test with the Cladoceran, *Daphnia magna*, Exposed Under Static-Renewal Conditions, DACO: 9.3.3
3067531	2013, XDE-848 Benzyl Ester: Acute Toxicity to the Freshwater Midge, *Chironomus riparius*, Determined Under Static-Renewal Test Conditions, DACO: 9.3.4
3067532	2015, XDE-848 Benzyl Ester: Chronic Toxicity in Whole Sediment to Freshwater Midge, *Chironomus riparius*, Using Spiked Water, DACO: 9.3.4
3067545	2013, XDE-848 Benzyl Ester: Growth Inhibition Test with the Freshwater Aquatic Plant, Duckweed, *Lemna gibba*, DACO: 9.3.4
3067546	2017, XDE-848 Benzyl Ester: Whole Sediment Acute Toxicity Test with Midge Larvae (Chironomus dilutus), DACO: 9.3.4
3067547	2014, XDE-848 Benzyl Ester TGAI: Life-Cycle Toxicity Test with Mysids (*Americamysis bahia*) Following U.S. EPA OCSPP Draft Guideline 850.1350, DACO: 9.4.2
3067548	2015, GF-3301: Acute Toxicity with the Mysid Shrimp, *Americamysis bahia*, Determined Under Flow- Through Test Conditions, DACO: 9.4.2
3067549	2015, GF-3301: Growth Inhibition Test with the Unicellular Green Alga, *Pseudokirchneriella subcapitata*, DACO: 9.4.4

PMRA document number	Reference
3067550	2013, X11438848 (XDE-848 acid): Acute Toxicity to the Rainbow Trout, *Oncorhynchus mykiss*, Determined Under Static-Renewal Test Conditions, DACO: 9.5.2.1
3067551	2013, XDE-848 Benzyl Ester: Acute Toxicity Test with the Rainbow Trout, *Oncorhynchus mykiss*, Determined Under Flow-Through Test Conditions, DACO: 9.5.2.1
3067555	2014, X11966341 (a metabolite of XDE-848 BE): Acute Toxicity to the Common Carp, *Cyprinus carpio*, Determined Under Static-Renewal Test Conditions, DACO: 9.5.2.3
3067556	2014, X12131932 (a metabolite of XDE-848 BE): Acute Toxicity to the Common Carp, *Cyprinus carpio*, Determined Under Static-Renewal Test Conditions, DACO: 9.5.2.3
3067557	2015, X12483137 (a metabolite of XDE-848 BE): Acute Toxicity to the Common Carp, *Cyprinus carpio*, Determined Under Static-Renewal Test Conditions, DACO: 9.5.2.3
3067558	2013, XDE-848 Benzyl Ester: Acute Toxicity Test with the Fathead Minnow, *Pimephales promelas*, Determined Under Flow-Through Test Conditions, DACO: 9.5.2.3
3067559	2013, XDE-848 Benzyl Ester: Acute Toxicity to the Common Carp, *Cyprinus carpio*, Determined Under Flow-Through Test Conditions, DACO: 9.5.2.3
3067560	2015, Toxicity to the Carp *Cyprinus carpio* under Laboratory Conditions (Acute Toxicity Test - Semi-Static), DACO: 9.5.2.3
3067561	2013, XDE-848 Benzyl Ester: Acute Toxicity to the Sheepshead Minnow, *Cyprinodon variegatus*, Determined Under Flow-Through Conditions, DACO: 9.5.2.4
3067563	2013, X11959130 (XDE-848 benzyl ester): An acute oral toxicity study with the northern bobwhite, DACO: 9.6.2.1
3067564	2015, XDE-848 Benzyl Ester: An Acute Oral Toxicity Study with the Mallard Using a Sequential Testing Procedure, DACO: 9.6.2.2
3067565	2013, X11959130 (XDE-848 benzyl ester): An acute oral toxicity study with the zebra finch, DACO: 9.6.2.3
3067566	2013, X11959130 (XDE-848 benzyl ester): A dietary LC50 study with the northern bobwhite, DACO: 9.6.2.4
3067567	2013, X11959130 (XDE-848 benzyl ester): A dietary LC50 study with the mallard, DACO: 9.6.2.5
3067568	2014, X11959130 (XDE-848 benzyl ester): A reproduction study with the northern bobwhite, DACO: 9.6.3.1
3067569	2014, X11959130 (XDE-848 benzyl ester): A reproduction study with the mallard, DACO: 9.6.3.2

PMRA document number	Reference
3067570	2013, X11438848 (XDE-848 acid): Growth Inhibition Test with the Unicellular Green Alga, *Pseudokirchneriella subcapitata*, DACO: 9.8.2
3067571	2014, X11966341 (a metabolite of XDE-848 BE): Growth Inhibition Test with the Freshwater Diatom, *Navicula pelliculosa*, DACO: 9.8.2
3067572	2015, X12131932 (a metabolite of XDE-848 BE): Growth Inhibition Test with the Freshwater Diatom, *Navicula pelliculosa*, DACO: 9.8.2
3067573	2015, X12393505 (a metabolite of XDE-848 BE): Growth Inhibition Test with the Freshwater Diatom, *Navicula pelliculosa*, DACO: 9.8.2
3067574	2015, X12483137 (a metabolite of XDE-848 BE): Growth Inhibition Test with the Freshwater Diatom, *Navicula pelliculosa*, DACO: 9.8.2
3067575	2013, XDE-848 Benzyl Ester: Growth Inhibition Test with the Unicellular Green Alga, *Pseudokirchneriella subcapitata*, DACO: 9.8.2
3067576	2013, XDE-848 Benzyl Ester: Growth Inhibition Test with the Cyanobacterium, *Anabaena flos-aquae*, DACO: 9.8.2
3067577	2013, XDE-848 Benzyl Ester: Growth Inhibition Test with the Unicellular Freshwater Diatom, *Navicula pelliculosa*, DACO: 9.8.2
3067578	2013, XDE-848 Benzyl Ester: Growth Inhibition Test with the Marine Diatom, *Skeletonema costatum*, DACO: 9.8.3
3132979	2015, GF-3206: Effects on Reproduction and Growth of Earthworms *Eisenia fetida* in Artificial Soil, DACO: 9.2.3
3132980	2013, X11438848 (XDE-848 Acid): Effects on Reproduction and Growth of Earthworms *Eisenia fetida* in Artificial Soil with 10% Peat, DACO: 9.2.3
3132981	2014, X11966341 (a metabolite of XDE-848 BE): Effects on Reproduction and Growth of Earthworms *Eisenia fetida* in Artificial Soil with 10% Peat, DACO: 9.2.3
3132983	2015, X12483137 (a metabolite of XDE-848 BE): Effects on Reproduction and Growth of Earthworms *Eisenia fetida* in Artificial Soil with 10% Peat, DACO: 9.2.3
3132984	2015, GF-3206: Acute contact and oral effects on honeybees (*Apis mellifera* L.) in the laboratory, DACO: 9.2.4.1,9.2.4.2
3132985	2016, X11438848 (XDE-848 Acid) - Honey Bee (*Apis mellifera* L.) Larval Toxicity Test (Single Feeding Exposure), DACO: 9.2.4.3
3132986	2018, GF-3206 - Honey Bee (*Apis mellifera* L.) 22 Day Larval Toxicity Test (Repeated Exposure), DACO: 9.2.4.3
3132987	2020, Rationale for using GF-3206 as a test material instead of TGAI for bee larvae toxicity and bee adult chronic toxicity studies, DACO: 9.2.4.3,9.2.4.4

PMRA document number	Reference
3132988	2017, GF-3206 - Assessment of Effects on the Adult Honey Bee, *Apis mellifera* L., in a 10 Day Chronic Feeding Test under Laboratory Conditions, DACO: 9.2.4.4
3132989	2015, GF-3206: A rate-response extended laboratory bioassay of the effects of fresh residues on the predatory mite *Typhlodromus pyri* (Acari: Phytoseiidae), DACO: 9.2.5
3132990	2015, GF-3206: A rate-response extended laboratory study with the green lacewing *Chrysoperla carnea* (Neuroptera, Chrysopidae), DACO: 9.2.5
3132991	2015, GF-3206: Effects on Reproduction of the Predatory Mite *Hypoaspis aculeifer* in Artificial Soil with 5% Peat, DACO: 9.2.5
3132992	2013, X11438848 (XDE-848 Acid): Effects on Reproduction of the Predatory Mite *Hypoaspis aculeifer* in Artificial Soil with 5% Peat, DACO: 9.2.5
3132993	2014, X11966341 (a metabolite of XDE-848 BE): Effects on Reproduction of the Predatory Mite *Hypoaspis aculeifer* in Artificial Soil with 5% Peat, DACO: 9.2.5
3132994	2015, X12483137 (a metabolite of XDE-848 BE): Effects on Reproduction of the Predatory Mite *Hypoaspis aculeifer* in Artificial Soil with 5% Peat, DACO: 9.2.5
3132995	2013, X11438848 (XDE-848 Acid): Effects on Reproduction of the Collembola *Folsomia candida* in Artificial Soil with 5% Peat, DACO: 9.2.7
3132996	2014, X11966341 (a metabolite of XDE-848 BE): Effects on Reproduction of the Collembola *Folsomia candida* in Artificial Soil with 5% Peat, DACO: 9.2.7
3132997	2015, X12483137 (a metabolite of XDE-848 BE): Effects on Reproduction of the Collembola *Folsomia candida* in Artificial Soil with 5% Peat, DACO: 9.2.7
3132998	2015, GF-3206: Effects on Reproduction of the Collembola *Folsomia candida* in Artificial Soil with 5% Peat, DACO: 9.2.7
3132999	2013, X11438848 (XDE-848 acid): Acute Toxicity to the Cladoceran, *Daphnia magna*, Determined Under Static Test Conditions, DACO: 9.3.2,9.3.5
3133000	2014, Xl1966341 (a metabolite ofXDE-848 BE): Acute Toxicity to the Cladoceran, *Daphnia magna*, Exposed Under Static-Renewal Test Conditions, DACO: 9.3.2,9.3.5
3133001	2014, X12393505 (a metabolite of XDE-848 BE): Acute Toxicity to the Cladoceran, *Daphnia magna*, Exposed Under Static-Renewal Test Conditions, DACO: 9.3.2,9.3.5
3133002	2014, X12131932 (a metabolite of XDE-848 BE): Acute Toxicity to the Cladoceran, *Daphnia magna*, Determined Under Static-Renewal Test Conditions, DACO: 9.3.2,9.3.5
3133003	2015, X12483137 (a metabolite of XDE-848 BE): Acute Toxicity to the Cladoceran, *Daphnia magna*, Determined Under Static-Renewal Test Conditions, DACO: 9.3.2,9.3.5

PMRA document number	Reference
3133004	2015, GF-3206: Acute Toxicity to the Cladoceran, *Daphnia magna*, Determined Under Static-Renewal Test Conditions, DACO: 9.3.2,9.3.5
3133005	2013, XDE-848 Benzyl Ester: Acute Toxicity to the Snail, *Lymnaea stagnali*, Determined Under Flow- Through Test Conditions, DACO: 9.3.4,9.3.5
3133006	2013, XDE-848 Benzyl Ester: Acute Toxicity to the Amphipod, *Gammarus pseudolimnaeus*, Determined Under Flow-Through Test Conditions, DACO: 9.3.4,9.3.5
3133007	2016, X12300837 (a metabolite of XDE-848 BE): Chronic Toxicity in Whole Sediment to Freshwater Midge, *Chironomus riparius*, Using Spiked Sediment, DACO: 9.3.4,9.3.5
3133008	2016, X11966341 (a metabolite of XDE-848 BE): Chronic Toxicity in Whole Sediment to Freshwater Midge, *Chironomus riparius*, Using Spiked Sediment, DACO: 9.3.4,9.3.5
3133009	2013, XDE-848 Benzyl Ester: Acute Toxicity to Mysids (*Americamysis bahia*) OCSPP Draft Guideline 850.1035, DACO: 9.4.2
3133010	2013, XDE-848 Benzyl Ester: Effect on New Shell Growth of the Eastern Oyster (*Crassostrea virginica*), DACO: 9.4.3
3133011	2014, X12393505 (a metabolite of XDE-848 BE): Acute Toxicity to the Common Carp, *Cyprinus carpio*, Determined Under Static-Renewal Test Conditions, DACO: 9.5.2.1,9.5.2.2,9.5.2.3,9.5.4
3133012	2015, GF-3206: Acute Toxicity to the Common Carp, *Cyprinus carpio*, Determined Under Static-Renewal Test Conditions, DACO: 9.5.2.1, 9.5.2.2, 9.5.2.3, 9.5.4
3133013	2016, XDE-848 Benzyl Ester: Early Life-Stage Toxicity Test with the Fathead Minnow, *Pimephales promelas*, Under Flow-Through Conditions, DACO: 9.5.3.1
3133014	2014, X11438848 (XDE-848 acid): Early Life-Stage Toxicity Test with the Fathead Minnow, *Pimephales promelas*, Under Flow-Through Conditions, DACO: 9.5.3.1
3133015	2015, GF-3301: An Acute Oral Toxicity Study with the Northern Bobwhite Using a Sequential Testing Procedure, DACO: 9.6.4
3133016	2015, GF-3206: An Acute Oral Toxicity Study with the Northern Bobwhite Using a Sequential Testing Procedure, DACO: 9.6.4
3133017	2015, GF-3206: Growth Inhibition Test with the Unicellular Green Alga, *Pseudokirchneriella subcapitata*, DACO: 9.8.6
3133018	2015, GF-3206: Growth Inhibition of *Myriophyllum spicatum* in a Water/Sediment System, DACO: 9.8.6
3133019	2015, GF-3301: Growth Inhibition Test with the Unicellular Green Alga, *Pseudokirchneriella subcapitata*, DACO: 9.8.6

PMRA document number	Reference
3133020	2015, GF-3206: Growth Inhibition Test with the Freshwater Aquatic Plant, Duckweed, *Lemna gibba*, DACO: 9.8.6
3133021	2016, GF-3301: Growth Inhibition Test with the Freshwater Aquatic Plant, Duckweed, *Lemna gibba*, DACO: 9.8.6
3133022	2016, Growth Inhibition of *Myriophyllum spicatum* in a Water/Sediment System, DACO: 9.8.6
3133023	2014, XDE-848 Benzyl Ester: Acute Toxicity to the Tadpole, Xenopus laevis, Determined Under Flow-Through Test Conditions, DACO: 9.9
3067633	2019, Safety on Aminopyralid on rooted vascular plants, DACO: 10.3.2,9.3.4
3067634	2014, Effect of Aminopyralid on the growth of *Myriophyllum spicatum* in the presence of sediment with exposure via water phase, DACO: 10.3.2,9.3.4
3070862	2018, Hybrid Watermilfoil Management Report, DACO: 10.2.3,9.8.7
3070863	Netherland, M.D., Richardson, R.J., 2016, Evaluating Sensitivity of Five Aquatic Plants to a Novel Arylpicolinate Herbicide Utilizing an Organization for Economic Cooperation and Development Protocol, Weed Science 2016 64:181-190, DACO: 10.2.3,9.8.6,9.8.7
3070865	Richardson, R.J. et al, 2015, Response of seven aquatic plants to a new arylpicolinate herbicide, J. Aquat. Plant Manage. 54: 26¿31, DACO: 10.2.3,9.8.7
3070869	2018, Laboratory and Mesocosm Evaluation of Growth and Herbicide Response in Eurasian and Four Accessions of Hybrid Watermilfoil, DACO: 10.2.3,9.8.7
3070870	2017, Tahoe EWM Mesocosm Results Summary, DACO: 10.2.3,9.8.7
3070871	Beets, J., Netherland, M.D., 2018, Mesocosm response of crested floating heart, hydrilla, and two native emergent plants to florpyrauxifen-benzyl: A new arylpicolinate herbicide, J. Aquat. Plant Manage. 56: 57-62, DACO: 10.2.3,10.3.2,9.8.7
3070875	Haug, E.J., 2018, Monoecious Hydrilla and Crested Floating Heart Biology, and the Response of Aquatic Plant Species to Florpyrauxifen-benzyl Herbicide, https://repository.lib.ncsu.edu/handle/1840.20/35124, DACO: 10.2.3.3(B),9.8.7
3070876	Beets, J., Heilman, M., Netherland, M.D., 2019, Large-scale mesocosm evaluation of florpyrauxifen-benzyl, a novel arylpicolinate herbicide, on Eurasian and hybrid watermilfoil and seven native submersed plants, J. Aquat. Plant Manage. 57: 49-55, DACO: 10.2.3.3(B),10.3.2,9.8.7
3067790	2019, Value Summary - GF-2978, GF-3206, GF-3301, GF-3850, GF-3886, DACO: 10.1, 10.2.1, 10.2.2, 10.2.3, 10.2.3.1, 10.2.3.3(B), 10.2.3.4(B), 10.3.1, 10.3.2(A), 10.4, 10.5, 9.8.7

4.0 Value

PMRA document number	Reference
3067790	2019, Value Summary - GF-2978, GF-3206, GF-3301, GF-3850, GF-3886, DACO: 10.1, 10.2.1, 10.2.2, 10.2.3, 10.2.3.1, 10.2.3.3(B), 10.2.3.4(B), 10.3.1, 10.3.2(A), 10.4, 10.5
3067792	2019, Individual Field Trials, DACO: 10.2.3.3
3229082	2021, 10.3 Filbert Crop Tolerance to GF-3206, DACO: 10.3
3229085	2021, 10.3.2 Small research trials Tolerance Filbert, DACO: 10.3.2
3232088	2021, 10.2.4 Use history for Aerial applications Rinskor May 13, DACO: 10.2.4
3070849	2019, Value Summary - ProcellaCOR Aquatic Herbicide, Rinskor (Florpyrauxifen-benzyl), DACO: 10.1, 10.2.1, 10.2.2, 10.2.3, 10.3.1, 10.3.2(A), 10.4, 10.5.1, 10.5.2, 10.5.3, 10.5.4
3070851	2014, Biology and Control of Aquatic Plants, A Best Management Practices Handbook, Third edition. Lyn A. Gettys, William T. Haller and David G. Petty, editors. The Aquatic Ecosystem Restoration Foundation, DACO: 10.2
3070852	Netherland, M.D., Schardt, J.D., 2012, A Managers Definition of Aquatic Plant Control, *In* Biology and Control of Aquatic Plants, A Best Management Practices Handbook, Third edition. Lyn A. Gettys, William T. Haller and David G. Petty, editors. The Aquatic Ecosystem Restoration Foundation, DACO: 10.2.2
3070853	Netherland, M.D., Wiley, L., 2016, Mesocosm evaluation of three herbicides on Eurasian watermilfoil (*Myriophyllum spicatum*) and hybrid watermilfoil (*Myriophyllum spicatum* x *Myriophyllum sibiricum*): Developing a predictive assay, J. Aquat. Plant Manage. 55: 39–41, DACO: 10.2.2
3070854	Borrowman, K.R., Sager, E.P.S., Thum, R.A., 2014, Distribution of biotypes and hybrids of *Myriophyllum spicatum* and associated *Euhrychiopsis lecontei* in lakes of Central Ontario, Canada, Lake and Reservoir Management, 30:1, 94-104, DOI: 10.1080/10402381.2013.876469, DACO: 10.2.2
3070855	LaRue, E.A. et al., 2012, Hybrid watermilfoil lineages are more invasive and less sensitive to a commonly used herbicide than their exotic parent (Eurasian watermilfoil), Evolutionary Applications. Published by Blackwell Publishing Ltd 6 (2013) 462–471, DACO: 10.2.2
3070856	2018, Grays Bay Hennipen County, MN summary, DACO: 10.2.3
3070857	Heilman, M., 2018, Demonstration of selective hydrilla control through partial-site application of ProcellaCOR Aquatic Herbicide in a central Florida lake, Aquatics 41(2):23-28, DACO: 10.2.3
3070858	Heilman, M. et al., 2018, 2018 Selective, Spot Management of Hybrid Eurasian Watermilfoil with ProcellaCOR Aquatic Herbicide: Silver Lake - Kenosha County, Wisconsin, Technical Report to the Wisconsin Department of Natural Resources, DACO: 10.2.3

3070859	2019, Field evaluation of selective control of variable-leaf watermilfoil in New Hampshire using florpyrauxifen-benzyl, DACO: 10.2.3
3070860	2019, Preliminary report on the 2018 Cooperative Demonstration of Selective Control of Eurasian watermilfoil with ProcellaCOR Aquatic Herbicide: Morton Slough Pend Oreille, Idaho, DACO: 10.2.3
3070861	Howell, A. et al, 2019, Evaluating ProcellaCOR for aquatic weed control in New Zealand, DACO: 10.2.3
3070862	Hybrid Watermilfoil Management Report, DACO: 10.2.3
3070863	Netherland, M.D., Richardson, R.J., 2016, Evaluating Sensitivity of Five Aquatic Plants to a Novel Arylpicolinate Herbicide Utilizing an Organization for Economic Cooperation and Development Protocol, Weed Science 2016 64:181–190, DACO: 10.2.3
3070864	2016, Yellow Floating Heart NC 2017, DACO: 10.2.3
3070865	Richardson, R.J. et al, 2015, Response of seven aquatic plants to a new arylpicolinate herbicide, J. Aquat. Plant Manage. 54: 26–31, DACO: 10.2.3
3070866	2016, SePRO Field Efficacy Summary Report, ProcellaCOR, parrotfeather IN., DACO: 10.2.3
3070867	2019, 2018 Pickeral Cove, NH 2018 Summary, DACO: 10.2.3
3070868	2019, 2018 Milfoil Treatment at Scobie Pond in Francestown, NH SP127, DACO: 10.2.3
3070869	2018, Laboratory and Mesocosm Evaluation of Growth and Herbicide Response in Eurasian and Four Accessions of Hybrid Watermilfoil, DACO: 10.2.3
3070870	2017, Tahoe EWM Mesocosm Results Summary , DACO: 10.2.3
3070871	Beets, J., Netherland, M.D., 2018, Mesocosm response of crested floating heart, hydrilla, and two native emergent plants to florpyrauxifen-benzyl: A new arylpicolinate herbicide, J. Aquat. Plant Manage. 56: 57–62, DACO: 10.2.3,10.3.2
3070872	2019, APCRP Work Unit: Management of Water Chestnut, DACO: 10.2.3.2(B)
3070873	2018, Initial screening of the response of *Stratiotes aloides* (Water Soldier) to ProcellaCOR SC, DACO: 10.2.3.3(B)
3070874	Enloe, S.F., Lauer, D.K., 2017, Uruguay waterprimrose control with herbicides, J. Aquat. Plant Manage. 55: 71–75, DACO: 10.2.3.3(B)
3070875	Haug, E.J., 2018, Monoecious Hydrilla and Crested Floating Heart Biology, and the Response of Aquatic Plant Species to Florpyrauxifen-benzyl Herbicide (PhD thesis, North Carolina State University), https://repository.lib.ncsu.edu/handle/1840.20/35124 , DACO: 10.2.3.3(B)
3070876	Beets, J., Heilman, M., Netherland, M.D., 2019, Large-scale mesocosm evaluation of florpyrauxifen-benzyl, a novel arylpicolinate herbicide, on Eurasian and hybrid watermilfoil and seven native submersed plants, J. Aquat. Plant Manage. 57: 49–55, DACO: 10.2.3.3(B),10.3.2
3070877	2015, ProcellaCOR Pond Efficacy on Water chestnut (*Trapa* spp.) (GF-3301), DACO: 10.2.3.4(B)

3070878	2018, Wisconsin DNR Yellow Floating Heart (YFH) Eradication Effort ProcellaCOR Pond Efficacy on Water chestnut (*Trapa* spp.), DACO: 10.2.3.4(B)
3070879	2015, Evaluation of Foliar Application of ProcellaCOR SC for Crested Floating Heart Control Florida experimental 0.1 ha trial, DACO: 10.2.3.4(B)
3070880	Stoodley, S., 2019, 2019 Yellow Floating Heart Monitoring Results DACO: 10.2.3.4(B)
3070881	2017, Simulated irrigation study, DACO: 10.3.2
3070883	2019, University of Florida Irrigation Studies of ProcellaCOR Aquatic Herbicide, DACO: 10.3.2
3070885	2016, HFL17SX1552: Ornamental plant irrigation simulation study protocol for SePRO, 2017, DACO: 10.3.2
3070886	2019, Selective Control of Invasive Aquatic Plants with ProcellaCOR Aquatic Herbicide and Response of Native Aquatic Plants common in Canada., DACO: 10.3.2
3070887	2017, Aquatic Invasive Plant Management and the Use of Aquatic Herbicides in Canada A National Workshop, DACO: 10.4
3070888	Hawkins, C., Kaul, M., 2017, Review of Benefits of the Registration of Florpyrauxifen-benzyl in Aquatic Use Sites, https://www.regulations.gov/document/EPA-HQ-OPP-2016-0560-0017, DACO: 10.5
3070889	Breckels, R.D., Kilgour, B.W., 2018, Aquatic herbicide applications for the control of aquatic plants in Canada: effects to nontarget aquatic organisms, Environ. Rev. 00: 1–6 (0000) dx.doi.org/10.1139/er-2018-0002, DACO: 10.5
3070890	Skogerboe, J.G., Getsinger, K.D., Glomski, L.A.M., 2006, Efficacy of Diquat on Submersed Plants Treated Under Simulated Flowing Water Conditions, J. Aquat. Plant Manage. 44: 122-125, DACO: 10.5
3070891	Wehtje, G. et al., 2008, Interaction of Glyphosate and Diquat in Ready-To-Use Weed Control Products, Weed Technology 22:472–476, DACO: 10.5.3
3070892	Cedargreen, M., et al, 2007, Combination effects of herbicides on plants and algae: do species and test systems matter? Pest Manag Sci 63:282–295, DACO: 10.5.3
3070893	Koschnick, T.J., Haller, W.T., Glasgow, L., 2018, Documentation of landoltia (*Landoltia punctata*) resistance to diquat, Weed Science, 54:615–619, DACO: 10.5.3
3070897	Wersal, R.M., Madsen, J.D., 2009, Combinations of Penoxsulam and Diquat as Foliar Applications for Control of Waterhyacinth and Common Salvinia: Evidence of Herbicide Antagonism, J. Aquat. Plant Manage. 48: 21-25, DACO: 10.5.3
3070898	Pratt, J. et al., 2017, FINAL Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management, https://apps.ecology.wa.gov/publications/documents/1710020.pdf, DACO: 10.5.4

B. Additional information considered

i) Published information

1.0 Human and animal health

PMRA document number	Reference
3339998	Injection Technical Control Inc., 2020, Injection Technical Control Inc., Fertigation in Golf Courses, DACO: 5.2,8.6.2
3340006	Government of Canada, 2020, Government of Canada, How to have a healthy lawn, DACO: 5.2,8.6.2
3340007	University of Massachusetts Amherst, 2020, University of Massachusetts Amherst, Sizing the Greenhouse Water System, DACO: 5.2,8.6.2
3342054	Ontario Ministry of Agriculture, Food and Rural Affairs, 2020, Irrigation management of wine grapes in Ontario Part 2: Irrigation - when do I start to apply and how much is enough?, DACO: 5.2
3342055	Tam, S., Nyvall, T.J., and Brown, L. (B.C. Ministry of Agriculture, Food and Fisheries, Resource Management Branch), 2020, B.C. Irrigation Management Guide, Chapter 7, DACO: 5.2
3342056	Nyvall, T.J., Tam, S. (B.C. Ministry of Agriculture, Food and Fisheries ¿ Resource Management Branch), 2020, Irrigation System Assessment Guide ¿ Chapter 2: Climate, DACO: 5.2
3342057	Carly Peister, University of Waterloo, 2020, Water Use on Ontario Golf Courses, DACO: 5.2
3342058	Ontario Ministry of Agriculture, Food and Rural Affairs, 2021, Sod Production, DACO: 5.2
3342059	Mary Ellen Ellis (Gardening Know How), 2021, Flower Watering Tips: A Guide To Watering Flowers, DACO: 5.2
3342992	Scotts.ca, 2020, Scotts Lawn Guide, DACO: 5.2

2.0 Environment

PMRA document number	Reference
3339988	European Chemicals Agency (ECHA), 2021, Benzoic acid registration dossier, DACO: 12.5.9
3339990	European Chemicals Agency (ECHA), 2021, Benzyl alcohol acid registration dossier, DACO: 12.5.9
3339993	Organisation for Economic Cooperation and Development (OECD), 2001, SIDS Initial Assessment Report for 13th SIAM - Benzoates, DACO: 12.5.9
3339998	Injection Technical Control Inc., 2020, Fertigation in Golf Courses, DACO: 5.2,8.6.2
3340006	Government of Canada, 2020, How to have a healthy lawn, DACO: 5.2,8.6.2
3340007	University of Massachusetts Amherst, 2020, Sizing the Greenhouse Water System, DACO: 5.2,8.6.2
3168834	Ross H. McKenzie, Shelley A. Woods, 2011, Crop Water Use and Requirements. Agdex 100561-1, DACO: 7.4.1, 8.6.2